

GEOCRES No. 30M11-53DIST. 6 REGION W.P. No. CONT. No. RESEARCHW. O. No. 73-11048STR. SITE No. 37-817HWY. No. 401/427LOCATION BRIDGE #23 (SOUTHBOUND)- STRUCTURE MOVEMENT TESTNo of PAGES -OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT.REMARKS:

73-11048

**FOUNDATION FILE COPY**

MINISTRY  
OF  
TRANSPORTATION AND COMMUNICATIONS

DESIGN SERVICES BRANCH

# OVERSIZE DRAWING

K. SELBY

Mr. K. G. Selby,  
Supervising Foundations Engineer,  
Foundations Office,  
West Building.

Z. J. Byblow,  
Control Survey Officer,  
Engineering Surveys Office,  
West Building.  
November 26, 1973.

Coordinate Control Survey  
Bridge 23, Hwy. 401 & Hwy. 427

As you requested listed below are the coordinates and elevations  
for the deep type bench marks required for the above structure movement  
test.

	<u>Elevation</u>	<u>Northing</u>	<u>Easting</u>
① Deep B.M. #6009738045	501.982	15869542.286	978905.069
② " " " #6009738046	492.113	15868370.807	979536.316

ZJB/CFJ/ck

C. F. Josling,  
for: Z. J. Byblow,  
Control Survey Officer.

102  
103



movements are evident, or near potential thawing influences such as buildings, roads, and streams. Sometimes drilling techniques will alter soil conditions so that a bench mark will not "re-freeze" after installation. Bench marks, there-

fore, must be constructed so that they will not be affected by soil movements, frost heave, temperature variations, surface phenomena or other natural disturbances.

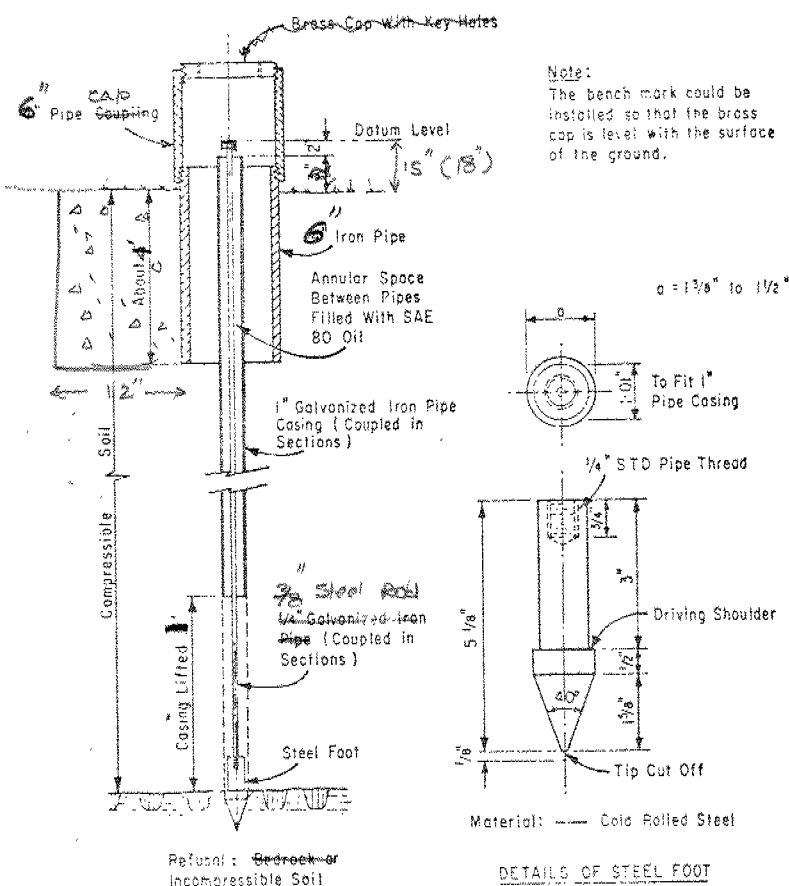


FIG. 2. Details of a Deep Bench Mark in Sensitive Clay.

fore, must be constructed so that they will not be affected by soil movements, frost heave, temperature variations, surface phenomena or other natural disturbances.

#### TYPES OF BENCH MARKS

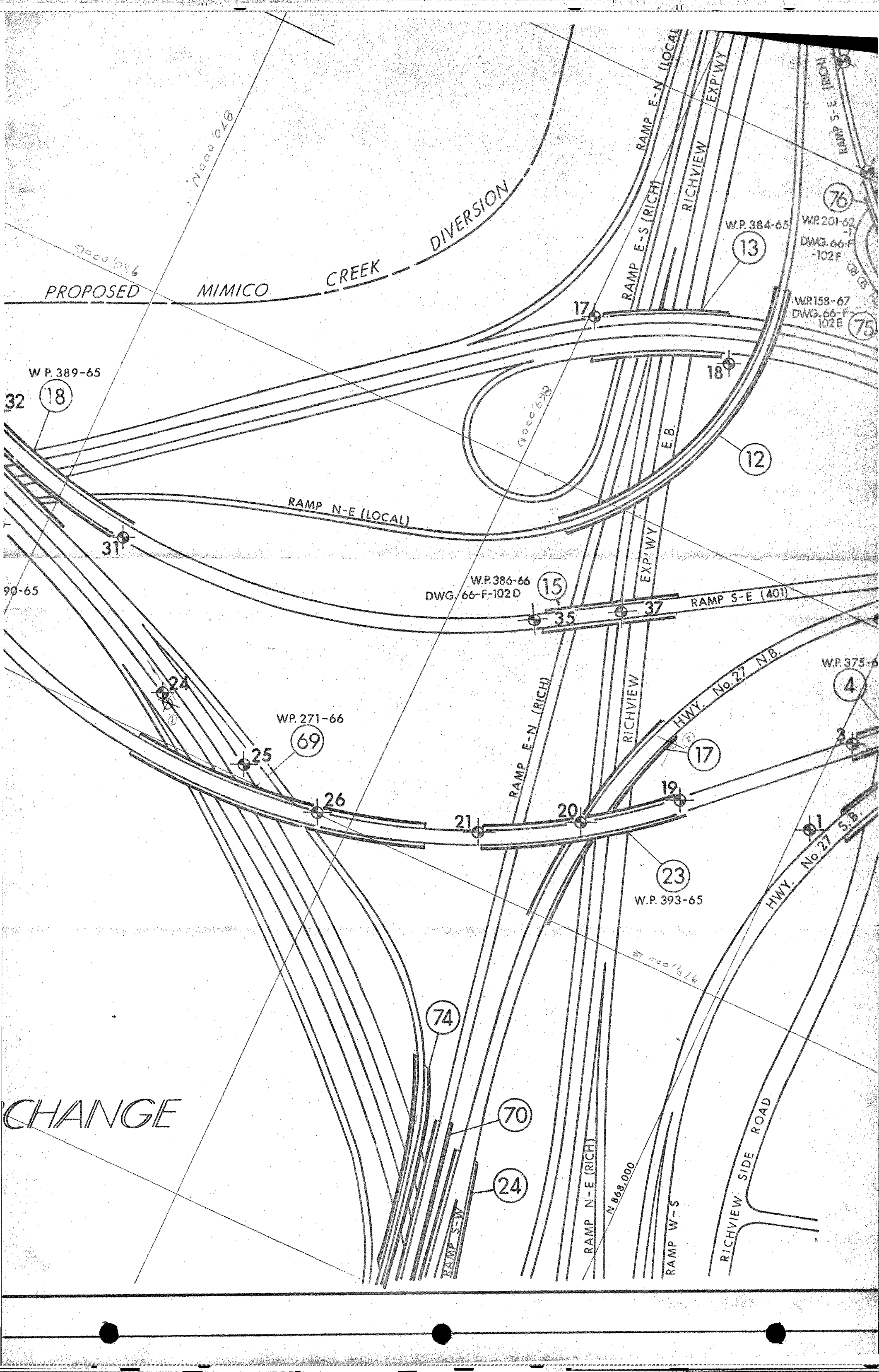
A steel rod driven through soft clayey soil and firmly seated on bedrock or in a

rod coated with asphalt and wrapped in oil-soaked waste should be lowered into a cased borehole and rammed firmly into the bottom; the casing would then be removed to allow the soil to fill the borehole. Asphalt and oil-soaked waste would protect the steel rod from corrosion and from vertical movements in the surrounding soil. The Swedish Geo-

technical Institute's bench mark, described by Kjellman et al. (5), is based on this principle. Taylor (6) describes a bench mark established in Cambridge.

FIG. 3. Installing a Deep Bench Mark Equipped with Hydraulic Feed.

in 1927. It consisted of a 6-in. steel pipe filled with concrete and seated in bed 120 ft below the surface of the ground. No protection was provided against movement in the surrounding soil. A simple, easily installed bench mark described by Pickover (7). It consists



# OVERSIZE DRAWING

Mr. P. F. Csagoly,  
Head, Structural Research,  
Eng. Research & Development,  
Central Building.

A. E. Kay,  
Head, Engineering Surveys Section,  
Engineering Plans Office,  
West Building.  
September 24th, 1974.

Hwy. 401 & 427  
Bridge No. 23 (Southbound)

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Enclosed find results of Test No. 21, dated September 1974  
on the above structure.

The next test will be conducted in three months.



J. Nikitina,  
For:  
A. E. Kay,  
Head, Engineering Surveys Section.

AEK/JN/ck  
Encl.

c.c. H. Greenland - attached  
K. Selby - information available upon request  
W. D. Birch  
C. S. Grebski  
G. P. Wilson



73-11048X



File 149

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS, ONTARIO

MEMORANDUM

TO: Mr. P. F. Csagoly,  
Head, Structural Research,  
Engineering Research & Development,  
Central Building.

FROM: A. E. Kay,  
Head, Engineering Surveys Section,  
Engineering Plans Office,  
West Building.

ATTENTION:

DATE: May 31, 1974.

OUR FILE REF.

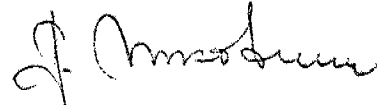
IN REPLY TO

SUBJECT: Hwy. 401 & 427  
Bridge No. 23 (Southbound)

Enclosed find results of Test No. 20, dated May, 1974 on the above structure.

The next test will be conducted in three months.

Please advise if the attachment (plan) is necessary in future.



J. Nikitina,

For:

A. E. Kay,  
Head, Engineering Surveys Section.

AEK/JN/ck  
Encl.

c.c. H. Greenland  
K. Selby ✓  
W. D. Birch  
C. S. Grebski  
G. P. Wilson

73-11-048 x

File 1498

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS, ONTARIO

MEMORANDUM

TO: Mr. P. F. Csagoly,  
Head, Research,  
Central Building.

FROM: C. F. Josling,  
Control Survey Office Supervisor,  
Engineering Plans Office,  
West Building.  
DATE: March 5, 1974.

ATTENTION:

DATE:

OUR FILE REF.

IN REPLY TO

SUBJECT:

Coordinate Control Survey Data  
Test Site Hwy. 401 & 427 Bridge 23 (Southbound)

Enclosed find print showing results of Test No. 19  
on above structure.

Please let this office know when the next test is  
required.

CFJ/ck  
Encl.

C. F. Josling,  
Control Survey Office Supervisor.

c.c. Messrs: H. Greenland  
K. Selby  
W. D. Birch  
C. S. Grebski  
G. P. Wilson

73-11-048X

K. SELBY

73-11048

Mr. K. G. Selby,  
Supervising Foundations Engineer,  
Foundations Office,  
West Building.

Z. J. Byblow,  
Control Survey Officer,  
Engineering Surveys Office,  
West Building.  
November 26, 1973.

Coordinate Control Survey  
Bridge 23, Hwy. 401 & Hwy. 427

As you requested listed below are the coordinates and elevations  
for the deep type bench marks required for the above structure movement  
test.

	<u>Elevation</u>	<u>Northing</u>	<u>Easting</u>
Deep B.M. #6009738045	501.982	15869542.286	978905.069
" " " #6009738046	492.113	15868370.807	979536.316

ZJB/CFJ/ck

C. F. Josling,  
for: Z. J. Byblow,  
Control Survey Officer.

73-11048 ✓

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS, ONTARIO

MEMORANDUM

TO: Mr. A.G. Stermac  
Foundations  
West Bldg., Downsview

FROM: Z.J. Byblow  
Control Survey Officer  
Engineering Surveys Office  
West Bldg., Downsview

ATTENTION: Mr. K. Selby

DATE: July 17th, 1973

OUR FILE REF.

IN REPLY TO

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SUBJECT:                    Structure Movement Test  
                             Bridge 23, Hwy. #401 & Hwy. #427


This will confirm our discussion and request for deep type bench marks required for the above Structure Movement Test.

Due to the length of the structure it is desirable to have two of these bench marks, one near each abutment.

Please advise when convenient for you to select the locations by field observation.

Your cooperation will be appreciated.



  
Z.J. Byblow  
Control Survey Officer

ZJB:AMF

c.c. Mr. H. Greenland  
      Mr. C.S. Grebski  
      Mr. W.D. Birch  
      Mr. P. Csagoly





Figure 1. The effect of the concentration of the  $\text{H}_2\text{O}_2$  solution on the amount of the released  $\text{H}_2\text{O}$  from the  $\text{H}_2\text{O}_2$ -loaded hydrogel. The amount of the released  $\text{H}_2\text{O}$  was measured by the weight difference of the hydrogel before and after the release. The concentration of the  $\text{H}_2\text{O}_2$  solution was 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, and 1.0 wt. %.

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS ONTARIO

MEMORANDUM

TO: Mr. Z. J. Byblow,  
Engineering Surveys Office,  
West Building.

FROM: Engineering Research and  
Development Branch.

ATTENTION:

DATE: June 26, 1973.

OUR FILE REF.

IN REPLY TO

SUBJECT: Bridge No. 23, Highway 401/427  
Index 37-817, District No. 6.

On June 15, 1973 I spoke to you about this structure and the request we had received from the Bridge Evaluation Committee to resume the survey of movements. We have now inspected the structure and decided upon the required survey points, which are shown on the enclosed drawing.

Of the survey points used last year we would like to have Piers 4 and 8 monitored again, but not Piers 1 and 11. In addition, we would like Pier 6, which is now fixed, to be monitored in the same manner, and also the North and South abutments. To obtain absolute and relative longitudinal movements of the abutments, test points should be placed at the ends of the superstructure and on the adjacent abutment walls.

The possibility of abutment rotation also needs to be checked, and for this we suggest two targets on each abutment wing wall to check elevations by precise levelling.

The survey needs to be carried out over an extended period of time, and we propose that readings be taken every two weeks until winter, to be resumed in the early spring, and terminated in June 1974.

*R.A. Dorton*

R.A. Dorton,  
Research Officer.

RAD/em

Encls.

cc: H. Greenland,

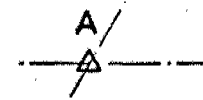
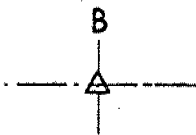
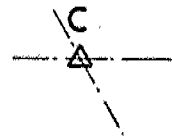
C. S. Grebski,

W. D. Birch,

A. G. Stermac,

P. Csagoly.

BRIDGE No. 23  
HWY. 401 / 427



NEW TEST POINTS

9 & 10

EXISTING TEST POINTS

5 & 6

PIER No. 8

PIER No. 6

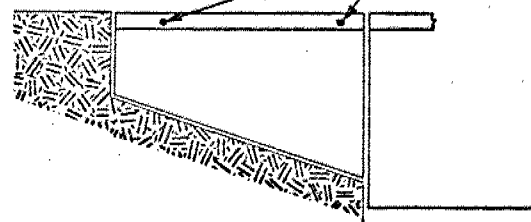
EXISTING TEST POINTS

3 & 4

PIER No. 4

PLAN

TARGETS FOR PRECISE  
LEVELING



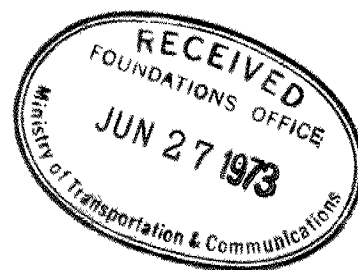
NEW TEST POINTS  
13 & 14

NEW TEST POINTS  
11 & 12

S. ABUT.

N. ABUT.

TYPICAL VIEW, ABUTMENT WING WALLS (4 WALLS).



## MINISTRY OF TRANSPORTATION AND COMMUNICATIONS, ONTARIO

## MEMORANDUM

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

ATTENTION:

FROM: Engineering Research  
and Development Branch.

DATE: June 25, 1973.

OUR FILE REF.

IN REPLY TO

SUBJECT:

Bridge No. 23, Highway 401/427  
Index 37-817, District No. 6.

The structure was discussed at the Bridge Evaluation Committee meeting on June 14, 1973 at which time you requested copies of the survey information obtained last year. The enclosed copies show the layout of survey stations and test points, and two charts of distance against time. One chart shows the absolute change in distance along the tangent for each test point, and the other shows the relative movement between the superstructure and the top of the pier at each of the four piers which were surveyed.

We are at present arranging for long term monitoring of Piers 4, 6 and 8 and the North and South abutments.



R.A. Dorton,  
Research Officer.

RAD:em.  
Encls.

67-F-15  
73-11048 ✓

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS, ONTARIO

Copy for the information of Mr. A. G. Stermac

Mr. J. T. Kernachan  
Maintenance Engineer  
West Bldg.  
Downsview

J. J. Byblow  
Control Survey Officer  
Engineering Surveys Office  
West Bldg., Downsview  
June 29/73

Structure Movement Test  
Bridge 23, Hwy. 401 & Hwy. 427

Engineering Surveys, at the request of the Research Branch, is required to resume the measurement for the purpose of monitoring movement of the above structure.

As in the previous series of Tests carried out in 1972, we again request your assistance in the placing of prism supports for test points and in erecting scaffolding at the piers to provide access to the test points.

The requirements, relating to the attached sketch, are as follows:

- Additional prism supports at Pier 6 (Test points 9 & 10).
- Additional prism supports at the north abutment (Test points 11 & 12).
- Additional prism supports at the south abutment (Test points 13 & 14).
- Scaffold for convenient access to the test points at Piers 4, 6, 8.

The Test points for precise leveling will be established by our own forces.

Further details can be discussed by our Field supervisor and your representative by arrangement of a field meeting convenient to both.

## MINISTRY OF TRANSPORTATION AND COMMUNICATIONS, ONTARIO

Copy for the information of

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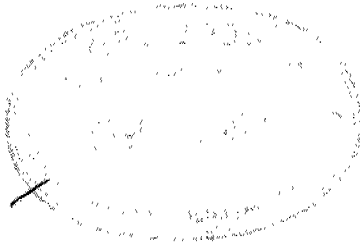
**Find attached a copy of the Research Branch request.**

**Your earliest assistance and cooperation will be appreciated.**

*Z. J. Byblow*  
**Z. J. Byblow**  
**Control Survey Officer**

**ZJB:AMF****encl.**

**c.c. Mr. H. Greenland**  
**Mr. C.E. Grebski**  
**Mr. W.D. Birch**  
**Mr. A.G. Stermac**  
**Mr. P. Csagoly**



73- 110 48

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Site 37-817

TO BE GIVEN

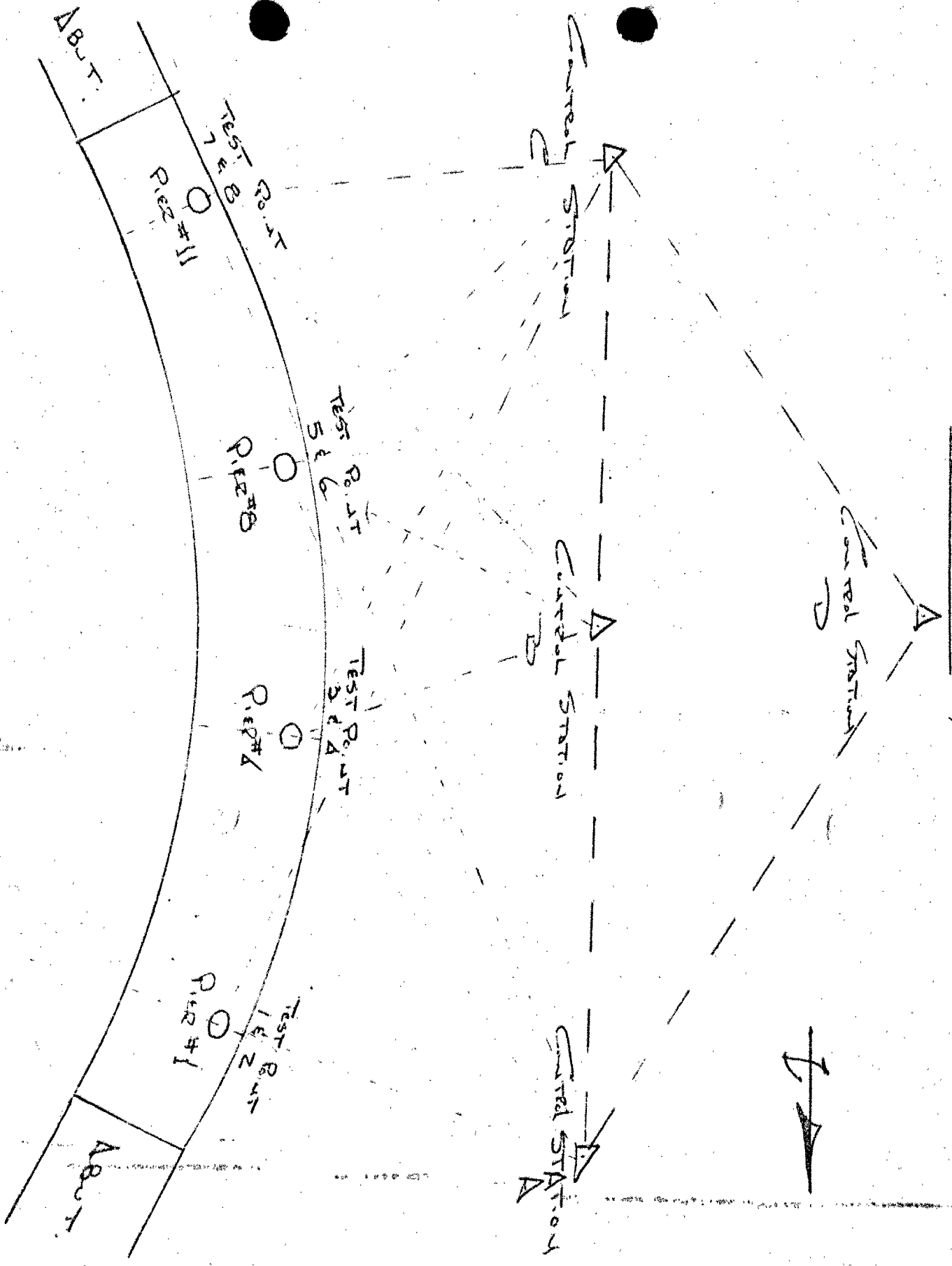
BY KEN (A. PRAPASH)

(NO INFORMATION AS YET)



Box 601 & Nov 67

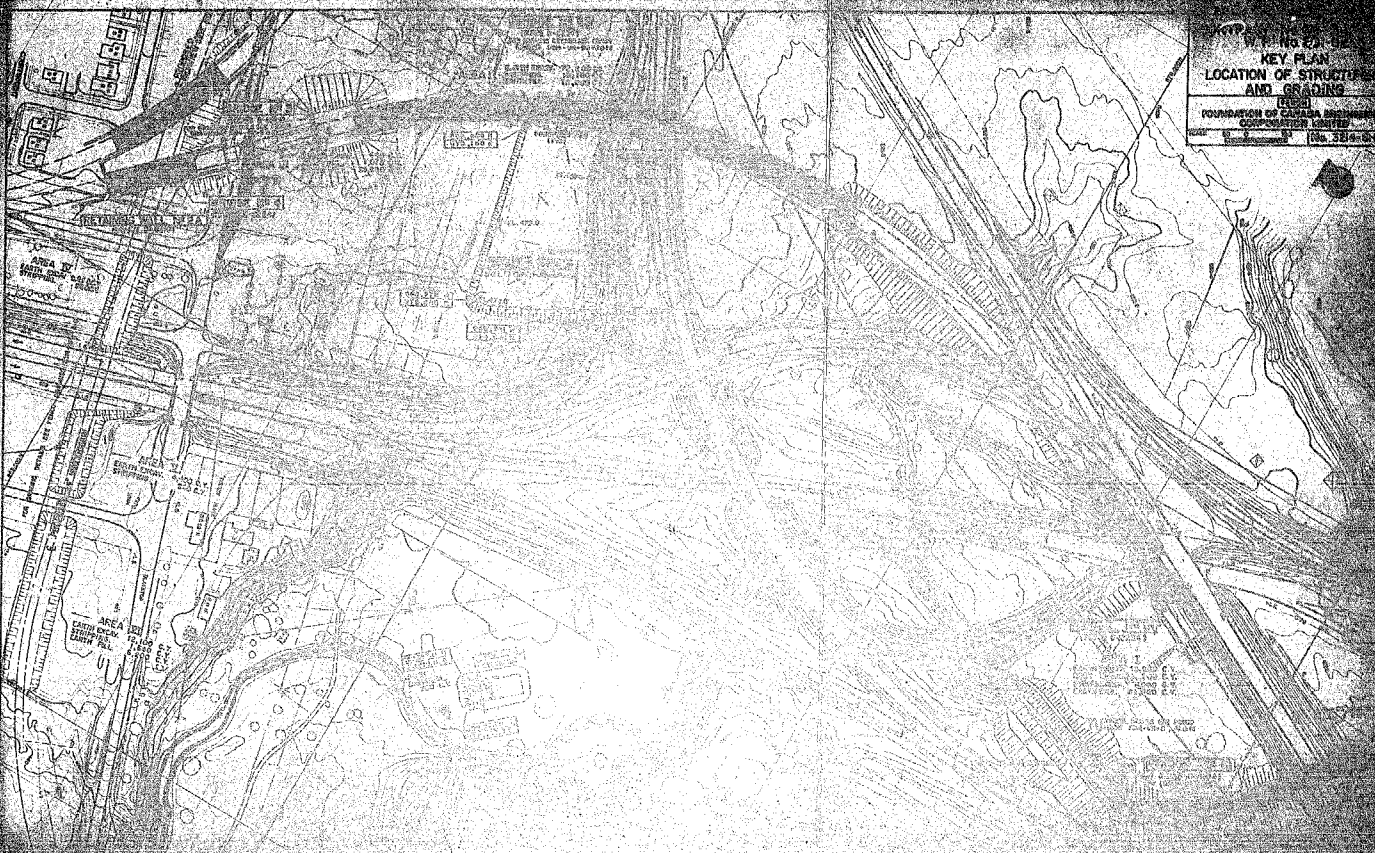
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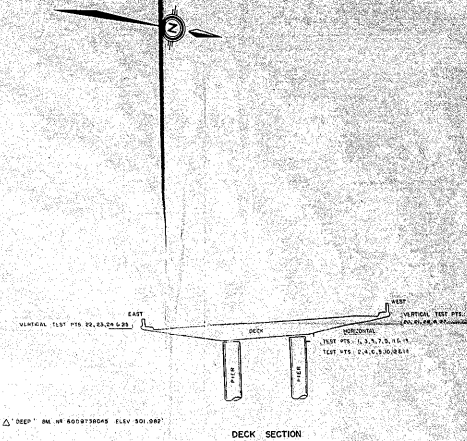
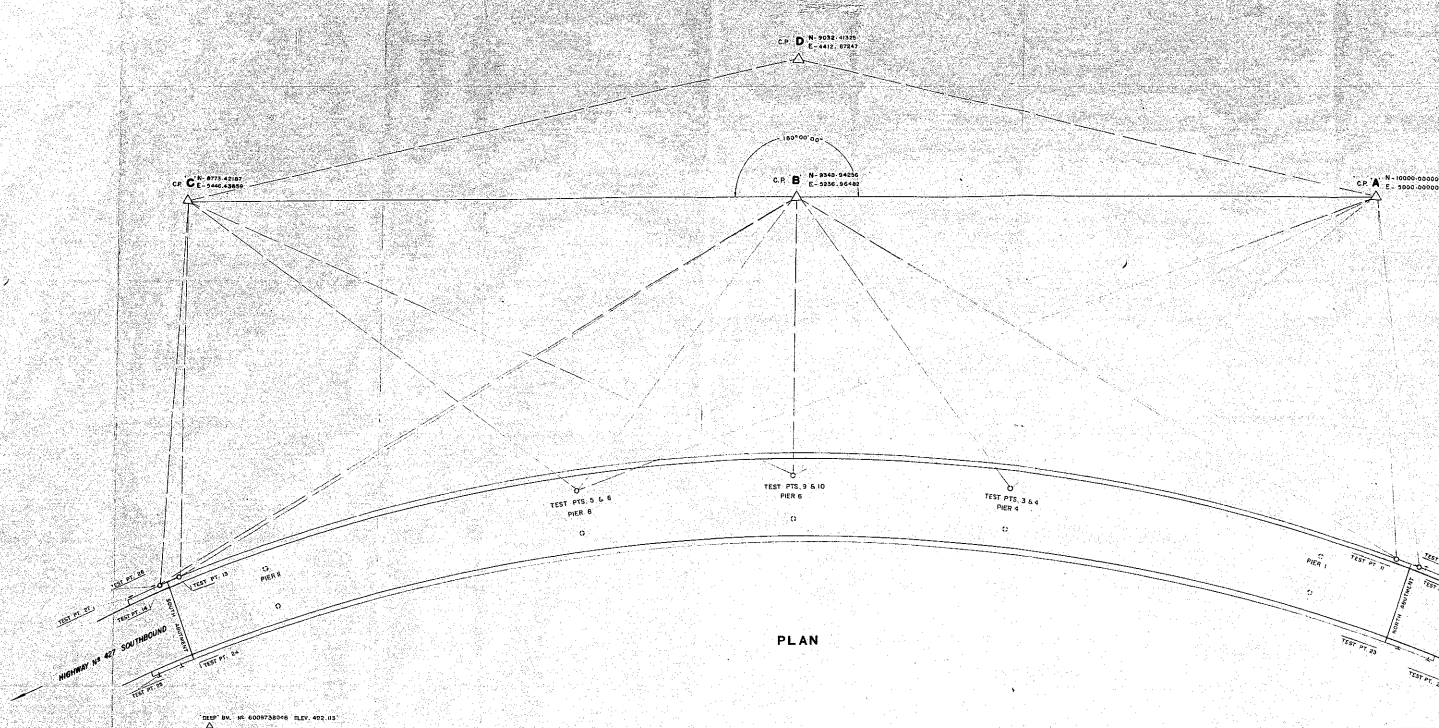
# OVERSIZE DRAWING

BRIDGE NO. 23  
HWY. 401 & 427 INTERCHANGE  
DEEP BENCH MARKS LOCATION

KEY PLAN  
LOCATION OF STRUCTURES  
AND ELEVATIONS  
FOUNDATION OF CANADA ENGINEERING  
CORPORATION LIMITED  
Scale 1" = 100' (100' = 30.48m)







HORIZONTAL CONTROL — LOCAL GRID																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
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NOTE: TABLES USED FOR VERTICAL TEST POINTS ONLY, SEE ELEVATIONS

NOTE: ALL TEMPERATURES  
TEMPERATURE IS SHOWN IN THE MIDDLE OF EACH COLUMN  
& COMPARISON OF TEMPERATURES  
TEMPERATURE CORRECTIONS HAVE BEEN ACCOUNTED FOR IN ALL CALCULATIONS

NOTE: TEST POINT NO. 14 WAS OBTAINED BETWEEN TEST NO. 14 & TEST NO. 15. ALL REVISIONS AND RECORD FOR THE PURPOSE OF FIELD TESTS.

VERTICAL CONTROL — GEODETIC DATUM													
TEST POINTS	TEST NO 14	TEST NO 15	TEST NO 16	TEST NO 17	TEST NO 18	TEST NO 19	TEST NO 20	TEST NO 21	TEST NO 22	TEST NO 23	TEST NO 24	TEST NO 25	TEST NO 26
	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
20	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
21	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
22	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
23	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
24	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
25	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
26	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000
27	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000	1000.000

W.O. 75-10000

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS  
ENGINEERING SURVEYS OFFICE — DESIGN SERVICES BRANCH  
CONTROL SECTION

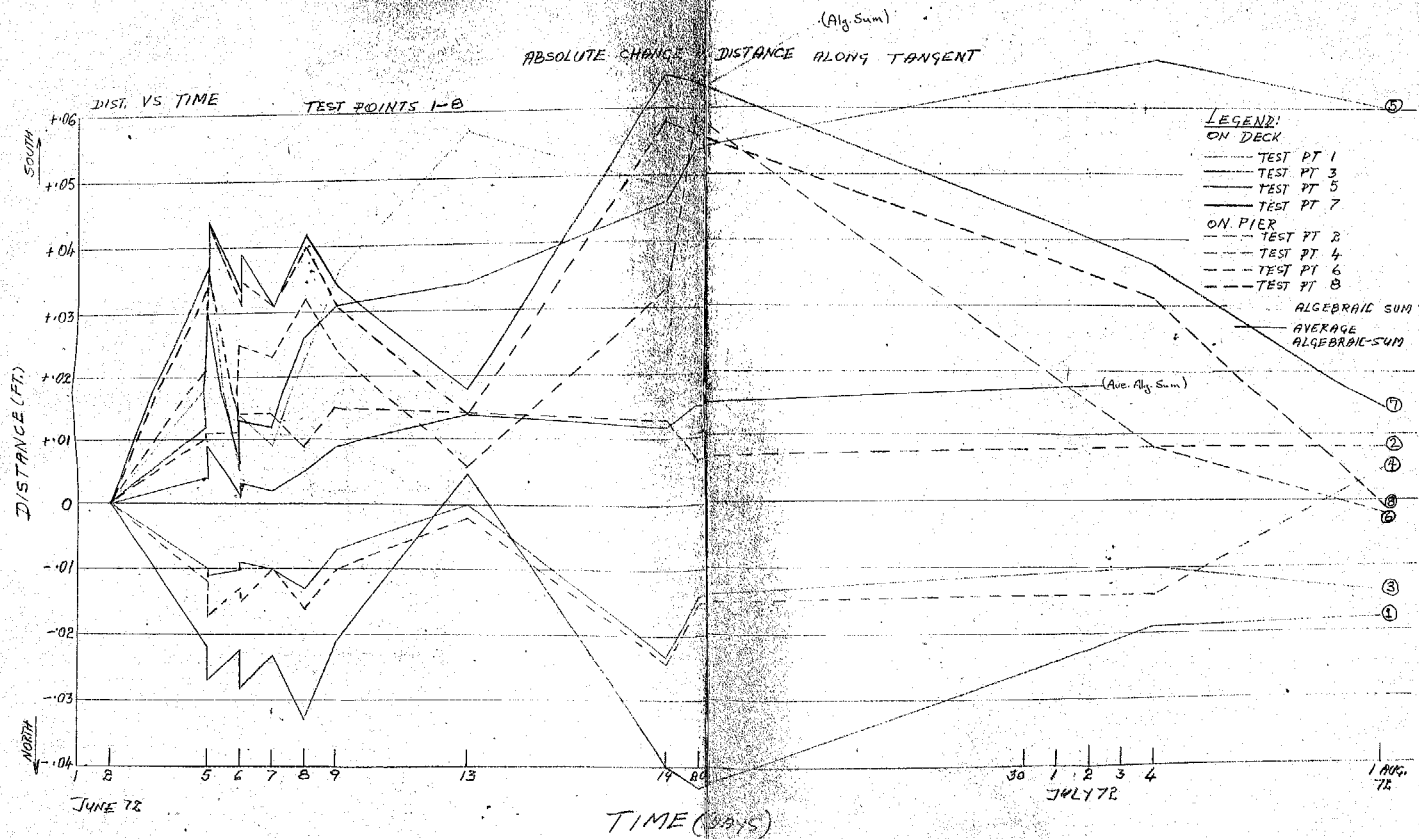
**HIGHWAY N° 427**

BRIDGE N° 23, OVER HWY. N° 401 AND EGLINTON AVE. WEST

BOROUGH OF CUMBERIDGE — DISTRICT NO. 4 TORONTO — CENTRAL REGION

NOT TO SCALE

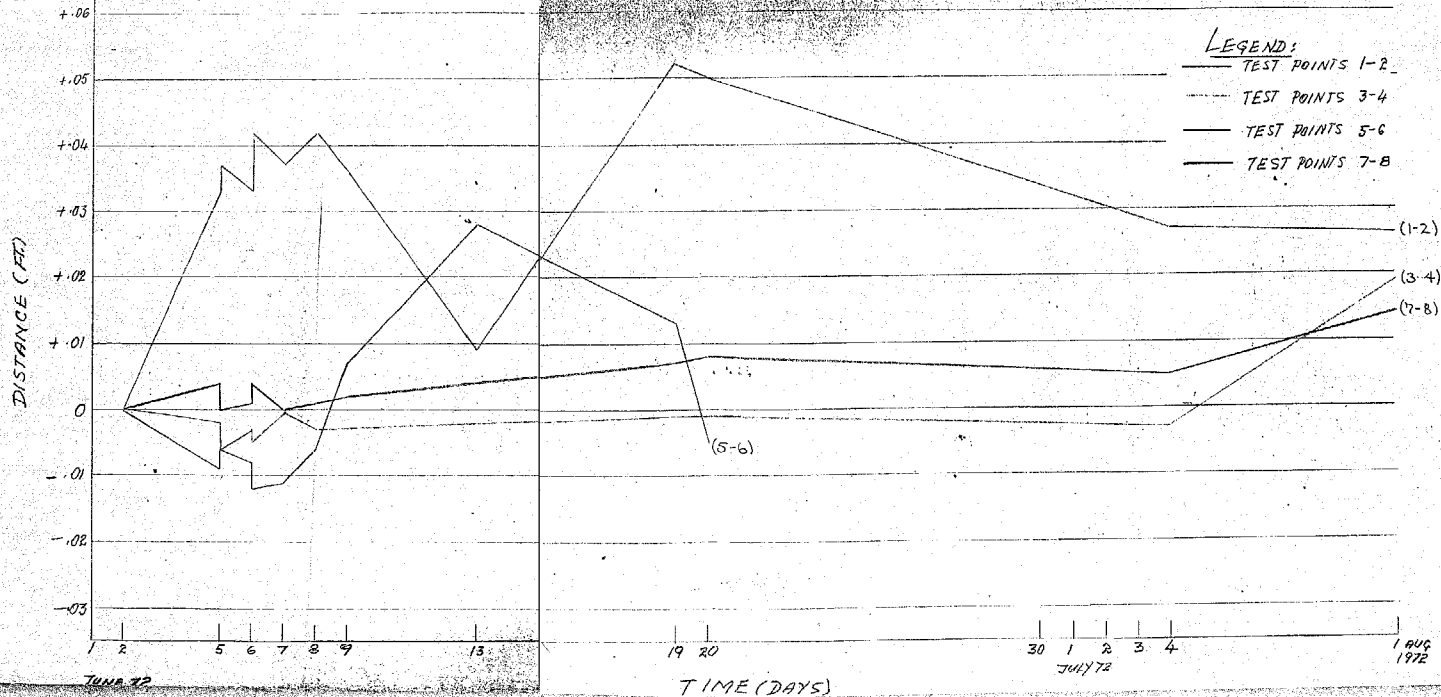




DIST. VS TIME

TEST POINTS 1,3,5,7 RELATIVE CHANGE IN DISTANCE ALONG TANGENT

73-11048





Contract 7 (Yellow)

W. P. 201-62-1		GDGB & Pav.	Hwys. 401, 27 and Richview Expressway Interchange.
W. P. 372-65	1	Struct.	Br. #1 - New Hwy. 27 S. Bound over old Hwy. 27 S. Bound.
W. P. 374-65	2	Struct.	Br. #3 - New Hwy. 27 S. Bound over Richview Sideroad.
W. P. 375-65	3	Struct.	Br. #4 - Ramp from Highway 401 West Bound to New Hwy. 27 South Bound over Richview Sideroad.
W. P. 376-65	✓	Struct.	Br. #5 - New Hwy. 27 North Bound over Richview Sideroad.
W. P. 377-65	5	Struct.	Br. #6 - Ramp from New Hwy. 27 North to Hwy. 401 East Bound over Richview Sideroad.
W. P. 378-65	6	Struct.	Br. #7 - Old Hwy. 27 south Bound over Richview Sideroad.
W. P. 379-65	7	Struct.	Br. #8 - Old Hwy. 27 North Bound over Richview Sideroad.
W. P. 380-65	8	Struct.	Br. #9 - Ramp from Old Hwy. 27 North Bound to Richview Expressway East Bound over Richview Sideroad.
W. P. 384-65	9	Struct.	Br. #13 - Old Hwy. 27 over Richview Expressway.
W. P. 389-65	10	Struct.	Br. #18 - Ramp from New Hwy. 27 North Bound to Hwy. 401 East Bound.
W. P. 390-65	11	Struct.	Br. #20 - Hwy. 401 over old Hwy. 27.
W. P. 391-65	12	Struct.	Br. #21 - Ramp from Hwy. 401 West Bound to New Hwy. 27 South Bound over old Hwy. 27.
W. P. 393-65	13	Struct.	Br. #23 - Ramp from Hwy. 401 West Bound to new Hwy. 27 South Bound over Hwys. 401 and Richview Expressway.
W. P. 279-65	14	Struct.	Br. #61 - Mimico Creek Diversion at Hwy. 401.
W. P. 116-66	15	Struct.	Br. #67 - Mimico Creek Diversion at Richview Sideroad and Richview Expressway.
W. P. 113-66	16	Struct.	<del>Br. #68 - Temporary structure for temporary west bound Hwy. 401 to South Bound Hwy. 27.</del>

W. P. 271-66

Struct. Br. #69 - Ramp from 401 W. Bound to New Hwy. 27  
S. Bound over Hwy. 401.

Program

Start Construction	April 22/68	Expend 1968	5,250,000
Comp. Construction	Nov. 30/69	Expend. 1969	3,430,000
			<hr/> 8,680,000

Pre-Engineering Schedule

Planning	Nov. 2/66
Structure Geometrics	Feb. 1/67 to Mar. 1/67
Foundation Report	Feb. 8/67 to Mar. 8/67
Preliminary Property Request	Jan. 4/67
Soils Report	Jan. 28/67
Final Property Request	Apr. 26/67
Bridge Design(D. H. O. ) Comp. D4 & Plans	Aug. 30/67 to Oct. 25/67
Consultants - Comp. D4, plans etc.	Nov. 22/67
Region RDO	Dec. 20/67
Head Office RDO	Jan. 17/68
Property Acquired	Jan. 31/68
Adv.	Feb. 21/68
Award	Apr. 3/68

## MEMORANDUM

23-69-06

TO: Mr. B. R. Davis,  
Bridge Engineer,  
Bridge Division.

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

Attention: Mr. S. McCombie

DATE: January 30, 1967

OUR FILE REF.

IN REPLY TO:

EEB - 8 1967

SUBJECT:

FOUNDATION INVESTIGATION REPORT  
For  
The Proposed Hwy. #401, Hwy. #27 and  
Richview Expressway Interchange  
District #6 (Toronto)  
"Contract #7 (Yellow)"  
W.J. 66-F-102 -- 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 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.

ACS/MdeP

Attach.

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

Foundations Files  
Gen. Files

*A. G. Sternac*

A. G. Sternac  
PRINCIPAL FOUNDATION ENGINEER

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  2. DESCRIPTION OF THE SITE.
  3. FIELD INVESTIGATION PROCEDURE.
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    - 4.3) Sands and Silts.
    - 4.4) Bedrock.
  5. GROUNDWATER CONDITIONS.
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-

FOUNDATION INVESTIGATION REPORT  
For  
The Proposed Hwy. #401, Hwy. #27 and  
Richview Expressway Interchange  
District #6 (Toronto)  
"Contract #7 (Yellow)"  
W.J. 66-F-102 -- W.P. 201-62-1

1. INTRODUCTION:

In a memo, dated November 24, 1966, the Regional Bridge Location Engineer, Mr. W. S. Melinyshyn, requested a foundation investigation at the proposed site of Hwy. #401, Hwy. #27 and Richview Expressway interchange.

The request covers Contract #7 (Yellow), which is the first part of the whole complex of the proposed interchange and Hwy. #27 improvement, and contains some 16 bridges. Due to the magnitude of the project and the very tight time schedule, it was agreed that a conditional report be submitted only, based on a limited number of boreholes at each proposed structure.

After the exact locations of the footings and the geometrics for the bridges are made available, it is intended to review this report, and additional investigation will be carried out, if necessary. A supplementary report will likely follow these studies.

The field work, laboratory test program and the preparation of the geotechnical data sheets for the boreholes were undertaken by Dominion Soil Investigation Ltd. The boreholes were located and surveyed in the field by personnel from the construction staff of District #6.

Presented in this report are the results of the investigation, together with the evaluation of the soil stratigraphy and the recommendations pertaining to the foundations.

cont'd. /2 ...

2. DESCRIPTION OF THE SITE:

A large part of the area is occupied by the existing interchange of Hwy. #401 and Hwy. #27, the vicinity being generally a built up residential, light industrial and farming zone.

The site under investigation, belongs to the physiographic region known as the "South Slope", forming part of the belt of the till plain and moraine, south of "Peel Plain". The terrain of this portion of the region consists of ground moraines with irregular knolls and hollows.

3. FIELD INVESTIGATION PROCEDURE:

Some 34 sampled boreholes and, adjacent to the borings, 34 dynamic cone penetration tests were carried out during the course of the field investigation. The soils exploration was performed by means of three continuous flight augers and two conventional diamond core drills adapted for soil sampling purposes. 2-inch O.D. split-spoon samplers were used to recover soil samples, advanced by a free falling hammer of 140 lb., utilizing an energy of 350 ft.-lb. Usually, two boreholes were placed in the vicinity of each proposed structure. The soil stratigraphy at the locations of the future piers is, therefore, not exact; in fact, may be subject to considerable error.

The locations and elevations of the borings, as well as the soil profiles along the individual structures, are presented on Drawing #66-F-102A and #66-F-102B.

4. SOIL CONDITIONS:

4.1) General:

The entire area investigated, is covered by deposits of glacial till of the Wisconsin, or more recent age. From the engineering standpoint, two main strata may be recognized - i.e., a fine-grained cohesive, and a coarse-grained granular layer.

cont'd. /3 ...

4. SOIL CONDITIONS: (cont'd.) ...

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

In their undisturbed state the deposits are usually hard or very dense; at certain locations, however, due to recent fills or other disturbances, firm to stiff material was also encountered.

Grey shale bedrock underlies the overburden.

Field and laboratory tests were performed on representative soil specimens, the results of which are plotted on the geotechnical data sheets accompanying this report. The description of the various layers is presented as follows:

4.2) Clayey Silt (Glacial Till):

The cohesive portion of the glacial till was variously identified to be clayey silt with sand and traces of gravel, clayey silt with layers of cobbles and boulders, clayey silt with gravel, etc. The layer exhibits slight plasticity, having an average value of plastic limit of 14% and liquid limit of 21%. The natural moisture content usually falls below the plastic limit, averaging about 10%. The grain-size analyses of the samples show great variations, so characteristic of the glacial drifts. The range of the constituent grain sizes expressed as a percentage of weight, are listed below:

Gravel	:	0	-	16%
Sand	:	12	-	46%
Silt	:	24	-	59%
Clay	:	12	-	26%

The consistency of the clayey silt is generally hard, indicated by penetration 'N' values much in excess of 100 blows/ft. In certain boreholes, consistencies of soft to very stiff, were also observed - usually within the upper portion.

cont'd. /4 ...

4. SOIL CONDITIONS: (cont'd.) ...

4.3) Sands and Silts:

The granular variety of the subsoil was even more heterogeneous than the cohesive. Based on the grain-size distribution of the samples tested, the soils within the main stratum were specified to be sandy silts, silty sands, fine sands, gravelly sands with traces of silt, etc. The granular material usually appears beneath the cohesive one and exhibits a very dense relative density, corresponding to 'N' values in excess of 100 blows/ft. penetration. The upper and lower limits of the observed natural moisture contents and the constituent grains of the samples, are as follows:

		%
Natural Moisture		0 - 21
Grain Size Distribution	Gravel	0 - 40
	Sand	22 - 87
	Silt	13 - 62
	Clay	0 - 13

4.4) Bedrock:

Grey shale bedrock was proved by diamond drilling for a depth of 10 ft. at three borehole locations. The elevation of the bedrock was found to vary between 425 and 449 ft., corresponding to depths of 55 - 26 ft. below ground level.

cont'd. /5 ...



5. GROUNDWATER CONDITIONS:

Groundwater was established in every borehole at relatively shallow depths. The depth of water was measured to lie between 0 and 15 ft. below existing ground. The average depth of groundwater may be taken to be 2 - 3 ft. below ground level.

6. DISCUSSION AND RECOMMENDATIONS:

6.1) General:

Contract #7 (Yellow) - covered by this report - includes the construction of some 16 new structures within the proposed Hwy. #401, #27 and Richview Expressway interchange. The structures are numbered: 1, 3, 4, 5, 6, 7, 8, 9, 13, 18, 20, 21, 23, 61, 67, and 69. Since neither the exact locations of the abutments and piers, nor the design grades are known, it is not intended to give detailed recommendations for the individual bridges in this report. Instead, recommendations of a more general nature, are presented for the footings, to enable the designer to proceed with the preliminary bridge design.

Recommendations for the footing elevations of the structures are given without the consideration of the proposed design grade. It is suggested that a minimum of four ft. cover be employed above the footing bases for frost protection. The recommended elevations should, therefore, be lowered if necessary, in order to provide for a cover of four ft. below finished grade.

No stability problems are foreseen for the approach embankments, provided that they are built with slopes of 2 horizontal to 1 vertical.

The stratigraphical profiles along the individual structures are presented on the attached Drawing #66-F-102B.

cont'd. /6 ...

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

6.2) Structure Foundations:

Bridge #1 -

(New Hwy. #27 Southbound over old Hwy. #27 Southbound)

The subsoil at the site, below el. 470 ft., appears to have sufficient strength to support the bridge on spread footings.

By placing the footings at or below el. 470 ft., a safe design load of 4 t.s.f. may be employed on the footing bases.

The sandy silt and sand strata are susceptible to conditions of unbalanced hydrostatic head. In the case of lowering the footings below el. 357 - 362 ft., a dewatering scheme will likely be necessary in order to prevent the excavation bottom from "boiling".

Bridge #3 -

(New Hwy. #27 Southbound over Richview Side Road)

Spread footings are recommended for the piers as well as for the abutments. The base of the footings should be at or below el. 483 ft. A safe load of up to 4.0 t.s.f. may be assumed for design purposes.

No dewatering problems are foreseen within the cohesive clayey silt stratum. Should the footings be lowered, however, below el. 455 - 460 ft., into the sandy silt to silty sand layer, a dewatering scheme might be necessary.

Bridge #4 -

(Ramp from Hwy. #401 Westbound to New Hwy. #27 Southbound over Richview Side Road)

Spread footings appear to be the most economical for the entire structure. Footings may be placed at or below el. 485 ft. with an allowable bearing capacity of 3.5 t.s.f.

cont'd. /7 ...

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

6.2) Structure Foundations: (cont'd.) ...

Bridge #4 -

(Ramp from Hwy. #401 Westbound to New Hwy. #27 Southbound over Richview Side Road) - (cont'd.) ...

If the design grades necessitate excavations below el. 458 ft., some dewatering problems may be encountered, since the silt and sand are likely to "boil" under conditions of unbalanced hydrostatic head.

Bridge #5 -

(New Hwy. #27 Northbound over Richview Side Road; and

Bridge #6 -

(Ramp from New Hwy. #27 North to Hwy. #401 Eastbound over Richview Side Road)

No uniform footing elevations can be given for the two structures, in spite of their close proximity, on account of the rather different soil conditions.

For Bridge #5, spread footings may be placed at or below el. 490 ft. with a design load of up to 4.5 t.s.f.

Bridge #6 may be supported at or below el. 475 ft.

Since the strength of the subsoil at the location was found to be less favourable, only 2 t.s.f. soil pressure may be allowed on the footings.

It is expected that rather deep excavations will be carried out to reach the proposed grade. For excavations extending below el. 361 ft., a dewatering scheme may be necessary.

cont'd. /8 ...

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

6.2) Structure Foundations: (cont'd.) ...

Bridge #7 -

(Old Hwy. #27 Southbound over Richview Side Road)

Bridge #8 -

(Old Hwy. #27 Northbound over Richview Side Road)

Bridge #9 -

(Ramp - Old Hwy. #27 Northbound to Richview Expressway Eastbound over Richview Side Road)

These bridges may be supported on spread footings at or below el. 487 ft. within the clayey silt stratum. Safe bearing pressures of up to 4 t.s.f. may be employed on the footings of Bridge #7 and #8 at the above recommended elevation. Due to the somewhat weaker soil at the location of Bridge #9, allowable loads of 3 t.s.f. are suggested for this structure.

No dewatering problems are anticipated for excavations not exceeding el. 462 ft. Below this elevation, however, due to the silty sand layer, some dewatering scheme might be necessary.

Bridge #13 -

(Old Hwy. #27 over Richview Expressway)

The larger part of the proposed site of Bridge #13 is situated in the Mimico Creek valley; the south-west corner, however, is on the plateau, some 40 - 45 ft. higher. It is assumed that Richview expressway will traverse the valley on an embankment; consequently, piled foundations appear to be the most economical solution. Steel H-piles, driven to approx. el. 440 ft. are recommended within the creek valley. A design load of 70 T/pile may be utilized on 12" BP at 53 H-piles, driven to the above elevation. The topography at the location of the south abutment indicates that the west part of the abutment might be supported on spread footings on the higher ground. The latter will need further clarification after the exact location of the abutments becomes known.

cont'd. /9 ...

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

6.2) Structure Foundations: (cont'd.) ...

Bridge #18 -

(Ramp from New Hwy. #27 Northbound to Hwy. #401 Eastbound)

The structure may be supported on spread footings at or below el. 454 ft. A safe bearing pressure of up to 4.0 t.s.f. may be imposed on the footings. A dewatering scheme for the excavations within the sandy silt stratum may be necessary.

Perched abutments - or in the case of higher design grades - the entire structure may be supported on piles. It is assumed that 12-3/4" x 1/4" steel tube piles or 12" BP at 53 steel H-piles will support loads of 70 T/pile, provided that tubes are driven to el. 450 ft. <sup>+</sup> and H-piles some 5 - 10 ft. deeper.

Bridge #20 -

(Hwy. #401 over Old Hwy. #27)

The uppermost loose, stiff and compact soils have not adequate strength for economical spread footings. Further, it is assumed that the existing ground at the locations of Boreholes #29 and 30 is lower than the proposed design grade of old Hwy. #27. It is, therefore, recommended to use piles driven to approx. el. 455 ft. By using 12-3/4" x 1/4" steel tubes or 12" BP at 53 H-piles, a design load of 70 T/pile may be assumed. It is anticipated that H-piles will penetrate some 5 - 10 ft. deeper than the suggested el. of 455 ft.

Bridge #21 -

(Ramp from Hwy. #401 Westbound to New Hwy. #27 Southbound over Old Hwy. #27)

From the topography of the site, it appears that the west side of the crossing will be in a cut, the east side, however, on an embankment. For the west portion of the bridge - due to the high ground - spread footings are believed to be more economical.

cont'd. /10 ...

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

6.2) Structure Foundations: (cont'd.) ...

Bridge #21 -

(Ramp from Hwy. #401 Westbound to New Hwy. #27 Southbound over Old Hwy. #27) - (cont'd.) ...

Footings should be placed at or below el. 486 ft., with a design load of up to 4 t.s.f. The east portion of the structure may be supported either on steel tubes driven to approx. el. 455 ft., or steel H-piles, driven to el. 445 - 455 ft. 70 T/pile safe load may be assumed on 12" BP at 53 steel H-piles.

Bridge #23 -

(Ramp from Hwy. #401 Westbound to New Hwy. #27 Southbound over Hwy. #401 and Richview Expressway)

At the locations of Boreholes #20 and 21 the upper 15 - 20 ft. of soils do not appear to exhibit adequate strength to support the structure economically. Spread footings should, therefore, be placed at or below el. 476 ft. At the location of the proposed south abutment (B.H. #19), soil conditions were found to be more favourable; consequently, spread footings might be placed at or below el. 485 ft. Safe pressures of up to 4 t.s.f. may be utilized on the footings.

Perched abutments may also be founded on piles. Safe loads of 70 T/pile may be used on 12" BP at 53 steel H-piles driven to approx. el. 465 ft. Steel tubes may also be considered.

Bridge #61 -

(Mimico Creek Diversion at Hwy. #401)

The structure may be supported on spread footings, at or below el. 465 ft., assuming a safe design load of 2 t.s.f. Since the sand and silt layers are susceptible to conditions of unbalanced hydrostatic head, dewatering of the excavations by sheeting or by wellpoints, may be necessary.

cont'd. /11 ...

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

6.2) Structure Foundations: (cont'd.) ...

Bridge #67 -

(Mimico Creek Diversion at Richview Side Road and Richview Expressway)

Spread footings are recommended for this structure, to be placed at or below el. 450 ft. An allowable bearing capacity of 2 t.s.f. may be assumed on the footing plane for design purposes. Due to the sandy and silty subsoils, a dewatering scheme might be needed.

Bridge #69 -

(Ramp from Hwy. #401 Westbound to New Hwy. #27 Southbound over Hwy. #401)

Spread footings anywhere below el. 491 ft., will support a design load of 3 t.s.f. No dewatering problems are anticipated for the excavations.

Perched abutments may also be placed on piles. Steel tubes should be driven to approx. el. 470 ft.; H-piles will probably penetrate some 5 - 10 ft. deeper. On 12-3/4" x 1/4" steel tubes or 12" BP at 53 steel H-piles, 70 T/pile safe load may be utilized.

7. SUMMARY:

7.1) The foundation investigation at the site of the proposed Hwy. #401, Hwy. #27 and Richview Expressway interchange is presented. Contract #7 (Yellow) covered by this report, includes the construction of some 16 bridges. Since neither the exact locations of the piers and abutments, nor the proposed design grades are yet known, this report does not attempt to give detailed recommendations, and should be considered as conditional only. After the design details become available, additional field investigation will likely be necessary, and a final report will be prepared.

cont'd. /12 ...

7. SUMMARY: (cont'd.) ...

7.2) Subsoil at the site was found to consist of cohesive and granular glacial till deposits. Generally, the strata exhibited hard consistencies and very dense relative densities; at certain locations, however, firm to stiff material was also encountered. Shale bedrock underlies the overburden at depths of 26 - 55 ft. below existing ground level.

7.3) The majority of the proposed structures may be supported on spread footings at relatively shallow depths. The recommended safe pressures on spread footings range from 2.0 to 4.5 t.s.f. Alternative piled foundations are also discussed, where applicable. Some of the structures will, of necessity, be supported on piles. Steel tubes or steel H-piles might be considered for these structures. By using 12-3/4" x 1/4" steel tubes or 12" at 53 steel H-piles, a design load of approx. 70 T/pile may be assumed for design purposes.

Since the silt and fine sand deposits are susceptible to conditions of unbalanced hydrostatic head, dewatering schemes for some of the footing excavations will be required.

No stability problems are foreseen for the approach embankments, provided that they are built with slopes of 2 horizontal to 1 vertical.

8. MISCELLANEOUS:

The field work, performed during the month of December 1966, together with the laboratory testing, were undertaken by Dominion Soil Investigation Ltd., who also owned and operated the drilling equipment. This report was prepared by Mr. A. K. Barsvary, Senior Foundation Engineer, D.H.O., and reviewed by Mr. K. G. Selby, Supervising Foundation Engineer, D.H.O.

January 1967



APPENDIX I.

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . . . ! . . .

OUR REFERENCE NO. 6-11-11  
Your Ref. No. W. J. 66-F-102

CLIENT: D. H. O.

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

LOCATION: 867,965 N; 979,477 E.

DATUM ELEVATION: G. S. C.

METHOD OF BORING: AUGERING

DIAMETER OF BOREHOLE: 3 1/2"

DATE: DEC. 12-13, 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- or Advancement of Sampler	2.0	4.0	6.0	8.0	10.0	PL	W	LI		
495.6	0	GROUND SURFACE														
492.6																W.L. EI. <del>496.3</del> 492.8 Dec. 16, 1966
																W.L. EI. <del>494.4</del> 491.1 Dec. 22, 1966
490	5			1	S.S.	50										W.L. EI. <del>488.8</del> 487.8 Dec. 13, 1966
485	10	CLAYEY		2	S.S.	100/6"										
480	15	SILT brown grey		3	S.S.	67										
		with														
475	20	SAND (Glacial Till)		4	S.S.	48										GR. 4%; SA. 39% SI. 40%; CL. 17%
		Hard														
470	25			5	S.S.	100/6"										
465	30			6	S.S.	100/6"										
460	35			7	S.S.	100/6"										
455	40	SANDY SILT with a trace of GRAVEL and CLAY		8	S.S.	100/5"										GR. 7%; SA. 38% SI. 49%; CL. 6%
		Very Dense														
450	45			9	S.S.	100/5"										
442.3	50	wet dry		10	S.S.	100/3"										
440.3	50.3	END OF BOREHOLE														

VERTICAL SCALE: 1 IN TO 5 FT.

DOMINION SOIL INVESTIGATION LIMITED

MADE: D. A. M. CHD

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . . 2 . .

OUR REFERENCE NO. 6 - 11 - 11  
Your Ref. No. W. J. 66 - F - 102

CLIENT D. H. O.

PROJECT HWYS. 401, 27 & RICHVIEW EXPWY. INTERCHANGE

LOCATION 867, 754 N.; 979, 701 E.

DATUM ELEVATION G. S. C.

METHOD OF BORING AUGERING

DIAMETER OF BOREHOLE 3 1/2"

DATE DEC. 13, 1966

ENCLOSURE NO.

W P 201-62-1

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot					CONSISTENCY water content %				REMARKS
				NUMBER	TYPE	No. or Advancement of Sampler	2,0	4,0	6,0	8,0	10,0	PL	W	LI		
490.6	0	GROUND SURFACE														
		TOPSOIL														
		traces of organic matter														
485	5	firm to stiff hard		1	S.S.	12										
		CLAYEY SILT														
480	10	with sand		2	S.S.	72									GR. 9% ; SA. 39% SI. 46% ; CL. 6%	
		brown grey (glacial till)														
475	15			3	S.S.	53										
470	20			4	S.S.	44										
465	25	thin layers of sand		5	S.S.	58										
460	30	silt layer		6	S.S.	82.9"									GR. 14% ; SA. 36% SI. 36% ; CL. 14%	
455	35	boulder		7	S.S.	150.9"										
450	40	SILTY SAND (glacial till) Very Dense		8	S.S.	110.6"									GR. 6% ; SA. 49% SI. 44% ; CL. 1%	
445	45	END OF BOREHOLE		9	S.S.	100.1"										
440	50															

# GEOTECHNICAL DATA SHEET FOR BOREHOLE...3...

OUR REFERENCE NO. 6-11-11

Your Ref. No. 66-F-102

CLIENT D. H. O.

PROJECT HWYS. 401, 27 & RICHVIEW EXPWY. INTERCHANGE

LOCATION 867,968 N.; 979,717 E.

DATUM ELEVATION G. S. C.

METHOD OF BORING WASHBORING

DIAMETER OF BOREHOLE 2 7/8"

DATE DEC. 15-16, 1966

ENCLOSURE NO.

WP 201-62-1

ELEVATION ft	DEPTH ft	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot					CONSISTENCY water content %				REMARKS
				NUMBER	TYPE	N <sub>60</sub> or Adjustment of Sample	2.0	4.0	6.0	8.0	10.0	PL	W	LL		
492.7	0	GROUND SURFACE														
		TOPSOIL														
490	5	firm hard		1	S.S.	46										
485	10	CLAYEY SILT		2	S.S.	75										
480	15	with sand		3	S.S.	38										
475	20	(glacial till)		4	S.S.	31										
470	25			5	S.S.	30										
465	30			6	S.S.	100/4										
460	34.0	SANDY SILT														
35	35	v. dense BOULDER		7	S.S.	100/4										
35.3		END OF BOREHOLE														
455	40															

VERTICAL SCALE: 1 IN TO 5 FT

DOMINION SOIL INVESTIGATION LIMITED

MADE D. A. M.

CHD *Roller*

MADE D. A. M. CHO *Pro.*

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . . 5 . .

OUR REFERENCE NO. 6 - 11 - 11  
Your Ref. No. W.J. 66-F-102

CLIENT: D.H.O.

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

LOCATION: 868, 033 N.; 980, 024 E

DATUM ELEVATION: G. S. C.

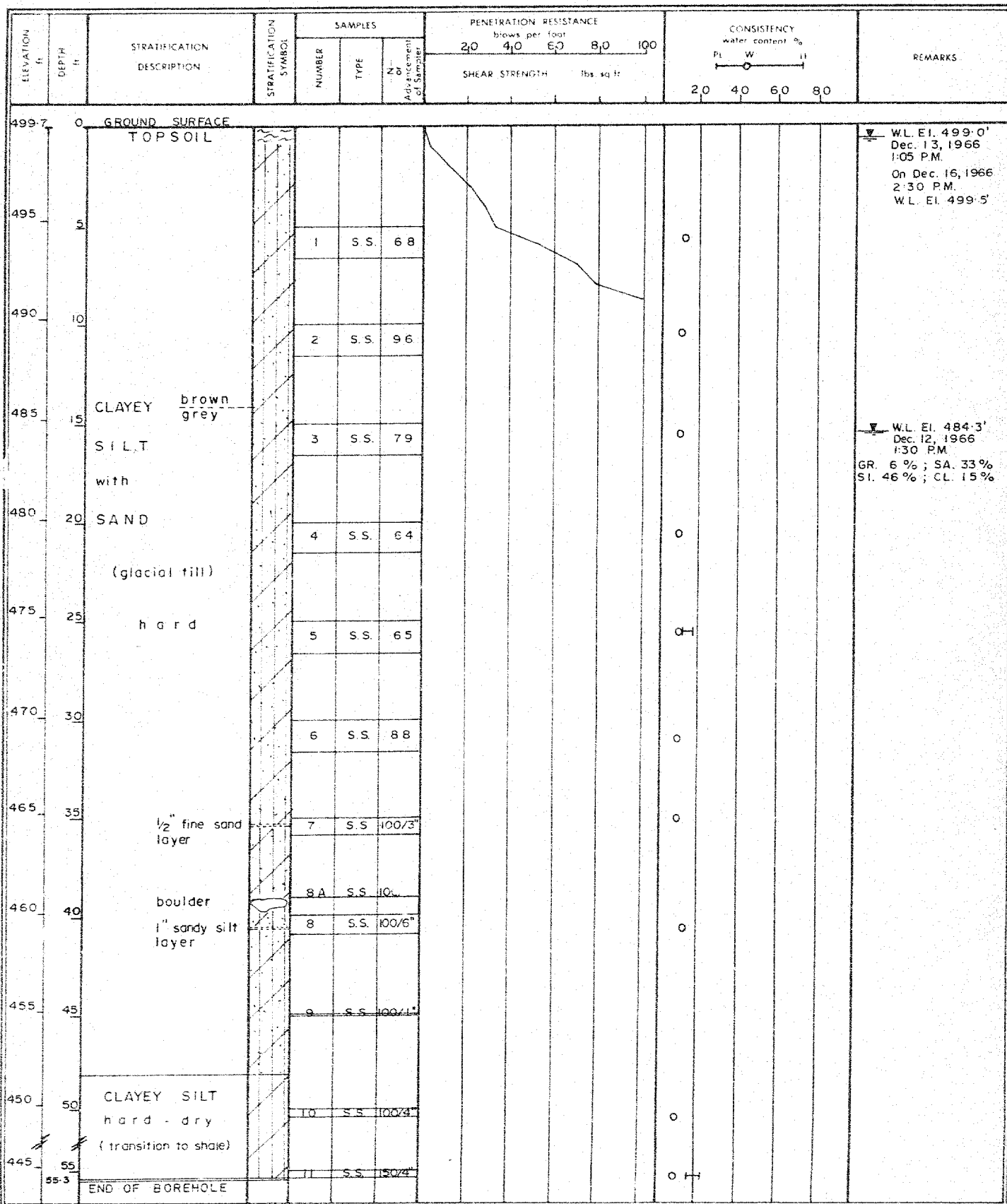
METHOD OF BORING: AUGERING

DIAMETER OF BOREHOLE: 3 1/2"

DATE: DEC. 9, 1966

W. P. 201 - 62 - 1

ENCLOSURE NO.



VERTICAL SCALE 1 IN TO 5 FT

DOMINION SOIL INVESTIGATION LIMITED

MADE: D. A. M. CHD. Kello

# GEOTECHNICAL DATA SHEET FOR BOREHOLE 6

OUR REFERENCE NO. 6-II-II  
YOUR REF. NO. W.J. 66-F-102

CLIENT: D. H. O.  
PROJECT: HWYS. 401, 27 & RICHVIEW EXPWY. INTERCHANGE  
LOCATION: 867, 905 N.; 980, 152 E.  
DATUM ELEVATION: G.S.C.

METHOD OF BORING: AUGERING  
DIAMETER OF BOREHOLE: 3 1/2"  
DATE: Dec. 7-8, 1966  
W.P. 201-62-1

ENCLOSURE NO.

ELEVATION ft	DEPTH ft	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE		CONSISTENCY		REMARKS
				NUMBER	TYPE	Size or Admixture of Grain Size	blows per foot	SHEAR STRENGTH lb/sq ft	water content % PI W LI		
498.8	0	GROUND SURFACE TOP SOIL									
495	5	CLAYEY SILT with SAND brown grey (glacial till) hard		1	SS	60					W.L. El. 496.1' Dec. 13, 1966
490	10			2	SS	87/7"					W.L. El. 493.3' Dec. 9, 1966 4:30 P.M. GR. 4% ; SA. 33% SI. 44% ; CL. 19%
485	15			3	SS	100/6"					GR. 0% ; SA. 44% SI. 43% ; CL. 13%
480	20			4	SS	70					W.L. El. 478.0' Dec. 9, 1966 8:00 A.M.
475	25			5	SS	120					
470	30			6	SS	50					
465	35			7	SS	100/5"					
460	~38'			8	SS	100/4"					GR. 14% ; SA. 54% SI. 25% ; CL. 7%
455	~43'			9	SS	100/6"					
450	50			10	SS	100/1"					
	50.1	END OF BOREHOLE									

VERTICAL SCALE 1 IN TO 5 FT

DOMINION SOIL INVESTIGATION LIMITED

MADE V.G.H.

CHD *Reles*

# GEOTECHNICAL DATA SHEET FOR BOREHOLE 7

OUR REFERENCE NO. 6-II-II  
YOUR REF. No. W. J. 66 - F-102

CLIENT: D. H. O.  
PROJECT: HWYS 401, 27 & RICHVIEW EXPWY INTERCHANGE  
LOCATION: 868, 058 N.; 980, 148 E.  
DATUM ELEVATION: G. S. C.

METHOD OF BORING: AUGERING & WASHBORING  
DIAMETER OF BOREHOLE: 3 1/2" & 2 7/8" ENCLOSURE NO.  
DATE: Dec. 8-12 1966.  
W.P. 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 Advancement of Sampler	SHEAR STRENGTH lbs./sq. ft.					PL W LI				
							20	40	60	80	100	20	40	60	80	
484.2	0	GROUND SURFACE TOPSOIL														
480	5	CLAYEY SILT  with  SAND  (glacial till)  very stiff to hard  grey		1	SS	30										
475	10			2	SS	60										
470	15			3	SS	27										W.L. El. 469.8' Dec. 13, 1966 GR. 0 % ; SA. 35 % SI. 43 % ; CL. 22 %
465	20			4	SS	80										W.L. El. 466.2' Dec. 12, 1966
460	25	SANDY SILT with a trace of CLAY (glacial till)  and  layers of  SILTY SAND  very dense		5	SS	100/3"										GR. 3 % ; SA. 22 % SI. 62 % ; CL. 13 %
455	30			6	SS	100/5"										
450	35			7	SS	100/1 1/2"										GR. 0 % ; SA. 54 % SI. 39 % ; CL. 7 %
445	39'	CLAYEY SILT-hard		8	SS	200/4"										
440	45	Grey  SHALE  BEDROCK		9	RC.	55 %										
435	50			10	RC.	100 %										
50.3	50.3	END OF BOREHOLE														

VERTICAL SCALE: 1 IN. TO 5 FT.

DOMINION SOIL INVESTIGATION LIMITED

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



# GEOTECHNICAL DATA SHEET FOR BOREHOLE . . 8 . .

OUR REFERENCE NO. 6-11-11  
Your Ref. No. W.J. 66-F-102

CLIENT D.H.O.

PROJECT HWYS. 401, 27 & RICHVIEW EXPWY. INTERCHANGE

LOCATION 867,904 N ; 980,197 E.

DATUM ELEVATION G.S.C.

METHOD OF BORING AUGERING

DIAMETER OF BOREHOLE 3 1/2"

DATE DEC. 9-12, 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 <sub>60</sub> or Adjusted No. of Blows of Sampler	2.0	4.0	6.0	8.0	10.0	PL	W	LI	
484.9	0	GROUND SURFACE													
	1.5	SANDY FILL brown grey													WL. El. 483.8' Dec. 13, 1966 WL. El. 484.0' Dec. 22, 1966
480	5			1	SS	33									
		CLAYEY													
475	10	SILT hard		2	S.S.	22									WL. El. 476.2' Dec. 12, 1966
		with													
470	15	SAND very stiff		3	S.S.	18									
		(Glacial Till)													
465	20	hard		4	S.S.	54									GR. 3 % ; SA. 37 % SI. 41 % ; CL. 19 %
460	25			5	S.S.	100/6"									GR. 0 % ; SA. 67 % SI. 25 % ; CL. 8 %
		SILTY FINE cobbles													
455	30	SAND with a trace of CLAY		6	S.S.	150/2"									
		very dense													
450	35			7	S.S.	130/6"									
445	40	CLAYEY SILT - hard, dry transition to shale		8	S.S.	100/2"									
402		END OF BOREHOLE													
440	45														

VERTICAL SCALE: 1 IN TO 5 FT.

DOMINION SOIL INVESTIGATION LIMITED

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

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . . . 9 . . .

OUR REFERENCE NO. 6-11-11  
YOUR REF. NO. W.J. 66-F-102

CLIENT D. H. O.  
PROJECT HWYS. 401, 27 & RICHVIEW EXPWY. INTERCHANGE  
LOCATION 867, 997 N; 980, 530 E.  
DATUM ELEVATION G. S. C.

METHOD OF BORING WASHBORING  
DIAMETER OF BOREHOLE 2 3/8"  
DATE Nov. 29. -- Dec. 2. 1966.  
W. P. 201-62-1

ENCLOSURE NO.

ELEVATION ft	DEPTH ft	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE		CONSISTENCY		REMARKS
				NUMBER	TYPE	Notes Adjustment of Sample	blows per foot	lb/sq ft	water content %		
4938	0	GROUND SURFACE									
		TOPSOIL									
490	5			1a	CS						
				1	SS	99					
485	10	brown grey		2	SS	58					
480	15			3	SS	49/6"					GR: 5% SA: 40% SI: 41% CL: 14%
		fine sand layer									
475	20			4	SS	63					
470	25	CLAYEY SILT with SAND		5	SS	48					Dec. 7. 1966. W.L. EL. 468.8 GR: 5% SA: 40% SI: 38% CL: 17%
465	30			6	SS	66					GR: 7% SA: 33% SI: 42% CL: 18%
460	35	(glacial till) Hard		7	SS	112/2 1/2"					
455	40			8	RC	10%					
				9							
				10							
450	45	boulders and cobbles		11	SS	102/3"					
				12	SS	50/NP					
				13	WS						
445	50			14	RC	10%					
		END OF BOREHOLE									

VERTICAL SCALE: 1 IN. TO 5 FT.

DOMINION SOIL INVESTIGATION LIMITED

MADE V. G. H. CHD *Rolko*

# GEOTECHNICAL DATA SHEET FOR BOREHOLE 10

OUR REFERENCE NO. 6-11-11  
YOUR REF. NO. W J 66-F-102

CLIENT D. H. O.  
PROJECT: HWYS. 401, 27 & RICHVIEW EXPWY. INTERCHANGE  
LOCATION 868, 178 N; 980, 514 E.  
DATUM ELEVATION G. S. C.

METHOD OF BORING AUGERING  
DIAMETER OF BOREHOLE 3 1/2"  
DATE Dec. 1, 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 or Advance of Sampler	20	40	60	80		100
4956	0	GROUND SURFACE										
		SAND FILL										W.L. AT SURFACE DUE TO HEAVY RAINFALLS Dec. 7, 1966.
												W.L. El. 494.8' on Dec. 13, 1966
490	5			1	SS	60						GR: 0% SA: 33% SI: 49% CL: 18%
485	10			2	SS	100/10 <sup>10</sup>						
		grey brown										
480	15			3	SS	54						GR: 3% SA: 40% SI: 40% CL: 17%
		CLAYEY SILT with SAND										
475	20	(glacial tilt)		4	SS	63						
		Hard										
470	25			5	SS	38						GR: 4% SA: 39% SI: 42% CL: 15%
465	30			6	SS	81/8"						
31.2	31.2	END OF BOREHOLE										HAMMER MEETS REFUSAL
460	35											

VERTICAL SCALE: 1 IN TO 5 FT.

DOMINION SOIL INVESTIGATION LIMITED

MADE V. G. H. CH'D: *Reiko*

# GEOTECHNICAL DATA SHEET FOR BOREHOLE ...

OUR REFERENCE NO. 6-11-11  
YOUR REF NO. W. J. 66-F-102

CLIENT D. H. O.  
PROJECT HWYS. 401, 27 & RICHVIEW EXPWY. INTERCHANGE  
LOCATION 868, 043 N, 980, 645 E.  
DATUM ELEVATION G. S. C.

METHOD OF BORING WASHBORING  
DIAMETER OF BOREHOLE 2 7/8"  
DATE NOV. 28 - DEC. 7, 1966  
W. P. 201-62-1

ENCLOSURE NO.

ELEVATION " "	DEPTH " "	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE		CONSISTENCY		REMARKS
				NUMBER	TYPE	N or Advance of Sampler	blows per foot	lbs. sq. ft.	water content %		
							20 40 60 80 100		PI W LI	2.0 4.0 6.0 8.0	
492.6	0	GROUND SURFACE									
		TOP SOIL									W.L. El. 491.5' Dec. 13, 1966
490				1	SS	29					GR: 1% ; SA: 40 % SI: 36% ; CL: 23 %
485	4.5	v stiff hard		2	SS	25/6"					
480	10	CLAYEY SILT with SAND		3	SS	132					GR: 2% ; SA: 42 % SI: 36% ; CL: 20 %
475	15	brown grey (glacial till)		4	SS	71					
470	20			5	SS	40/NP					
465	25			6	SS	69					
460	30			7	SS	86					
455	33.5			8	SS	85/4"					GR: 20% ; SA: 53% SI: ~24% ; CL: ~3 %
450	40	SILTY SAND with GRAVEL to fine to medium SAND very dense grey		9	SS	170					
445	46.5	END OF BOREHOLE		10	SS	96					GR: 0% ; SA: 86% SI: ~14% ; CL: ~0 %
440	50										

VERTICAL SCALE: 1 IN. TO 5 FT.

DOMINION SOIL INVESTIGATION LIMITED

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

# GEOTECHNICAL DATA SHEET FOR BOREHOLE 12

OUR REFERENCE NO. 6-11-11  
YOUR REF. NO. W. J. 66-F-102

CLIENT: D. H. O.  
PROJECT: HWYS. 401, 27 & RICHVIEW EXPWY. INTERCHANGE  
LOCATION: 868, 212 N; 980, 596 E.  
DATUM ELEVATION: G. S. C.

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

ENCLOSURE NO.

ELEVATION ft	DEPTH ft	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE		CONSISTENCY		REMARKS
				NUMBER	TYPE	No. or Advancement of Sampler	blows per foot	SHEAR STRENGTH lbs. sq. ft.	water content %	PI W LI	
496.6	0	GROUND SURFACE									
		TOP SOIL									WL El. 495.4' Dec. 7, 1966 WL El. 495.0' Dec. 16, 1966
495											
	5	CLAYEY		1	SS	54					
490		SILT									
	10	with		2	SS	85					
485		SAND									
	15			3	SS	73					GR. 6% ; SA. 39% SI. 39% ; CL. 16%
480		brown grey									
	20	(glacial till)		4	SS	54					
475		hard									
	25			5	SS	37					
470											
	30			6	SS	70					GR. 3% ; SA. 40% SI. 40% ; CL. 17%
465											
	33.0	END OF BOREHOLE									
460											
	35										
	40										

VERTICAL SCALE 1 IN TO 5 FT

DOMINION SOIL INVESTIGATION LIMITED

MADE V. G. H. CHD. *Rolko*

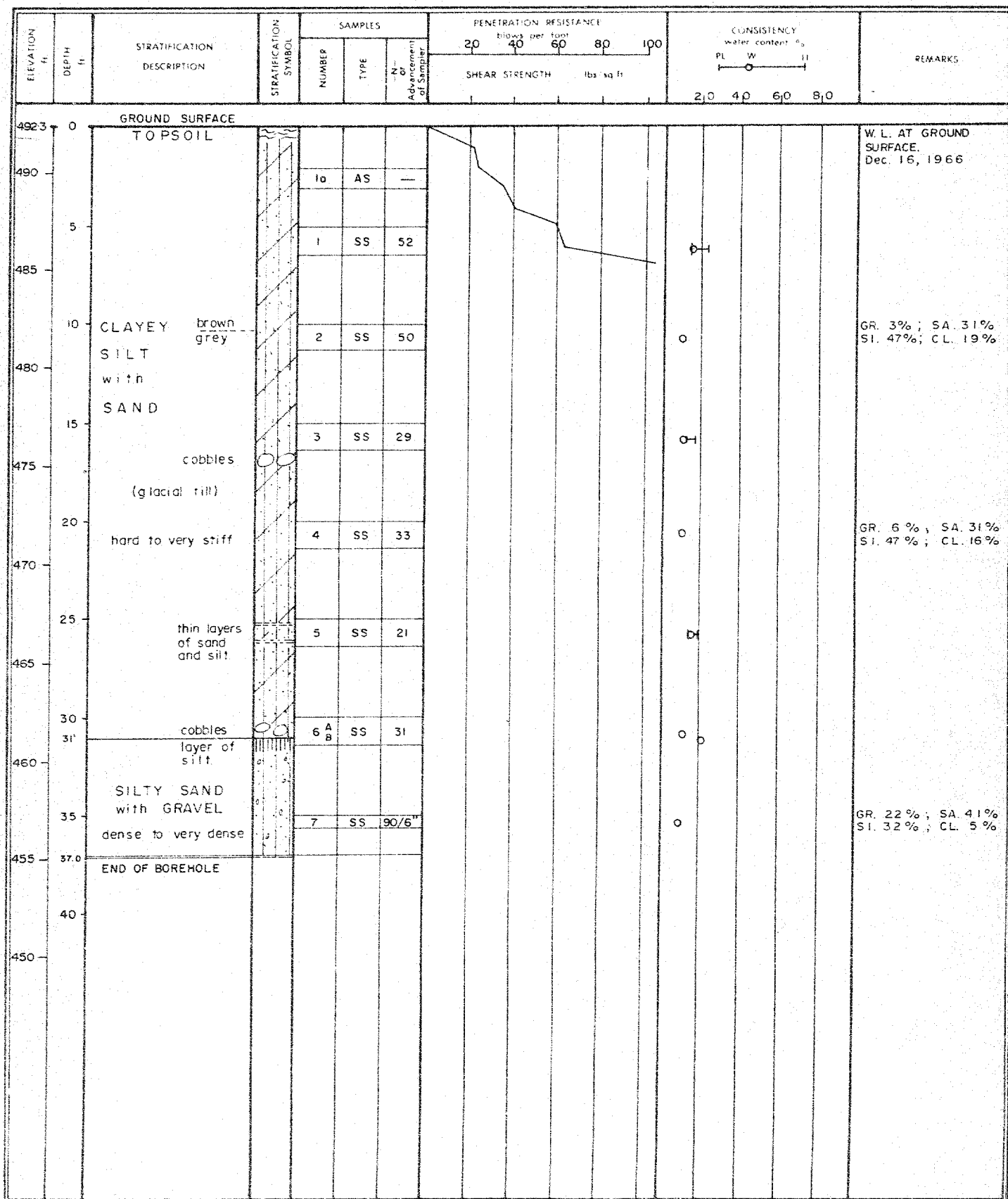
# GEOTECHNICAL DATA SHEET FOR BOREHOLE 13

OUR REFERENCE NO. 6-11-11  
YOUR REF. NO. W. J. 66-F-102

CLIENT: D. H. O.  
PROJECT: HWYS. 401, 27 & RICHVIEW EXPWY. INTERCHANGE  
LOCATION: 868, 229 N; 980, 723 E.  
DATUM ELEVATION: G. S. C.

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

ENCLOSURE NO.



VERTICAL SCALE: 1 IN TO 5 FT.

DOMINION SOIL INVESTIGATION LIMITED

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

# GEOTECHNICAL DATA SHEET FOR BOREHOLE 14...

OUR REFERENCE NO. 6 - 11 - 11  
Your Ref. No. 66-F-102

CLIENT: D.H.O.

PROJECT: HWYS. 401, 27 & RICHVIEW EXPWY INTERCHANGE

LOCATION: 868, 638 N., 981, 600 E.

DATUM ELEVATION: G.S.C.

METHOD OF BORING: AUGERING

DIAMETER OF BOREHOLE: 3 1/2"

DATE: DEC. 8, 1966

WP 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 or Advance- ment of Sampler	20	40	60	80	
457.4	0	GROUND SURFACE									
455	5	brown grey  SILT with traces of organic matter Compact		1	S.S.	18					
450	7.0	CLAYEY SILT with SAND (glacial till)		2	S.S.	80/4"					
445	15	Hard grey boulders and cobbles		3	S.S.	100/6"					
440	20	CLAYEY SILT hard-dry (transition to shale)		4	S.S.	100/1"					
435	20.1	END OF BOREHOLE									

W.L. EL. 455.3'  
Dec. 16, 1966

NOTE: BOREHOLE WAS RELOCATED BECAUSE OF BOULDERS.

VERTICAL SCALE: 1 IN TO 5 FT

DOMINION SOIL INVESTIGATION LIMITED

MADE: D.A.M.

CHD: *Roller*

# GEOTECHNICAL DATA SHEET FOR BOREHOLE 15

OUR REFERENCE NO. 6-11-11  
Your Ref. No. W.J. 66-F-102

CLIENT: D.H.O.

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

LOCATION: 868, 925 N; 981, 510 E.

DATUM ELEVATION: G.S.C.

METHOD OF BORING: AUGERING

DIAMETER OF BOREHOLE: 3 1/2"

DATE: DEC. 12, 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 <sub>60</sub> or Advancement of Sampler	2,0	4,0	6,0	8,0	10,0	PL	W	LI			
456.7	0	GROUND SURFACE															
		TOPSOIL															
455		CLAYEY SILT soft to firm		1	S.S.	4											
450	5	SAND (weathered glacial fill)															
445	7.5	SILT Dense to V. Dense grey		2	S.S.	40											
440	10			3	S.S.	60/6"											
435	10.5																
430	15	CLAYEY SILT with sand and some gravel. (glacial fill) hard - dry		4	S.S.	75/3"											
425	20			5	S.S.	75/1"											
420	25	(transition to shale)															
415	25.1	END OF BOREHOLE		6	S.S.	100/4"											
410																	
405																	
400																	
395																	
390																	
385																	
380																	
375																	
370																	
365																	
360																	
355																	
350																	
345																	
340																	
335																	
330																	
325																	
320																	
315																	
310																	
305																	
300																	

W.L. El. 450.5'  
Dec 23, 1966

GR. 17.5% ; SA. 34%  
SI. 32% ; CL. 16.5%

VERTICAL SCALE: 1 IN. TO 5 FT

DOMINION SOIL INVESTIGATION LIMITED

MADE D.A.M. CHD. *Roller*



# GEOTECHNICAL DATA SHEET FOR BOREHOLE .16.

OUR REFERENCE NO. 6-11-11  
Your Ref. No. 66-F-102

CLIENT: D. H. O.

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

LOCATION: 869, 173 N; 981, 408 E.

DATUM ELEVATION: G. S. C.

METHOD OF BORING: AUGERING

DIAMETER OF BOREHOLE: 3 1/2"

DATE: DEC. 13, 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 <sub>60</sub> or Advancement of Sampler	20	40	60	80	100	PL	W	LI			
458.0	0	GROUND SURFACE															
		TOPSOIL															
455		GRAVELLY SAND with some silt.															
	5	Compact brown to grey V. Dense boulders and cobbles		1	S.S.	16										W.L. El. 453.7' Dec. 23, 1966 GR. 34 % ; SA. 45 % SI. 16 % ; CL. 5 %	
450	10			2	S.S.	100/2"										GR. 0 % ; SA. 69 % SI. ~31 % ; CL. ~0 %	
445		SILTY FINE SAND Very Dense															
440	15	CLAYEY SILT hard - dry (transition to shale)		3	S.S.	100/2"											
435	19.1	END OF BOREHOLE		4	S.S.	100/1"										NOTE: BOREHOLE WAS RELOCA- TED BECAUSE OF BOULDERS.	
430	20																
425	25																

VERTICAL SCALE: 1 IN. TO 5 FT

INGENIUM SOIL INVESTIGATION LIMITED

MADE D. A. M. CHG

*Riches*

# GEOTECHNICAL DATA SHEET FOR BOREHOLE 17..

OUR REFERENCE NO. 6-11-11  
Your Ref. No. 66-F-102

CLIENT D. H. O.

PROJECT HWYS. 401, 27 & RICHVIEW EXPWY. INTERCHANGE

LOCATION 868, 988 N.; 980, 402 E.

DATUM ELEVATION G. S. C.

METHOD OF BORING AUGERING

DIAMETER OF BOREHOLE 3 1/2"

DATE DEC 13, 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	IN- b Advancement of Sampler	2,0	4,0	6,0	8,0	10,0	PL	W	
458.6	0	GROUND SURFACE												
455	5	FINE SAND with traces of silt Loose to Compact		1	S.S.	7								W.L. El. 455.7' Dec. 22, 1966  GR. 0%; SA. 87% SL. 13%; CL. 0%
450	10			2	S.S.	22								
445	12.0	cobbles												
440	15	CLAYEY SILT with sand. Hard (glacial till)		3	S.S.	70/4"								
438.20		END OF BOREHOLE		4	S.S.	100/NP								
435	25													

VERTICAL SCALE 1 IN TO 5 FT

DOMINION SOIL INVESTIGATION LIMITED

MADE D. A. M. CHD. Kelle

# GEOTECHNICAL DATA SHEET FOR BOREHOLE .18

OUR REFERENCE NO. 6-11-11

Your Ref. No. 66-F-102

CLIENT D.H.O.

PROJECT HWYS. 401, 27 & RICHVIEW EXPWY INTERCHANGE

LOCATION 868, 641 N; 980, 432 E.

DATUM ELEVATION G.S.C.

METHOD OF BORING AUGERING

DIAMETER OF BOREHOLE 3 1/2"

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- Adj. - percent of sampler	2.0	4.0	6.0	8.0	100	PL	W	LI	
501.1	0	GROUND SURFACE													
500															
495	5	soft to firm hard		1	S.S.	42									
490	10	CLAYEY SILT with sand		2	S.S.	71									
485	15			3	S.S.	66/6"									
480	17.7	brown grey  (glacial till)		4	S.S.	63									
475	25			5	S.S.	50									GR. 2% ; SA. 25% SI. 47% ; CL. 26%
470	30			6	S.S.	52									
465	33.0			7	S.S.	68/6"									GR. 2% ; SA. 40% SI. 42% ; CL. 16%
460	40	SANDY SILT damp moist with a		8	S.S.	100/3"									
455	45	trace of clay brown grey		9	S.S.	68/6"									GR. 17% ; SA. 43% SI. 35% ; CL. 5%
450	50	SILTY SAND moist wet with some gravel		10	S.S.	57/6"									
445	55	very dense		11	S.S.	78/6"									GR. 5% ; SA. 78% SI. 17% ; CL. 0%
440	59	CLAYEY SILT hard - dry		12	S.S.	150/2"									
	60	(transition to shale)		13	S.S.	125/5"									
635	65	END OF BOREHOLE		14	S.S.	80/NP									

VERTICAL SCALE: 1 IN. TO 5 FT

DOMINION SOIL INVESTIGATION LIMITED

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

# GEOTECHNICAL DATA SHEET FOR BOREHOLE 19

OUR REFERENCE NO. 6-11-11  
Your Ref. No. W.J. 66-F-102

CLIENT D. H. O.

PROJECT HWYS. 401, 27 & RICHVIEW EXPWY INTERCHANGE

LOCATION 868,288 N, 979,405 E

DATUM ELEVATION G.S.C.

METHOD OF BORING AUGERING

DIAMETER OF BOREHOLE 3 1/2"

DATE DEC 13-14, 1966

WP 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 <sub>60</sub> or Advance- ment of Sampler	2.0	4.0	6.0	8.0	10.0	PL	W	LI	
							SHEAR STRENGTH lbs. sq. ft.				2.0 4.0 6.0 8.0				
491.6	0	GROUND SURFACE													
		TOPSOIL													
490															W.L. El. 491.1' Dec. 14, 1966
	5	firm to stiff													W.L. El. 490.2' Dec. 22, 1966
485		hard		1	S.S.	41									
	10	CLAYEY SILT													
480		with sand		2	S.S.	86									GR. 7% ; SA. 39% SI. 39% ; CL. 15%
	15	brown grey													
475		(glacial till)		3	S.S.	63									
	20														
470				4	S.S.	106									GR. 16% ; SA. 32% SI. 36% ; CL. 16%
	25														
465				5	S.S.	100/4									GR. 9% ; SA. 37% SI. 42% ; CL. 12%
	30														
460	30.5	END OF BOREHOLE		6	S.S.	100/6									
	35														

VERTICAL SCALE 1 IN = 5 FT

DOMINION SOIL INVESTIGATION LIMITED

MADE D.A.M. CHD. *Rocco*

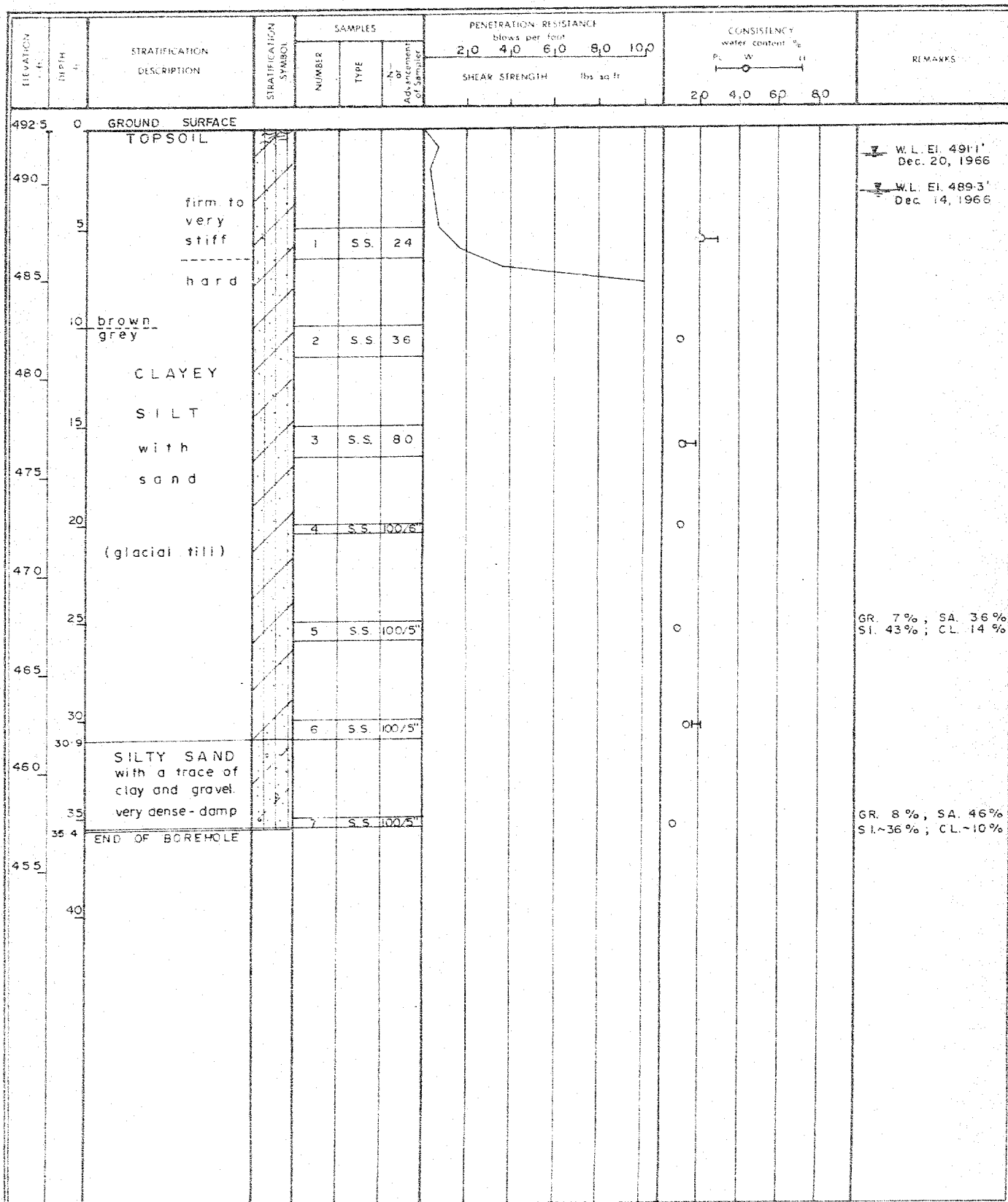
# GEOTECHNICAL DATA SHEET FOR BOREHOLE . 20 .

OUR REFERENCE NO. 6-11-11  
Your Ref. No. 66-F-102

CLIENT D. H. O.  
PROJECT HWYS. 401, 27 & RICHVIEW EXPWY. INTERCHANGE  
LOCATION 868, 485 N; 979, 250 E  
DATUM ELEVATION: G.S.C.

METHOD OF BORING: AUGERING  
DIAMETER OF BORING: 3 1/2"  
DATE DEC. 14, 1966  
W.P. 201-62-1

ENCLOSURE NO.



VERTICAL SCALE 1 IN. TO 5 FT

DOMINION SOIL INVESTIGATION LIMITED

MADE D. A. M. CND Rollo

# GEOTECHNICAL DATA SHEET FOR BOREHOLE 21

OUR REFERENCE NO. 6-11-11  
Your Ref. No. 66-F-102

CURVE D.H.O.

PROJECT HWYS. 401, 27 & RICHMEW EXPWY INTERCHANGE

LOCATION 868, 705 N; 979, 125 E

DATUM ELEVATION G.S.C.

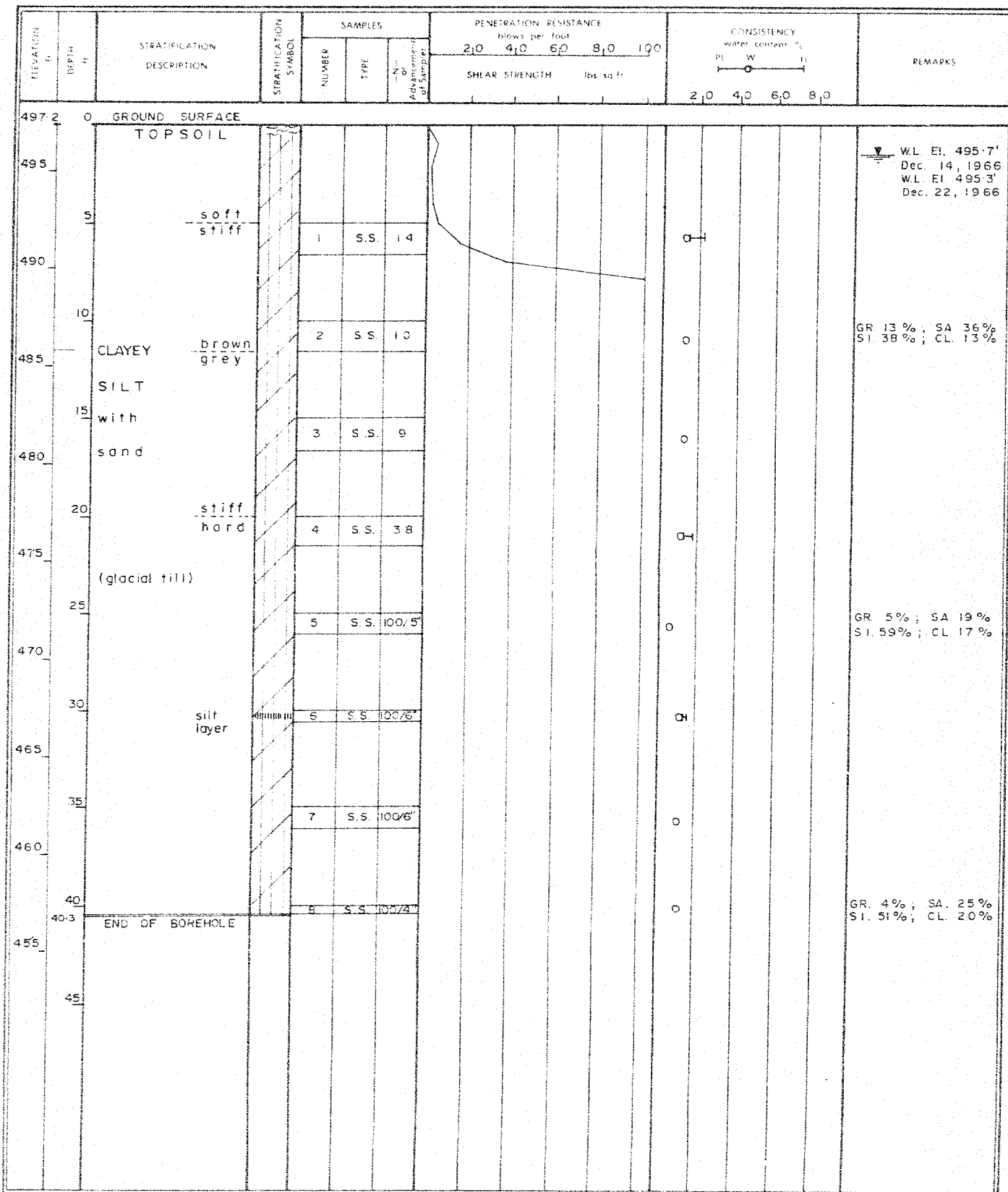
METHOD OF BORING AUGERING

DIAMETER OF BOREHOLE 3 1/2"

DATE DEC 14, 1966

W.P. 201-62-1

ENCLOSURE NO.



VERTICAL SCALE 1 IN TO 5 FT

DOMINION SOIL INVESTIGATION LIMITED

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

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . . 22 . .

OUR REFERENCE NO. 6 - 11 - 11  
Your Ref. N<sup>o</sup> WJ 66-F-102

CLIENT D. H. O.

PROJECT HWYS. 401, 27 & RICHVIEW EXPWY. INTERCHANGE

LOCATION 867,063 N., 980,373 E.

DATUM ELEVATION G. S. C.

METHOD OF BORING AUGERING

DIAMETER OF BOREHOLE 3 1/2"

DATE DEC. 17-20, 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	No. of Advancement of Sampler	2.0	4.0	6.0	8.0	10.0	FL	W	
481.2	0	GROUND SURFACE												
480		TOP SOIL												
		CLAYEY												W.L. El. 478.2' Dec. 22, 1966
475	5	SILT		1	S.S.	60								W.L. El. 474.8' Dec. 20, 1966
		with												
470	10	sand		2	S.S.	60/6"								
		hard												
465	15	brown grey		3	S.S.	65/6"								
		(glacial till)												
460	20			4	S.S.	69/6"								
455	25	SANDY SILT		5	S.S.	69								GR. 0% ; SA. 50% SI. 44% ; CL. 6%
		to												
450	30	GRAVELLY SAND		6	S.S.	54/6"								GR. 30% ; SA. 47% SI. ~23% ; CL. ~0%
		with some silt.												
445	35	(glacial till)		7	S.S.	100/5"								
		very dense												
440	40			8	S.S.	100/5"								GR. 25% ; SA. 49% SI. 21% ; CL. 5%
435	45	END OF BOREHOLE		9	S.S.	100/5"								

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . . 23.

OUR REFERENCE NO. 6 - 11 - 11  
Your Ref. No. W.J. 66 - F - 102

CLIENT: D. H. O.  
PROJECT: HWYS. 401, 27 & RICHVIEW EXPY. INTERCHANGE  
LOCATION: 866,735 N, 980, 429 E.  
DATUM ELEVATION: G.S.C.

METHOD OF BORING: WASH BORING  
DIAMETER OF BOREHOLE: 2 7/8"  
DATE: DEC. 20 - 27, 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 % PL W LI	REMARKS
				NUMBER	TYPE	IN- 2-8 Advancement of Sampler	2,0	4,0	6,0	8,0	10,0		
480.3	0	GROUND SURFACE										2.0 4.0 6.0 8.0	
		TOPSOIL											
475	5	brown CLAYEY SILT firm to stiff hard		1	S.S.	15						0	
470	10	with sand (glacial till)		2	S.S.	37						0-H	WL. El. 468.8' Dec. 28, 1966
465	15			3	S.S.	192/10						0-H	
460	20	SANDY SILT with a trace of clay (glacial till) very dense		4	S.S.	100/6"						0	GR. 3% ; SA. 43% SI. 44% ; CL. 10%
455	25	SAND with some gravel and silt. very dense		5	S.S.	100/6"						0	GR. 22% ; SA. 59% SI. 15% ; CL. 4%
450	30			6	S.S.	100/6"						0	
445	35			7	S.S.	120/6"						0	
440	40			8	S.S.	100/3"						0	
435	45			9	S.S.	100/6"						0	
430	50	CLAYEY SILT with sand hard		10	S.S.	100/3"						0-H	
425	55			11	S.S.	100/6"						0-H	
420	60	Grey SHALE BEDROCK		12	R.C.	87%							
415	65	END OF BOREHOLE		13	R.C.	95%							

VERTICAL SCALE: 1 IN TO 5 FT.

DOMINION SOIL INVESTIGATION LIMITED

MADE: D. A. M. CHD *201*



# GEOTECHNICAL DATA SHEET FOR BOREHOLE 24

OUR REFERENCE NO. 6-11-11  
Your Ref. No. W.J. 66-F-102

CLIENT D. H. O.

PROJECT HWYS. 401, 27 & RICHVIEW EXPWY. INTERCHANGE

LOCATION 859, 560 N.; 979, 110 E.

DATUM ELEVATION G.S.C.

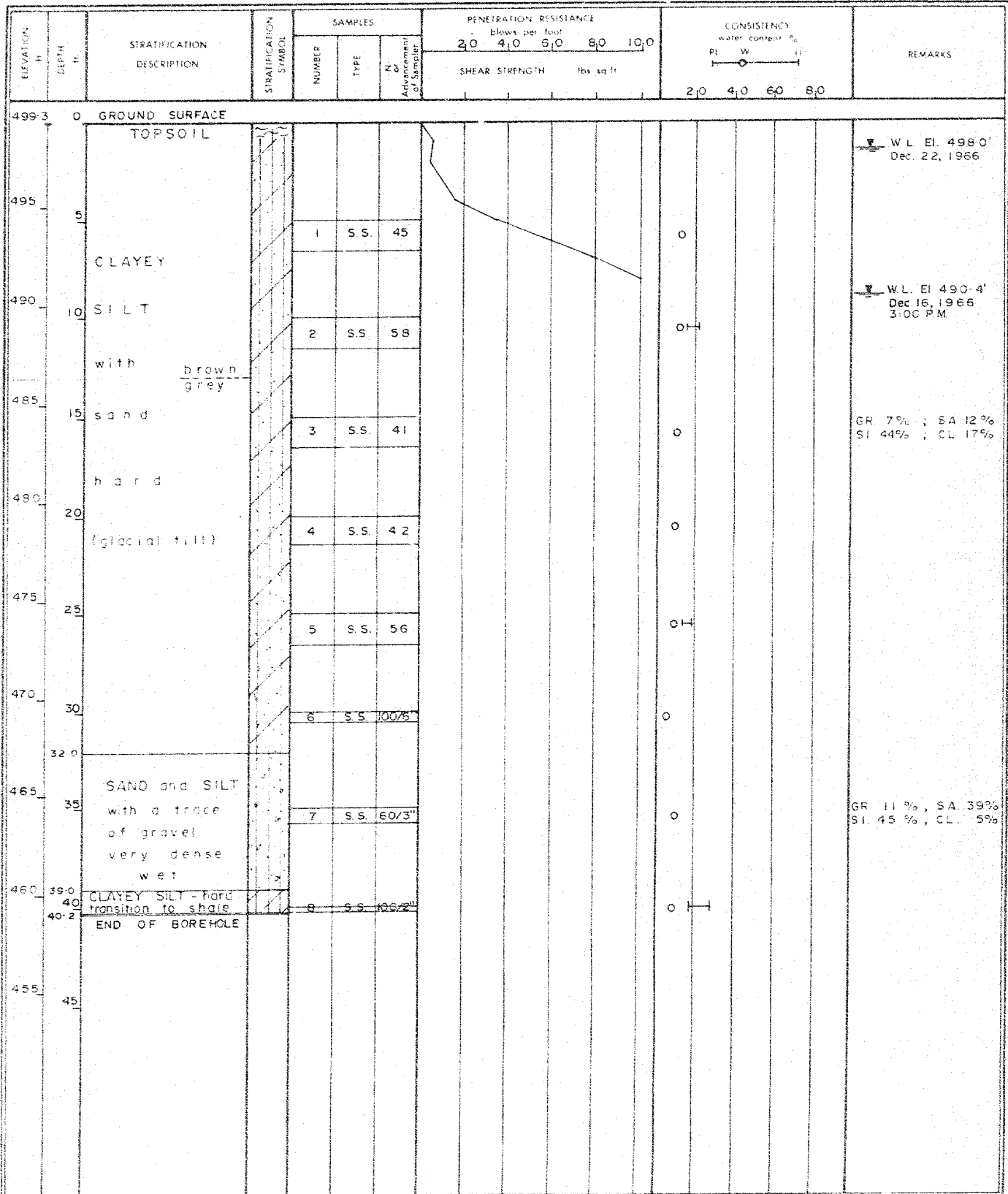
METHOD OF BORING AUGERING

DIAMETER OF BOREHOLE 3 1/2"

DATE DEC. 15-16, 1966

W.P. 201-62-1

ENCLOSURE NO.



VERTICAL SCALE 1 IN. TO 5 FT

DOMINION SOIL INVESTIGATION LIMITED

MADE D.A.M. END *Kellie*

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . . 25 . .

OUR REFERENCE NO. 6-11-11  
Your Ref. No. W.J. 66-F-102

CLIENT D. H. O.

PROJECT HWYS. 401, 27 & RICHVIEW EXPWY. INTERCHANGE

LOCATION 869,302 N.; 979,030 E.

DATUM ELEVATION G. S. C.

METHOD OF BORING AUGERING

DIAMETER OF BOREHOLE 3 1/2"

DATE DEC. 15, 1966

ENCLOSURE NO.

WP. 201-62-1

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot					CONSISTENCY water content %					REMARKS
				NUMBER	TYPE	N <sub>60</sub> or Advancement of Sampler	2.0	4.0	6.0	8.0	10.0	PL	W	LI			
501.5	0	GROUND SURFACE															
		TOP SOIL															
500																	
	5																
495		weathered very stiff hard		1	S.S.	21											
	10																
490		brown grey		2	S.S.	44											
	15																
485		CLAYEY SILT		3	S.S.	32											
	20	with sand															
480				4	S.S.	46											
	25	hard very stiff															
475				5	S.S.	26											
	30	hard (glacial till)															
470				6	S.S.	79											
	35	SILTY SAND with a trace of gravel. (glacial till) very dense-wet															
465				7	S.S.	62											
	40																
460	40.5	END OF BOREHOLE		8	S.S.	97/6"											
	45																

W.L. El. 499.3'  
Dec. 16, 1966  
1:30 P.M.

GR. 4% ; SA 33%  
SI. 46% ; CL 17%

GR. 0% ; SA 26%  
SI. 48% ; CL 26%

GR. 9% ; SA 56%  
SI. 30% ; CL. 5%

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . . 26 .

OUR REFERENCE NO. 6-11-11  
Your Ref. No. W.J. 66-F-102

CLIENT: D.H.O.

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

LOCATION: 869,080 N ; 979,000 E.

DATUM ELEVATION: G.S.C.

METHOD OF BORING: AUGERING

DIAMETER OF BOREHOLE: 3 1/2"

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 <sub>60</sub> or Advance of Sampler	2.0	4.0	6.0	8.0	10.0	PL	W	LI	
508.0	0	GROUND SURFACE TO SOIL													
505	5	firm to very stiff		1	S.S.	39									W.L. El. 505.6' Dec. 23, 1966
		hard													
500	10	brown grey		2	S.S.	41									GR. 3% ; SA. 35 % SI. ~45% ; CL. ~17 %
495	15			3	S.S.	30									W.L. El. 494.8' Dec. 16, 1966 1:30 P.M.
490	20	CLAYEY SILT		4	S.S.	28									GR. 13% ; SA. 44 % SI. 31% ; CL. 12%
		with sand													
485	25	hard		5	S.S.	42									
480	30	(glacial till)		6	S.S.	40									
475	35			7	S.S.	64									
470	40			8	S.S.	100/6"									
465	45	SANDY SILT layered structure very dense-wet		9	S.S.	90									GR. 3% ; SA. 30 % SI. 62% ; CL. 5 %
50.5	50	END OF BOREHOLE		10	S.S.	110/6"									
455		CLAYEY SILT hard - dry transition to shale													

VERTICAL SCALE: 1 IN. TO 5 FT.

DOMINION SOIL INVESTIGATION LIMITED

MADE D.A.M. CHD. *Roco*

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . 27 .

OUR REFERENCE NO. 6-11-11  
Your Ref. No. W.J. 66-F-102

CLIENT D. H. O.

PROJECT HWYS. 401, 27 & RICHVIEW EXPWY. INTERCHANGE

LOCATION 870, 273 N; 975, 195 E.

DATUM ELEVATION G. S. C.

METHOD OF BORING AUGERING

DIAMETER OF BOREHOLE 3 1/2"

DATE DEC 20-21, 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	2'-6" Advancement of Sample	2.0	4.0	6.0	8.0	10.0	PL	W	LI	
491.8	0	GROUND SURFACE													
		TOP SOIL													
490															W.L. El. 489.3' Dec. 22, 1966
485	5	CLAYEY		1	S.S.	112									
480	10	SILT brown grey		2	S.S.	62									
		with													
475	15	sand		3	S.S.	42									GR. 8% ; SA. 37% SI. 39% ; CL. 16%
		(glacial till)													
470	20	hard		4	S.S.	55									W.L. El. 473.3' Dec. 21, 1966
465	25			5	S.S.	45									
460	30	SILTY SAND		6	S.S.	60/4"									GR. 8% ; SA. 48% SI. 37% ; CL. 7%
		with a trace of gravel.													
455	35	CLAYEY SILT		7	S.S.	70/4"									
		with sand.													
450	40	(glacial till)		8	S.S.	70/6"									
		hard													
445	45			9	S.S.	100/6"									
		END OF BOREHOLE													
	50														

VERTICAL SCALE 1 IN. TO 5 FT

DOMINION SOIL INVESTIGATION LIMITED

MADE D.A.M. CHD Kachla

# GEOTECHNICAL DATA SHEET FOR BOREHOLE 28.

OUR REFERENCE NO. 6-11-11  
Your Ref. No. W.J. 66-F-102

CLIENT: D.H.O.

PROJECT: HWYS. 401, 27 & RICHVIEW EXPWY INTERCHANGE

LOCATION: 870, 609 N; 979, 356 E

DATUM ELEVATION: G. S. C.

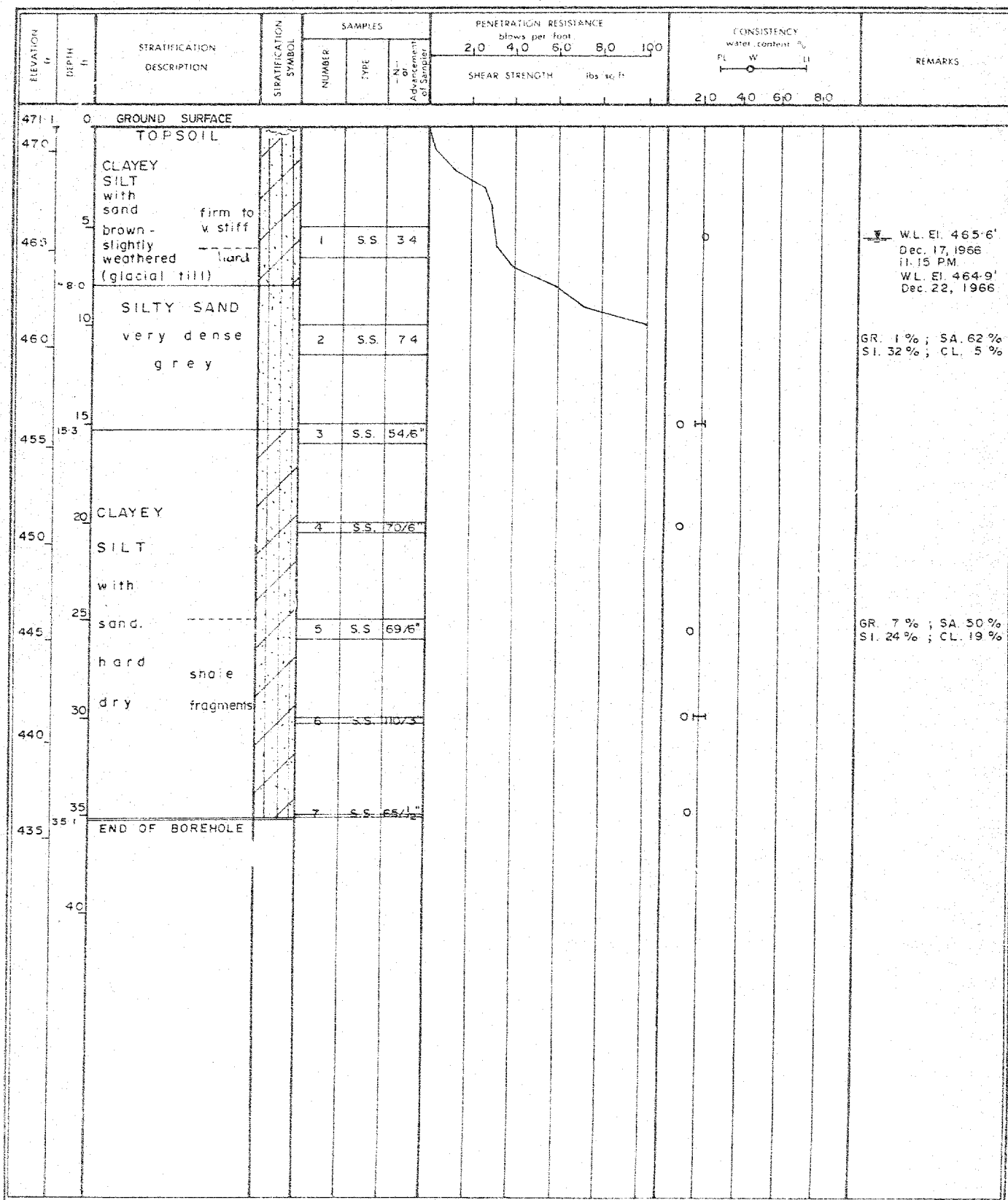
METHOD OF BORING: AUGERING

DIAMETER OF BOREHOLE: 3 1/2"

DATE: DEC. 16, 1966

W.P. 201-62-1

ENCLOSURE NO.



# GEOTECHNICAL DATA SHEET FOR BOREHOLE 29

OUR REFERENCE NO. 6-11-11  
Your Ref. No. WJ. 66-F-102

CLIENT: D. H. O.

PROJECT: HWYS. 401, 27 & RICHVIEW EXPWY. INTERCHANGE DIAMETER OF BOREHOLE 3 1/2"

LOCATION: 870, 110 N; 979, 312 E.

DATE: DEC. 22, 1966

DATUM ELEVATION: G.S.C.

W.P. 201-62-1

ENCLOSURE NO.

ELEVATION ft	DEPTH ft	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot				CONSISTENCY water content $w_p$				REMARKS
				NUMBER	TYPE	N or Advance of Sampler	2.0	4.0	6.0	8.0	10.0	PI	W	LI	
467.8	0	GROUND SURFACE													
		TOPSOIL													
465	5	SILTY SAND (FILL) loose		1	S.S.	9									
460	8.0	CLAYEY SILT with sand (glacial till) hard		2	S.S.	60/3"									
455	14.1			3	S.S.	80/1"									
	15	END OF BOREHOLE													
450	20														

W.L. El 465.3'  
Dec. 22, 1966

VERTICAL SCALE: 1 IN. TO 5 FT

DOMINION SOIL INVESTIGATION LIMITED

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

# GEOTECHNICAL DATA SHEET FOR BOREHOLE 30

OUR REFERENCE NO. 6-11-11  
Your Ref. No. W.J. 66-F-102

CLIENT: D.H.O.

PROJECT: HWYS. 401, 27 & RICHVIEW EXPWY INTERCHANGE

LOCATION: 870, 402 N., 979, 422 E.

DATUM ELEVATION: G.S.C.

METHOD OF BORING: AUGERING

DIAMETER OF BOREHOLE: 3 1/2"

DATE: DEC. 16, 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 20 40 60 80 100	SHEAR STRENGTH lbs. sq. ft.	water content % PL W LI		
472.4	0	GROUND SURFACE									
		TOPSOIL & FILL									
470	5	CLAYEY SILT with sand stiff, brown		1	S.S.	8					
465	8.0	SILTY SAND with a trace of gravel. compact		2	S.S.	29					
460	15			3	S.S.	62					
455	15.7	CLAYEY SILT with sand hard, grey		4	S.S.	110/6"					
450	20										
445	24.8	(transition to shale)		5	S.S.	100/4"					
	25	END OF BOREHOLE									
445	30										

W.L. El. 465.0'  
DEC. 17, 1966  
11:15 P.M.

GR. 10% ; SA. 63%  
SI. 21% ; CL. 6%

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . . 3.1 . .

OUR REFERENCE NO. 6-11-11  
 Your Ref. No. WJ. 66-F-102  
 CLIENT: D. H. O.  
 PROJECT: HWYS. 401, 27 & RICHVIEW EXPWY. INTERCHANGE  
 LOCATION: 869, 816 N.; 979, 417 E  
 DATUM ELEVATION: G. S. C.

METHOD OF BORING: AUGERING  
 DIAMETER OF BOREHOLE: 3 1/2"  
 DATE: DEC. 22, 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		
461.3	0	GROUND SURFACE														
460	1.3	TOPSOIL														
455	5.3	SANDY SILT with a trace of clay. <span style="margin-left: 20px;">brown grey</span>		1	S.S.	12										GR. 8 % ; SA. 32% SI. 46 % ; CL. 14%
450	10.3	CLAYEY SILT		2	S.S.	128/11"										
445	15.3	(glacial till) with shale fragments		3	S.S.	63/6"										
440	20.3	END OF BOREHOLE		4	S.S.	100/2"										

VERTICAL SCALE: 1 IN. TO 5 FT.

DOMINION SOIL INVESTIGATION LIMITED

MADE D. A. M. CHD. *Roller*



# GEOTECHNICAL DATA SHEET FOR BOREHOLE 3.2.

OUR REFERENCE NO. 6-11-11

Your Ref. No. 66-F-102

CLIENT D. H. O.

PROJECT HWYS. 401, 27 & RICHVIEW EXPWY. INTERCHANGE

LOCATION 870, 225 N.; 979, 570 E.

DATUM ELEVATION G. S. C.

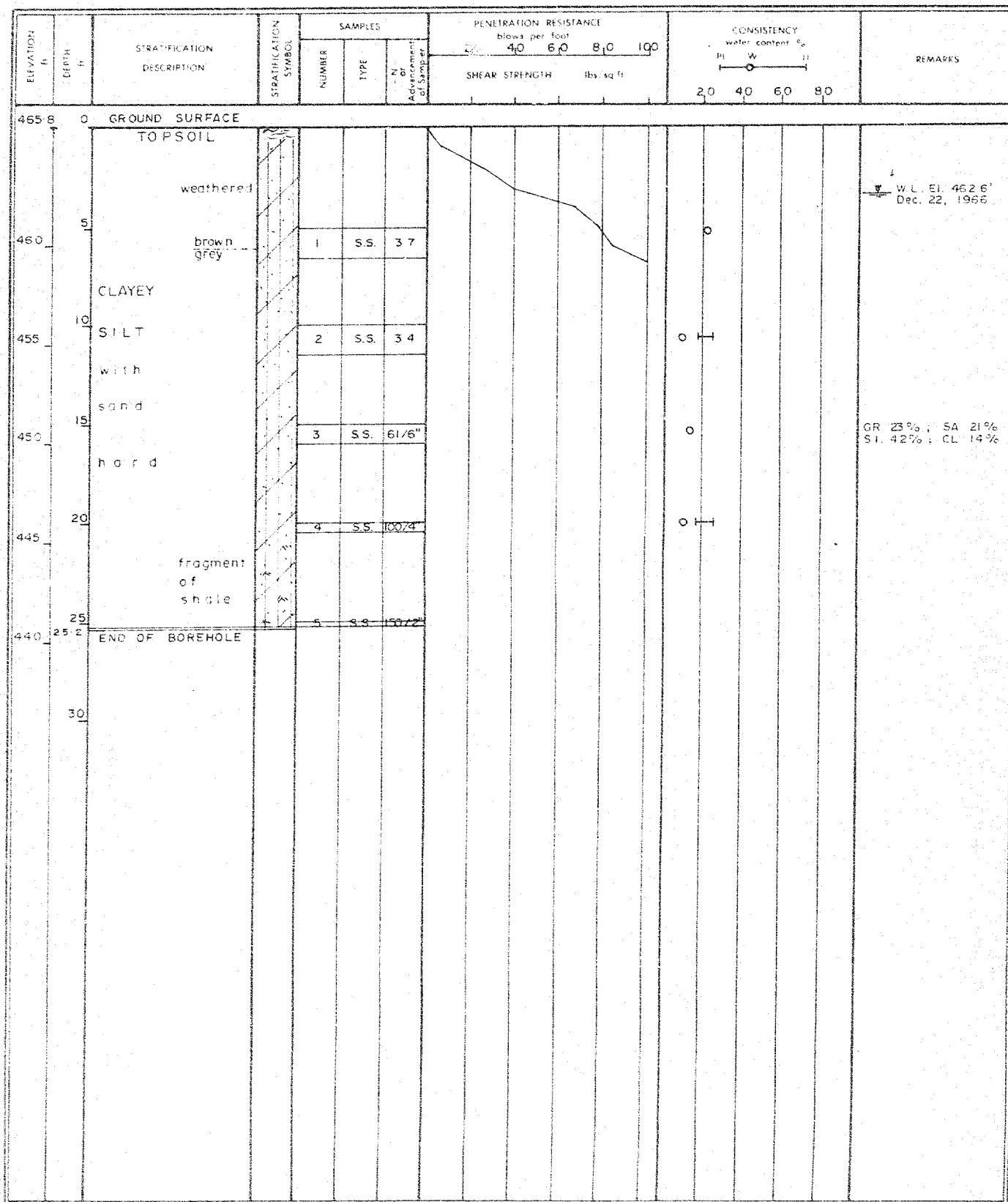
METHOD OF BORING AUGERING

DIAMETER OF BOREHOLE 3 1/2"

DATE DEC. 17, 1966

W.P. 201-62-1

ENCLOSURE NO.



VERTICAL SCALE 1 IN TO 5 FT

DOMINION SOIL INVESTIGATION LIMITED

MADE D. A. M. CHD. *Roller*

# GEOTECHNICAL DATA SHEET FOR BOREHOLE . 33 .

OUR REFERENCE NO. 6-11-11  
Your Ref. No. W. J. 66-F-102

CLIENT: D. H. O.

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

LOCATION: 870, 575 N., 979, 698 E.

DATUM: ELEVATION G. S. C.

METHOD OF BORING: AUGERING

DIAMETER OF BOREHOLE: 3 1/2"

DATE: DEC. 20, 1966

ENCLOSURE NO.

W. P. 201-62-1

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	
466.6	0	GROUND SURFACE									
		TOPSOIL									
465	5	SANDY SILT with gravel FILL compact		1	S.S.	28					W.L. El. 462.2' Dec. 22, 1966
460	10										W.L. El. 459.4' Dec. 20, 1966
455	10.5	SAND with silt and gravel very dense		2	S.S.	50					GR. 17% ; SA. 66% SI. 17% ; CL. 0%
450	16.0	CLAYEY SILT hard-dry (transition to shale)		3	S.S.	110/10					
445	20			4	S.S.	82/6					
440	22.1	END OF BOREHOLE		5	S.S.	100/L					

VERTICAL SCALE: 1 IN. TO 5 FT

DOMINION SOIL INVESTIGATION LIMITED

MADE: D.A.M. AND *Rodger*

# GEOTECHNICAL DATA SHEET FOR BOREHOLE 34.

OUR REFERENCE NO. 6-11-11

Your Ref. No. W.J. 66-F-102

CLIENT D. H. O.

PROJECT HWYS. 401, 27 & RICHVIEW EXPWY. INTERCHANGE

LOCATION 870, 848 N.; 979, 468 E.

DATUM ELEVATION G.S.C.

METHOD OF BORING AUGERING & WASHBORING  
DIAMETER OF BOREHOLE 3 1/2" & 2 7/8"

DATE DEC. 16-19, 1966

W.P. 201-62-1

ELEVATION ft	DEPTH ft	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot					CONSISTENCY water content %				REMARKS
				NUMBER	TYPE	N <sub>60</sub> Adj. amount of samples	2.0	4.0	6.0	8.0	10.0	PL	W	LI		
474.7	0	GROUND SURFACE														
		TOP SOIL														
47.0	5	CLAYEY firm weathered SILT -probably with a fill		1	S.S.	13										
465	10	trace of sand		2	SS	24										W.L. El. 466.6' Dec. 22, 1966
		v. stiff														GR. 0% ; SA. 24% SI. 55% ; CL. 21%
460	15	GRAVELLY SAND with a trace of silt. very dense		3	S.S.	57										GR. 32% ; SA. 53% SI. 13% ; CL. 2%
455	20	CLAYEY SILT with sand hard		4	SS	70/5"										
450	25	weathered shale		5	S.S.	80/2"										
445	30	Grey SHALE BEDROCK		6	RC	87%										
440	35			7	RC	97%										
435	40	END OF BOREHOLE														

VERTICAL SCALE: 1 IN TO 5 FT

DOMINION SOIL INVESTIGATION LIMITED

MADE D.A.M. CHD: Rocco

## RECORD OF BOREHOLE NO. 35

FOUNDATION SECTION

## MATERIALS &amp; TESTING DIVISION

JOB 66-F-102LOCATION Co-ord. 868,812 N; 979,672 E.ORIGINATED BY KALW.P. 386-65BORING DATE July 14, 1967COMPILED BY BRGDATUM GeodeticBOREHOLE TYPE Cont. Flight AugerCHECKED BY 20

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT				LIQUID LIMIT — WL PLASTIC LIMIT — WP WATER CONTENT — W				BULK DENSITY P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F.				WATER CONTENT %					
506.4	Ground Level															
0.0	Clayey silt with some sand and traces of gravel		1	SS	73	500										
			2	SS	76											
	Hard		3	SS	83	490										
			4	SS	115	480										
			5	SS	144											
			6	SS	54											
			7	SS	56	470										
			8	SS	91											
			9	SS	100/5"											
457.4						460										
49.0	Clayey silt with shale fragments.		10	SS	120/6"											
450.8	Hard		11	SS	100/1"											
EE 6	End of Borehole															

469.4

DEPARTMENT OF HIGHWAYS - ONTARIO

## MATERIALS &amp; TESTING DIVISION

JOB 66-F-102

W. P. 386-65

DATUM Geodetic

## RECORD OF BOREHOLE NO. 6 (67-F-35)

LOCATION Co-ord. 868,534 N; 979,844 E.

BORING DATE April 24, 1967

BOREHOLE TYPE Cont. Flight Auger

FOUNDATION SECTION

ORIGINATED BY AMS

ORIGINATED BY BRG  
COMPILED BY \_\_\_\_\_

CHECKED BY

[illegible]

ORIGINATED BY KAL

BORING DATE July 13, 14, 1967

COMPILED BY BRG

BOREHOLE TYPE Cont. Flight Auger

CHECKED BY \_\_\_\_\_

[illegible]



## OFFICE REPORT ON SOIL EXPLORATION

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS &amp; TESTING DIVISION

## RECORD OF BOREHOLE NO. 39

FOUNDATION SECTION

JOB 66-F-102LOCATION Co-ord. 867,153 N.; 980,490 E.ORIGINATED BY B.R.G.W.P. 373-65BORING DATE July 5, 1967COMPILED BY B.R.G.DATUM GeodeticBOREHOLE TYPE Continuous Flight AugerCHECKED BY RP

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT				LIQUID LIMIT — WL PLASTIC LIMIT — WP WATER CONTENT — W			BULK DENSITY P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F.				WP	W	WL		
486.0	Ground Level														
0.0															
	Clayey Silt with some sand and traces of Gravel to Silty Clay		1	SS	51	480									
			2	SS	140	473"									
			3	SS	60										
			4	SS	69	470									
			5	SS	77										
			6	SS	155										
			7	SS	75	460									
			8	SS	114										
452.7															
33.3	Silt to Sandy Silt		9	SS	26	450									
447.3	Very Dense		10	SS	150	455"									
38.9	End of Borehole														

W.L. 483.0



FOUNDATION SECTION

MATERIALS &amp; TESTING DIVISION

LOCATION Co-ord. 867,300 N.; 980,519 E.

ORIGINATED BY B.R.G.

W. P. 373-65

BORING DATE June 30, 1967 - July 4, 1967

COMPILED BY B.R.G.

DATUM Geodetic

BOREHOLE TYPE Continuous Flight Auger

CHECKED BY

[illegible]

DEPARTMENT OF HIGHWAYS - ONTARIO

## MATERIALS &amp; TESTING DIVISION

JOB 66-F-102

W.P. 373-65

DATUM Geodetic

LOCATION Co-ord. 867,431 N.; 980,496 E.

BORING DATE July 4, 1967

BOREHOLE TYPE Cont. Flight Auger

## FOUNDATION SECTION

ORIGINATED BY BRG

COMPILED BY BRG

CHECKED BY \_\_\_\_\_

[illegible]

## MATERIALS &amp; TESTING DIVISION

## RECORD OF BOREHOLE NO. 43

FOUNDATION SECTION

JOB 66-P-102LOCATION Co-ord. 867,167 N.; 980,404 E.ORIGINATED BY B.R.G.W.P. 373-65BORING DATE July 7, 1967COMPILED BY B.R.G.DATUM GeodeticBOREHOLE TYPE Continuous Flight AugerCHECKED BY [Signature]

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT				LIQUID LIMIT — WL PLASTIC LIMIT — wp WATER CONTENT — w			BULK DENSITY P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F.				wp	w	WL		
486.2	Ground Level														
0.0	Clayey Silt, with some Sand and traces of Gravel.		1	SS	23	480									V.L. 481.8
			2	SS	57										
			3	SS	100	475"									
			4	SS	58	470									
			5	SS	71										
	Hard		6	SS	155										
			7	SS	102	460									
454.7			8	SS	50										
31.5	Silt to Fine Sandy Silt, Traces of Gravel.		9	SS	69	450									
			10	SS	100	450									
444.7	Very Dense		11	SS	100	450									
41.5	End of Borehole														

SUPERIMPOSED DOCUMENT MAY  
APPEAR AS MULTI-FEED ON FILM.

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

# RECORD OF BOREHOLE NO. 45

FOUNDATION SECTION

JOB 66-F-102

LOCATION Co-ord. 867,491 N.; 980,455 E.

ORIGINATED BY B. R. G.

W.P. 373-65

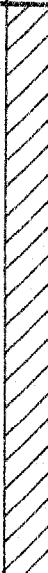
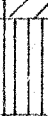
BORING DATE June 30, 1967

COMPILED BY B. R. G.

DATUM Geodetic

BOREHOLE TYPE Continuous Flight Auger

CHECKED BY so

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT _____ W <sub>L</sub>			BULK DENSITY	REMARKS	
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT					PLASTIC LIMIT _____ W <sub>P</sub>					
488.4	Ground Level						SHEAR STRENGTH P.S.F.					WATER CONTENT _____ W					
												W <sub>P</sub> W      W <sub>L</sub>					
												WATER CONTENT %					
												10      20      30					
0.0	Clayey Silt with some Sand and Traces of Gravel.  Hard		1	SS	115	480											
			2	SS	54												
			3	SS	63												
			4	SS	66												
			5	SS	49	470											
			6	SS	45												
			7	SS	99												
			8	SS	74	460											
456.3																	
32.1	Silt to Silty		9	SS	70												
450.6	Sand with some																
	Gravel - Very		10	SS	210/8"												
37.8	Dense.																

SUPERIMPOSED DOCUMENT MAY  
APPEAR AS MULTIFIELD ON FILM.

W.L. 472.4  
▽

W.L. 472.4

SUPERIMPOSED DOCUMENT MAY APPEAR AS MULTIFIELD ON FILM.

DEPARTMENT OF HIGHWAYS - ONTARIO

## RECORD OF BOREHOLE NO. 46

FOUNDATION SECTION

MATERIALS &amp; TESTING DIVISION

JOB 66-F-102

LOCATION Co-ord. 867,435 N; 980,406 E.

ORIGINATED BY BRG

W.P. 373-65

BORING DATE July 10, 1967

COMPILED BY BRG

DATUM Geodetic

BOREHOLE TYPE Cont. Flight Auger

CHECKED BY *So*

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT				LIQUID LIMIT — WL PLASTIC LIMIT — WP WATER CONTENT — W			BULK DENSITY P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F.				WP	W	WL		
487.1	Ground Level														
0.0	Clayey silt, with some sand and traces of gravel		1	SS	43	480									483.6
			2	SS	42										
			3	SS	27	470									
			4	SS	29										
	Hard		5	SS	44										
			6	SS	39	460									
			7	SS	63										
			8	SS	91										
452.1															
35.0	Silt to sandy silt with some gravel		9	SS	69	450									
446.8	(pocket Cl. silt) V. Dense		10	SS	100/4"										
40.3	End of Borehole														

SUPER IMPOSED DOCUMENT MAY  
APPEAR AS MULTI-FEED ON FILM.

## MATERIALS &amp; TESTING DIVISION

## RECORD OF BOREHOLE NO. 47

FOUNDATION SECTION

JOB 66-F-102 LOCATION Co-ord. 867.851 N.; 980.381 E. ORIGINATED BY KAL  
 W.P. 373-65 BORING DATE July 20, 21, 1967 COMPILED BY BRG  
 DATUM Geodetic BOREHOLE TYPE Cont. Flight Auger CHECKED BY So

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE			LIQUID LIMIT — $w_L$			BULK DENSITY	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT	SHEAR STRENGTH P.S.F.			PLASTIC LIMIT — $w_p$	WATER CONTENT — $w$		
487.5	Ground Level													
0.0	Clayey silt, with some sand & traces of gravel.													
			1	SS	88	480								
			2	SS	95	470								
			3	SS	83									
			4	SS	62									
	Hard.		5	SS	57	460								
			6	SS	47									
451.2			7	SS	40									
36.3	Sandy silt, traces of gravel. V.Dense.		8	SS	100/3 1/2"	450								
442.2														
442.2			9	SS	100/2"									
445.3	End of Borehole													

SUPERIMPOSED DOCUMENT MAY  
 APPEAR AS MULTI-FEED ON FILM.

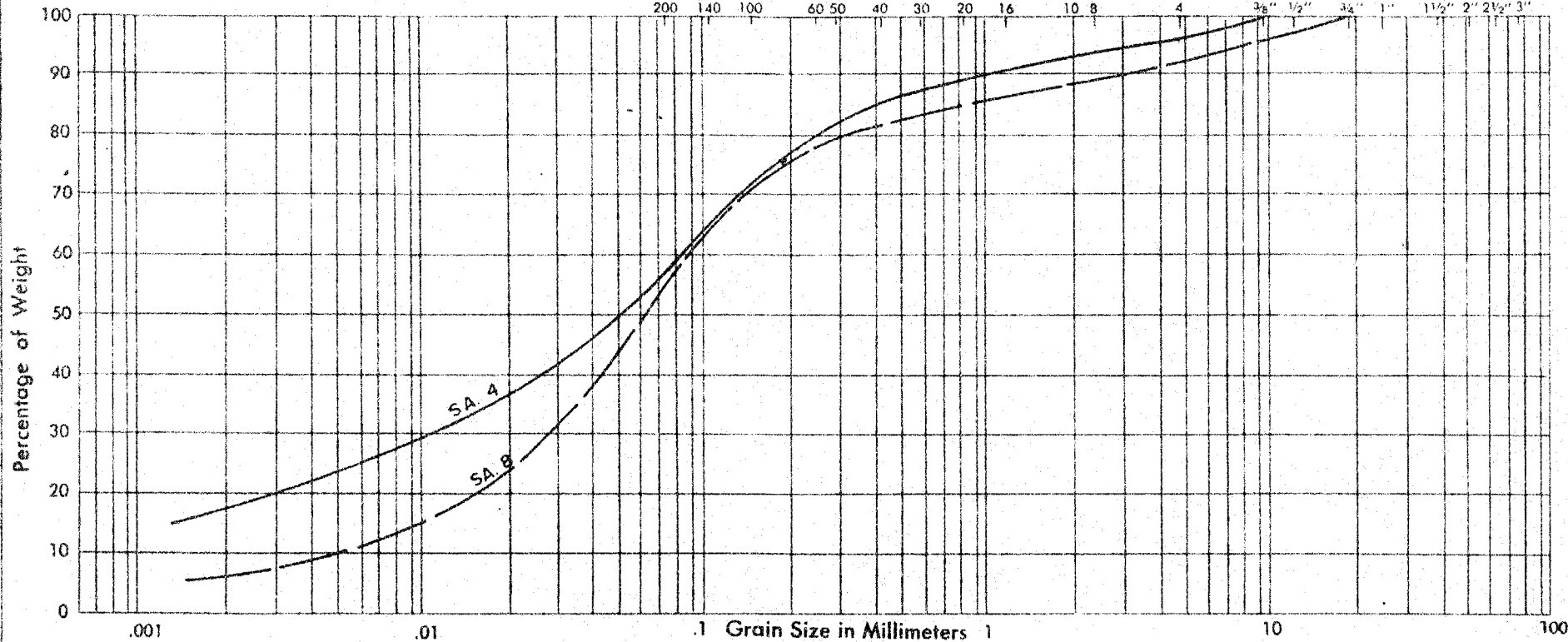
# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6-11-11

UNIFIED SOIL CLASSIFICATION  
SYSTEM

SILT AND CLAY	SAND			GRAVEL	
	FINE	MEDIUM	COARSE	FINE	COARSE



PROJECT: W. J. 66 - F - 102  
 LOCATION: HWY. 27 @ RICHVIEW  
 BOREHOLE NO.: 1  
 SAMPLE NO.: 4 8  
 DEPTH OF SAMPLE: 20' 40'  
 ELEVATION OF SAMPLE: 475.6' 455.6'

COEFFICIENT OF UNIFORMITY NON APPLICABLE  
 COEFFICIENT OF CURVATURE

**Classification of Sample and Group Symbol:**

CLAYEY SILT with SAND CL-ML	SANDY SILT with a trace of GRAVEL and CLAY SM
-----------------------------------	--

S A. 4

S A. 8

PLASTIC PROPERTIES.

LIQUID LIMIT	% =	17.5
PLASTIC LIMIT	% =	12.5
PLASTICITY INDEX	% =	5.0
MOISTURE CONTENT	% =	9.0
ACTIVITY	=	0.45

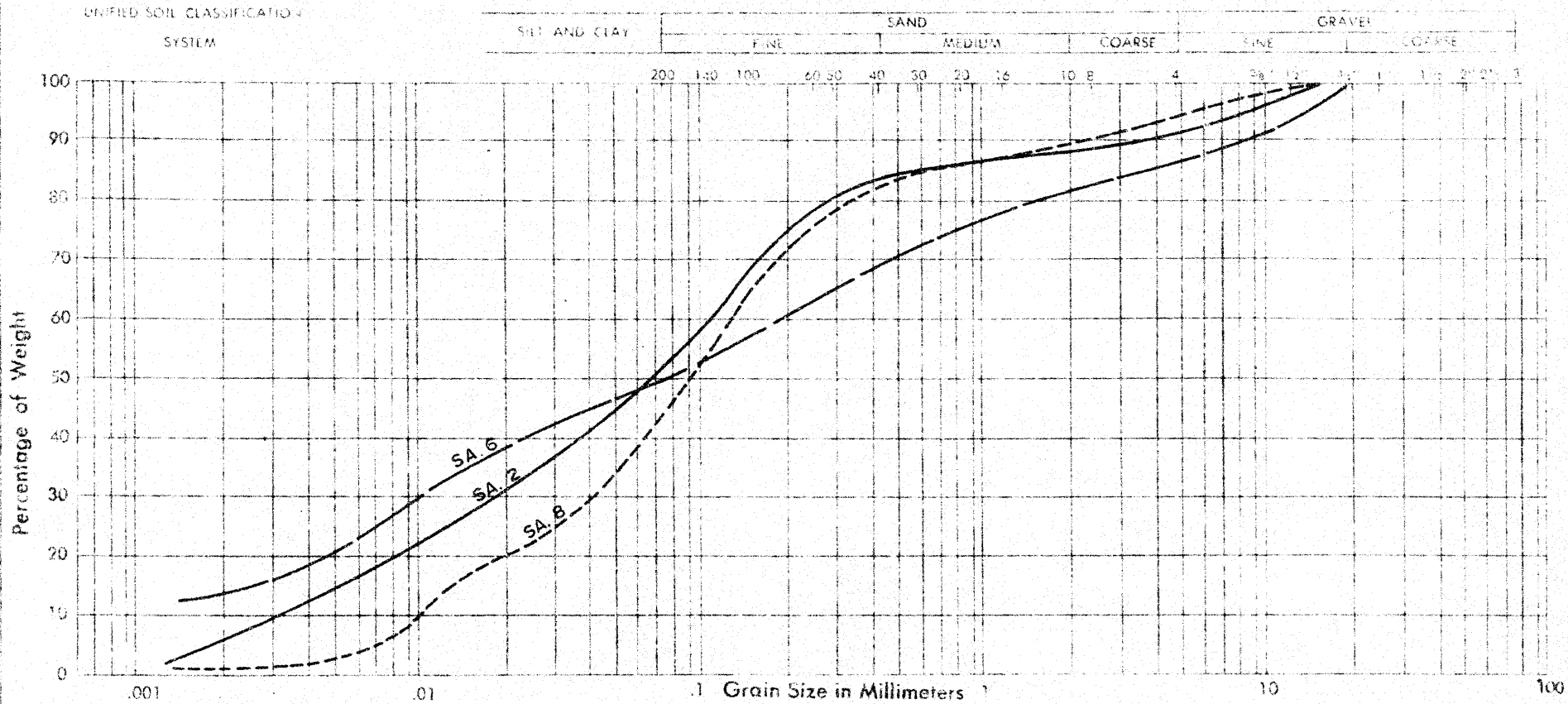
CL - ML  
(average)

Enclosure No.

# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6-11-11



PROJECT: W. J. 66 - F - 102  
 LOCATION: HWY. 27 @ RICHVIEW  
 BOREHOLE NO.: 2  
 SAMPLE NO.: 2 6 8  
 DEPTH OF SAMPLE: 10' 30' 40'  
 ELEVATION OF SAMPLE: 480.6' 460.6' 450.6'

COEFFICIENT OF UNIFORMITY SA. 8 : 13  
 COEFFICIENT OF CURVATURE 1.28

### Classification of Sample and Group Symbol:

CLAYEY SILT  
with sand

SILTY SAND

CL - ML

SW - SM

SA. 2 & 6

SA. 8

### PLASTIC PROPERTIES:

	CL - ML
LIQUID LIMIT %	19.0
PLASTIC LIMIT %	14.3
PLASTICITY INDEX %	4.7
MOISTURE CONTENT %	8.6
ACTIVITY	0.47

Enclosure No.



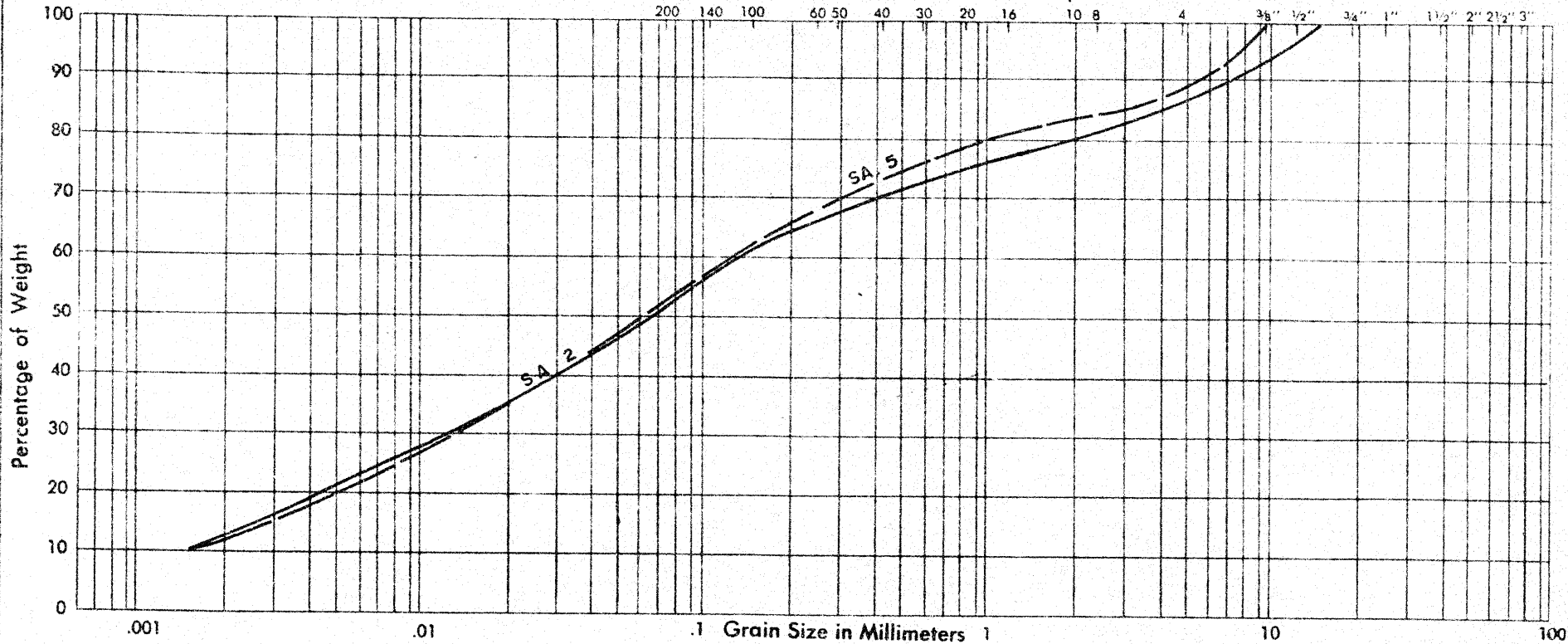
# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6-11-11

UNIFIED SOIL CLASSIFICATION  
SYSTEM

SILT AND CLAY	SAND						GRAVEL			
	FINE		MEDIUM		COARSE		FINE		COARSE	



PROJECT: W. J. 66 - F - 102  
 LOCATION: HWY. 27 @ RICHVIEW  
 BOREHOLE NO.: 3  
 SAMPLE NO.: 2 5  
 DEPTH OF SAMPLE: 10' 25'  
 ELEVATION OF SAMPLE: 482.7' 467.7'

COEFFICIENT OF UNIFORMITY  
 COEFFICIENT OF CURVATURE NON APPLICABLE

**Classification of Sample and Group Symbol:**  
 CLAYEY SILT with sand

CL - ML

PLASTIC PROPERTIES:

LIQUID LIMIT	% =	20.7
PLASTIC LIMIT	% =	14.5
PLASTICITY INDEX	% =	6.2
MOISTURE CONTENT	% =	10.8
ACTIVITY	=	0.5

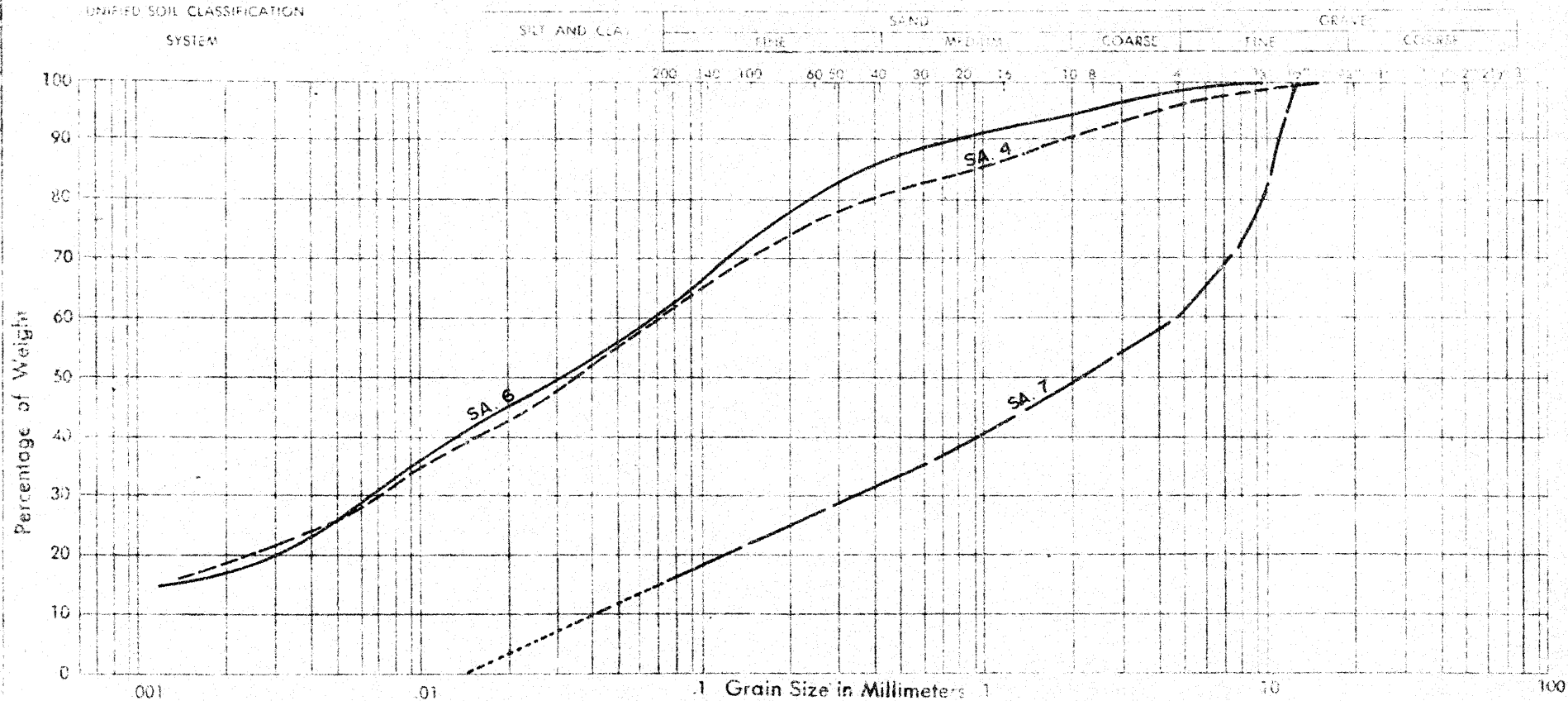
CL - ML  
(average)

Enclosure No.

# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6-11-11



PROJECT: W. J. 66 - F - 102  
 LOCATION: HWY. 27 @ RICHVIEW  
 BOREHOLE NO.: 4  
 SAMPLE NO.: 4 6 7  
 DEPTH OF SAMPLE: 20' 30' 35'  
 ELEVATION OF SAMPLE: 470.8' 460.8' 455.8'

COEFFICIENT OF UNIFORMITY SA. 7 : 8.7  
 COEFFICIENT OF CURVATURE 0.75

**Classification of Sample and Group Symbol:**

CLAYEY SILT with sand CL-ML	GRAVELLY SAND with some silt. GS-SP
-----------------------------------	---

SA. 4 & 6

SA. 7

PLASTIC PROPERTIES

TEST	RESULT	CL - ML
LIQUID LIMIT	21.0	21.0
PLASTIC LIMIT	14.0	14.0
PLASTICITY INDEX	7.0	7.0
MOISTURE CONTENT	11.3	11.3
ACTIVITY	0.41	0.41

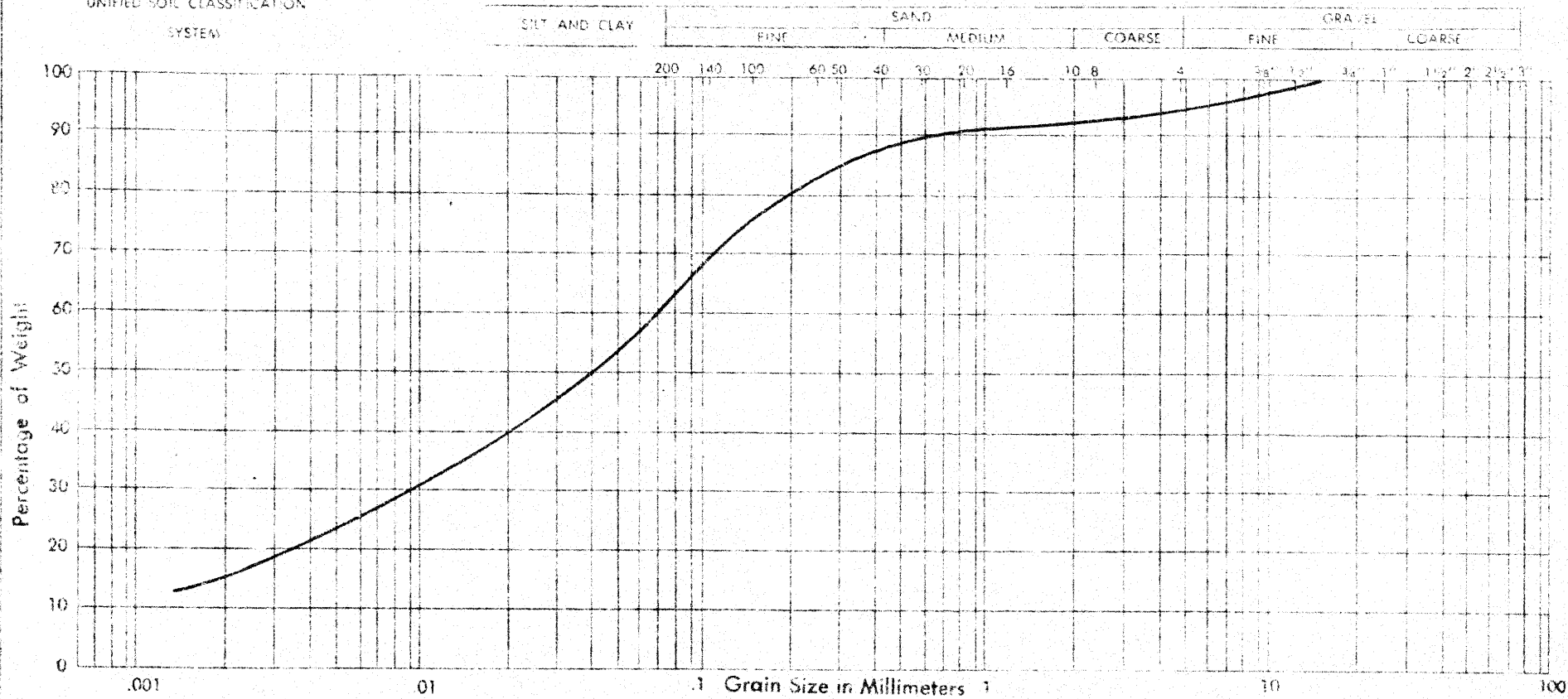
Enclosure No.

# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6-11-11

UNIFIED SOIL CLASSIFICATION  
SYSTEM



PROJECT: W.J. 66-F-102  
 LOCATION: HWY. NO 27 @ RICHVIEW  
 BOREHOLE NO.: 5  
 SAMPLE NO.: 3  
 DEPTH OF SAMPLE: 15'  
 ELEVATION OF SAMPLE: 484.7'

COEFFICIENT OF UNIFORMITY NON APPLICABLE  
 COEFFICIENT OF CURVATURE

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

PLASTIC PROPERTIES:

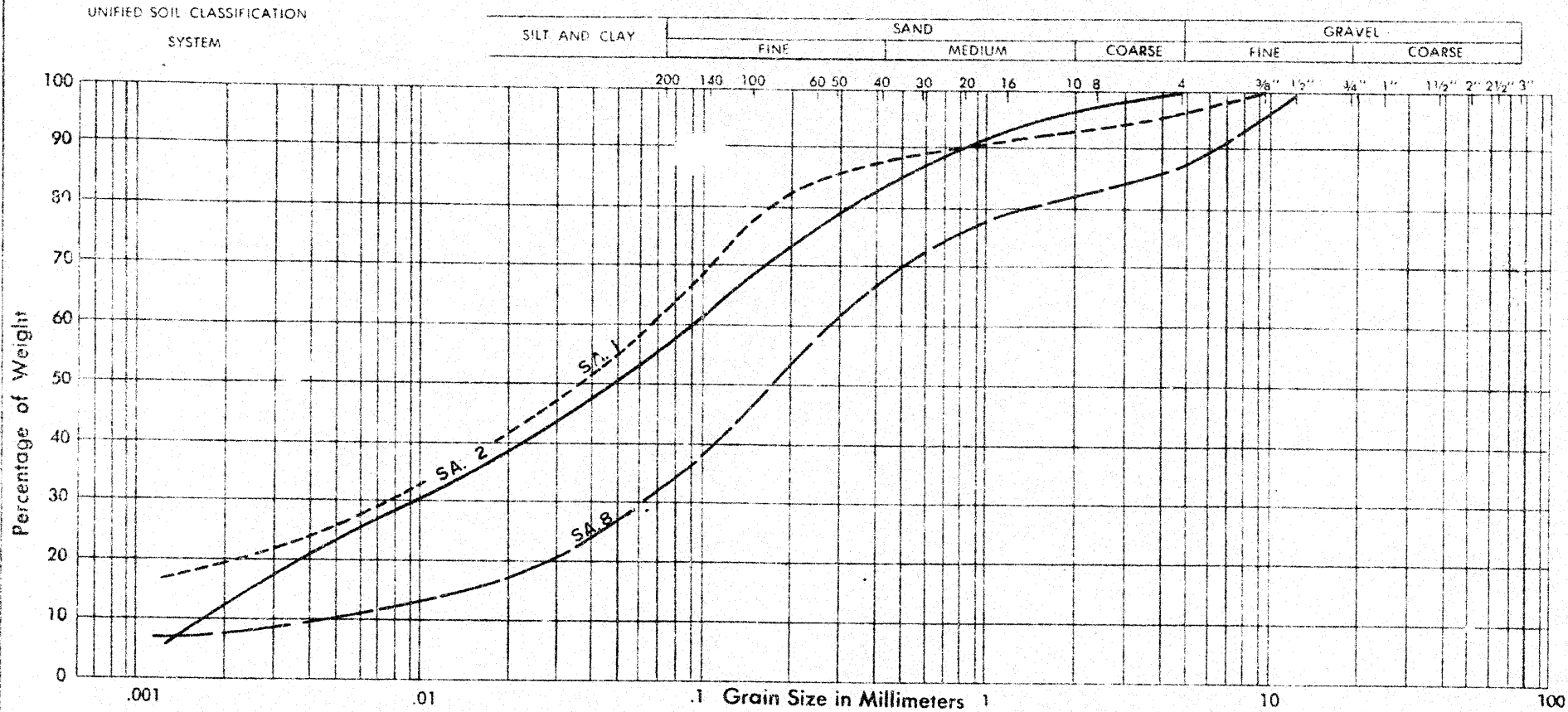
LIQUID LIMIT	$w_L =$	16.1
PLASTIC LIMIT	$w_p =$	10.9
PLASTICITY INDEX	$I_p =$	5.2
MOISTURE CONTENT	$w =$	9.8
ACTIVITY	$A =$	0.3

Enclosure No.

# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6-11-11



PROJECT: W.J. 66 - F - 102  
 LOCATION: HWY. 27 @ RICHVIEW  
 BOREHOLE NO.: 6  
 SAMPLE NO.: 1 2 8  
 DEPTH OF SAMPLE: 5' 10' 40'  
 ELEVATION OF SAMPLE: 493.8' 488.8' 458.8'

COEFFICIENT OF UNIFORMITY SA. No 8 : 6.1  
 COEFFICIENT OF CURVATURE 3

**Classification of Sample and Group Symbol:**

CLAYEY SILT with SAND CL - ML	SILTY SAND with some GRAVEL SW - SM
-------------------------------------	---

PLASTIC PROPERTIES: AVERAGE

LIQUID LIMIT	% =	21.0
PLASTIC LIMIT	% =	14.6
PLASTICITY INDEX	% =	6.3
MOISTURE CONTENT	% =	10.6
ACTIVITY	=	0.4

(1 & 2)

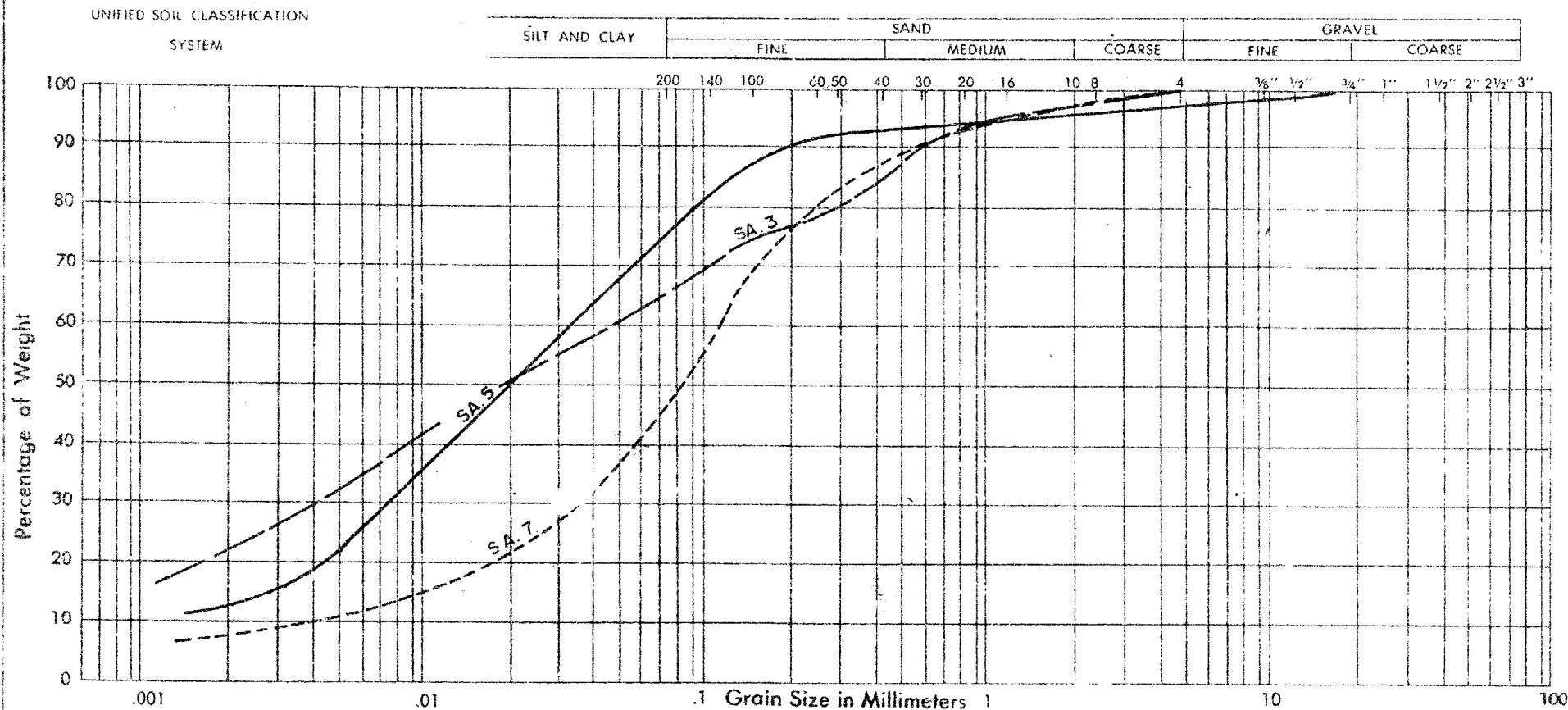
(8)

Enclosure No.

# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6 - 11 - 11



PROJECT: W. J. 66 - F - 102  
 LOCATION: HWY. 27 @ RICHVIEW  
 BOREHOLE NO.: 7  
 SAMPLE NO.: 3 5 7  
 DEPTH OF SAMPLE: 15' 25' 35'  
 ELEVATION OF SAMPLE: 4692' 4592' 4492'

COEFFICIENT OF UNIFORMITY SA. N<sup>o</sup> 7 : 30  
 COEFFICIENT OF CURVATURE 2.7

### Classification of Sample and Group Symbol:

CLAYEY SILT with SAND CL-ML	SANDY SILT with a trace of CLAY SM	SILTY SAND SW-SM
-----------------------------------	--	---------------------

PLASTIC PROPERTIES: SA. N<sup>o</sup> 3

LIQUID LIMIT	% =	18.4
PLASTIC LIMIT	% =	12.8
PLASTICITY INDEX	% =	5.6
MOISTURE CONTENT	% =	9.2
ACTIVITY	=	0.25

(3)

(5)

(7)

Enclosure No.

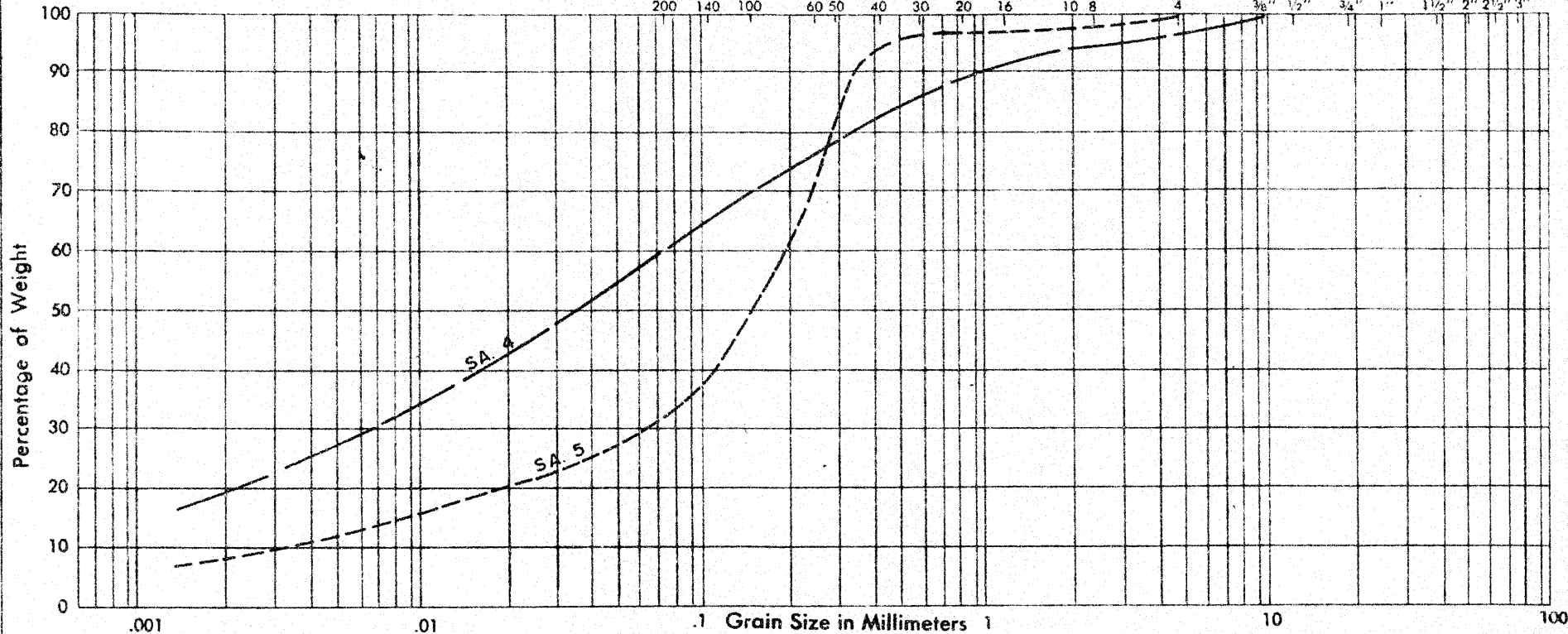
# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6 - II - 11

UNIFIED SOIL CLASSIFICATION  
SYSTEM

SILT AND CLAY	SAND			GRAVEL	
	FINE	MEDIUM	COARSE	FINE	COARSE



PROJECT: W. J. 66 - F - 101  
 LOCATION: HWY. 27 @ RICHVIEW  
 BOREHOLE NO.: 8  
 SAMPLE NO.: 4 5  
 DEPTH OF SAMPLE: 20' 25'  
 ELEVATION OF SAMPLE: 464.9' 459.9'

COEFFICIENT OF UNIFORMITY SA. No 5 : 67  
 COEFFICIENT OF CURVATURE 7

**Classification of Sample and Group Symbol:**  
 CLAYEY SILT      SILTY FINE SAND  
 with SAND      with a trace of CLAY

CL - ML

SP - SM

SA. 4

SA. 5

PLASTIC PROPERTIES:

CL - ML

LIQUID LIMIT % = 18.1  
 PLASTIC LIMIT % = 12.6  
 PLASTICITY INDEX % = 5.5  
 MOISTURE CONTENT % = 10.3  
 ACTIVITY = 0.3

Enclosure No.

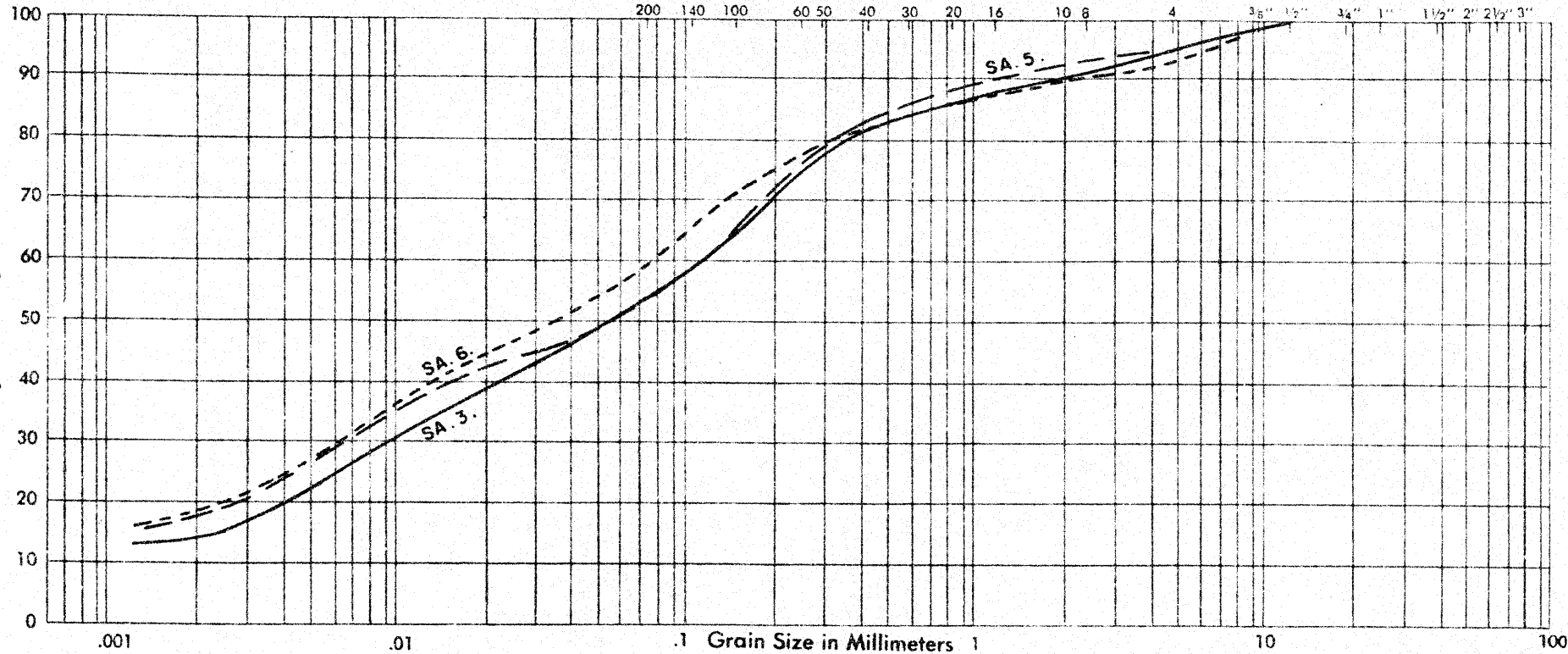
# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO **6-11-11**

UNIFIED SOIL CLASSIFICATION  
SYSTEM

SILT AND CLAY	SAND			GRAVEL	
	FINE	MEDIUM	COARSE	FINE	COARSE



PROJECT: **W. J. 66 - F - 102**  
 LOCATION: **HWY. 27 @ RICHVIEW**  
 BOREHOLE NO.: **9**  
 SAMPLE NO.: **3      5      6**  
 DEPTH OF SAMPLE: **15'    25'    30'**  
 ELEVATION OF SAMPLE: **479'    469'    464'**

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      % = **17.9**  
 PLASTIC LIMIT    % = **12.4**  
 PLASTICITY INDEX    % = **5.5**  
 MOISTURE CONTENT    % = **10.3**  
 ACTIVITY            = **0.3**

Enclosure No.



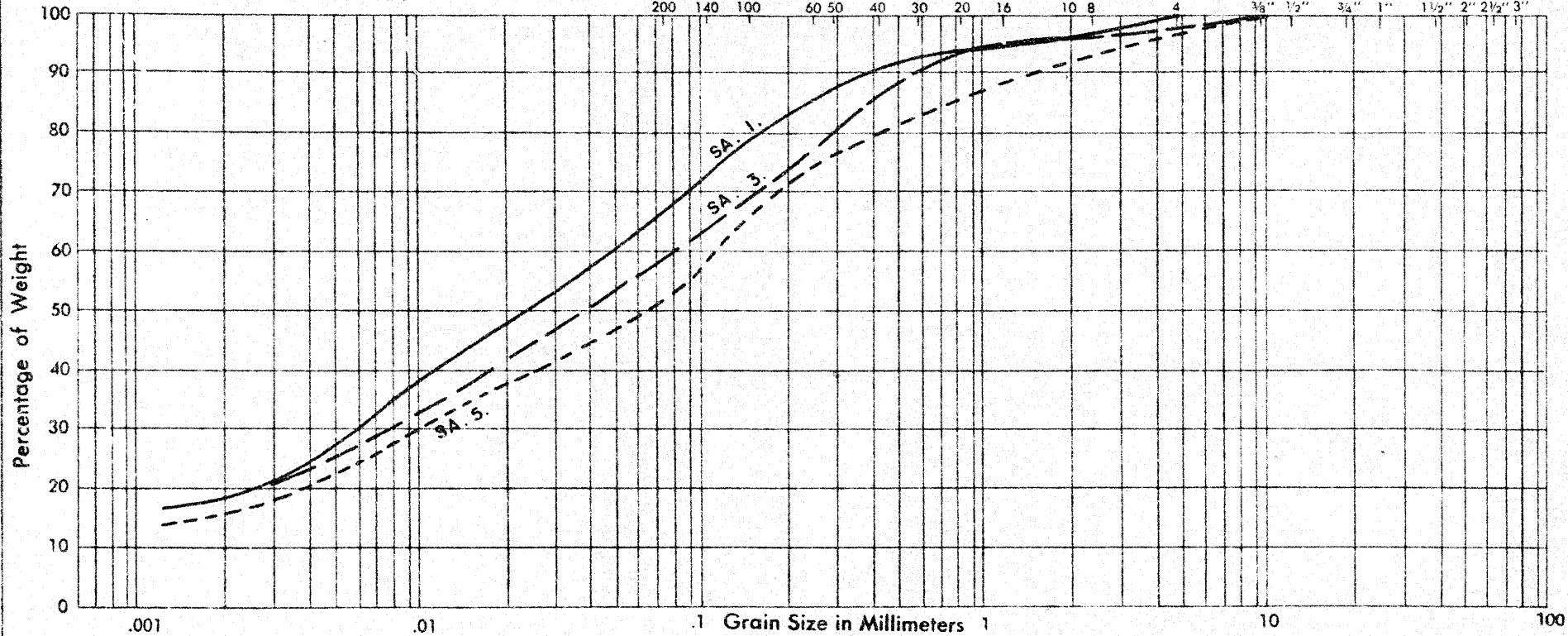
# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6-11-11

UNIFIED SOIL CLASSIFICATION  
SYSTEM

SILT AND CLAY	SAND			GRAVEL	
	FINE	MEDIUM	COARSE	FINE	COARSE



PROJECT: W. J. 66 - F - 102  
 LOCATION: HWY. 27 @ RICHVIEW  
 BOREHOLE NO.: 10  
 SAMPLE NO.: 1 3 5  
 DEPTH OF SAMPLE: 5' 15' 25'  
 ELEVATION OF SAMPLE: 490' 480' 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	% =	16.9
PLASTIC LIMIT	% =	12.6
PLASTICITY INDEX	% =	4.3
MOISTURE CONTENT	% =	8.9
ACTIVITY	=	0.2

Enclosure No.



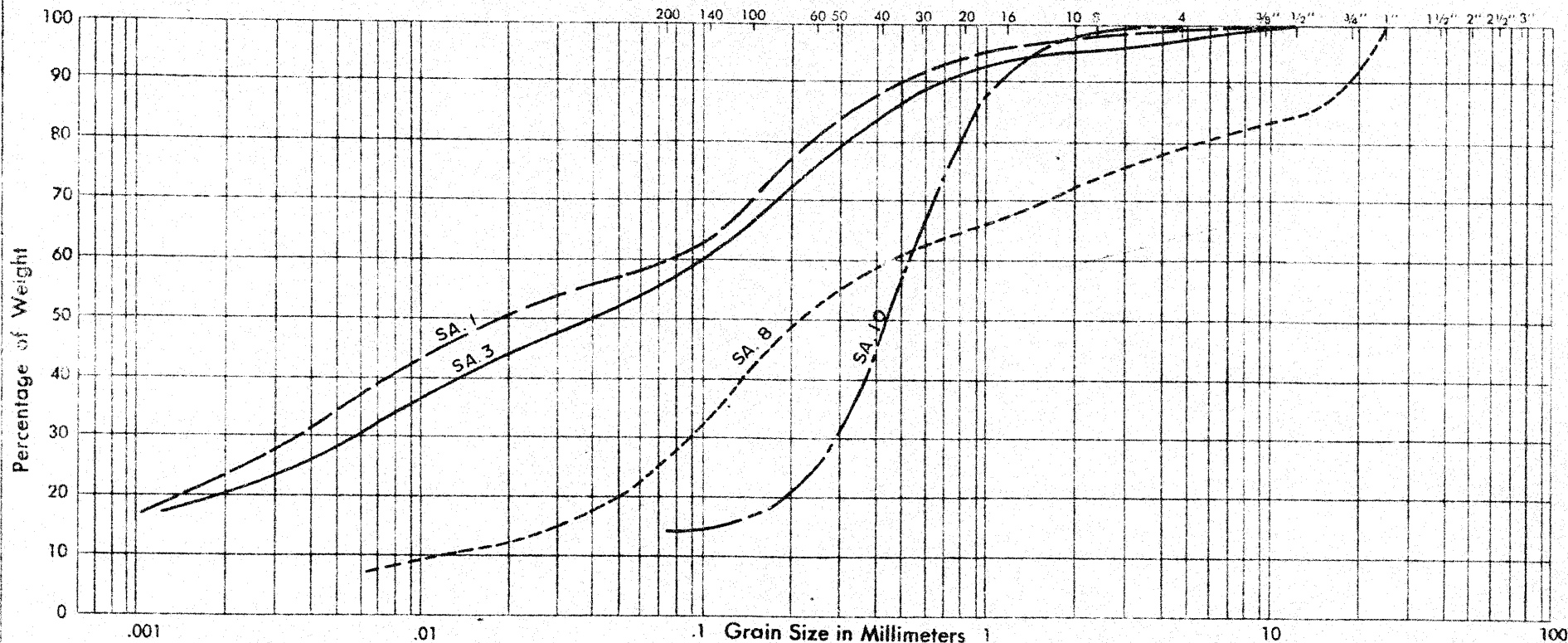
# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6-11-11

UNIFIED SOIL CLASSIFICATION  
SYSTEM

SILT AND CLAY	SAND			GRAVEL	
	FINE	MEDIUM	COARSE	FINE	COARSE



PROJECT: W. J. 66 - F - 102

LOCATION: HWY. 27 @ RICHVIEW

BOREHOLE NO.: 11

SAMPLE NO.: 1 3 8 10

DEPTH OF SAMPLE: 3' 10' 35' 45'

ELEVATION OF SAMPLE: 489.6' 482.6' 457.6' 447.6'

COEFFICIENT OF UNIFORMITY

COEFFICIENT OF CURVATURE

SA. 8

3.8

1.5

SA. 10

~55

> 15

PLASTIC PROPERTIES:

SA.1 SA.3

LIQUID LIMIT % = 25.1 15.3

PLASTIC LIMIT % = 16.7 11.2

PLASTICITY INDEX % = 8.4 4.1

MOISTURE CONTENT % = 15.6 8.1

ACTIVITY = 0.4 0.2

### Classification of Sample and Group Symbol:

CLAYEY SILT with SAND CL	CLAYEY SILT with SAND CL - ML	SILTY SAND with GRAVEL SW - SM	Fine to Medium SAND SP
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(1)

(3)

(8)

(10)

Enclosure No.

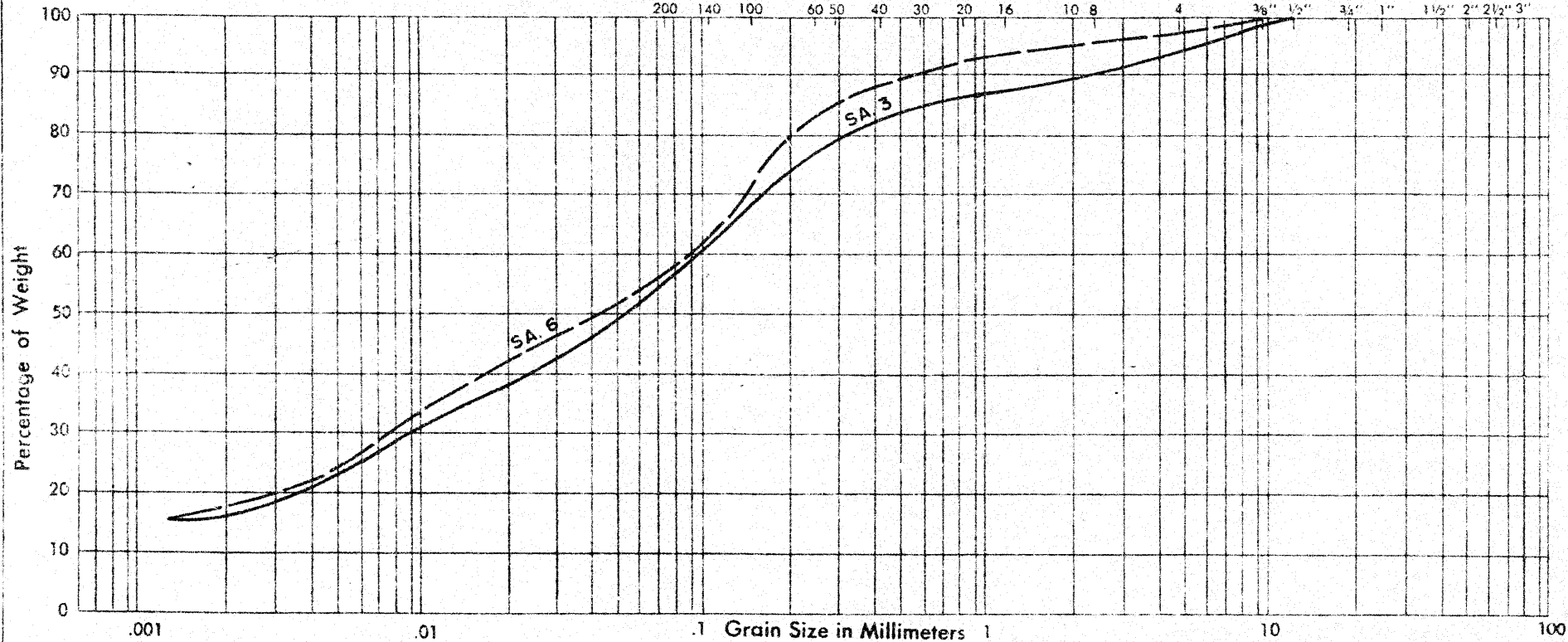
# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6-11-11

UNIFIED SOIL CLASSIFICATION  
SYSTEM

SILT AND CLAY	SAND			GRAVEL	
	FINE	MEDIUM	COARSE	FINE	COARSE



PROJECT: W.J. 66-F-102  
LOCATION: HWY. NO 27 @ RICHVIEW  
BOREHOLE NO.: 12  
SAMPLE NO.: 3 6  
DEPTH OF SAMPLE: 15' 30'  
ELEVATION OF SAMPLE: 481.6' 466.6'

COEFFICIENT OF UNIFORMITY NON APPLICABLE  
COEFFICIENT OF CURVATURE

**Classification of Sample and Group Symbol:**  
CLAYEY SILT with SAND

CL-ML

PLASTIC PROPERTIES: average

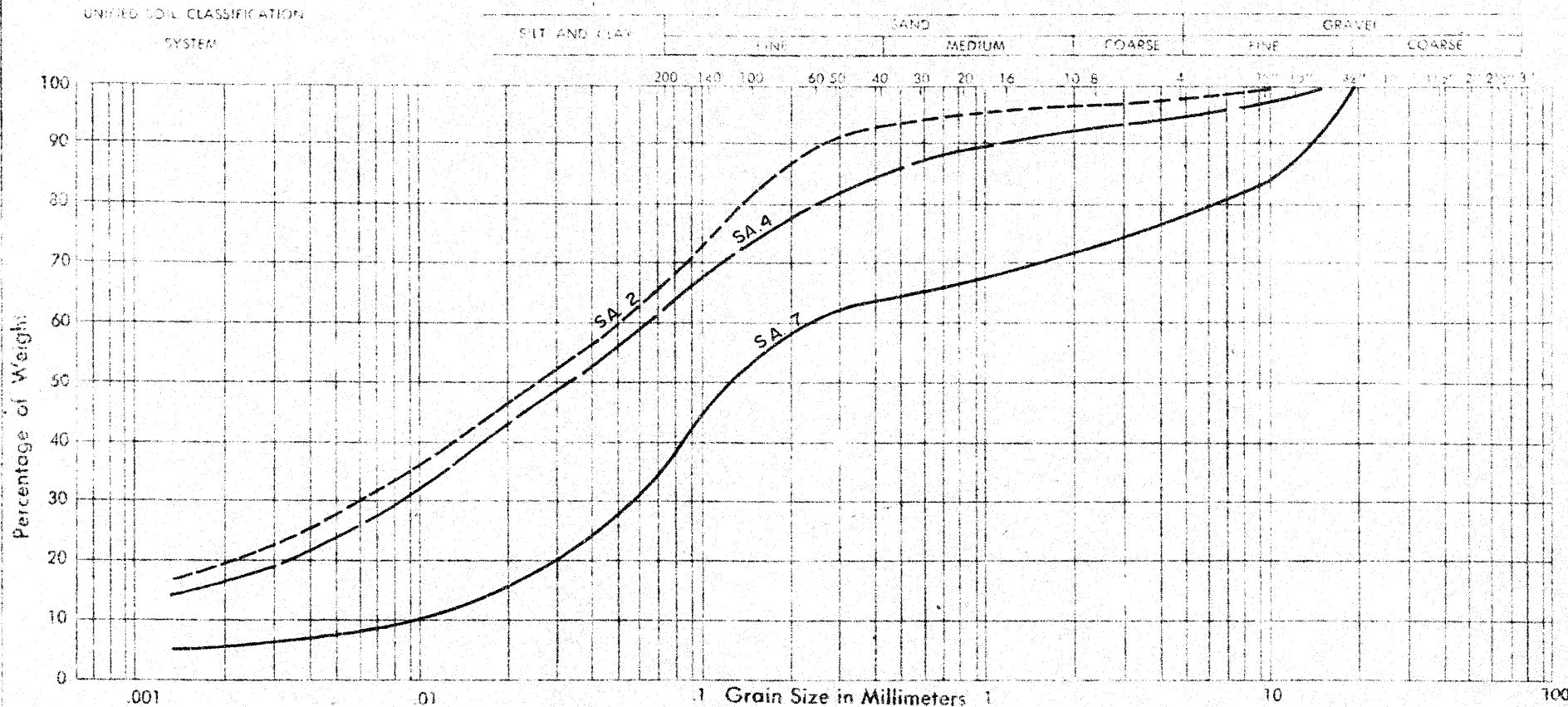
LIQUID LIMIT % = 19.7  
PLASTIC LIMIT % = 13.7  
PLASTICITY INDEX % = 6.0  
MOISTURE CONTENT % = 10.2  
ACTIVITY = 0.35

Enclosure No.

# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6-11-11



PROJECT: W. J. 66 - F - 102  
 LOCATION: HWY. 27 @ RICHVIEW  
 BOREHOLE NO.: 13  
 SAMPLE NO.: 2 4 7  
 DEPTH OF SAMPLE: 10' 20' 35'  
 ELEVATION OF SAMPLE: 482.3' 472.3' 457.3'

COEFFICIENT OF UNIFORMITY SA. N° 7: 25.6  
 COEFFICIENT OF CURVATURE 2.2

**Classification of Sample and Group Symbol:**  
 CLAYEY SILT with SAND | SILTY SAND with some GRAVEL.  
 CL-ML | SW-SM

(SA's 2 & 4)

(SA. N° 7)

PLASTIC PROPERTIES		average
	SA's 1 to 5	
LIQUID LIMIT	%	20.8
PLASTIC LIMIT	%	14.2
PLASTICITY INDEX	%	6.6
MOISTURE CONTENT	%	13.7
ACTIVITY		0.4

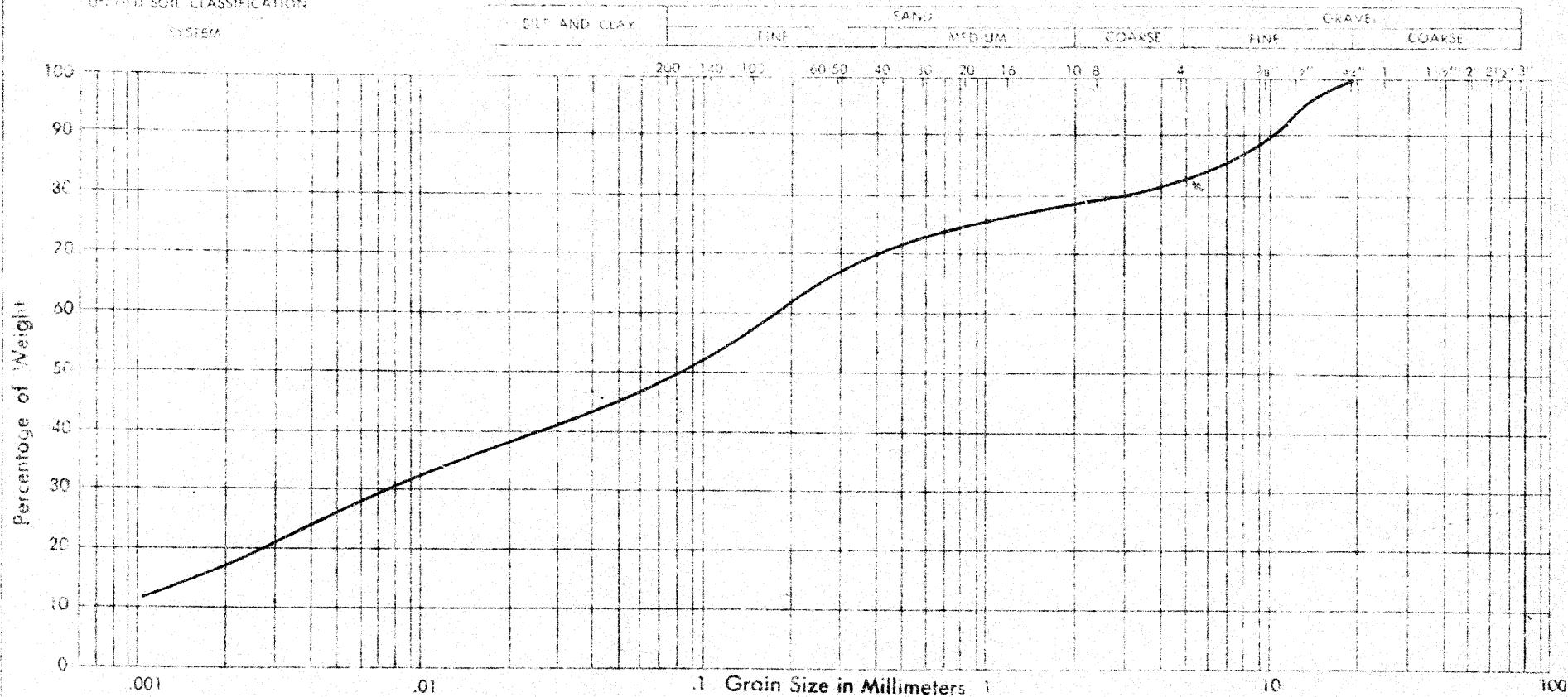
Enclosure No.

# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6 - 11-11

UNIFIED SOIL CLASSIFICATION  
SYSTEM



PROJECT: W. J. 66-F-102  
 LOCATION: HWY. 27 @ RICHVIEW  
 BOREHOLE NO.: 15  
 SAMPLE NO.: 5  
 DEPTH OF SAMPLE: 20'  
 ELEVATION OF SAMPLE: 436.7'

COEFFICIENT OF UNIFORMITY  
 COEFFICIENT OF CURVATURE

NON APPLICABLE

**Classification of Sample and Group Symbol:**  
 CLAYEY SILT with SAND  
 and some GRAVEL

C.L.

PLASTIC PROPERTIES:

LIQUID LIMIT	% =	22.8
PLASTIC LIMIT	% =	14.6
PLASTICITY INDEX	% =	8.2
MOISTURE CONTENT	% =	—
ACTIVITY	=	0.5

Enclosure No.

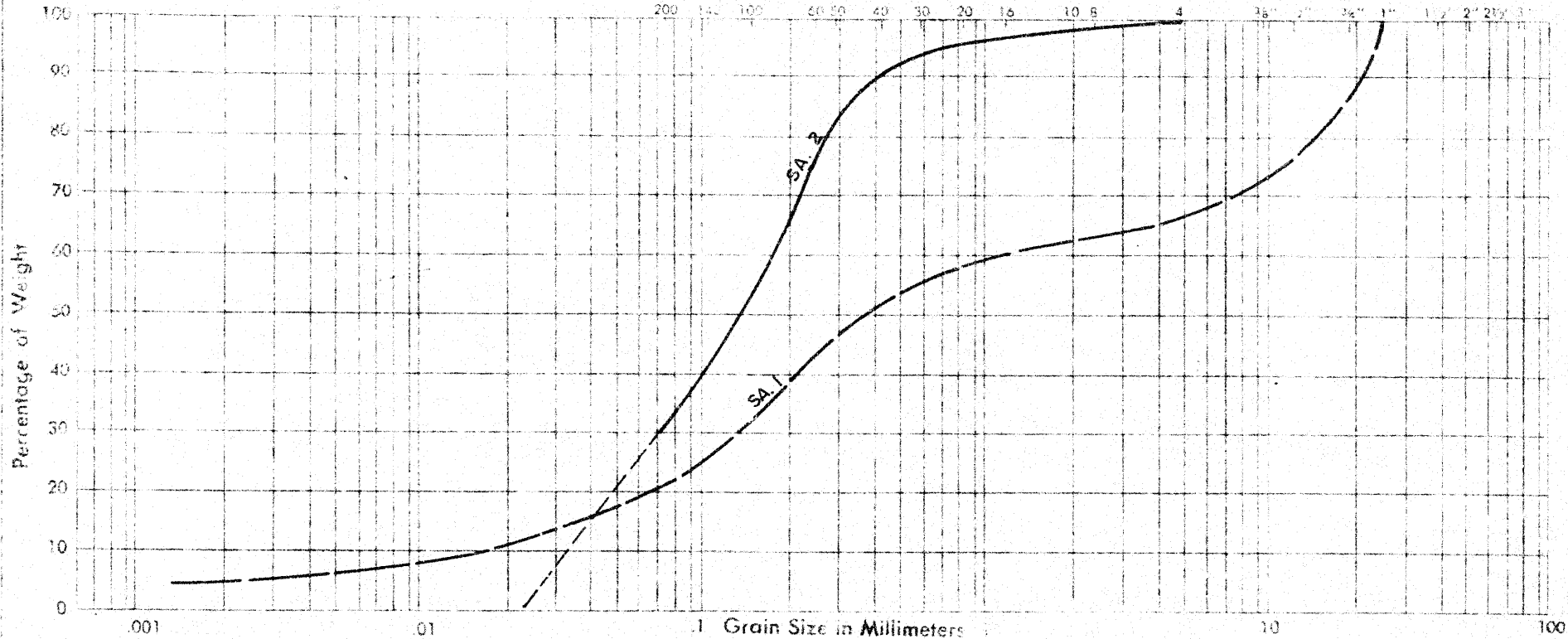
# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6-11-11

UNIFIED SOIL CLASSIFICATION  
SYSTEM

SILT AND CLAY		SAND				GRAVEL		
		FINE	MEDIUM	COARSE		FINE	COARSE	



PROJECT: W.J. 66-F-102  
LOCATION: HWY. 27 @ RICHVIEW  
BOREHOLE NO. 16  
SAMPLE NO. 1 2  
DEPTH OF SAMPLE 5' 10'  
ELEVATION OF SAMPLE 453.0' 448.0'

COEFFICIENT OF UNIFORMITY SA.1 66 SA.2 52  
COEFFICIENT OF CURVATURE SA.1 1.01 SA.2 1.02

Classification of Sample and Group Symbol:  
GRAVELLY SAND | SILTY FINE SAND  
with some SILT. |  
GS-SW | SP-SM

SA. 1

SA. 2

PLASTIC PROPERTIES

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

Enclosure No.

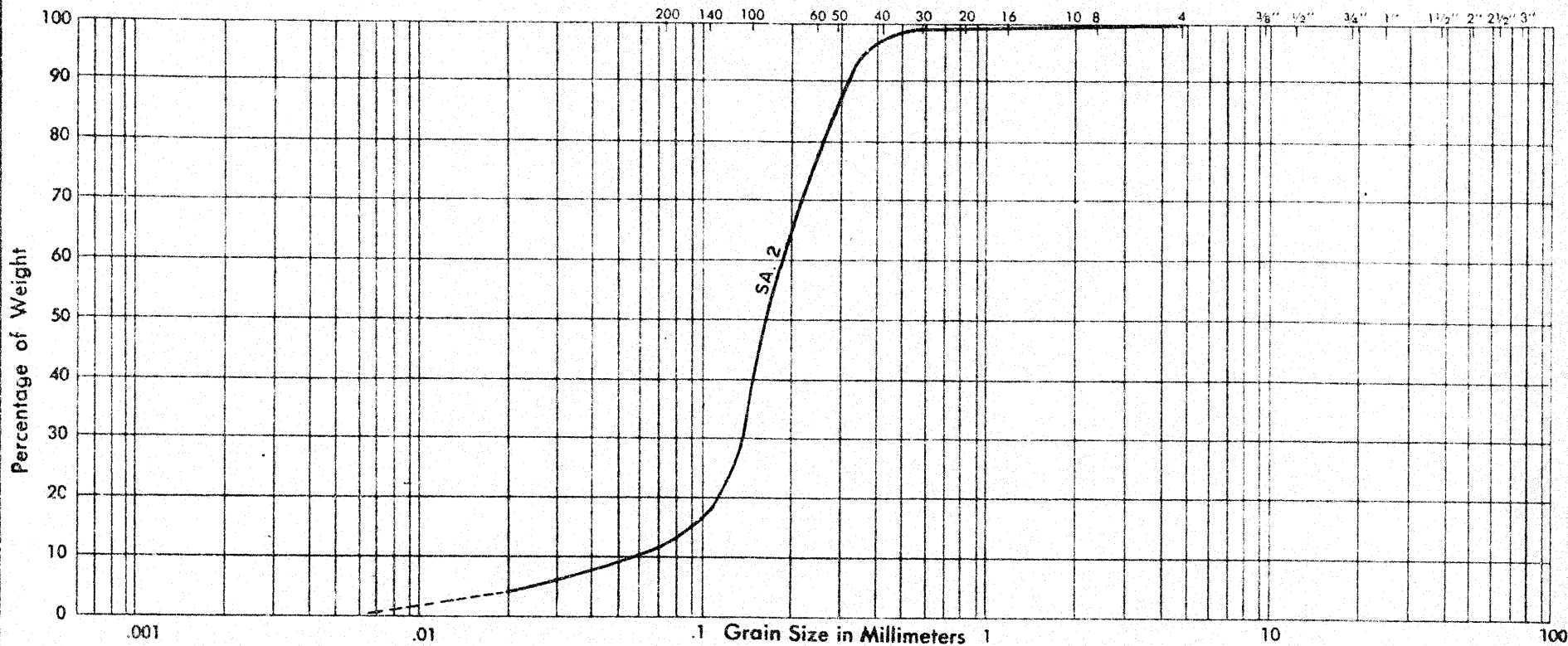
# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6-11-11

UNIFIED SOIL CLASSIFICATION  
SYSTEM

SILT AND CLAY	SAND			GRAVEL	
	FINE	MEDIUM	COARSE	FINE	COARSE



PROJECT: W. J. 66 - F - 102  
 LOCATION: HWY. 27 @ RICHVIEW  
 BOREHOLE NO.: 17  
 SAMPLE NO.: 2  
 DEPTH OF SAMPLE: 10'  
 ELEVATION OF SAMPLE: 448.6'

COEFFICIENT OF UNIFORMITY 3.2  
 COEFFICIENT OF CURVATURE 1.7

**Classification of Sample and Group Symbol:**  
 FINE SAND with a trace of SILT

S P

PLASTIC PROPERTIES:

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

Enclosure No.

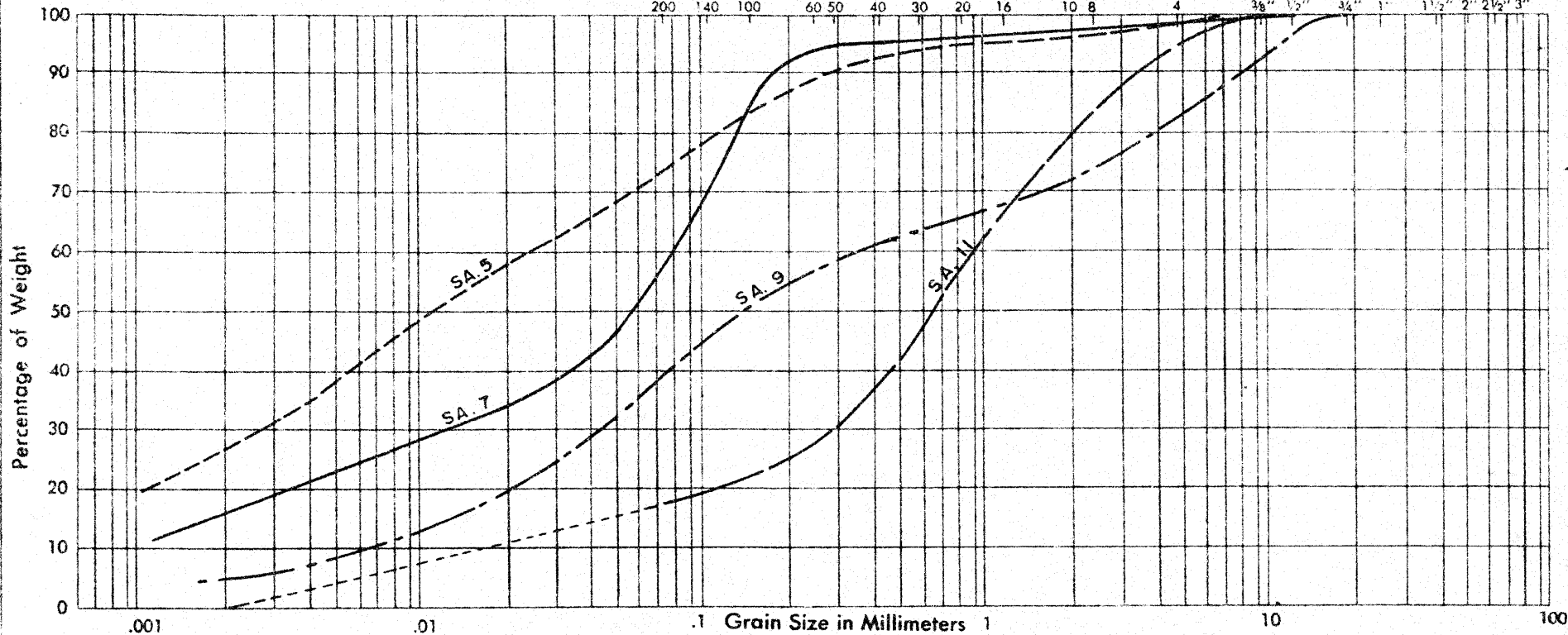
# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO 6 - 11 - 11

UNIFIED SOIL CLASSIFICATION  
SYSTEM

SILT AND CLAY	SAND			GRAVEL	
	FINE	MEDIUM	COARSE	FINE	COARSE



PROJECT: W.J. 66 - F - 102

LOCATION: HWY. 27 @ RICHVIEW

BOREHOLE NO.: 18

SAMPLE NO.: 5 7 9 11

DEPTH OF SAMPLE: 25' 35' 45' 55'

ELEVATION OF SAMPLE: 476.1' 466.1' 456.1' 446.1'

COEFFICIENT OF UNIFORMITY

SA. 9  
5.1

SA. 11  
5.3

COEFFICIENT OF CURVATURE

0.87

5.6

PLASTIC PROPERTIES:

			C.L. (average)
LIQUID LIMIT	%	=	21.4
PLASTIC LIMIT	%	=	14.1
PLASTICITY INDEX	%	=	7.3
MOISTURE CONTENT	%	=	9.9
ACTIVITY		=	0.28

### Classification of Sample and Group Symbol:

CLAYEY SILT with sand C.L.	SANDY SILT with a trace of clay. M.L.	SILTY SAND with some gravel. SP-SM	SILTY SAND S.P.
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Nº 5

Nº 7

Nº 9

Nº 11

Enclosure No.



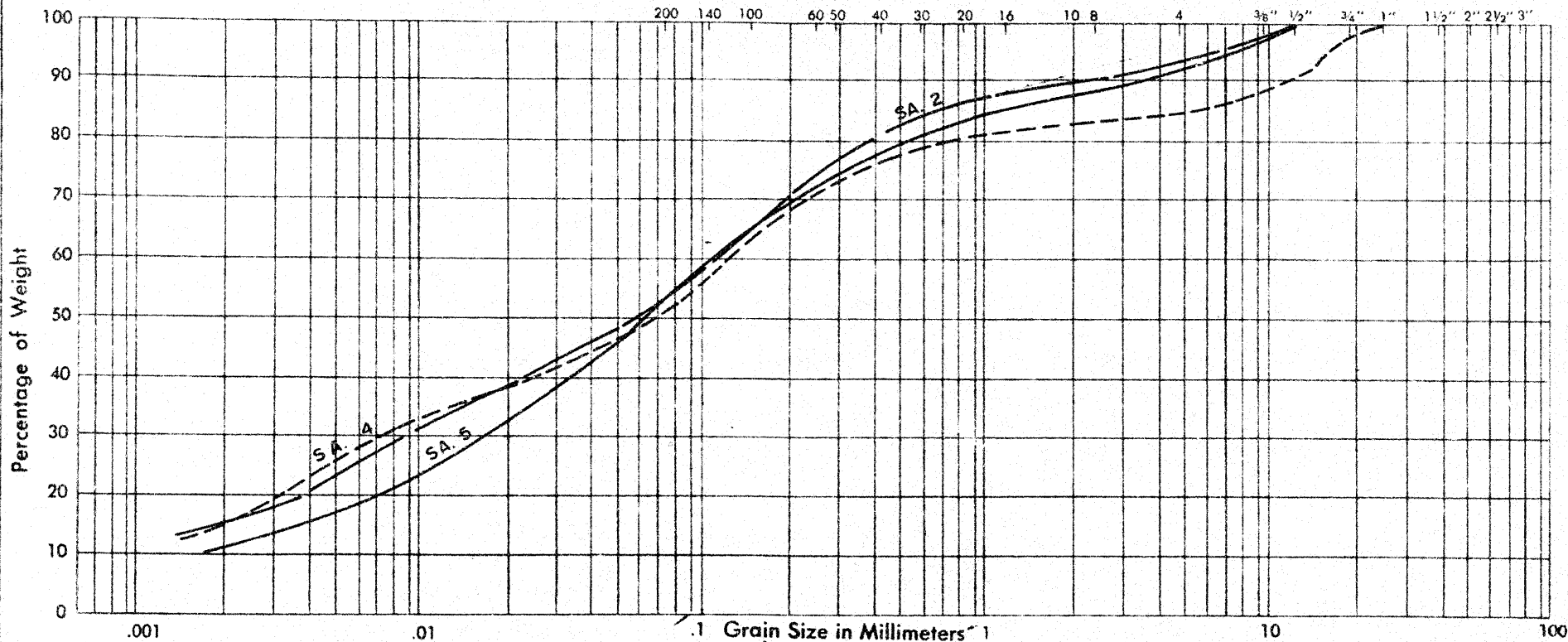
# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6-11-11

UNIFIED SOIL CLASSIFICATION  
SYSTEM

SILT AND CLAY	SAND			GRAVEL	
	FINE	MEDIUM	COARSE	FINE	COARSE



PROJECT: W. J. 66 - F - 102

LOCATION: HWY. 27 @ RICHVIEW

BOREHOLE NO.: 19

SAMPLE NO.: 2 4 5

DEPTH OF SAMPLE: 10' 20' 25'

ELEVATION OF SAMPLE: 481.6' 471.6' 466.6'

COEFFICIENT OF UNIFORMITY

COEFFICIENT OF CURVATURE

NON APPLICABLE

**Classification of Sample and Group Symbol:**

CLAYEY SILT with sand

C L

PLASTIC PROPERTIES:

		C L (average)
LIQUID LIMIT	% =	22.5
PLASTIC LIMIT	% =	14.6
PLASTICITY INDEX	% =	7.9
MOISTURE CONTENT	% =	10.0
ACTIVITY	=	0.53

Enclosure No.

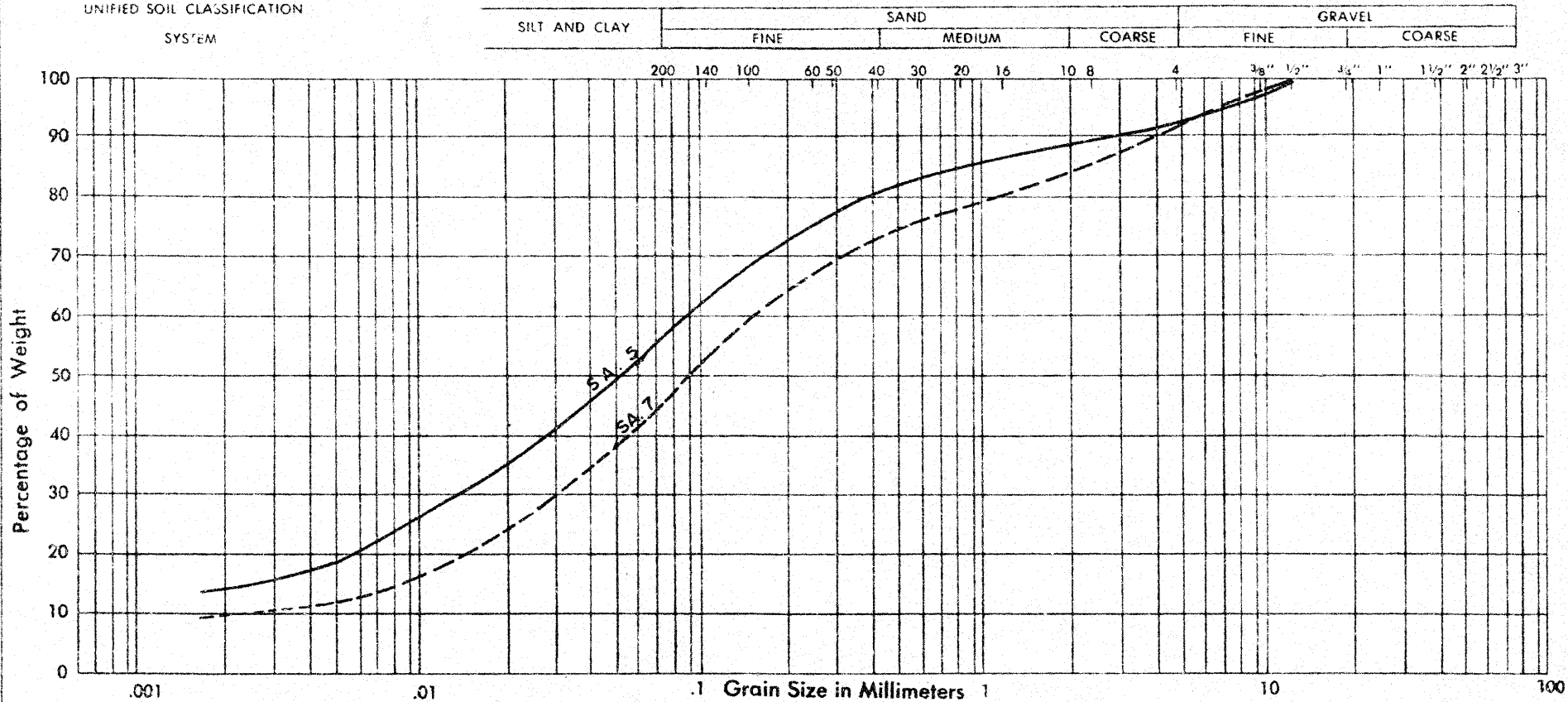


# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6-11-11

UNIFIED SOIL CLASSIFICATION  
SYSTEM



PROJECT: W.J. 66 - F - 102  
LOCATION: HWY. 27 @ RICHVIEW  
BOREHOLE NO.: 20  
SAMPLE NO.: 5 7  
DEPTH OF SAMPLE: 25' 35'  
ELEVATION OF SAMPLE: 467.5' 457.5'

COEFFICIENT OF UNIFORMITY SA. No 7 70  
COEFFICIENT OF CURVATURE 3.2

**Classification of Sample and Group Symbol:**  
CLAYEY SILT with sand  
SILTY SAND with a trace of clay and gravel

CL

SP - SM

PLASTIC PROPERTIES:

CL  
(average)

LIQUID LIMIT	% =	22.9
PLASTIC LIMIT	% =	15.8
PLASTICITY INDEX	% =	7.1
MOISTURE CONTENT	% =	14.8
ACTIVITY	=	0.5

Enclosure No.

SA. 5

SA. 7

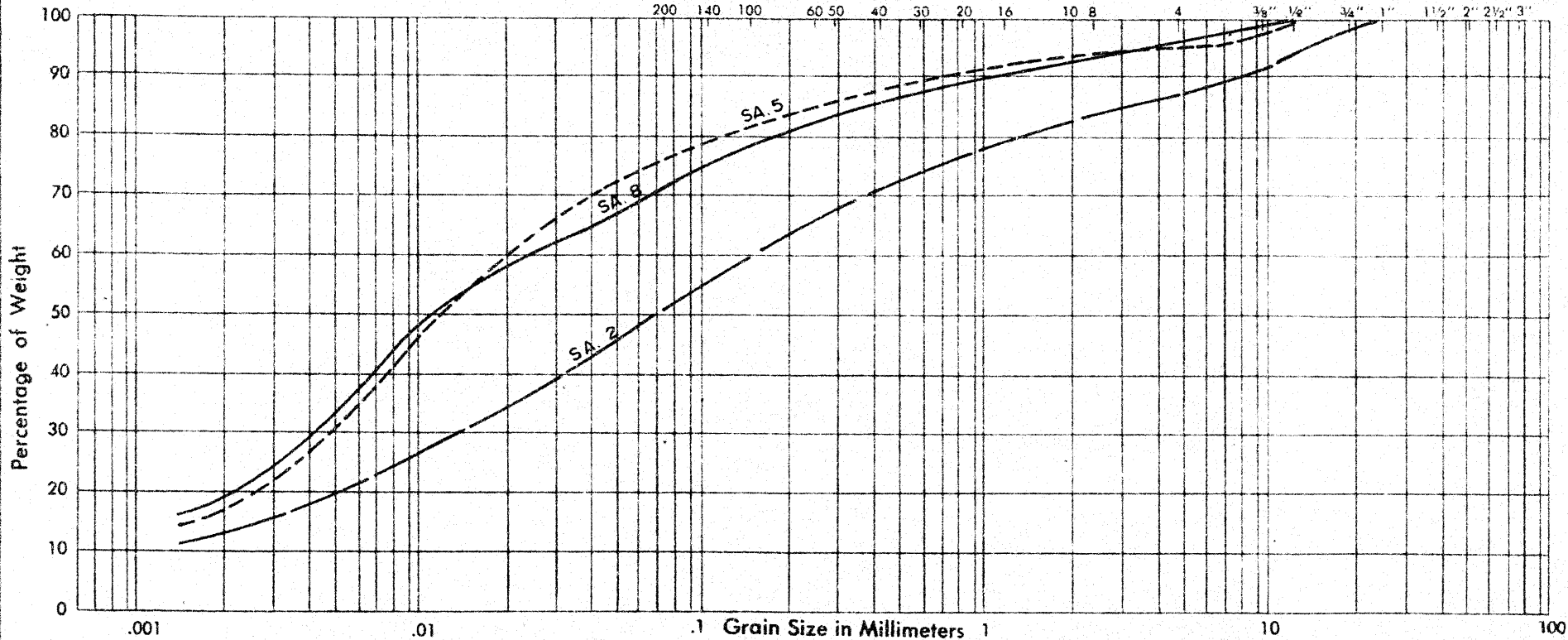
# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6-11-11

UNIFIED SOIL CLASSIFICATION  
SYSTEM

SILT AND CLAY	SAND			GRAVEL	
	FINE	MEDIUM	COARSE	FINE	COARSE



PROJECT: W. J. 66 - F - 102  
 LOCATION: HWY. 27 @ RICHVIEW  
 BOREHOLE NO.: 21  
 SAMPLE NO.: 2 5 8  
 DEPTH OF SAMPLE: 10' 25' 40'  
 ELEVATION OF SAMPLE: 487.2' 472.2' 457.2'

COEFFICIENT OF UNIFORMITY  
 COEFFICIENT OF CURVATURE NON APPLICABLE

**Classification of Sample and Group Symbol:**  
 CLAYEY SILT with sand

CL - ML

PLASTIC PROPERTIES:

LIQUID LIMIT	% =	17.2
PLASTIC LIMIT	% =	12.8
PLASTICITY INDEX	% =	4.4
MOISTURE CONTENT	% =	10.4
ACTIVITY	=	0.26

Enclosure No.

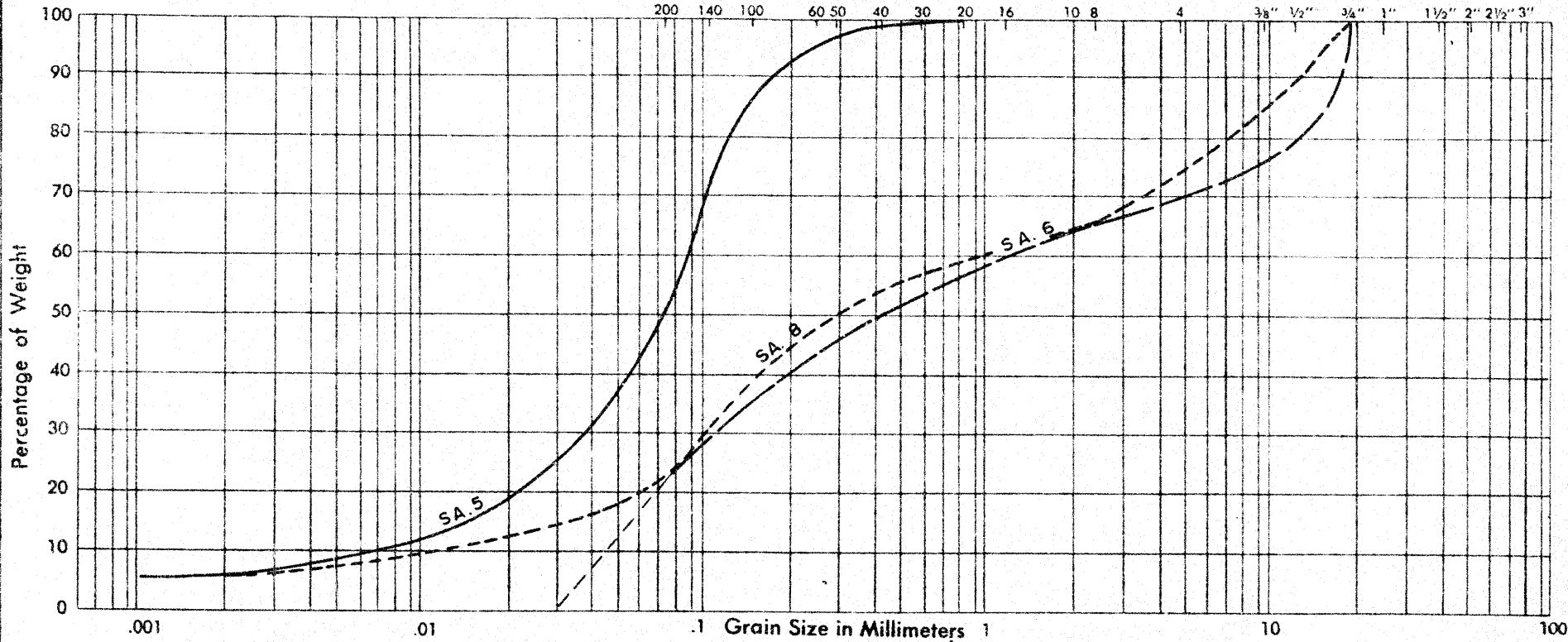
# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6 - 11 - 11

UNIFIED SOIL CLASSIFICATION  
SYSTEM

SILT AND CLAY	SAND			GRAVEL	
	FINE	MEDIUM	COARSE	FINE	COARSE



PROJECT: W. J. 66 - F - 102  
 LOCATION: HWY. 27 a) RICHVIEW  
 BOREHOLE NO.: 2 2  
 SAMPLE NO.: 5 6 8  
 DEPTH OF SAMPLE: 25' 30' 40'  
 ELEVATION OF SAMPLE: 456.2' 451.2' 441.2'

COEFFICIENT OF UNIFORMITY  
 COEFFICIENT OF CURVATURE

SA. 5	SA. 6	SA. 8
12	~2.4	82
2.3	~0.24	1.2

PLASTIC PROPERTIES:

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

**Classification of Sample and Group Symbol:**

SAND and SILT  SW-ML	GRAVELLY SAND with some silt.  GS-SM
----------------------------	---

SA. 5

SA. 6 8 8

Enclosure No.

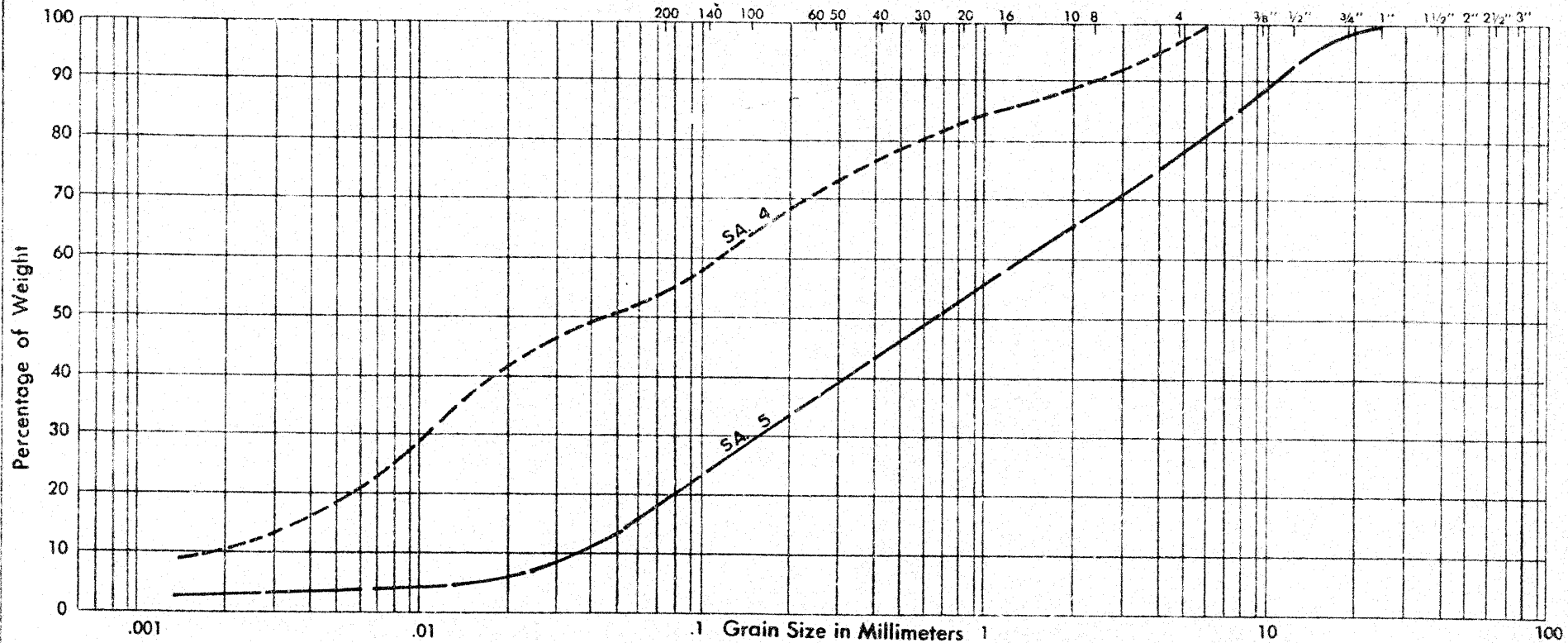
# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6-11-11

UNIFIED SOIL CLASSIFICATION  
SYSTEM

SILT AND CLAY	SAND			GRAVEL	
	FINE	MEDIUM	COARSE	FINE	COARSE



PROJECT: W. J. 66 - F - 102  
LOCATION: HWY. 27 @ RICHVIEW  
BOREHOLE NO.: 23  
SAMPLE NO.: 4 5  
DEPTH OF SAMPLE: 20' 25'  
ELEVATION OF SAMPLE: 460.3' 455.3'

COEFFICIENT OF UNIFORMITY S A. 5 : 3.8  
COEFFICIENT OF CURVATURE 0.5

PLASTIC PROPERTIES:

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

**Classification of Sample and Group Symbol:**  
SANDY SILT SAND with  
with a trace of clay some gravel and silt

SM - ML

SP

S A. 4

S A. 5

Enclosure No.

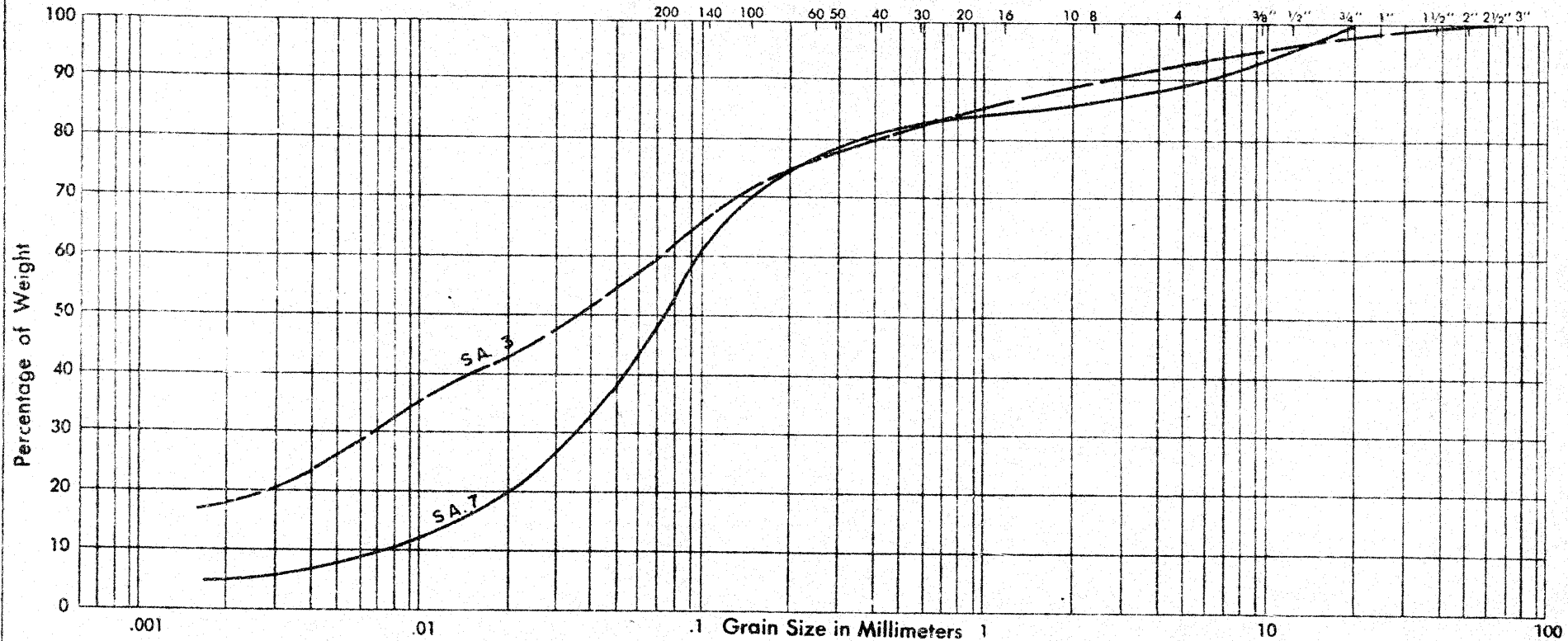
# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6-11-11

UNIFIED SOIL CLASSIFICATION  
SYSTEM

SILT AND CLAY	SAND			GRAVEL	
	FINE	MEDIUM	COARSE	FINE	COARSE



PROJECT: W. J. 66 - F - 102  
 LOCATION: HWY. 27 @ RICHVIEW  
 BOREHOLE NO.: 24  
 SAMPLE NO.: 3 7  
 DEPTH OF SAMPLE: 15' 35'  
 ELEVATION OF SAMPLE: 484.3' 464.3'

COEFFICIENT OF UNIFORMITY  
 COEFFICIENT OF CURVATURE

NON APPLICABLE

**Classification of Sample and Group Symbol:**  
 CLAYEY SILT SAND and SILT  
 with sand. with a trace of gravel

CL - ML

S M

PLASTIC PROPERTIES:

		CL - ML (average)
LIQUID LIMIT	% =	20.5
PLASTIC LIMIT	% =	14.5
PLASTICITY INDEX	% =	6.0
MOISTURE CONTENT	% =	10.2
ACTIVITY	=	0.3

Enclosure No.

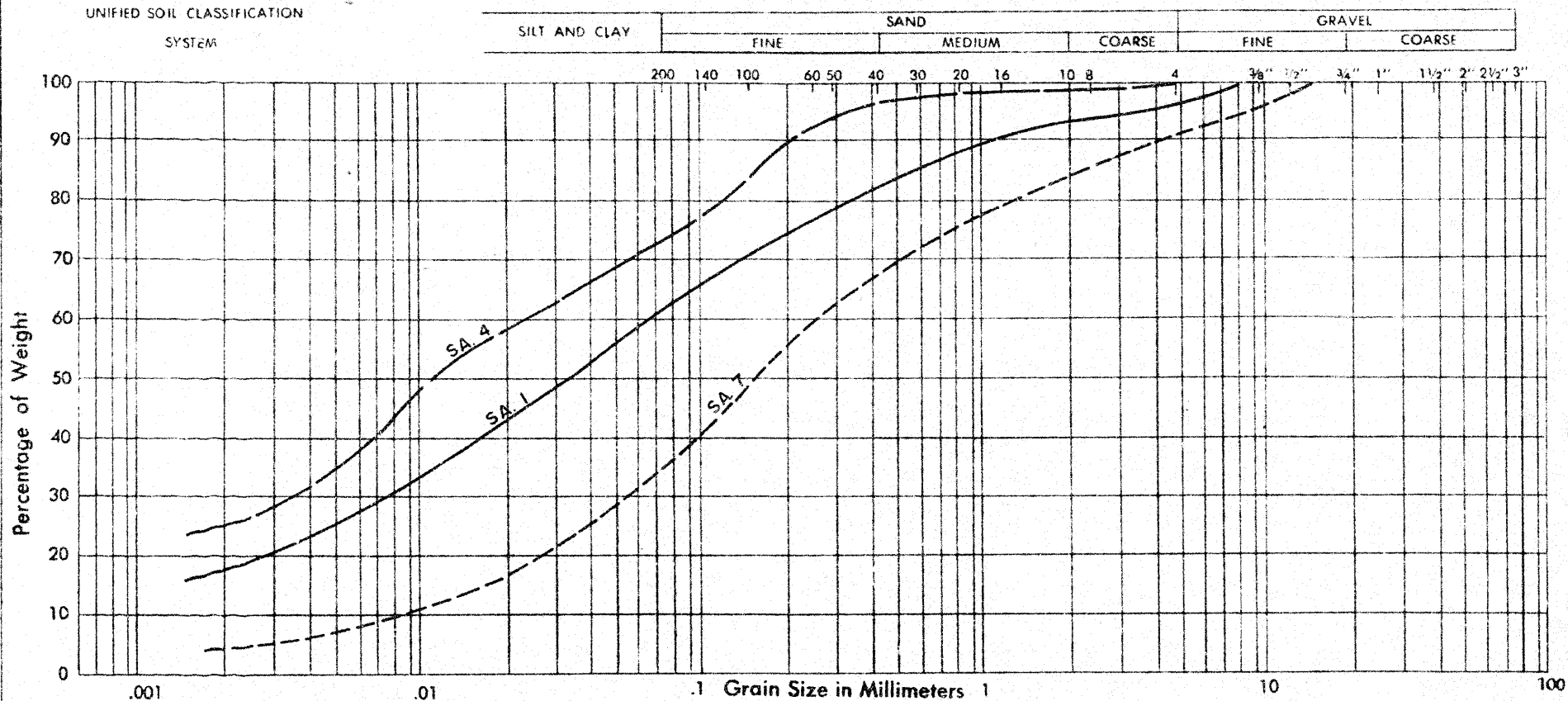
SA. 3

SA. 7

# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6 - 11 - 11



PROJECT: W. J. 66 - F - 102  
 LOCATION: HWY. 27 @ RICHVIEW  
 BOREHOLE NO.: 2 5  
 SAMPLE NO.: 1 4 7  
 DEPTH OF SAMPLE: 5' 20' 35'  
 ELEVATION OF SAMPLE: 496.5' 481.5' 466.5'

COEFFICIENT OF UNIFORMITY SA. N° 7 : 31  
 COEFFICIENT OF CURVATURE 1.32

**Classification of Sample and Group Symbol:**  
 CLAYEY SILT                      SILTY SAND  
 with sand                      with a trace of gravel

CL - ML

SW - SM

SA. N° 1 8 4

SA. N° 7

PLASTIC PROPERTIES:

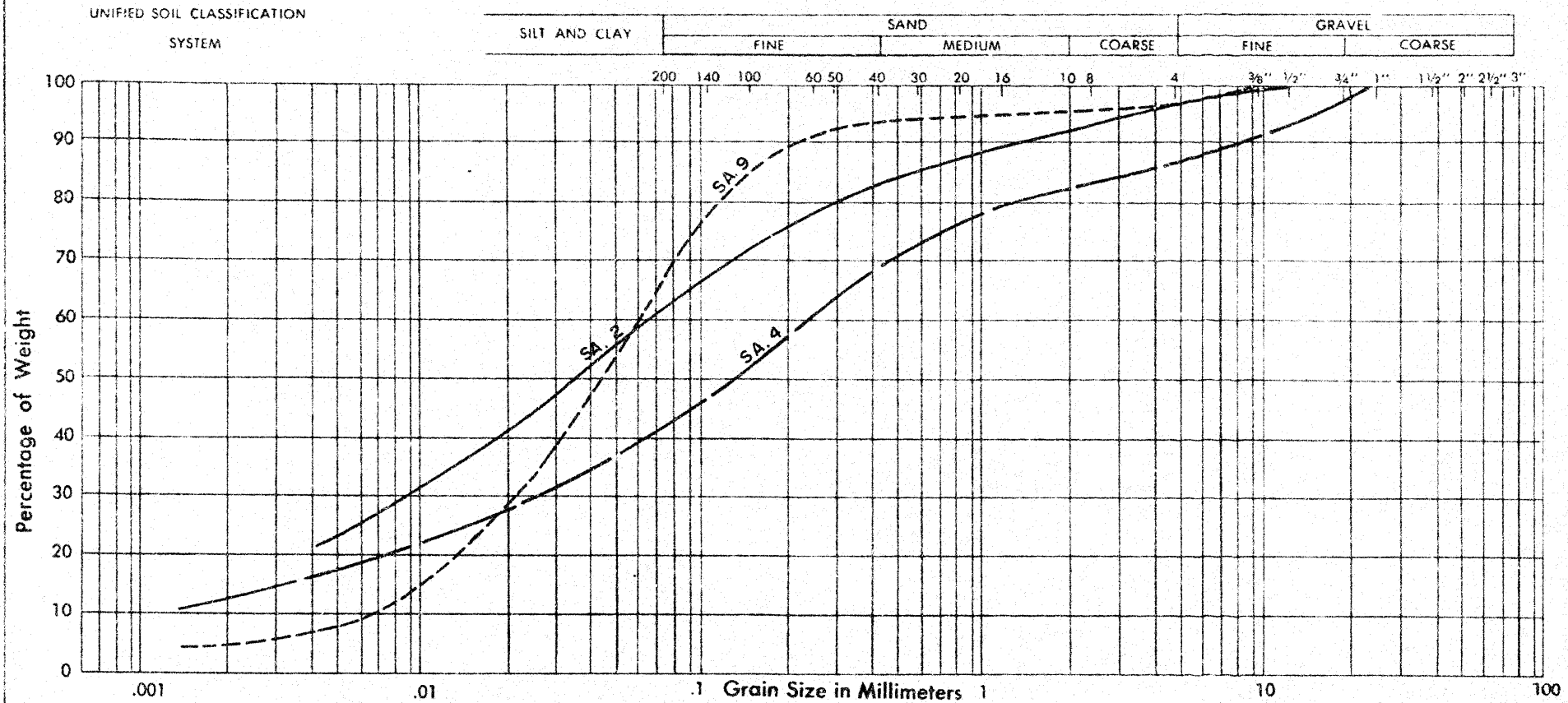
		CL-ML (average)
LIQUID LIMIT	% =	20.3
PLASTIC LIMIT	% =	13.8
PLASTICITY INDEX	% =	6.5
MOISTURE CONTENT	% =	6.9
ACTIVITY	=	0.31

Enclosure No.

# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6-11-11



PROJECT: W. J. 66 - F - 102

LOCATION: HWY. 27 @ RICHVIEW

BOREHOLE NO.: 26

SAMPLE NO.: 2 4 9

DEPTH OF SAMPLE: 10' 20' 45'

ELEVATION OF SAMPLE: 498.0' 488.0' 463.0'

COEFFICIENT OF UNIFORMITY  
COEFFICIENT OF CURVATURE

NON APPLICABLE

PLASTIC PROPERTIES:

CL-ML  
(average)

LIQUID LIMIT	%	=	19.8
PLASTIC LIMIT	%	=	14.6
PLASTICITY INDEX	%	=	5.2
MOISTURE CONTENT	%	=	11.2
ACTIVITY		=	0.3

### Classification of Sample and Group Symbol:

CLAYEY SILT  
with sand

SANDY SILT

CL-ML

ML

SA. No 2 & 4

SA. No 9

Enclosure No.



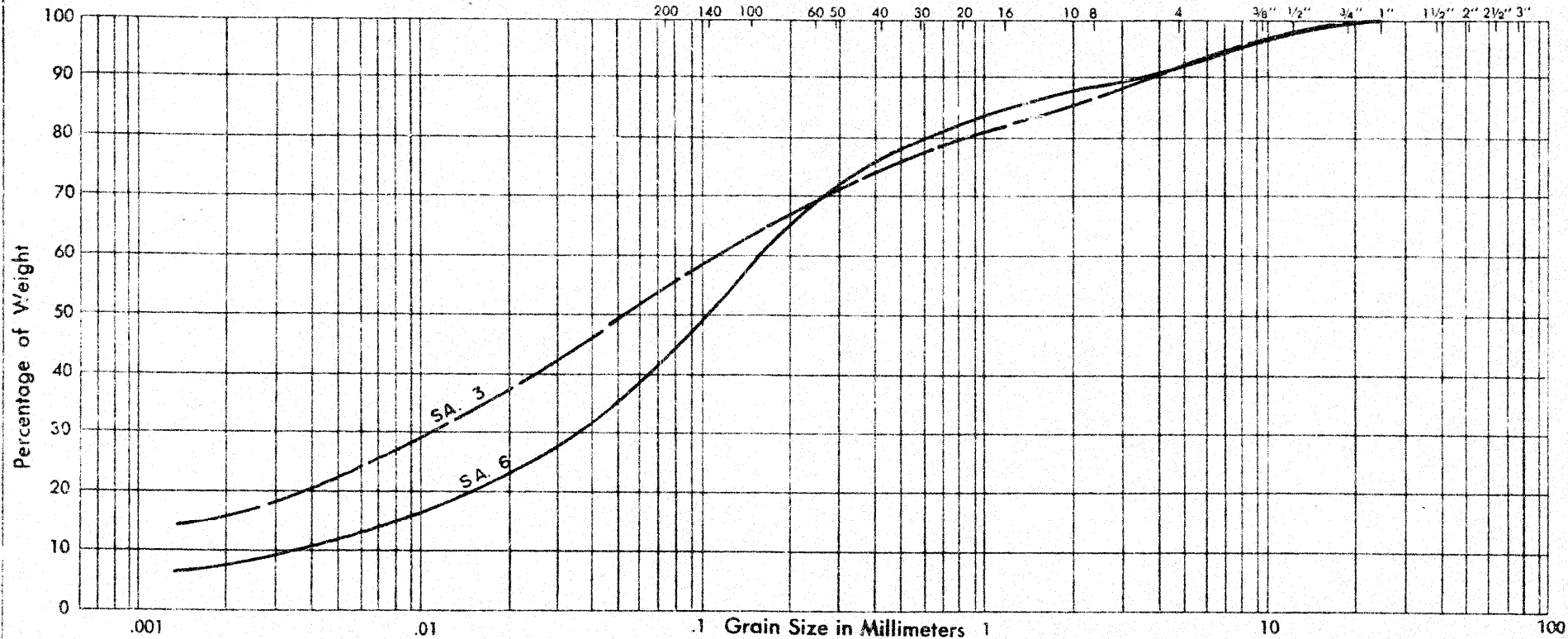
# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6 - 11-11

UNIFIED SOIL CLASSIFICATION  
SYSTEM

SILT AND CLAY	SAND			GRAVEL	
	FINE	MEDIUM	COARSE	FINE	COARSE



PROJECT: W.J. 66-F-102  
 LOCATION: HWY. 27 & RICHVIEW  
 BOREHOLE NO.: 27  
 SAMPLE NO.: 3 6  
 DEPTH OF SAMPLE: 15' 30'  
 ELEVATION OF SAMPLE: 476.8' 461.8'

COEFFICIENT OF UNIFORMITY 4.3  
 COEFFICIENT OF CURVATURE 2.1

**Classification of Sample and Group Symbol:**  
 CLAYEY SILT      SILTY SAND  
 with sand.      with a trace of gravel

CL

SW-SM

PLASTIC PROPERTIES:

		CL (average)
LIQUID LIMIT	% =	21.6
PLASTIC LIMIT	% =	14.2
PLASTICITY INDEX	% =	7.4
MOISTURE CONTENT	% =	12.8
ACTIVITY	=	0.5

Enclosure No.

SA. 3

SA. 6



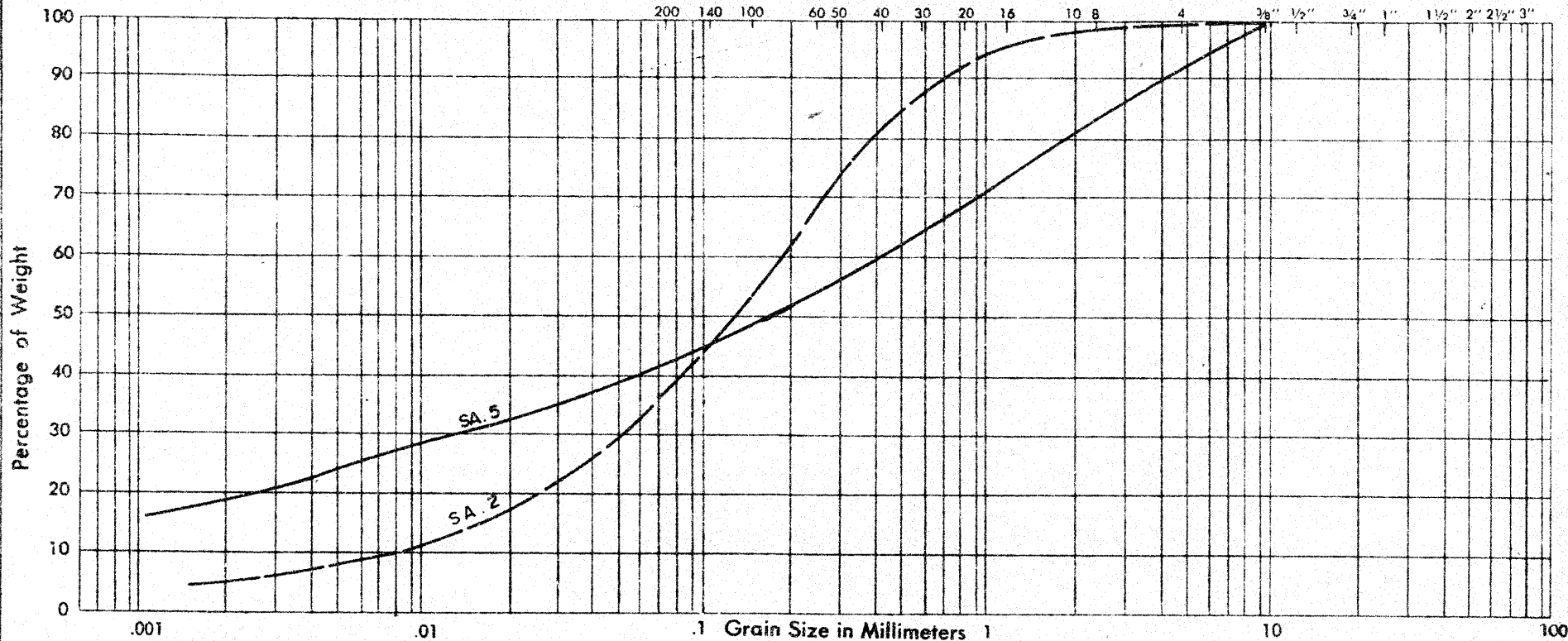
# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6-11-11

UNIFIED SOIL CLASSIFICATION  
SYSTEM

SILT AND CLAY	SAND			GRAVEL	
	FINE	MEDIUM	COARSE	FINE	COARSE



PROJECT: W. J. 66 - F - 102  
 LOCATION: HWY. 27 @ RICHVIEW  
 BOREHOLE NO.: 28  
 SAMPLE NO.: 2 5  
 DEPTH OF SAMPLE: 10' 25'  
 ELEVATION OF SAMPLE: 461.1' 446.1'

COEFFICIENT OF UNIFORMITY SA. 2 : 2.1  
 COEFFICIENT OF CURVATURE 2.0

**Classification of Sample and Group Symbol:**  
 SILTY SAND | CLAYEY SILT with sand  
 SW-SM | CL-ML

PLASTIC PROPERTIES: CL-ML

LIQUID LIMIT:	% =	22.6
PLASTIC LIMIT	% =	16.1
PLASTICITY INDEX	% =	6.5
MOISTURE CONTENT	% =	10.3
ACTIVITY	=	0.3

SA. 2

SA. 5

Enclosure No.

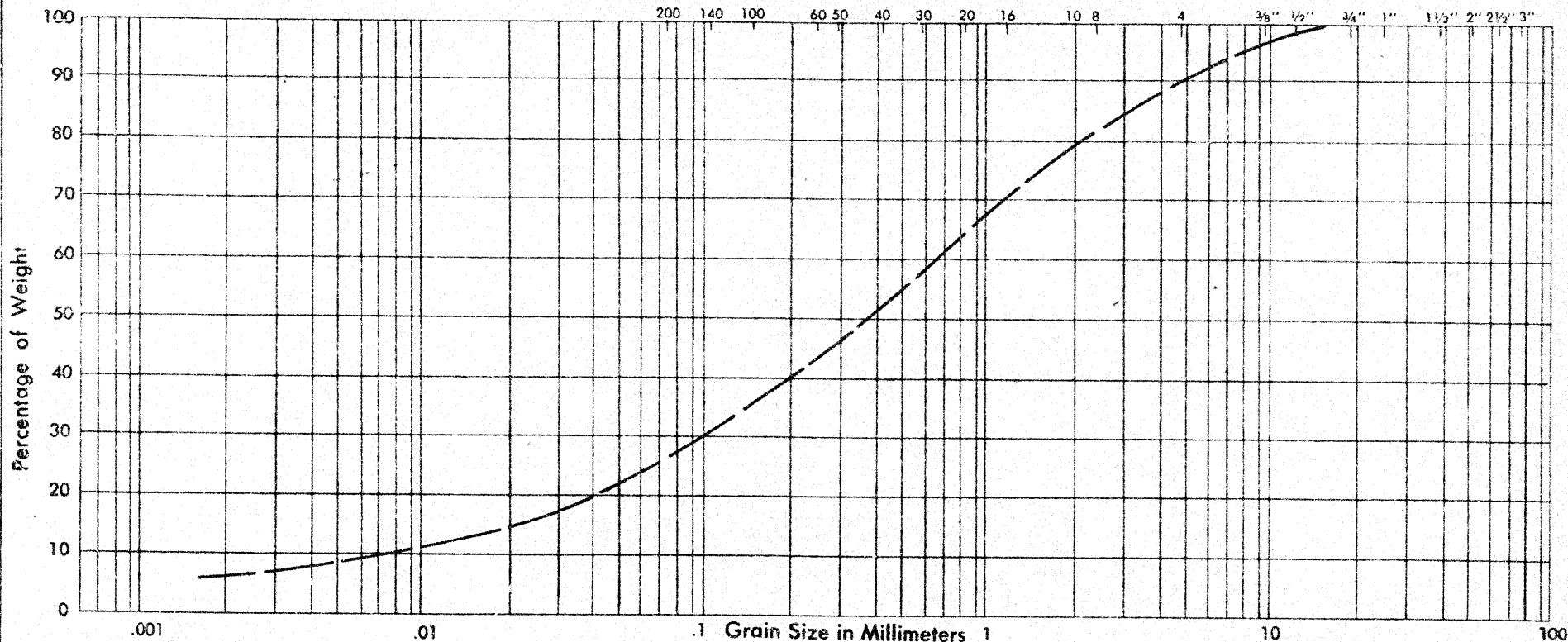
# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6-11-11

UNIFIED SOIL CLASSIFICATION  
SYSTEM

SILT AND CLAY	SAND			GRAVEL	
	FINE	MEDIUM	COARSE	FINE	COARSE



PROJECT: W. J. 66 - F - 102  
 LOCATION: HWY. 27 @ RICHVIEW  
 BOREHOLE NO.: 30  
 SAMPLE NO.: 2  
 DEPTH OF SAMPLE: 10'  
 ELEVATION OF SAMPLE: 462.4'

COEFFICIENT OF UNIFORMITY 8.2  
 COEFFICIENT OF CURVATURE 1.95

**Classification of Sample and Group Symbol:**  
 SILTY SAND with a trace of gravel.

SW - SM

PLASTIC PROPERTIES:

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

Enclosure No.

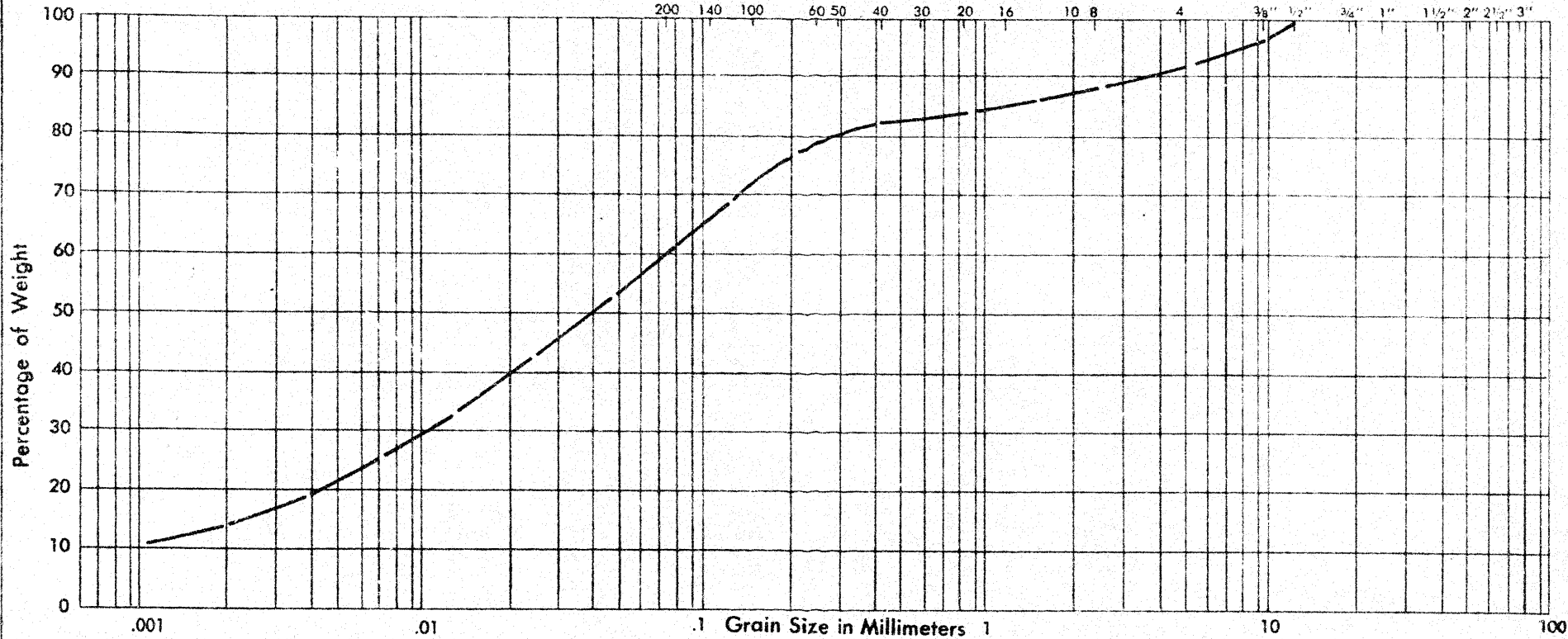
# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6-11-11

UNIFIED SOIL CLASSIFICATION  
SYSTEM

SILT AND CLAY	SAND			GRAVEL	
	FINE	MEDIUM	COARSE	FINE	COARSE



PROJECT: W. J. 66 - F - 102  
 LOCATION: HWY. 27 @ RICHVIEW  
 BOREHOLE NO.: 31  
 SAMPLE NO.: 1  
 DEPTH OF SAMPLE: 5'  
 ELEVATION OF SAMPLE: 456.3'

COEFFICIENT OF UNIFORMITY  
 COEFFICIENT OF CURVATURE

NON APPLICABLE

**Classification of Sample and Group Symbol:**  
 SANDY SILT with a trace of clay

SM - ML

PLASTIC PROPERTIES:

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

Enclosure No.

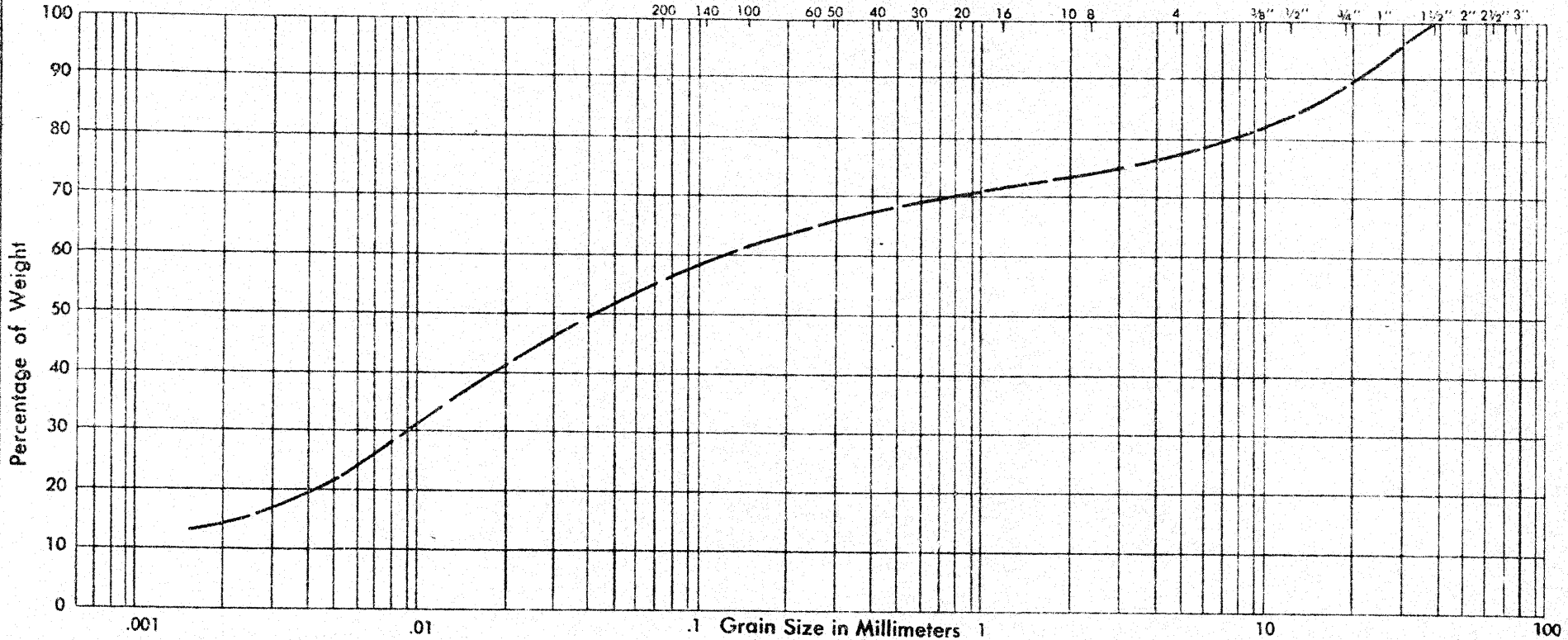
# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6 - 11-11

UNIFIED SOIL CLASSIFICATION  
SYSTEM

SILT AND CLAY	SAND			GRAVEL	
	FINE	MEDIUM	COARSE	FINE	COARSE



PROJECT: W.J. 66 - F - 102  
 LOCATION: HWY. 27 @ RICHVIEW  
 BOREHOLE NO.: 32  
 SAMPLE NO.: 3  
 DEPTH OF SAMPLE: 15'  
 ELEVATION OF SAMPLE: 450.8'

COEFFICIENT OF UNIFORMITY NON APPLICABLE  
 COEFFICIENT OF CURVATURE

**Classification of Sample and Group Symbol:**  
 CLAYEY SILT with sand

C L

PLASTIC PROPERTIES:

LIQUID LIMIT	%	=	25.7
PLASTIC LIMIT	%	=	17.0
PLASTICITY INDEX	%	=	8.7
MOISTURE CONTENT	%	=	9.3
ACTIVITY		=	0.6

CL  
(average)

Enclosure No.

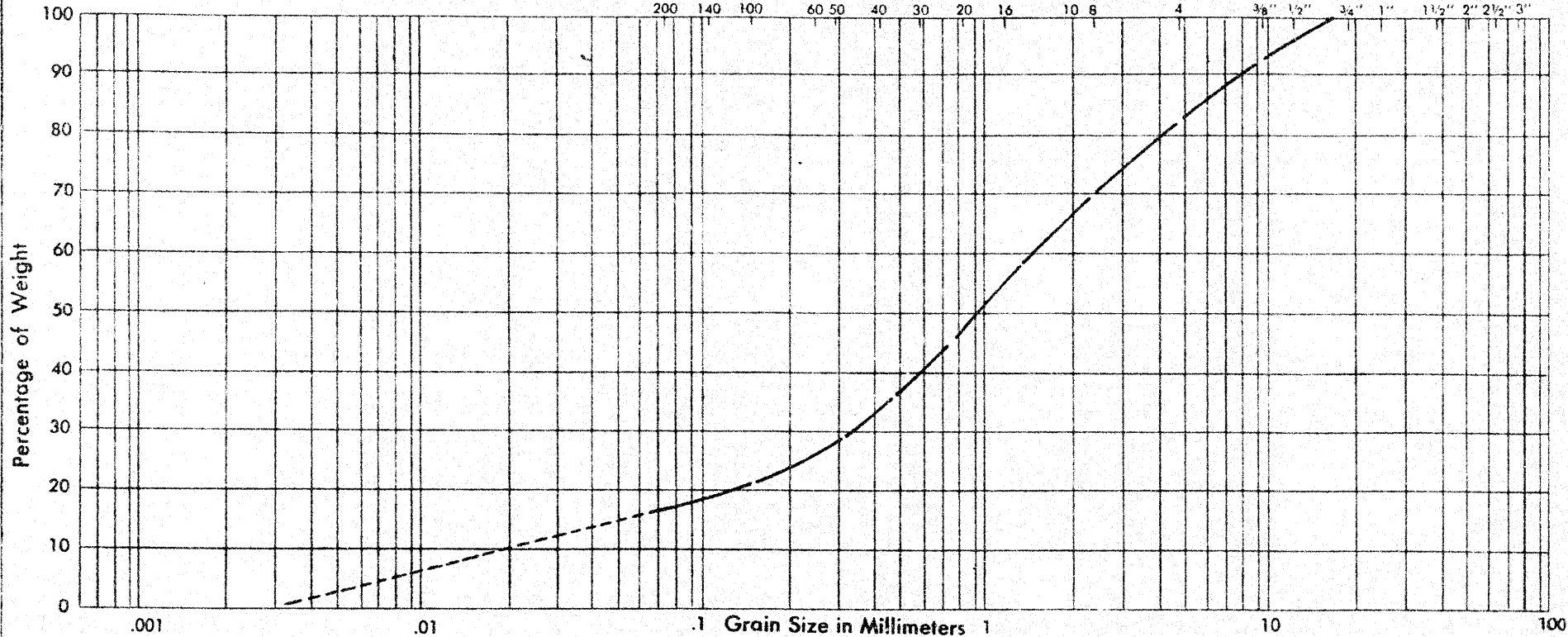
# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6-11-11

UNIFIED SOIL CLASSIFICATION  
SYSTEM

SILT AND CLAY	SAND			GRAVEL	
	FINE	MEDIUM	COARSE	FINE	COARSE



PROJECT: W. J. 66 - F - 102  
 LOCATION: HWY. 27 @ RICHVIEW  
 BOREHOLE NO.: 33  
 SAMPLE NO.: 2  
 DEPTH OF SAMPLE: 10'  
 ELEVATION OF SAMPLE: 456.6'

COEFFICIENT OF UNIFORMITY ~ 7.1  
 COEFFICIENT OF CURVATURE ~ 3.2

**Classification of Sample and Group Symbol:**  
 SAND with silt and gravel

S P

PLASTIC PROPERTIES:

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

Enclosure No.

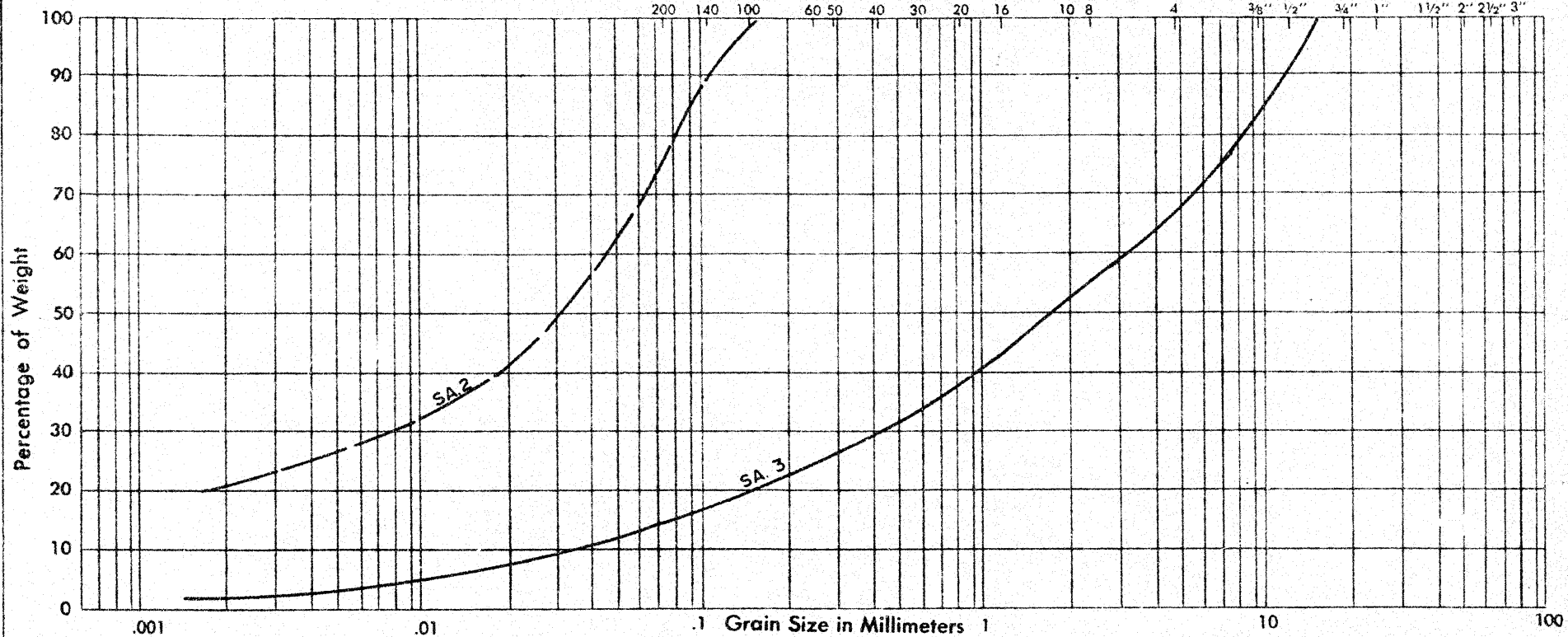
# DOMINION SOIL INVESTIGATION LIMITED

## GRAIN SIZE DISTRIBUTION

OUR REFERENCE NO. 6-11-11

UNIFIED SOIL CLASSIFICATION  
SYSTEM

SILT AND CLAY	SAND			GRAVEL	
	FINE	MEDIUM	COARSE	FINE	COARSE



PROJECT: W. J. 66 - F - 102  
 LOCATION: HWY. 27 @ RICHVIEW  
 BOREHOLE NO.: 34  
 SAMPLE NO.: 2 3  
 DEPTH OF SAMPLE: 10' 15'  
 ELEVATION OF SAMPLE: 464.7' 459.7'

COEFFICIENT OF UNIFORMITY SA. 3 : 100  
 COEFFICIENT OF CURVATURE 1.5

**Classification of Sample and Group Symbol:**  
 CLAYEY SILT GRAVELLY SAND  
 with a trace of sand with a trace of silt  
 CL GS-SW

PLASTIC PROPERTIES:  
 LIQUID LIMIT: % = 21.4  
 PLASTIC LIMIT: % = 13.8  
 PLASTICITY INDEX: % = 7.6  
 MOISTURE CONTENT: % = 8.8  
 ACTIVITY: % = 0.36

SA. 2

SA. 3

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

Q <sub>u</sub>	UNCONFINED COMPRESSION	L.V.	LABORATORY VANE
Q	UNDRAINED TRIAXIAL	F.V.	FIELD VANE
Q <sub>cu</sub>	CONSOLIDATED UNDRAINED TRIAXIAL	C	CONSOLIDATION
Q <sub>d</sub>	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
$S_t$	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



Mr. A. E. McKim,  
Bridge Control Engineer,  
Bridge Control Section,  
Bridge Office, Admin. Bldg.

Foundation Section,  
Materials & Testing Office,  
Room 107, Lab. Bldg.

December 20, 1968

PILE DRIVING, CONTRACT 68-24

Attached, please find a memo summarizing the data concerning the discrepancies between the length of piles ordered and actually driven on the above project.

We have discussed the contents of this memo with you as well as with Messrs. Davis and Keen.

Again, we would like to emphasize that the purpose of this memo is just to record the facts as best as possible, and not to blame anybody. Whatever this memo contains is history now. Presently we have adopted a different procedure of plan checking which, we all believe, will eliminate possible errors.

If errors do occur, they will be mistakes that are unavoidable in the normal course of the work, and will not be due to misunderstandings or lack of communication.

AGS/NdeF  
Attach.

*A. G. Stermac*  
A. G. Stermac  
PRINCIPAL FOUNDATION ENGINEER

cc: Foundations Files ✓  
Gen. Files

Mr. A. E. McKim,  
Bridge Control Engineer,  
Bridge Control Section,  
Bridge Office, Admin. Bldg.

Foundation Section,  
Materials & Testing Office,  
Room 107, Lab. Bldg.

December 20, 1968

PILE DRIVING, CONTRACT 68-24

We have noted with interest the memo from Mr. G. E. Boggis to Mr. D. E. Thrasher, in which the lengths of piles designed by the Bridge Office are compared with the actual lengths driven during the construction of Bridges #3, #4, #21 and #23.

With regard to Bridges #3 and #4, we have no comments since our Foundation Report 66-F-102 recommended spread footings only (pages 6 and 7). Furthermore, Preliminary Plans DD 6223 P1 and DD 6224 P1, which were reviewed by us on September 6, 1967, showed both structures to be founded on spread footings.

With regard to Bridge #21 and #23, we have compared the actual lengths driven to the lengths recommended in our Foundation Reports. This information is tabulated below.

Structure	Bridge #23	Bridge #21
Type of Pile	12 BP @ 53	12 BP @ 53
No. of Piles	210	96
Est. Tip El.	465.0	445 - 455 Avg. 450
Total Est. Length - (By Foundation Report)	5450 Ft.	2845 Ft.
Actual Length Driven	4257 Ft.	2880 Ft.
Difference	+ 1193 Ft.	- 35 Ft.
Actual Length Supplied	7542 Ft.	3622 Ft.

It will be noted that the average cut-off per pile would have been 5 ft. in the case of Bridge #23 had our recommendations been followed. When allowance for buckling, due to driving, is

Mr. A. E. McKim,  
Bridge Control Engineer,  
Bridge Control Section,  
Bridge Office, Admin. Bldg.

2

December 20, 1968

made, this means that the pile lengths were overestimated by about 3 ft. per pile. In the case of Bridge #21, we have probably underestimated by about 2 ft. per pile. In all, considering the difficulties involved, we regard our estimates as being entirely acceptable.

Since we did not review the final drawings for these structures, we were not aware that pile lengths greatly in excess of our estimates, had been supplied for the contract.

KGS/mdeF

cc: Foundations Files ✓  
Gen. Files

*K. L. Selby*  
K. G. Selby,  
SUPERVISING FOUNDATION ENGR.  
For:  
A. G. Stermac,  
PRINCIPAL FOUNDATION ENGR.

## MEMORANDUM

To: D.E. Thrasher,  
Project Engineer, Freeways.

From: G.E. Boggis,  
Construction Supervisor.

Attention:

Date: October 30, 1968.

Our File Ref.

In Reply To

Subject: Pile Driving, Contract 68-24.

Enclosed is a summary of the designed length and the actual driven length of piles used on this contract. Also enclosed are plans of the bore hole data with a number of piles plotted thereon. Perhaps some of this information may be of some use in determining the pile lengths on the future jobs in this interchange.

GEB:bc

cc:File

G.E. Boggis,  
Construction Supervisor.

## MEMORANDUM

To: Mr. A. Stermac,  
Principal Foundation Engineer,  
Room 107, Lab. Building

FROM: Bridge Division,  
Downsview, Ontario

ATTENTION:

DATE: September 3, 1968

OUR FILE REF:

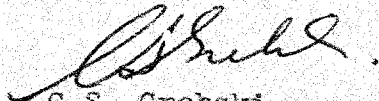
IN REPLY TO

SUBJECT: Bridge No. 1  
Hwy. #27 S.B. & Ramp E-S  
over Brown's Line S.B.  
W.P. 372-65, Site 37-801  
401/27 Interchange, District 6

66-F-102

Attached herewith we are submitting the final  
bridge drawings which show the foundation design for  
this structure.

Kindly give us your comments at your earliest  
convenience.



C.S. Grebski,  
Bridge Design Engineer

CSG:rd

Attach.

c.c. Foundation Section

NO COMMENTS

A.K.B. 

9. SEPT / 1968

DEPARTMENT OF HIGHWAYS ONTARIO

MEMORANDUM

To: Mr. A. Stermac,  
Principal Foundation Engineer,  
Room 107, Lab. Building

FROM: Bridge Division,  
Downsview, Ontario

ATTENTION:

DATE: September 3, 1968

OUR FILE REF:

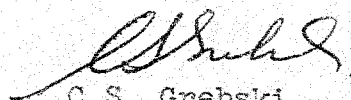
IN REPLY TO

SUBJECT: Bridge No. 2  
Hwy. #27 N.B. and Ramp S-E(401)  
over Brown's Line S.B.  
W.P. 373-65, Site 37-802  
401/27 Interchange, District 6

66-F-102

Attached herewith we are submitting the final  
bridge drawings which show the foundation design for  
this structure.

Kindly give us your comments at your earliest  
convenience.

  
C.S. Grebski,  
Bridge Design Engineer

CSG:rd

Attach.

c.c. Foundation Section

NO COMMENTS.

A.K.B. 

9. SEPT/68.

## MEMORANDUM

To: Mr. A. Stermac,  
Principal Foundation Engineer,  
Room 107, Lab. Building

FROM: Bridge Division,  
Downsview, Ontario

ATTENTION:

DATE: August 1, 1968

OUR FILE REF:

IN REPLY TO


SUBJECT: Bridge No. 76  
Ramp S-E (Rich.) over  
Ramp S-E & W. (Richview Side Rd.)  
W.P. 159-67-1, Site 37-864  
Hwys. 401 & 27, District 6

Attached herewith we are submitting the final bridge  
drawings which show the foundation design for this  
structure.

Kindly give us your comments at your earliest  
convenience.

CSG:rd

Attach.

  
C.S. Grebski,  
Bridge Design Engineer

66-F-102

NO COMMENTS

7. Aug. 68

A.H.B.

*a stermac*



Telephone: 248-3446

DEPARTMENT OF HIGHWAYS  
Toronto Regional Road Design Office,  
DOWNSVIEW, July 15, 1968.

Mr. R.L. Clark,  
Commissioner of Works,  
Metro Department of Works,  
12th Floor, East Tower,  
City Hall, Toronto 1, Ontario.

Attn: Mr. D. Petrie

Re: W.P. 201-62-1, Highway 27 - 401  
Interchange,  
District #6, Toronto,  
54"  $\phi$  Metro Sanitary Sewer,  
Your file: 1156.62

*66 F 102*

Dear Sir:

Thank you for your letter of July 8/68 with calculations showing the plane of equal settlement for the backfill of the above sewer work.

We have had the method of backfill you propose reviewed by our Foundation Section. They are of the opinion that your design is adequate for our requirements for proper earth fill construction. They stressed the necessity for maintaining the minimum width of trench possible. Further, they inquired if you had made provision for obtaining the projection condition in shallow backfill areas such as the Mimico Creek crossing of the line.

Cont'd ..... 2



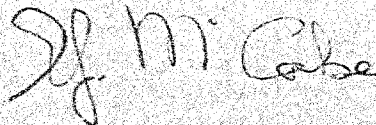
Mr. R.L. Clark  
Re: W.P. 201-62-1

July 15, 1968

In general, they expressed no objection to the use of the imperfect trench method of backfilling but stated that each proposal to use this method should be decided on the merits of each site condition.

I understand that you will be awarding the contract for this work to Sam Cosentino Limited.

Yours very truly,

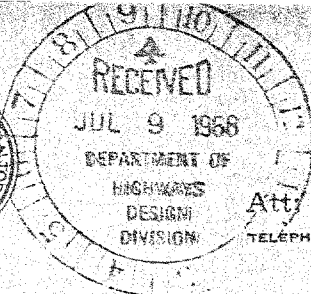
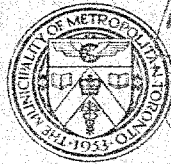


E.J. McCabe  
Expressway Consultant Control Engineer  
For:  
G.K. Hunter  
Regional Road Design Engineer

EJM/lec

c.c. A. Stermac✓  
D. Thrasher  
Fenco

ROSS L. CLARK  
B.A. Sc., P. ENG.  
COMMISSIONER OF WORKS



ADDRESS ALL  
CORRESPONDENCE  
TO THE COMMISSIONER

Att: Mr. D. Petrie  
TELEPHONE: 367-8240

## THE MUNICIPALITY OF METROPOLITAN TORONTO

DEPARTMENT OF WORKS  
CITY HALL TORONTO 1

July 8, 1968

Department of Highways  
Toronto Regional Road Design Office  
Downsview, Ontario

Attention of Mr. E. J. McCabe  
Expressway Consultant Control Engineer

D.H.O. - RECONSTRUCTION OF HWY. 27  
FILE NO. 1156.62

We acknowledge your letter of July 3,  
regarding the strengthening of our sewer at  
Highways 27 and 401.

As requested, we enclose our calculations  
which show that the plane of equal settlement  
falls within the embankment.

As regards using a trench with sloping sides,  
a reinforced structure would have to be  
placed around the sewer under the high fill  
to provide sufficient strength. This method  
would cost far more than the contract price  
received for carrying out the work with a  
trench with vertical sides.

F. J. Horgan, P. Eng.  
Director, Engineering Division

DP:EK 94226  
Encl.

W.P. ....	
PROG. REP. - 01	CORRESPOND. (GEN.)
PROG. REP. - 02	UTILITIES
PROG. REP. - 03	PROG. REP. - 04
PROG. REP. - 05	PROG. REP. - 06
PROG. REP. - 07	PROG. REP. - 08
PROG. REP. - 09	PROG. REP. - 10
PROG. REP. - 11	PROG. REP. - 12
PROG. REP. - 13	PROG. REP. - 14
PROG. REP. - 15	PROG. REP. - 16
PROG. REP. - 17	PROG. REP. - 18
PROG. REP. - 19	PROG. REP. - 20
PROG. REP. - 21	PROG. REP. - 22
PROG. REP. - 23	PROG. REP. - 24
PROG. REP. - 25	PROG. REP. - 26
PROG. REP. - 27	PROG. REP. - 28
PROG. REP. - 29	PROG. REP. - 30
PROG. REP. - 31	PROG. REP. - 32
PROG. REP. - 33	PROG. REP. - 34
PROG. REP. - 35	PROG. REP. - 36
PROG. REP. - 37	PROG. REP. - 38
PROG. REP. - 39	PROG. REP. - 40
PROG. REP. - 41	PROG. REP. - 42
PROG. REP. - 43	PROG. REP. - 44
PROG. REP. - 45	PROG. REP. - 46
PROG. REP. - 47	PROG. REP. - 48
PROG. REP. - 49	PROG. REP. - 50
PROG. REP. - 51	PROG. REP. - 52
PROG. REP. - 53	PROG. REP. - 54
PROG. REP. - 55	PROG. REP. - 56
PROG. REP. - 57	PROG. REP. - 58
PROG. REP. - 59	PROG. REP. - 60
PROG. REP. - 61	PROG. REP. - 62
PROG. REP. - 63	PROG. REP. - 64
PROG. REP. - 65	PROG. REP. - 66
PROG. REP. - 67	PROG. REP. - 68
PROG. REP. - 69	PROG. REP. - 70
PROG. REP. - 71	PROG. REP. - 72
PROG. REP. - 73	PROG. REP. - 74
PROG. REP. - 75	PROG. REP. - 76
PROG. REP. - 77	PROG. REP. - 78
PROG. REP. - 79	PROG. REP. - 80
PROG. REP. - 81	PROG. REP. - 82
PROG. REP. - 83	PROG. REP. - 84
PROG. REP. - 85	PROG. REP. - 86
PROG. REP. - 87	PROG. REP. - 88
PROG. REP. - 89	PROG. REP. - 90
PROG. REP. - 91	PROG. REP. - 92
PROG. REP. - 93	PROG. REP. - 94
PROG. REP. - 95	PROG. REP. - 96
PROG. REP. - 97	PROG. REP. - 98
PROG. REP. - 99	PROG. REP. - 100

Department of Highways Ontario

Copy for the information of

Mr. A. Stermac, Principal Foundation Eng., Room 107 Lab. Bldg.

Bridge Division,  
Downsview, Ontario,  
June 27th, 1968.

Mr. F. L. Clark,  
Commissioner of Works,  
Municipality of Metropolitan Toronto,  
City Hall,  
TORONTO, Ontario.

Attention: Mr. P. Petrie

RE: S.P. 390-65, Bridge No. 20,  
Hwy. #401/27 Interchange,  
District No. 6,  
Your file 1156.62.

Dear Sir:

After our telephone conversation of earlier today I have had further discussion of the problem with our Bridge Design Engineer and our Foundation Engineer. It was pointed out, that one of the drawbacks of driving an open tube casing in an augered hole was that it would be impossible to ensure that no loose material from the shaft accumulated at the bottom of the hole prior to filling with concrete. Settlement of the loose material could occur when the footing was loaded.

Because of this it has been decided to predrill to 6' below the bottom of the sewer (i.e. elev. 443). The pile would then be set in place, driven to refusal, and then backfilled with sand. The driving will be approximately 10' from the nearest point of the sewer and will not be very extensive as the pile tip will be in the fragmented shale strata.

....2

RE: W.P. 390-65, Bridge No. 20,  
Hwy. 401/27 Interchange,  
District No. 6,  
Your file 1156.62.

If, in your opinion the augering is too close to the sewer; we would consider widening the footing to give greater clearance between the auger hole and the sewer.

You have asked for further details of pier # 1:4 which is also located close to the sewer. I am enclosing a print of our footing layout D-6235-2 together with sketches showing the relation of both footings to the sewer. With pier 1:4 it is our intention to predrill the north row of piles before driving with the S.E. pile placed vertically.

We would be pleased to receive your recommendations and approval of our proposals.

Yours truly,

JCM:ca  
Encl.

J. C. McAllister,  
for W. Melnyshyn,  
Regional Bridge Location Engineer.

c.c. C. Grebski  
M. Stoyanoff  
T. Kingsland  
A. Steraac

April 5, 1968

Memo for File

HIGHWAY 27 - WIDENING  
FILE NO. 1156.62

Study and Calculations re Reinforcing  
of Existing Sewer Under Highway 27

Existing Conditions

Our sanitary sewer is a 54-inch C76-57T Class II, circular concrete pipe in cradle. This pipe is fully encased in the sections under the existing road and creek.

This sewer has generally a 10 foot cover, except at creek crossings (5 feet) and under Richview Side Road (17 feet).

Soil conditions in the whole length (1,400 feet) are quite variable but most fine-structured clays and silts. At the foundation level shale layers are encountered.

Change in Conditions.

Due to the widening of the highway, an additional soil load will be added to the pipe. The depth of cover will be approximately 23 feet and under the new highway maximum 43 feet.

The manholes (3) to be extended or rearranged to suit the new height.

Proposed Construction for Sewer

Existing pipe in the ground is strong enough to carry the increased load, if encased, but not the cradled portions. Pipe in the cradle can not support the soil load over 16 feet (120 lbs. cu. ft.). In our case it is needed to support 23 feet all over the length and 43 feet under the new highway.

Reinforcement of the cradled portion is required. There is no simple way to achieve structurally a cheap ~~and~~ good solution. Pouring "negative cradle" on top, thus simulating the condition of encasement is ~~the~~ the *optimum*.

Imperfect Trench Method

This method is not new (Marston 1930) and it has been practised already several decades in the U.S.A. The results have been good and this method is accepted officially for

highway construction in the U.S.A.

This kind of method is proposed for use in our case.

According to Marston's Theory and M.J. Spangler's paper (ASCE Transactions #2337 - 1948, Volume 113, Page 316) and same as W.J. Schlick's paper (Iowa State College Bulletin Engineering Report #14 - 1952 - 1953), our case is a negative projecting conduit with the original ground 10 feet above the top of the pipe (Case A) and 17 feet under the existing road (Case B).

The classification based on relative settlement of interior/exterior prisms and the location of the plane of equal settlement (~~if~~ we do use imperfect trench conditions) - our case will be a conduit of incomplete ditch condition.

#### Notations

- Bc - Width of conduit
- Bd - Width of ditch
- C - Load coefficient
- H - Height of ~~fill~~ <sup>fill</sup>
- He - Height of equal settlement
- K - Ratio of lateral to vertical pressure
- m - coefficient of internal friction
- p - Projection ratio
- r - Settlement ratio
- dc - Deflection of conduit
- Sf - Settlement of conduit
- Sg - Settlement of embankment (*ext.*)
- Sd - Settlement at critical level (*int.*)
- w - Unit weight of soil
- W - Load on conduit



## Calculations

There are known values

$$Bc = 5.5$$

$$Bd = 9.0$$

$$H = 23.0 \text{ (Case A)} \quad H = 43 \text{ (Case B)}$$

There are assumptions made

$$1. \quad W = 120 \text{ lb. cu. ft.}$$

$$2. \quad \text{Critical plane 1 foot above the pipe}$$

$$3. \quad \text{Height of straw-fill } 5.5 \text{ feet and 11 feet}$$

$$4. \quad \text{The ratio of } \frac{Sg}{Sd} = \frac{1}{2}$$

Settlement ratio

Equalizing the settlements in exterior/interior prisms  
in case of negative projecting conduits

$$r = \frac{Sg - (Sd + Sf + dc)}{Sd}$$

In our case:

$$dc = 0$$

$$Sf = 0, \text{ or very small}$$

$$r = \frac{Sg - Sd}{Sd} = \frac{Sg}{Sd} - 1 = \underline{\underline{-0.5}}$$

In available literature the values -0.3 to -0.5 are suggested.

## Coefficient of Internal Friction

Will be very difficult to establish without shear and cohesion tests.

All available tables are prepared for combination of  $K_m = 0.13$  and it is suggested to be used by Marston in similar grounds we have, for clayey soils with some slipping and sliding effects.

## Calculations of Load on the Pipe

Imperfect trench conditions assumed.

### Case A

$p$  is calculated on the basis of the straw-soil fill

$$p = 1$$

$$\frac{H}{Bc} = \frac{23}{5.5} = 4.2$$

### Case B

$$p = 2$$

$$\frac{H}{Bc} = \frac{43}{5.5} = 7.8$$

Tables for  $K_m = 0.13$  and  $r = -0.5$

$$C = 2.6$$

$$C = 3.6$$

$$W = C_w B_c^2$$

$$W = C_w B_c^2$$

$$W = 2.6 \times 120 \times 30 = \underline{9,400}$$

$$W = 3.6 \times 120 \times 30 = \underline{13,000}$$

### Strength of Existing Pipe

Strength of existing pipe is according to Concrete Pipe Handbook 1958 by OCPA, figure 26:

"Minimum 3-edge bearing load to produce 0.01-inch crack - 4,500 lbs. per linear foot of barrel"

As our pipe is bedded in cradle, the load factor will be 3.0.

Therefore, minimum load of  $4,500 \times 3 = 13,500$  lbs. might produce first crack. Minimum load of 20,000 lbs. might cause failure.

Our expected maximum load is 13,000, slightly less <sup>than</sup> critical. There are more factors for safety, as the unit weight of soil above the pipe is not  $W = 120$  but less, as the completely stabilized state of the conduit, and last but not least - the whole ditch of the existing ground might be filled with loose fill, thus increasing the total shear resistance considerably. Certainly the height of the "plane of equal settlement" will be a limiting factor - of how high we can go with straw-loose soil fill.

### Calculation for He

#### Case A (Marston's equation)

$$e^{-2K_m He/B_c} - 2K_m He/B_c = -2K_m r p + 1$$

$$2 K_m = 0.26$$

$$\frac{2K_m}{B_c} = 0.0473$$

$$r = 0.5$$

$$p = 1$$

by trial and error

$$\begin{array}{rcl} \underline{12} = He & 0.569 & = + 0.26 \times \frac{1}{2} + 1 = \underline{1.13} \\ & 0.565 & \\ & \underline{1.134} & \end{array}$$

Answer : He = 12 feet



Case B

All the values are the same, but  $p = 2.0$ , the equation will be: ~~(Answer)~~  $He = 17.4$

$$\frac{0.44}{0.82} = 1.26$$

$$\frac{0.82}{1.26} \quad \text{Answer: } \underline{He = 17.4 \text{ feet}}$$

Closer study of Marston's equation does show that the He values are lower than by Spangler's formula. The location of He under the new highway fill is of paramount importance.

Check with Spangler's Formula for He

Proceedings of the Highway Research Board December, 1950 - Page 153 (13th. Annual Meeting).

$$C = 3.7 \text{ (from table)}$$

$$3.7 = \frac{e^{-2Km \ He/Bc} - 1}{-2Km} + \left( \frac{H}{Bc} - \frac{He}{Bc} \right) e^{-2Km \ He/Bc}$$

$$H = 43$$

$$2Km = 0.26$$

$$Bc = 5.5$$

$$r = 0.5$$

$$p = 2$$

$$\frac{H}{Bc} = 7.8$$

$$Bc$$

$$\frac{2Km}{Bc} = 0.0473$$

$$Bc$$

Assume  $He = 24.5$ , then

$$3.7 = \frac{0.3135 - 1}{-0.26} + (7.8 - 4.45) 0.3135$$

$$2.64 + 1.05 = 3.69$$

$$\text{Answer: } \underline{He = 24.5}$$

This value is safe against 43 feet, but coefficient  $p = 2$  is somewhat low - and we should have loose-fill more than 11 feet, say up to 14 feet, i.e.,  $p = 2.5$ .

Calculation will be quite complicated, as shown on the paper, mentioned before, page 158, equation 18.

For approximate value the linear representations Fig. 8, 9, 10, 11 have been graphically extended and has rendered for our case:

C = 3.5 (an approximation)

If C = 3.5, then assuming He as 30

$$\frac{0.242}{-0.26} - 1 + (7.8 - 5.46) 0.242$$

$$2.9 + 0.56 = 3.46$$

The depth He is even less than 30 feet. Therefore, plane of equal settlement is safely below the ground.

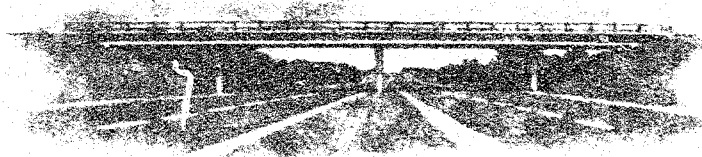
### The Construction

The existing sewer has to be located exactly and a ditch dug just above the line, with a width of 5.5 feet. Location and width of this ditch are important. This ditch has to be dug down to one foot above the culvert. The sides of the ditch shall be vertical. If sheeting is used it shall be inside of the width of the excavation, which shall be clear 5.5 feet wide. The bottom portion from one foot up from the top of conduit, to 5.5 feet shall be filled with baled straw and sides with loose fill. Above the straw, the existing ditch shall be filled with loose soil up to the existing ground level.

Under the portion of the new highway, more care should be taken. As the approximate calculations indicate - just under the new road at 43 feet fill, where the existing ground is 17 feet above the pipe, 11 feet of straw-loose-soil is probably deep enough *for* *shear strength* but all excavation in the existing ground could be loose-filled. But care should be taken that loose fill does not reach above 17 feet from the top of pipe, i.e., above ground level. It is rather advisable to start compaction 2-3 feet below the ground level. All fill above existing ground, for the new road, shall be compacted in ordinary way.

9-4-68

127A



401 & Keele Street  
Downsview, Ontario

DEPARTMENT OF HIGHWAYS

March 5, 1968

Dominion Soil Investigation  
77 Crockford Blvd.  
Scarborough, Ontario

Dear Sirs:

This is to confirm our request of January 31, 1968 for the supply of a Diamond Drill and a Pennsylvania Auger, together with all necessary equipment, as specified under the terms of our Contract Agreement, at Hwy. #401 and #27, on February 1, 1968.

These projects bear Job Numbers 68-F-10; 67-F-37; 66-F-102.

Yours truly,

K. G. Selby  
Supervising Foundation Engineer  
for: A. G. Sternac  
Principal Foundation Engineer

KGS:mt

cc: H. Konings  
Foundation Files (2)  
General File



401 & Keele Street  
Downsview, Ontario

DEPARTMENT OF HIGHWAYS

March 5, 1968

Canadian Longyear Limited  
35 Brydon Drive  
Rexdale, Ontario

Dear Sirs:

This is to confirm our request of January 31, 1968 for the supply of a track mounted auger together with all necessary equipment, as specified under the terms of our Contract Agreement, at Hwy. 401 & Hwy. 27, Toronto, on February 1, 1968.

These projects bear Job Numbers: 68-F-10; 67-F-37; 66-F-102.

Yours truly,

KOS:rt

K. G. Selby  
Supervising Foundation Engineer  
for: A. G. Starnac  
Principal Foundation Engineer

cc: H. Kondings  
Foundation Files (10)  
General File

23-69-05

Hwy. 401 &amp; 27

Support Columns

Mr. B. Richardson,  
Regional Bridge Project Engr.  
Bridge Division,  
Admin. Bldg.

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

Attn: Mr. T. C. Kinsland

February 27, 1968

Bridge No. 20 - East Bridge  
-- Hwy's. 401 & 27 --  
District No. 6 (Toronto)  
W.P. 390-65 -- W.J. 66-F-102

With regard to your memo of February 23, 1968, we have considered your proposal to support columns g and h of Bridge #20 on spread footings founded some 5 feet above an existing 54-inch I.D. sewer. This sewer was constructed by a tunnelling process which could have resulted in some loosening of the subsoil over the top, although any voids should have been filled in by subsequent grouting.

Borings recently carried out by this Section to determine the sewer location, showed a wide variation in the external dimensions of the sewer. This indicates to us that a considerable amount of grouting was necessary because of the large amount of voids (and loosening) which occurred during the tunnelling.

In view of the foregoing, we would prefer that the columns be supported on piled foundations as recommended in our Foundation Report and subsequent memo dated July 5, 1967.

ECS/WdeF

cc: Mr. C. S. Grebski

Foundations Files  
Gen. Files

*A. G. Selby*  
A. G. Selby,  
SUPERVISING FOUNDATION ENGR.  
For:  
A. G. Sternac,  
PRINCIPAL FOUNDATION ENGR.

Mr. B. H. Davis,  
Bridge Engineer,  
Bridge Division,  
Admin. Bldg.

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

Attention: Mr. S. McCamble

February 15, 1968

FOUNDATION INVESTIGATION REPORT  
Proposed Interchange  
Hwy. No. 401, 27 & Highview Expressway  
Contract No. 7 - Yellow  
Township of Etobicoke, County of York  
District No. 6 (Toronto)  
N.J. 66-F-102      --      N.P. 201-62-1

---

REVISED DRAWING No. 66-F-102A (supersedes existing dwg.)

Prior to inserting the attached, revised drawing  
in your copy(s) of the above mentioned report, would you  
kindly delete and destroy the existing drawing.

Thank you.

EGS/MdeP  
Attach.

cc: Messrs. B. H. Davis (2)  
E. A. Treganoke  
O. E. Farren  
O. E. Hunter (2)  
F. Allen  
E. C. Melingshyn  
T. J. Kovich  
B. A. Singh

*H. G. Selby*  
H. G. Selby,  
SUPERVISING FOUNDATION ENGR.  
For:  
A. C. Sternac,  
PRINCIPAL FOUNDATION ENGR.

Foundations Files  
Gen. Files

## MEMORANDUM

BA2504A

TO: Mr. B. R. Davis,  
Bridge Engineer,  
Bridge Division,  
Admin. Bldg.

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

Attention: Mr. S. McCombie

DATE: December 8, 1967

OUR FILE REF.

IN REPLY TO

DEC 11 1967

## SUBJECT:

FOUNDATION INVESTIGATION REPORT  
For

Bridges No. 7, 8, 9, 75 and 76,  
Highway #401 & #27 Interchange,  
District #6 (Toronto)

W.J. 66-F-102 -- W.P. 201-62-1  
-- (Revisions) --

In a memo dated November 23, 1967, Mr. W. S. Melinyshyn, Regional Bridge Location Engineer, advised us that some of the proposed bridges at the Hwy. #401 and #27 interchange have been revised. According to the memo, Bridges #7 and #8 have been changed only slightly. Bridge #9 has been shifted easterly with a new bridge, numbered 75 being proposed between Bridges #8 and #9. Another new bridge numbered 76 is also incorporated, to carry Ramp S.E. (Richview) over Ramp S. Richview Side Rd. Additional foundation investigations were requested by the Bridge Location Engineer, at the site of the revised or proposed new bridges, so that Foundation Report W.J. 66-F-102 could be amended.

After studying the proposed changes, it was decided that no additional boreholes were necessary for Bridges #7 and #8. The original foundation report is considered to be valid for the practically unchanged proposal for Bridges #7 and #8. For Bridges #9 and #76, however, additional field and laboratory investigations were carried out, the results of which are attached to this memo. All these structures are included in Contract #7 (Yellow).

You are requested to insert these pages and drawings into your copy(s) of the original report W.J. 66-F-102.

KGS/MdeF  
Attach.

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

K. G. Selby,  
SUPERVISING FOUNDATION ENGR.  
For:  
A. G. Stermac,  
PRINCIPAL FOUNDATION ENGR.

Foundations Files  
Gen. Files

REVISED BRIDGES #7 and #8 -

Since these bridges were changed only very slightly, the original foundation recommendations are still valid. (See para. 6.2, page 8 of Foundation Report W.J. 66-F-102.)

REVISED BRIDGE #9 -

Three new boreholes, numbered 52, 53 and 54, were augered at the site of the revised Bridge #9. Layers of brown and gray clayey silts were revealed by the borings, with some embedded coarse sand and fine gravel. The subsoil is heavily overconsolidated, hence spread footings at or below el. 488 ft. are feasible. Up to 4 t.s.f. design pressure may be employed on the footings with provision of a four-ft. cover above the footing bases. Since the subsoil has some plasticity, dewatering of the excavations should encounter no difficulties.

BRIDGE #75 -

According to the new plan, an additional bridge, numbered 75, is placed at the approx. location of the original Bridge #9. It is felt that no supplementary field investigation is necessary for this bridge, and the original recommendations for Bridge #9 are applicable for the proposed Bridge #75.

Spread footings at or below el. 487 ft. will safely support 3 t.s.f. design loads. A minimum of four ft. cover should be provided for frost protection. No dewatering problems are anticipated in the excavations.

BRIDGE #76 -

Bridge #76 is also a newly proposed structure, to carry Ramp S.-E. (Richview) over Ramp S. Richview Side Rd.

Two boreholes were carried out during the recent field work at this site. The borings were numbered 50 and 51.



BRIDGE #76 - (cont'd.) ...

Subsoils were found to be brown and grey clayey silts with traces of sand and gravel. The consistency of the strata ranges from very stiff to hard, with corresponding 'N' values of 23 blows/ft. to over 100 blows/ft.

Shallow foundations may be employed for the whole structure, the spread footings being placed at some four ft. below existing ground, or lower. Safe loads up to 3 t.s.f. may be assumed on the footings for design purposes.

The abutments may also be supported on piles, the pile caps being formed within the approach fills. It is estimated that 12 BP @ 53 steel H-piles driven to approx. el. 450 ft. will support safe loads up to 60 T/pile. The working load on the piles, however, should be checked during driving by means of the Hiley formula (D.H.O. Standards DD-1218 and 1219).

No dewatering problems are foreseen for the excavations.

MISCELLANEOUS:

The recent field work, carried out during December 1 - 5, 1967, was supervised by Mr. A. M. Seppala, Project Foundation Engineer.

Machinery used was owned and operated by Canadian Longyear Co. Ltd.

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

December 8, 1967

DEPARTMENT OF HIGHWAYS ONTARIO  
MATERIALS AND TESTING DIVISION

## RECORD OF BOREHOLE NO. 50

FOUNDATION SECTION

JOB 66-F-102

LOCATION Co-ords. 868,449 N; 980,915 E.

ORIGINATED BY AMS

W. P. 201-62-1

BORING DATE Nov. 29, 1967

COMPILED BY \_\_\_\_\_ AKB

DATUM Geodetic

BOREHOLE TYPE Auger

CHECKED BY

SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT			LIQUID LIMIT — WL PLASTIC LIMIT — WP WATER CONTENT — W			BULK DENSITY P.C.F.	REMARKS	
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT	ELEV. SCALE	SHEAR STRENGTH P.S.F.			Wp      W      WL WATER CONTENT % 10      20      30				
487.0	Ground Level													
0.0	Clayey silt, traces of sand.		1	SS	51	480								
	Hard.		2	SS	115									
178.0	Brown		3	SS	61									
2.0	Clayey silt, traces of sand & gravel.		4	SS	36	470								
			5	SS	33									
			6	SS	38									
	Hard.		7	SS	110	460								
455.5	Grey		8	SS	143 1/2"								▼ 457.	
31.5	End of Borehole													

DEPARTMENT OF HIGHWAYS ONTARIO  
MATERIALS AND TESTING DIVISION

# RECORD OF BOREHOLE NO. 51

FOUNDATION SECTION

JOB 66-F-102 LOCATION Co-ords. 868,547 N; 981,014 E. ORIGINATED BY AMS  
W.P. 201-62-1 BORING DATE Nov. 29, 1967 COMPILED BY AKB  
DATUM Geodetic BOREHOLE TYPE Auger CHECKED BY AKB

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT				LIQUID LIMIT — WL PLASTIC LIMIT — WP WATER CONTENT — W			BULK DENSITY P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLT	NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F.				WP	W	WL		
482.5	Ground Level														
0.0	Clayey silt, traces of sand. Hard.		1	SS	69	480									
476.0	Brown.		2	SS	39										
6.5	Clayey silt with traces of sand & gravel.		3	SS	26										
			4	SS	24	470									
	Very stiff to hard.		5	SS	23										
			6	SS	26	460									
	Grey		7	SS	67/5"										
451.0			8	SS	115/7"										
31.5	End of Borehole														

457.5

DEPARTMENT OF HIGHWAYS ONTARIO  
MATERIALS AND TESTING DIVISION

RECORD OF BOREHOLE NO.52

FOUNDATION SECTION

JOB 66-F-102 LOCATION Co-ords. 868,058 N; 980,711 E. ORIGINATED BY AMS  
W P 201-62-1 BORING DATE Nov. 30, 1967 COMPILED BY AKB  
DATUM Geodetic BOREHOLE TYPE Auger CHECKED BY [Signature]

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT				LIQUID LIMIT — WL PLASTIC LIMIT — WP WATER CONTENT — W			BULK DENSITY P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F.				WP	W	WL		
491.6	Ground Level														
0.0	Clayey silt, traces of sand & gravel.		1	SS	48	490									
	Hard		2	SS	65										
	Brown		3	SS	68	480									
472.1			4	SS	53										
12.5	Clayey silt, traces of sand & gravel.		5	SS	40										
	Hard		6	SS	80	470									
			7	SS	49										
	Grey		8	SS	143										
160.1															
31.5	End of Borehole														

465.6

FOUNDATION SECTION

CHECKED BY

[illegible]

DEPARTMENT OF HIGHWAYS ONTARIO  
MATERIALS AND TESTING DIVISION

RECORD OF BOREHOLE NO. 54

FOUNDATION SECTION

JOB	66-F-102	LOCATION	CoOrds. 868,277 N; 980,797 E.	ORIGINATED BY	AMS
W P	201-62-1	BORING DATE	Nov. 30, 1967	COMPILED BY	AKB
DATUM	Geodetic	BOREHOLE TYPE	Auger	CHECKED BY	<i>[Signature]</i>

[illegible]

Mr. C. S. Grebski  
Bridge Design Engineer  
Bridge Division  
Admin. Bldg.

23-69-05  
✓ R4: Richview Side  
Rd. Plans.  
Foundation Section  
Room 107  
Lab. Building

September 21, 1967

Bridge #5  
Hwy. No. 27 N.B. over Richview Side Rd.  
W.P. 376-65 Site No. 37-805 W.J. 66-F-102  
Hwys. 401 & 27 - District #6

We have reviewed Preliminary Bridge Plan Drawing  
D-6225-P1 for the above-mentioned structure.

We have no comments.

KGS:mt

cc: S. McCombie  
W. Melnyshyn  
Foundation Office  
General File ✓

*Ad. L. Selby*  
K. G. Selby  
Supervising Foundation Engineer  
for: A. C. Stermac  
Principal Foundation Engineer

Mr. C. S. Grebski  
Bridge Design Engineer  
Bridge Division  
Admin. Building

23-69-03, R.  
Hwy. #401 and  
Richview Side road.  
Foundation Section  
Room 107  
Lab. Building

September 21, 1967

Bridge No. 6  
Ramp S-E Hwy. #401 over Richview Side Rd.  
W.P. 377-65 Site No. 37-829 W.J. 66-P-102  
Hwys. 401 & 27 - District #6 (Toronto)

We have reviewed Preliminary Bridge Plan Drawing  
D-6249-P1 for the above-mentioned structure.

We have no comments.

KGS:mt

*H. G. Selby*  
K. G. Selby  
Supervising Foundation Engineer  
for: A. G. Stermac  
Principal Foundation Engineer

cc: S. McCombie  
W. Melnyshyn  
Foundation File  
General File



Mr. C. S. Grebski,  
Bridge Design Engineer,  
Bridge Division,  
Admin. Bldg.

236905  
Re: Bridge #8  
Hwy 401 & 27  
Foundation Section,  
Materials & Testing Div.,  
Room 107, Lab. Bldg.

September 8, 1967

Bridge No. 8 - Brown's Line,  
Northbound over Richview Side Road,  
W.P. 379-65, Site No. 37-830, W.J. 66-F-102,  
Hwy.'s 401 & 27, District No. 6 (Toronto).

We have reviewed revised Preliminary Bridge  
Plan Drawing D-6250-P for the above mentioned  
structure.

We have no comments.

KGS/mdeP

*H. G. Selby*  
K. G. Selby,  
SUPERVISING FOUNDATION ENGR.  
For:  
A. G. Stermac,  
PRINCIPAL FOUNDATION ENGR.

cc: Messrs. S. McCombie  
W. S. Melnyshyn

Foundations Files  
Gen. Files

af

Re: Bridge #7

Reviewed file.

Mr. C. S. Grebski,  
Bridge Design Engineer,  
Bridge Division,  
Admin. Bldg.

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

September 7, 1967

Bridge No. 7 - Brown's Line,  
Southbound over Richview Side Road,  
W.P. 373-65, Site No. 37-806, W.J. 66-P-102,  
Hwy's. 401 & 27 - District No. 6 (Toronto).

We have reviewed revised Preliminary Bridge Plan  
Drawing D-6226-P for the above mentioned structure.

We have no comments.

KGS/MdeF

*K. G. Selby*  
K. G. Selby,  
SUPERVISING FOUNDATION ENGR.  
For:  
A. G. Stermac,  
PRINCIPAL FOUNDATION ENGR.

cc: Messrs. S. McCombie  
W. S. Melinyshyn

Foundations Files  
Gen. Files

ak

Mr. C. S. Grebski,  
Bridge Design Engineer,  
Bridge Division,  
Admin. Bldg.

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

August 15, 1967

Bridge #7, Brown's Line, S.B. over  
Richview Side Road, Hwy's. #401 & #27,  
Site 37-806, District #6 (Toronto),  
W.P. 378-65 -- W.J. 66-P-102

We have reviewed Preliminary Plan No.  
D-6226-P for the above structure.

We have no comments.

*K. G. Salby*

KGS/ndef

K. G. Salby,  
SUPERVISING FOUNDATION ENGR.  
For:  
A. G. Stermac,  
PRINCIPAL FOUNDATION ENGR.

cc: Messrs. S. McCombie  
W. S. Melinyshyn

Foundations Files  
Gen. Files ✓

Mr. C. S. Grebski,  
Bridge Design Engineer,  
Bridge Division,  
Admin. Bldg.

*23-69-05*  
*Bridge #8, main*  
*side road*  
Foundation Section,  
Materials & Testing Div.,  
Room 107, Lab. Bldg.

August 15, 1967

Bridge #8 - Brown's Line - N.B. over  
Richview Side Road, Hwy's. #401 & #27,  
District #6 (Toronto) - Site 37-830,  
W.P. 379-65 -- W.J. 66-F-102.

We have reviewed Preliminary Plan No.  
D-6250-P for the above structure.

We have no comments.

KGS/MdeF

*H. G. Selby*  
K. G. Selby,  
SUPERVISING FOUNDATION ENGR.  
For:  
A. G. Stermac,  
PRINCIPAL FOUNDATION ENGR.

cc: Messrs. S. McCombie  
W. S. Melinyshyn  
Foundations Files  
Gen. Files ✓

Mr. C. S. Grebski,  
Bridge Design Engineer,  
Bridge Division,  
Admin. Bldg.

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

August 15, 1967

Bridge #9, Ramp S.-E. (Rich.) over  
Richview Side Road, Hwy. #401 & #27 Interchange,  
Site 37-807, District #6 (Toronto), --  
W.P. 380-65 -- W.J. 66-F-102.

---

We have reviewed Preliminary Plan No.  
D-6227-P for the above structure.

We have no comments.

EKS/MdeP

*H. G. Selby*  
K. G. Selby,  
SUPERVISING FOUNDATION ENGR.  
For:  
A. G. Sternac,  
PRINCIPAL FOUNDATION ENGR.

cc: Messrs. S. McCombie  
W. S. Melnyshyn  
Foundations Files  
Gen. Files

Mr. C. S. Grebski,  
Bridge Design Engineer,  
Bridge Division,  
Admin. Bldg.

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

July 5, 1967

Attention: Mr. B. S. Richardson

Proposed Hwy. #401 & #27 Interchange  
District #6 (Toronto) - W.P. 201-62-1  
(Protection of Existing Utilities  
During Pile Driving).

---

66F102

Regarding your recent query as to the precautions to be taken when piles are driven in the vicinity of existing utilities at the above mentioned project, we suggest that the following procedures be adopted:

(1) Where piles will be 12 ft. or more from the edge of a utility, no special precautions need be taken.

(2) All piles closer than 12 ft. from a utility should be prebored to a depth of about 6 ft. below the pipe bottom. The size of the augered hole need only be slightly larger than the pile section.

(3) Where holes are augered in non-cohesive subsoil, casing may be required to prevent the holes from caving in.

The above procedure was followed in Contract 63-182 with satisfactory results.

*Handwritten signature*

KGS/mdeF

K. G. Selby,  
SUPERVISING FOUNDATION ENGR.  
For:  
A. G. Stermac,  
PRINCIPAL FOUNDATION ENGR.

cc: Foundations Files,  
Gen. Files

N.P. 384-65. Re  
Bridge plans  
#12.

Mr. C. S. Grebski,  
Bridge Design Engineer,  
Bridge Division,  
Admin. Bldg.

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

June 7, 1967

Bridge #13 -- Site 37-811,  
Hwy. 401 & 27, District #6,  
W.J. 66-F-102, W.P. 384-65.

We have reviewed Preliminary Bridge Plan D-6231-P for the above mentioned structure and submit the following comments:

(1) We note that the elevation on the drawing shows bedrock at approximate el. 440. This is incorrect: if you refer to B.H.'s #17 and #18, Foundation Report 66-F-102, you will note that bedrock was not proved in either test hole. The borings were terminated in a layer of hard clayey silt (glacial till).

(2) Our recommendation for piles states that a design load of 70 tons per pile should be achieved at or about el. 440.0 - i.e., in the hard clayey silt stratum. The actual safe load on the piles should be checked in the field by means of the Hiley Formula, assuming a safety factor of 3.0.

KGS/MdeF

cc: Messrs. S. McCombie  
W. S. Melinyshyn

Foundations Files  
Gen. Files ✓

K. G. Selby,  
SUPERVISING FOUNDATION ENGINEER  
For:  
A. G. Stermac,  
PRINCIPAL FOUNDATION ENGINEER

# DOMINION SOIL INVESTIGATION LIMITED

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

BRANCH  
369 QUEENS AVENUE  
LONDON, ONTARIO  
TELEPHONE GE. 3-3851



FOUNDATION ENGINEERS

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

Our Ref. No: 6-11-11

23rd January 1967.

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

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

Re: Highway # 27, Richview Expressway Interchange  
W.P. No. 201-62-1. W.J. 66-F-102

Dear Sirs,

Enclosed please find fourteen sets of Geotechnical Data Sheets and Grain Size Distribution Sheets for Boreholes 1 - 34.

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/me  
Enclosures.



DOMINION SOIL INVESTIGATION LIMITED

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

BRANCH  
369 QUEENS AVENUE  
LONDON, ONTARIO  
TELEPHONE GE. 3-3851



FOUNDATION ENGINEERS

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

Our Ref. No: 6-11-11  
Your Ref.: W.J. 66-F-102

18th January 1967.

Department of Highways, Ontario,  
Materials Testing Division,  
Downsview Avenue,  
Downsview, Ontario.

Attention: Mr. A. Barsvary, P.Eng.

Re: Soil Investigation for Proposed Hwy. #27 and 401 Interchange

Dear Sirs,

Please find enclosed one copy of the preliminary borehole logs of boreholes No. 3, 22, 23, 24, 27, 28, 29, 30, 31, 32, 33 and 34. Also enclosed are copies of the Grain Size Distribution Curves pertaining to these boreholes.

We trust that the forwarded information will be sufficient for your present requirement.

Yours very truly,

DOMINION SOIL INVESTIGATION LIMITED

I.P. Lieszkowszky, P.Eng.,  
Chief Engineer.

IPL/me  
Enclosures.

## MEMORANDUM

To: Mr. A. Stermac,  
Principal Foundation Engineer,  
Room 107,  
Lab. Building.

FROM: Bridge Division,  
Downsview, Ontario.

DATE: December 9th, 1966.

OUR FILE REF.

IN REPLY TO

SUBJECT: W.P. 201-62-1,  
Mimico Creek Realignment,  
Hwy. 401-27 Interchange,  
District #6.

Attached for your information are three prints of drawings 3214-C-2 and 3 showing location of boreholes with existing ground elevations and cross-sections.

Plan 3214-C-2 also shows a profile of the invert of the channel which you requested. However, it should be noted that this is preliminary only. When the final approved channel invert is available a copy will be forwarded to you.

JCMcA/cew  
Attach.

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

## PROPERTY DAMAGE REPORT

Second  
copy

REGION:

DATE:

IDENTIFICATION OF:



OWNER



TENANT

NAME: ~~R. SIMPSON~~~~SEAGER~~

POST OFFICE ADDRESS:

170 RANGOON ROAD, ETOBICOKE

LOCATION: ETOBICOKE

DISTRICT

HIGHWAY 27

TOWNSHIP, LOT AND CONCESSION ETC.

/

DETAIL OF DAMAGE: SOIL INVESTIGATION DATE DAMAGE DONE: DEC /66

TYPE(S) OF DAMAGE: (CROP, TREES, FENCES, LAWNS, FLOWER BEDS, ORNAMENTAL PLANTINGS ETC.)

DETAILED DESCRIPTION OF EACH TYPE OF DAMAGE: (USE ADDED SHEETS IF REQUIRED)

TRUCK TRACKS IN LAWN AND BOREHOLE  
IN FRONT GARDEN.

DAMAGED PART OF LAWN SHOULD BE REPAIRED

PARTY CHIEF

SECTION

## PROPERTY DAMAGE REPORT

REGION:

DATE:

IDENTIFICATION OF:

☐

OWNER

☐

TENANT

NAME:

R. SIMSON

POST OFFICE ADDRESS:

163 RANGLAND ROAD

LOCATION:

DISTRICT

HIGHWAY

TOWNSHIP, LOT AND CONCESSION ETC.

DETAIL OF DAMAGE:

DATE DAMAGE DONE:

TYPE(S) OF DAMAGE: (CROP, TREES, FENCES, LAWNS, FLOWER BEDS, ORNAMENTAL PLANTINGS ETC.)

DETAILED DESCRIPTION OF EACH TYPE OF DAMAGE: (USE ADDED SHEETS IF REQUIRED)

APPROX. 10 FT OF SHRUB FENCE DESTROYED MOVING TRUCK ONTO SITE.

APPROX. 20 FT x 20 FT LAWN DESTROYED BY DRILLING OPERATION.

PARTY CHIEF

SECTION

## PROPERTY DAMAGE REPORT

REGION:

DATE:

IDENTIFICATION OF:

☐

OWNER

☐

TENANT

NAME: Mr. D. JOYCEPOST OFFICE ADDRESS: 164 RANGOON ROAD

LOCATION:

DISTRICT

HIGHWAY

TOWNSHIP, LOT AND CONCESSION ETC.

DETAIL OF DAMAGE:

DATE DAMAGE DONE:

TYPE(S) OF DAMAGE: (CROP, TREES, FENCES, LAWNS, FLOWER BEDS, ORNAMENTAL PLANTINGS ETC.)

10ft of shrub fence destroyed.  
Wheel tracks in lawn 10ft x 65ft APPROX  
APPROX 20ft x 20ft of lawn destroyed by drilling  
operations

DETAILED DESCRIPTION OF EACH TYPE OF DAMAGE: (USE ADDED SHEETS IF REQUIRED)

PARTY CHIEF \_\_\_\_\_

SECTION \_\_\_\_\_

## PROPERTY DAMAGE REPORT

REGION:

DATE:

IDENTIFICATION OF:



OWNER



TENANT

NAME: H. MICHAMD

POST OFFICE ADDRESS: 123 INVERDON ROAD

LOCATION:

DISTRICT

HIGHWAY

TOWNSHIP, LOT AND CONCESSION ETC.

DETAIL OF DAMAGE:

DATE DAMAGE DONE:

TYPE(S) OF DAMAGE: (CROP, TREES, FENCES, LAWNS, FLOWER BEDS, ORNAMENTAL PLANTINGS ETC.)

DETAILED DESCRIPTION OF EACH TYPE OF DAMAGE: (USE ADDED SHEETS IF REQUIRED)

One wooden pole of a wire fence is knocked out by truck, one section of wire fence broken ~~use 20 ft~~ lawn damaged by driving operation on back yard

Fence checked & fixed immediately

PARTY CHIEF

SECTION

## DEPARTMENT OF HIGHWAYS ONTARIO

## MEMORANDUM

To: Mr. A. Stermac,  
Principal Foundation Engineer,  
Room 107, Lab. Bldg.

From: Bridge Division,  
Downsview, Ontario.

Date: November 24, 1966.

Our File Ref.

In Reply To:

Subject: W.P. 201-62-1 G.D.G.B. & Pav.  
Contract #7,  
Hwy. #401 & #27,  
Richview Expressway Interchange,  
Dist. #6.

This will confirm my request for a preliminary investigation of the structures (17) contained in Contract #7 (yellow) as shown in the listing of 4th November 1966.

This work is to be done by the preliminary/confirmatory method discussed on Tuesday 22nd. November 1966. As I said at that time, the staging for this project is not completely jelled and minor changes in contracts could happen. Actually I have been advised that Structure #69 (W.P. 271-66) in Contract #9 (Green) should now be included in the yellow Contract #7.

The single marked up print as given you on 22nd November 1966 may be only 75% correct. I am expecting at any time three prints for your use of this interchange which will be nearly 100% correct.

The timing for this work is that the general foundation report be available by 8th. January 1967.

8 Feb.

*J. C. McAllister*

JCMcA/sp  
cc. A. Crowley

J. C. McAllister,  
for W. Melnyshyn,  
Regional Bridge Location Engineer.

## MEMORANDUM

To: Mr. A. Sternac,  
Principal Foundation Engineer,  
Room 107,  
Lab. Bldg.

From: Bridge Division,  
Downsview, Ontario.

Date: November 24, 1966.

Our File Ref.

IN REPLY TO

SUBJECT: W.P. 201-62-1 Mimico Creek Realignment,  
Highway No. 401 - No. 27  
Richview Interchange,  
District No. 6.

This will confirm my request for an investigation of the slope stability in the area of the proposed Mimico Creek re-alignment in connection with the redesign of the above interchange.

You have received the one coloured print available of the proposed realignment with approximate location of test holes indicated. The main concern seems to be where slip failures could cause danger to life and property. The scope of the investigation, is however, left to your discretion.

The investigation for the structures proper, over this creek should be contained in the main report for the area.

I would suggest that this work be given top priority as the slope stability studies will have a bearing on the type of structure and channel as well as the location of the structures at Richview Road and Highway No. 401.

*J.C. McAllister*

JCMca/aw

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

c.c. a. Crowley



# 66-F-102

W.P.# 201-62-1

Hwy. # 401,

Hwy. # 27 &

RICHVIEW

EXPRESSWAY

LIST OF ADDITIONAL  
W.P. NOS. FOR 66-F-102

372-65 380-65

373-65 384-65

374-65 386-65

375-65 389-65

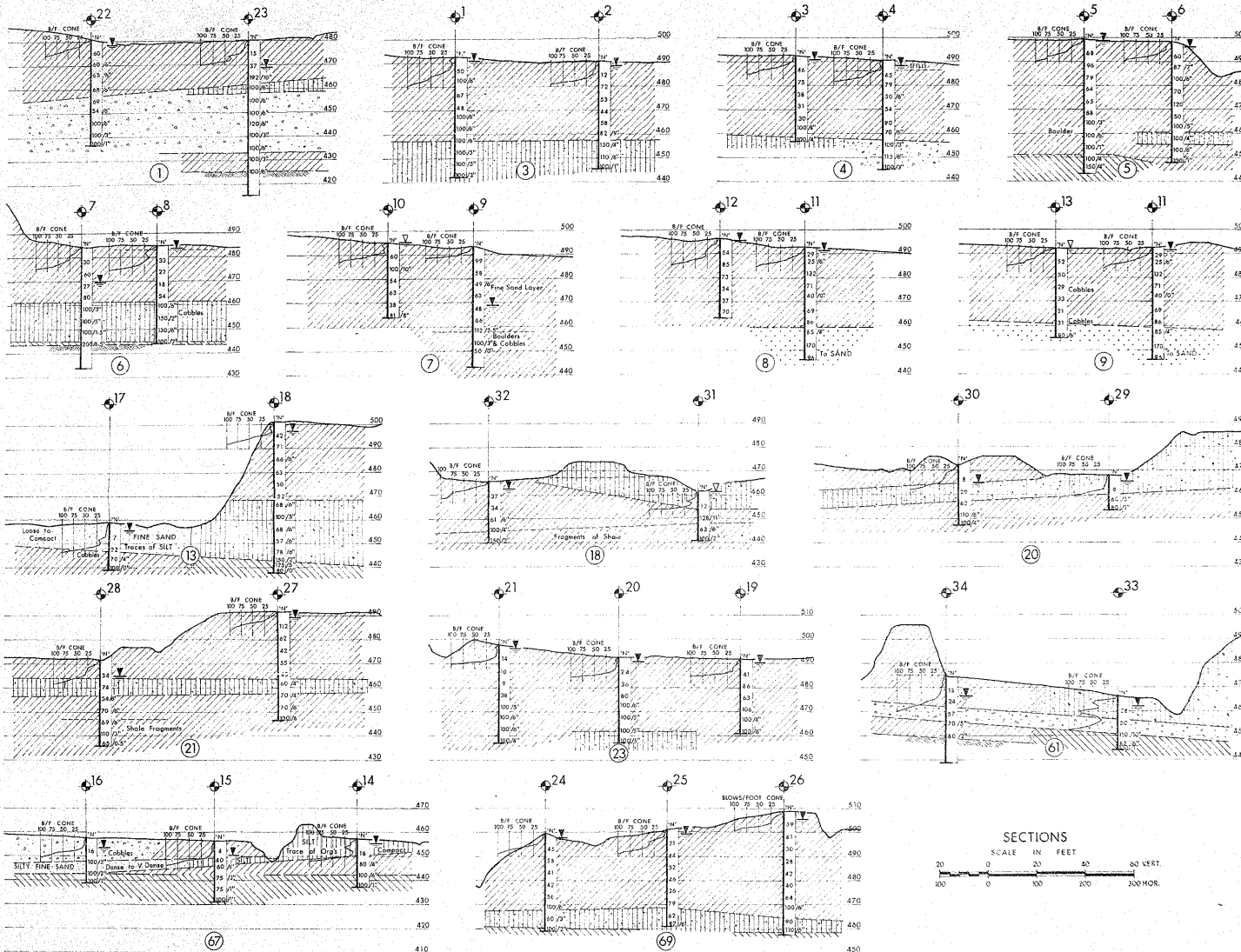
376-65 390-65

377-65 393-65

378-65 158-67

379-65 159-67-1





SEE DRAWING No. 66-F-102 A



# LEGEND

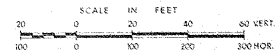
- Bore Hole
- Cone Penetration Hole
- Bore & Cone Penetration Hole
- Water Levels established at time of field investigation
- Water Levels at Surface due to heavy rainfall
- SILTY SAND WITH GRAVEL  
Dense to Very Dense
- SANDY SILT & SILTY SAND TRACE OF GRAVEL & CLAY  
Very Dense
- GRAVELLY SAND WITH SOME SILT  
Very Dense
- CLAYEY SILT with SAND TRACES OF GRAVEL  
Hard
- CLAYEY SILT TRANSITION to SHALE  
Hard - Dry
- SHALE RED ROCK

## NOTE

The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence and may be subject to considerable error.

DATE	BY	DESCRIPTION

## SECTIONS



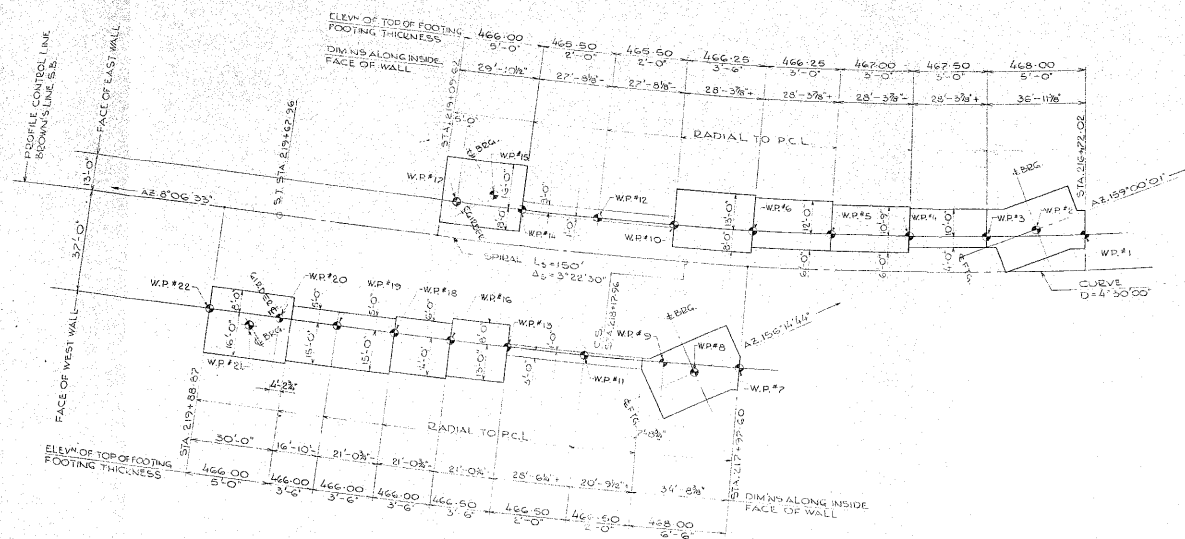
PRINT RECORD	NO	FOR	DATE

DEPARTMENT OF HIGHWAYS - ONTARIO			
MATERIALS & TESTING DIVISION - FOUNDATION SECTION			
PROPOSED INTERCHANGE			
HWY. No. 401, 27 & RICHVIEW EXP'Y			
KING'S HIGHWAY NO.	DIST. NO. 6		
CO. YORK	METROPOLITAN TORONTO		
TWP. ETOBICOKE	LOT	CON.	
SECTIONS AT STRUCTURES & SOIL STRATA			
SUBMD. A.B.	CHECKED 107	W.P. NO. 201-62-1	1187 DRAWING NO.
DRAWN D.H.	CHECKED 107	JOB NO. 66-F-102	66-F-102B
DATE 7 FEB. 1967	SITE NO.		BRIDGE DRAWING NO.
APPROVED <i>[Signature]</i>	CONT. NO.		

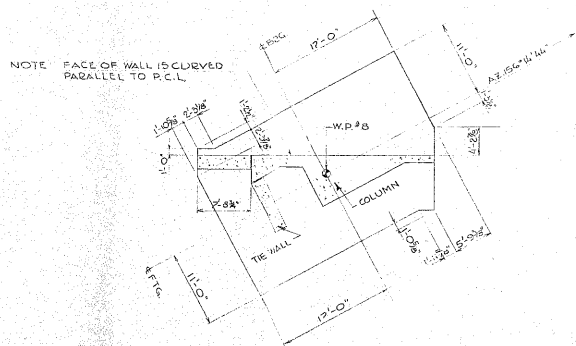




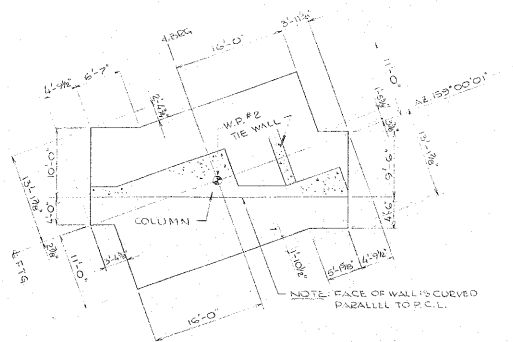




FOUNDATION LAYOUT



PLAN OF SOUTH WEST CORNER  
SCALE: 1/8" = 1'-0"



PLAN OF SOUTHEAST CORNER  
SCALE: 1/8" = 1'-0"

WD	COORDINATES		OFF-SET FROM PCL	STATION	STATION COORDINATES		REMARKS
	NORTH	EAST			NORTH	EAST	
1	566769.516	580419.321	13.0000	E 216.772.02	566769.5100	580408.293	
2	566780.222	580421.395	15.5533	E 216.790.85	566780.2985	580405.681	
3	566806.454	580418.681	13.0000	E 217.059.55	566806.421	580405.364	
4	566834.773	580418.923	13.0000	E 217.379.66	566835.056	580405.916	
5	566863.003	580419.202	13.0000	E 217.7.66.59	566863.037	580406.454	
6	566891.570	580421.317	13.0000	E 217.95.62	566892.121	580408.544	
7	566897.974	580331.584	37.0000	E 217.97.66	566899.411	580408.502	
8	566912.580	580337.128	39.9999	E 218.112.80	566909.771	580409.606	
9	566925.964	580373.657	57.0000	E 218.153.81	566926.744	580410.516	
10	566919.512	580423.467	13.0000	E 218.151.81	566920.744	580410.516	
11	566932.252	580376.417	57.0000	E 218.151.63	566936.423	580411.809	
12	566947.154	580426.167	13.0000	E 218.51.75	566958.533	580415.220	
13	566970.589	580379.660	57.0000	E 218.779.60	566976.220	580416.389	
14	566974.644	580429.294	13.0000	E 218.779.60	566976.220	580416.389	
15	566988.454	580433.551	15.4907	E 218.819.07	566987.586	580417.785	
16	567001.535	580382.197	37.0000	E 218.90.25	566996.007	580418.987	
17	566999.322	580432.427	13.0000	E 219.104.60	567001.021	580419.539	
18	567021.466	580355.087	37.0000	E 219.211.15	567017.157	580421.647	
19	567043.300	580337.933	73.0000	E 219.319.11	567033.176	580424.724	
20	567064.154	580330.741	57.0000	E 219.123.10	567058.969	580427.571	
21	567078.225	580339.008	59.666	E 219.73.93	567078.595	580429.039	
22	567079.638	580454.576	17.0000	E 219.75.87	567084.479	580431.206	

OFFSET FROM P.C.L.

1. DENOTES LEFT OF PCL } ORIENTATION IS IN DIRECTION  
2. DENOTES RIGHT OF PCL } OF INCREASING STATIONS.

## NOTES

FOR GENERAL NOTES SEE DWG'D 6221-1

### SELECTION OF COMPARISON

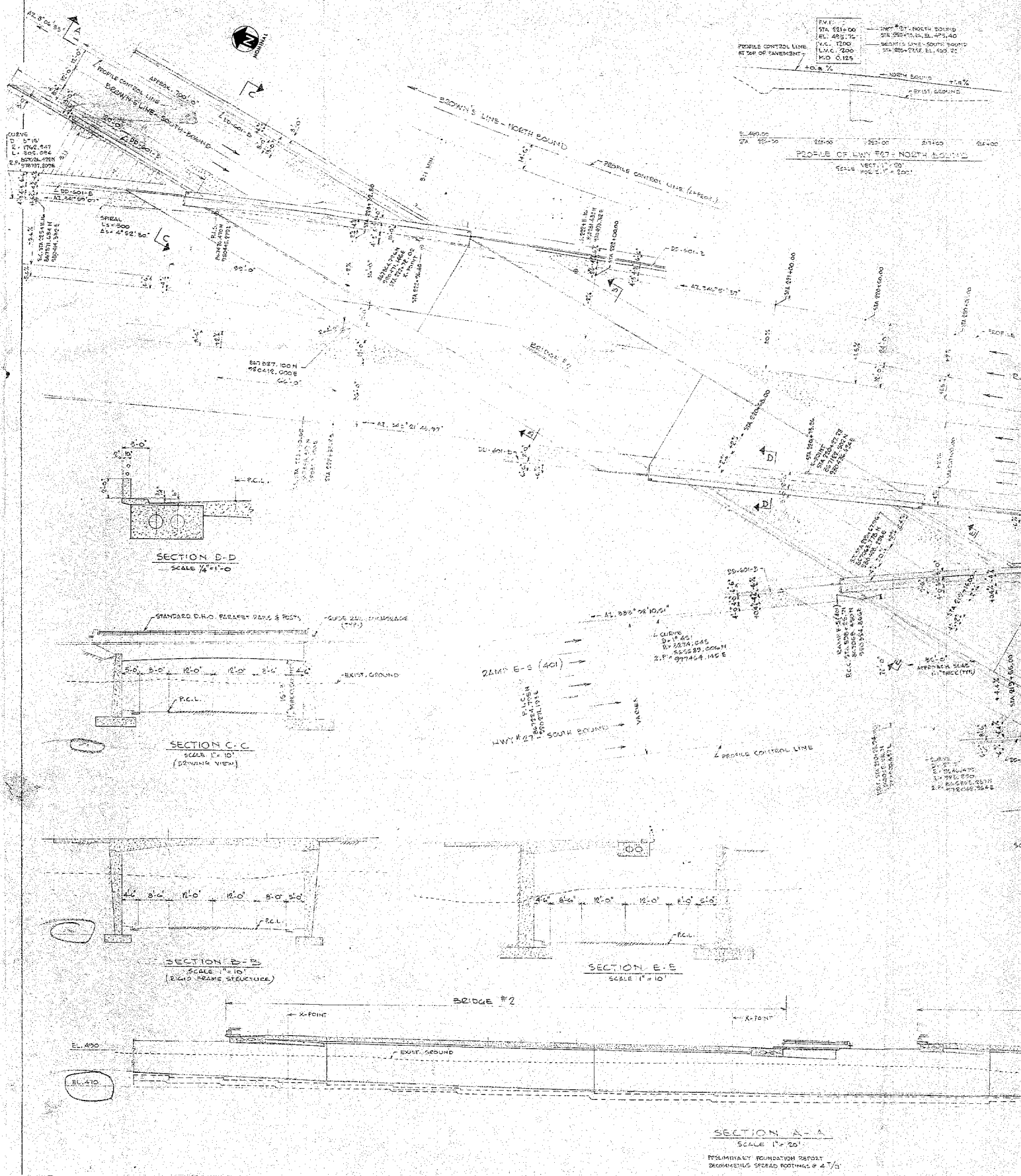
THE SEQUENCE OF CONSTRUCTION SHALL BE AS FOLLOWS:

1. CONSTRUCT FOUNDATIONS, WALLS AND COLUMNS.
2. CONSTRUCT TEMPORARY WIND WALLS AT THE EXPANSION JOINTS AT THE ENDS OF THE RIGID FRAME.
3. BACKFILL WALLS SUPPORTING TRIANGULAR END SLABS & SPACE BETWEEN COLUMNS AND BACKFILL SUPPORTING PRESTRESSED BEAMS, STOP BACKFILL E.G. BELOW TOP OF COLUMNS.
4. CONSTRUCT R.F. BEAMS AND CARRY OUT STAGE 1 PRESTRESSING.
5. INSTANT DEFECTION OF TRAVELLED LINES USING SPEEDING MACHINE AND HAND FINISH SHOULDER.
6. CARRY OUT STAGE II PRESTRESSING AND ABOUT 100% TESTS & CABLES.
7. CONSTRUCT END AND COVER WALLS ON SIDES OF BEAM AND CURBS & ROAD.
8. COMPLETE BACKFILLING.

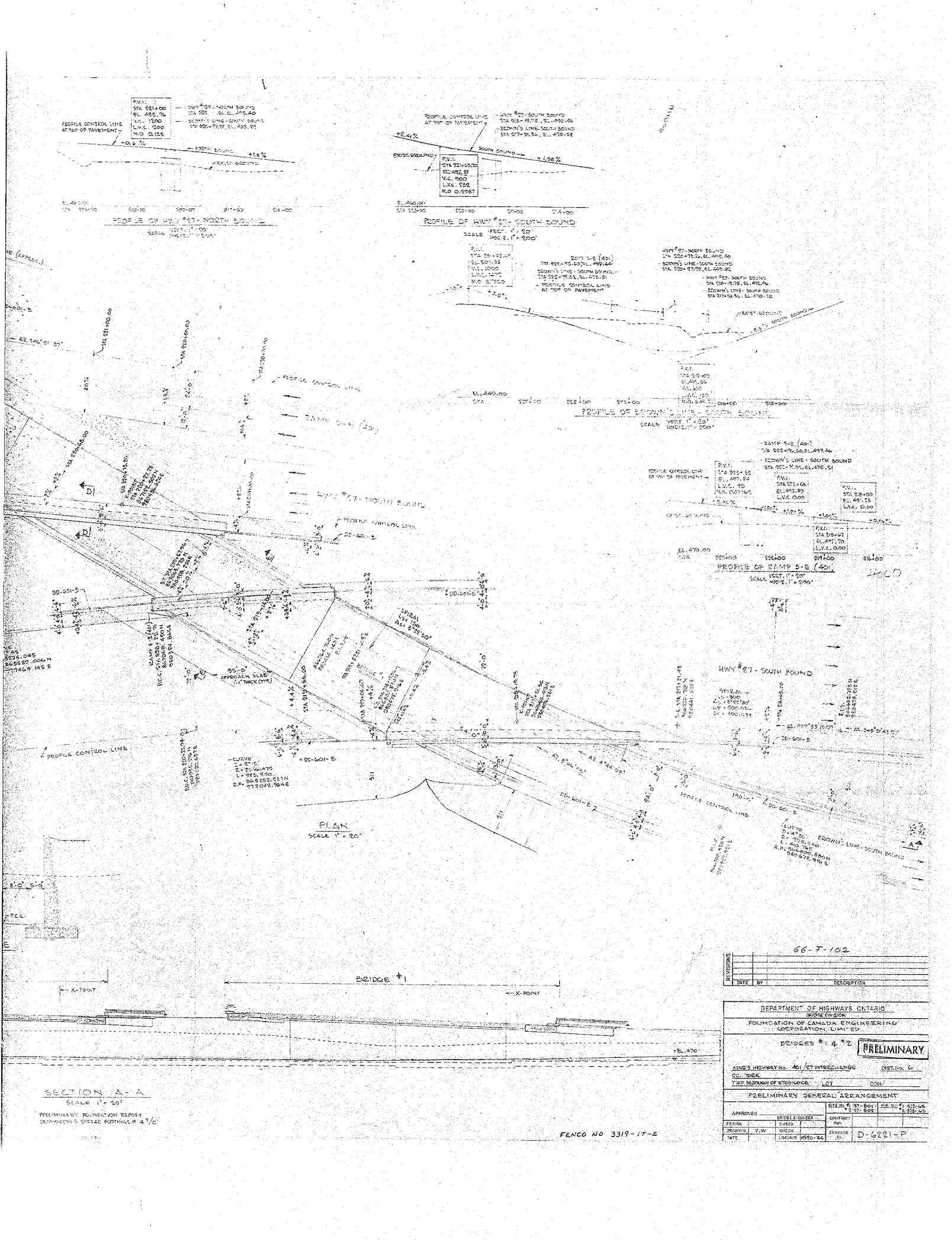
[illegible]

DEPARTMENT OF HIGHWAYS ONTARIO BRIDGE DIVISION			
FOUNDATION OF CANADA ENGINEERING CORPORATION LIMITED			
66-102			
BRIDGE # 1			
HWY#27 S.B. C/RAMP E-S (40) OVER BROWN'S LINE S.B.			
KING'S HIGHWAY N.401/E7 INTERCHANGE		DIST. No. 6	
CO. YORK		DIST. No. 6	
TWP. BURLINGTON OF LEBROCK		LOT CON.	
FOUNDATION LAYOUT			
APPROVED _____ BRIDGE ENGINEER		DATE 3-7-80 CONTRACT NO. 372-GS	
DESIGN	M.M. CHAMBERS	DRAWN	A.L.L.
CHECKED	J.A.L.	CHECKED	J.A.L.
DATE	MAY 1981	CONTRACT	D6221-4









PROFILE OF HWY #27 NORTH BOUND  
SCALE: HORIZ. 1" = 200'  
VERT. 1" = 20'

PROFILE OF HWY #27 SOUTH BOUND  
SCALE: HORIZ. 1" = 200'  
VERT. 1" = 20'

PROFILE OF BROWN'S LINE SOUTH BOUND  
SCALE: HORIZ. 1" = 200'  
VERT. 1" = 20'

PROFILE OF RAMP D-E (401)  
SCALE: HORIZ. 1" = 200'  
VERT. 1" = 20'

PLAN  
SCALE: 1" = 80'

SECTION A-A  
SCALE: 1" = 20'

66-F-102

REVISIONS	
DATE	DESCRIPTION

DEPARTMENT OF HIGHWAYS ONTARIO  
FOUNDATION OF CANADA ENGINEERING  
CORPORATION LIMITED

BRIDGES # 1 & 2

**PRELIMINARY**

KING'S HIGHWAY NO. 401/27 INTERCHANGE DIST. NO. 6  
DO: 108K  
TWP. TOWNSHIP OF WEDDLE LOT CON:

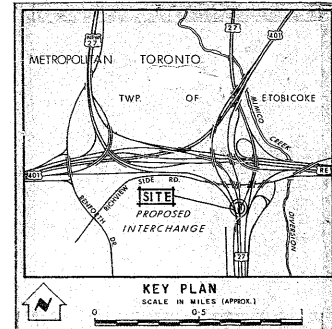
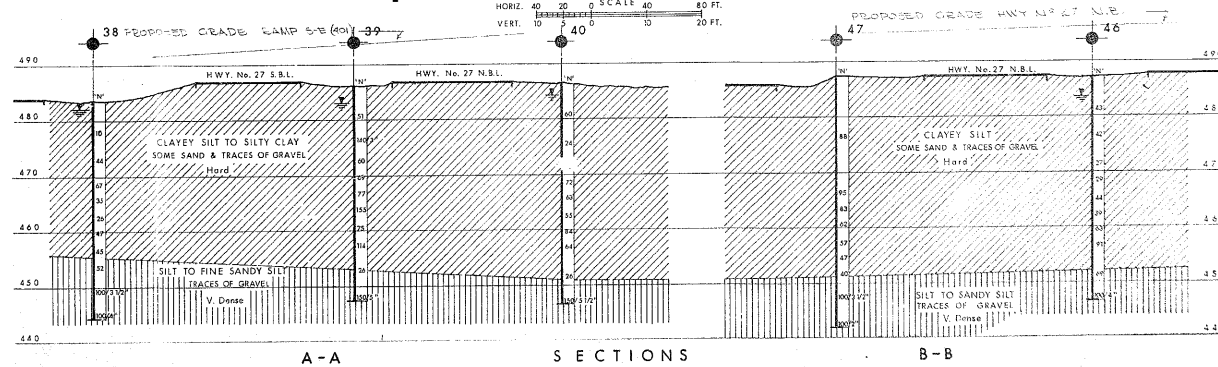
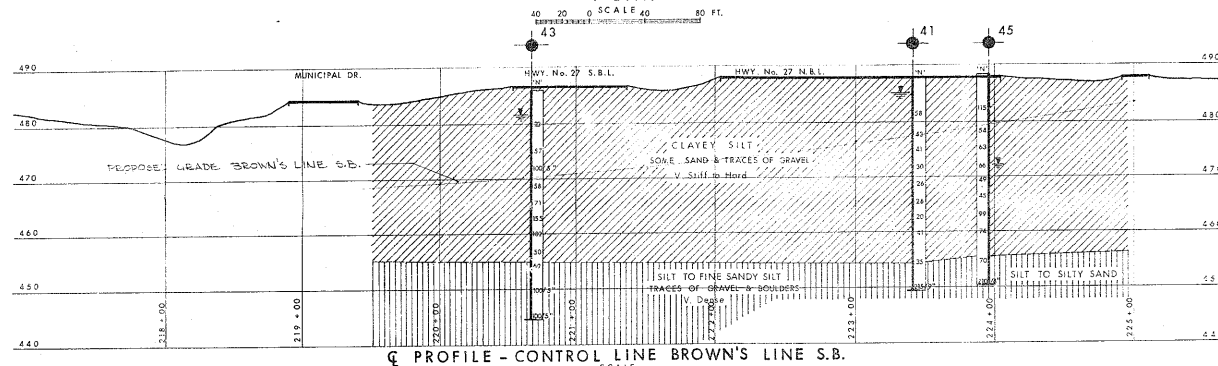
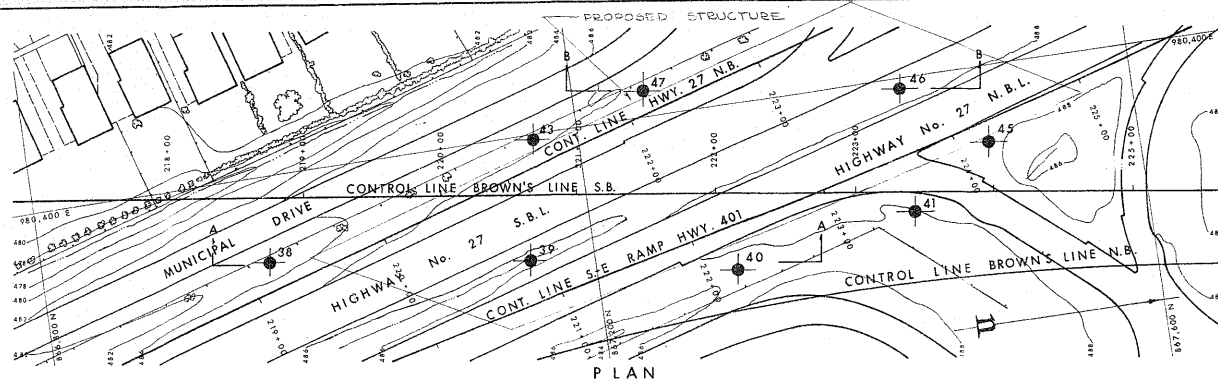
PRELIMINARY GENERAL ARRANGEMENT

APPROVED	DESIGNED	CHECKED	DATE

DESIGN: J.W. CHECK: L. M. DATE: 10/20/66

BRIDGE NO. 3319-17-E

D-6221-P



LEGEND				
	Bore Hole			
	Cone Penetration Hole			
	Bore & Cone Penetration Hole			
	Water Levels established at time of field investigation, July 1967			
NO.	ELEVATION	CO-ORDINATES		
		NORTH	EAST	
38	483.7	866,965	980,462	
39	486.0	867,152	980,490	
40	486.7	867,300	980,519	
41	487.8	867,431	980,496	
43	486.2	867,167	980,464	
45	488.4	867,491	980,435	
46	487.1	867,435	980,406	
47	487.5	866,831	980,381	

**NOTE**  
The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence and may be subject to considerable error.

REVOLUTIONS		DESCRIPTION
NO.	DATE	

DEPARTMENT OF HIGHWAYS - ONTARIO  
MATERIALS & TESTING DIVISION - FOUNDATION SECTION

**BRIDGE No. 2**  
RAMP SE (401) & HWY. 27 N.B. OVER BROWN'S LINE S.B.

KING'S HIGHWAY NO. 401 & 27 INTERSECTION DIST. NO. 6  
CO. YORK METRO TORONTO  
TWP. STOBICOKE LOT CON.

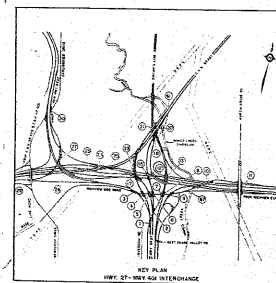
**BORE HOLE LOCATIONS & SOIL STRATA**

SUB'D A.B. CHECKED ☒ W.P. NO. 373-65 M.B.T. DRAWING NO.  
DRAWN P.G.O. CHECKED ☒ JOB NO. 66-F-102 66-F-102C  
DATE AUGUST 8, 1967 SITE NO. BRIDGE DRAWING NO.  
APPROVED *[Signature]* CONF. NO.

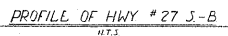
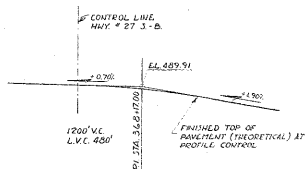
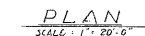




4 ABUT. BRCS. AND 4 PIERS ARE  
LOCATED ALONG THE RADIUS  
OF THE CONTROL LINE.



ELEVATION 491.429  
RICHVIEW SIDE ROAD BRIDGE OVER HWY #27  
TABLET IN SOUTHERLY FACE OF EASTERLY  
CONCRETE ABUTMENT, 12 INCHES EASTERLY FROM  
WESTERLY FACE AND 12 INCHES ABOVE TOP OF  
RETAINING WALL.

[illegible]

REVISIONS		
DATE	BY	DESCRIPTION

66-F-102

DEPARTMENT OF HIGHWAYS ONTARIO  
BRIDGE DIVISION

BRIDGE #3

HWY #27 S. B. OVER RICHVIEW SIDE RD.

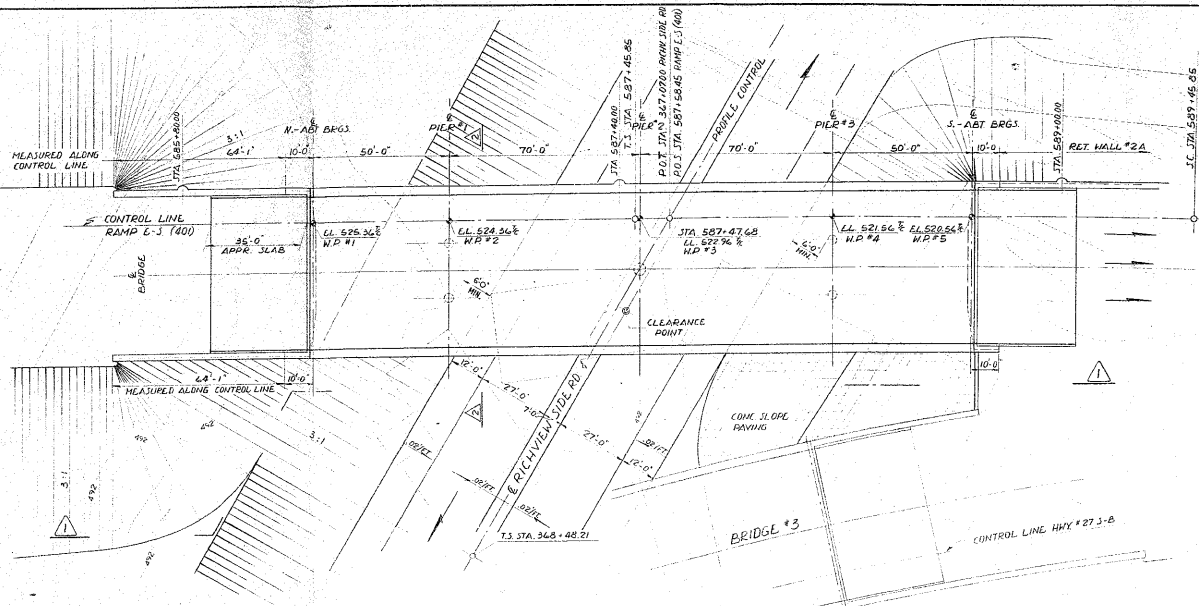
KING'S HIGHWAY No. 401 &amp; 27 DIST. No. 6

GOVERNMENT OF TORONTO

TWP. 5708100K6 LOT CON.

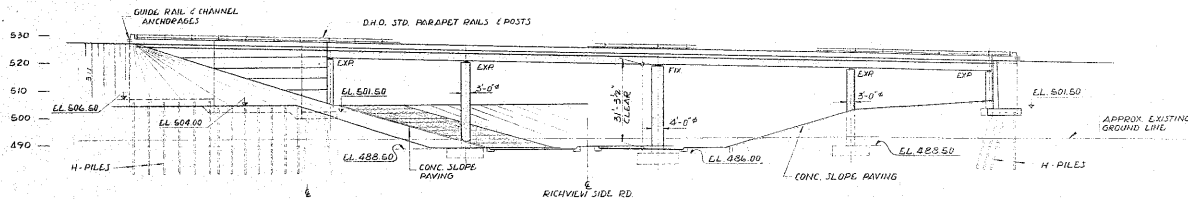
— PRELIMINARY PLAN —

APPROVED _____ SPECIAL ENGINEER				SITE No. 37-803		W.P. No. 374-0	
				CONTRACT No.			
DESIGN	A. M.	CHECK		DRAWING No. D-6223-P <sub>1</sub>			
DRAWING	A. A.	CHECK	Ans				
DATE	AUG 14/7		LOADING		14/20-06		

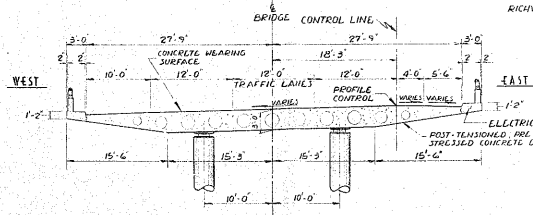


PLAN  
SCALE: 1" = 20'-0"

NOTE:  
• OF ABT BRG'S & PIERS ARE RADIAL AND ARE LOCATED PERPENDICULAR TO THE CONTROL LINE.  
• % DENOTES ELEVATIONS ARE AT TOP OF CONCRETE PAVEMENT

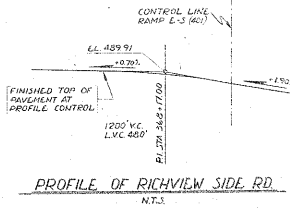


ELEVATION  
SCALE: 1" = 20'-0"



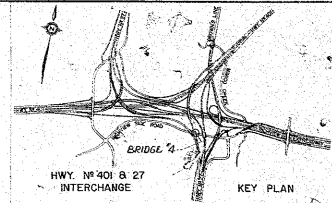
DECK SECTION  
SCALE: 1/2" = 1'-0"

PROFILE OF RAMP E-3 (400)  
N.T.S.



PROFILE OF RICHVIEW SIDE RD  
N.T.S.

- LIST OF DRAWINGS**
- D-6224-1 - GENERAL PLAN
  - 2 - FOUNDATION LAYOUT
  - 3 - FOOTINGS & PIERS
  - 4 - SOUTH ABUTMENT
  - 5 - NORTH ABUTMENT
  - 6 - RETAINING WALLS
  - 7 - BEARING DETAILS
  - 8 - DECK DETAILS
  - 9 - LONGIT. CABLE DETAILS
  - 10 - TRANSV. CABLE DETAILS
  - 11 - DECK REINFORCEMENT - I
  - 12 - DO - II
  - 13 - DO - III
  - 14 - PARAPET WALLS
  - 15 - APPROACH SLABS
  - 16 - DETAILS OF CONC. SLOPE PAVING
  - D-6224-17 - STANDARD DETAILS



D.H.O. PRECISE B.M. #7-187  
ELEVATION 591.422  
RICHVIEW SIDE ROAD BRIDGE OVER HWY. NO. 27.  
TABLET IN SOUTHERLY FACE OF EASTERLY CONCRETE ABUTMENT, 12 INCHES EASTERLY FROM WESTERLY FACE AND 3 INCHES ABOVE TOP OF RETAINING WALL.

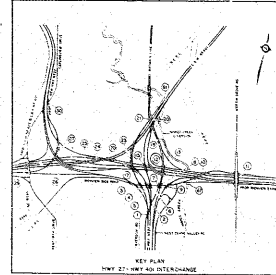
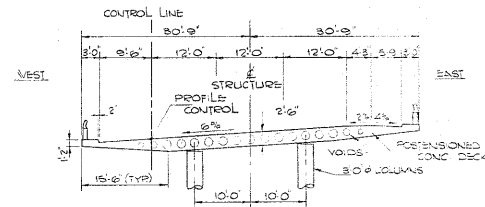
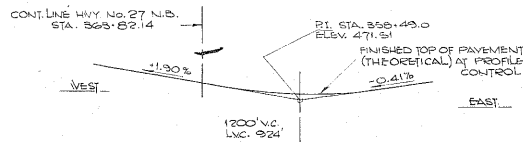
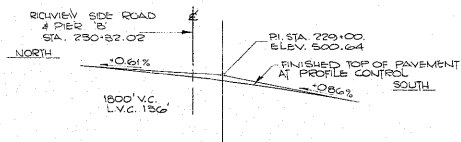
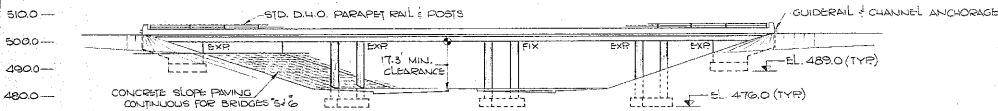
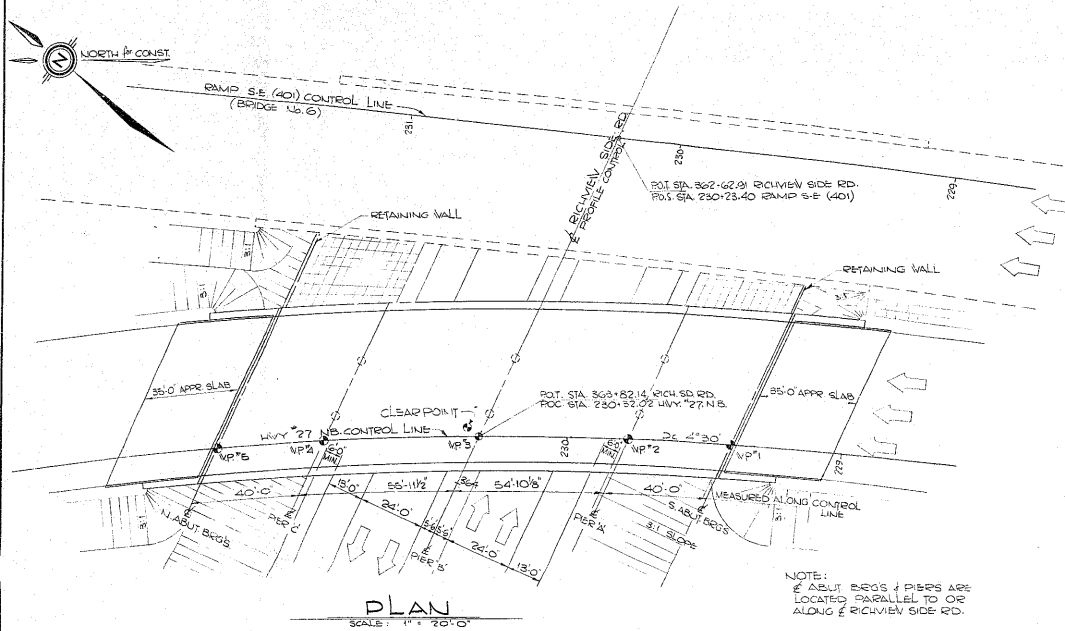
- NOTES**
- CLASS OF CONCRETE**
- DECK, CURBS, PARAPET WALLS 5000 P.S.I.  
DECK COLUMNS 3000 P.S.I.  
REMAINDER AND/OR AS NOTED  
**CLEAR COVER ON REINFORCING STEEL**
- FOOTINGS, ABUTMENTS, PIERS, DECK TOP 2"  
3" 3" 2" BOTTOM 1 1/2"
- CURBS PARAPET WALLS APPROACH SLABS 2" 1 1/2" 2"
- CONSTRUCTION NOTES**
1. THE CONTRACTOR IS RESPONSIBLE FOR FINISHING THE BEARING SEATS TO THE DESIRED ELEVATIONS WITH A TOLERANCE OF ± 1/2".
  2. NO CONCRETE SHALL BE PLACED ABOVE THE ABUTMENT BEARING SEATS UNTIL THE CONCRETE IN THE DECK HAS BEEN PLACED, STRICED AND CURBED FOR DETAILS OF CONSTRUCTION JOINT IN ABUTMENTS SEE DWGS. D-6224-4 & 5.
  3. FOR LIGHTING DETAILS SEE ELECTRICAL DRAWINGS.
  4. COMPACTED FILL TO BE PLACED UP TO 4" ABOVE UNDERLIEGE OF FOOTING ELEVATION BEFORE DRIVING PILES.

REVISIONS	DATE	BY	DESCRIPTION

DEPARTMENT OF HIGHWAYS ONTARIO			
BRIDGE DIVISION			
66-F-2003			
BRIDGE #4			
RAMP E-3 (400) OVER RICHVIEW SIDE RD.			
KING'S HIGHWAY NO. 401 & 27			
S.D. YORK		DIST. No. 4	
TYP. ETOBICOKE		CON.	
- GENERAL PLAN -			
APPROVED	DESIGN	CONTRACT	DATE
37-204	A.A. WITECKI	375-65	3/16/63
CHECK	CHECK	CHECK	CHECK
3/16/63	3/16/63	3/16/63	3/16/63



PRINT RECORD	NO.	FOR	DATE



#### GENERAL NOTES

CLASS OF CONCRETE	
DECK	000 psi
CURBS	000 "
PARAPET WALL	000 "
APPROACH SLAB	000 "
PIERS	000 "
PIER FOOTINGS	000 "
ABUTMENTS	000 "
ABUTMENT FOOTINGS	000 "
CLEAR COVER TO REINFORCING STEEL	
ABUTMENT & PIER FOOTINGS	3"
ABUTMENT & PIERS	3"
CURBS	2"
PARAPET WALL	2"
DECK TOP	2"
DECK BOTTOM	1 1/2"

D.O. PREPARE B.M. # T-187  
 2" x 4" x 8" x 16" x 24" x 36" x 48" x 60" x 72" x 84" x 96" x 108" x 120" x 132" x 144" x 156" x 168" x 180" x 192" x 204" x 216" x 228" x 240" x 252" x 264" x 276" x 288" x 300" x 312" x 324" x 336" x 348" x 360" x 372" x 384" x 396" x 408" x 420" x 432" x 444" x 456" x 468" x 480" x 492" x 504" x 516" x 528" x 540" x 552" x 564" x 576" x 588" x 600" x 612" x 624" x 636" x 648" x 660" x 672" x 684" x 696" x 708" x 720" x 732" x 744" x 756" x 768" x 780" x 792" x 804" x 816" x 828" x 840" x 852" x 864" x 876" x 888" x 900" x 912" x 924" x 936" x 948" x 960" x 972" x 984" x 996" x 1000"

#### LIST OF DRAWINGS D-6225-1 TO

GENERAL PLAN	.....
FOOTING LAYOUT	.....
FOOTING REINFORCEMENT	.....
ABUTMENT DIMENSIONS	.....
ABUTMENT REINFORCEMENT	.....
PIERS DIMS. & REIN.	.....
BEARING DETAILS	.....
CABLE DETAILS	.....
DECK DIMENSIONS	.....
DECK REINFORCEMENT	.....
DETAILS OF CONC. SLOPE PAVING	.....
APPROACH SLAB	.....
PARAPET WALL DETAILS	.....
STANDARD STEEL PARAPET RAIL	.....
STANDARD DETAILS	.....
FINGER PLATE DETAILS	.....
BRIDGE ELECTRICAL DETAILS	.....

REVISIONS	DATE	BY	DESCRIPTION

#### DEPARTMENT OF HIGHWAYS ONTARIO BRIDGE DIVISION

#### BRIDGE No. 5

HWY. No. 27 N.B. OVER RICHVIEW SIDE ROAD

BRIDGE No. 5

HWY. No. 27 N.B. OVER RICHVIEW SIDE ROAD

CO. YORK

TWP. HOBOKEN

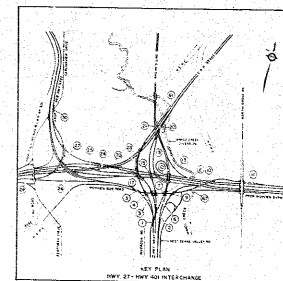
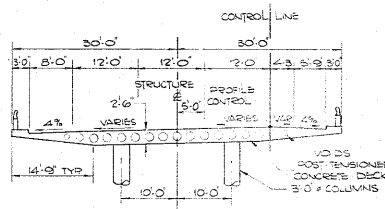
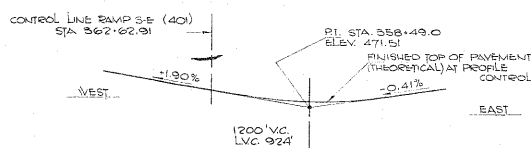
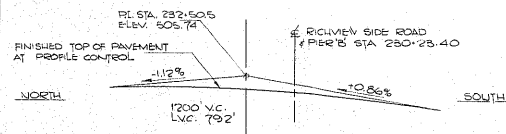
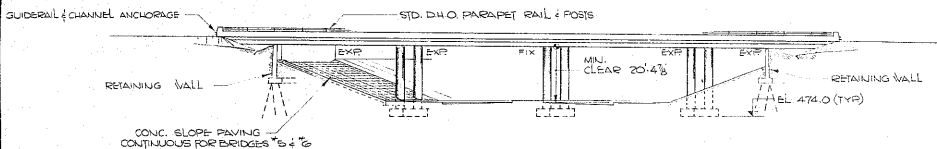
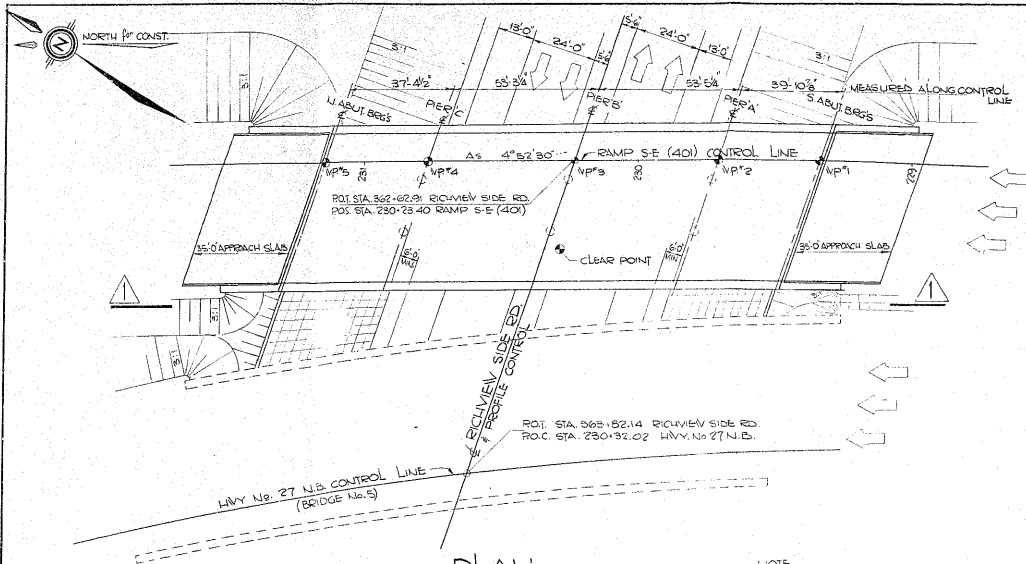
LOT

CON.

#### GENERAL PLAN PRELIMINARY

APPROVED	DESIGN	CHECK	DATE	LOADING	DATE

D-6225-P1



#### GENERAL NOTES

##### CLASS OF CONCRETE

DECK	000 psi
CURBS	000 "
PARAPET WALL	000 "
APPROACH SLAB	000 "
PIERS	000 "
PIER FOOTINGS	000 "
ABUTMENTS	000 "
ABUTMENT FOOTINGS	000 "

##### CLEAR COVER TO REINFORCING STEEL

ABUTMENT & PIER FOOTINGS	3"
ABUTMENT & PIERS	3"
CURBS	2"
PARAPET WALL	2"
DECK TOP	2"
DECK BOTTOM	1 1/2"

D40 PRECISE B.M. "T-187"  
ELEVATION 232.525  
SOUTH ELEV. SIDE ROAD BRIDGE OVER HWY. NO. 27.  
TABLE 1. SOUTHERLY FACE OF EASTERLY CONCRETE  
ABUTMENT, 12" HIGHER EASTERLY FROM WESTERLY  
FACE AND 12" HIGHER ABOVE TOP OF RETAINING  
WALL.

#### LIST OF DRAWINGS D-6249-1 TO

GENERAL PLAN	.....
FOOTING LAYOUT	.....
FOOTING REINFORCEMENT	.....
ABUTMENT DIMENSIONS	.....
ABUTMENT REINFORCEMENT	.....
PIERS DIMS. & REINF.	.....
BEARING DETAILS	.....
CABLE DETAILS	.....
DECK DIMENSIONS	.....
DECK REINFORCEMENT	.....
DETAILS OF CONC. SLOPE PAVING	.....
APPROACH SLAB	.....
PARAPET WALL DETAILS	.....
STANDARD STEEL PARAPET RAIL	.....
STANDARD DETAILS	.....
FINGER PLATE DETAILS	.....
BRIDGE ELECTRICAL DETAILS	.....

REVISION	DATE	BY	DESCRIPTION

66-F-102

#### DEPARTMENT OF HIGHWAYS ONTARIO

##### BRIDGE DIVISION

#### BRIDGE No. 6

RAMP S-E, 401 OVER RICHVIEW SIDE ROAD

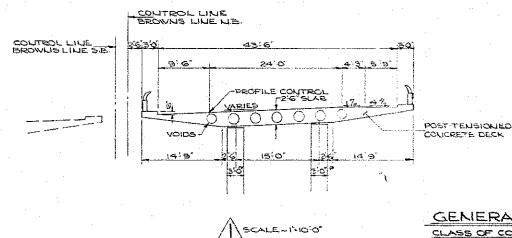
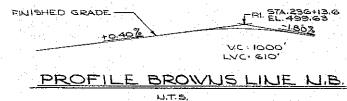
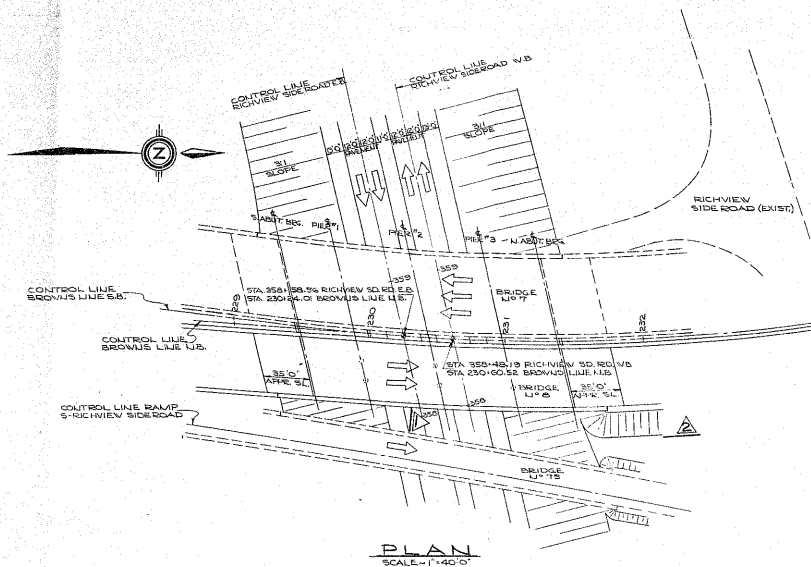
KING'S HIGHWAY No. 401 & 27 DIST. No. 6  
CO. YORK  
TWP. ELDONCOKE LOT CON.

#### GENERAL PLAN PRELIMINARY

APPROVED	SITE No. ST-823	FILE No. 377-65
DESIGN	BRIDGE ENGINEER	CONTRACT
DRAWING	CHIEF	No.
DATE	15/20/84	DRAWING No. D-6249-P1



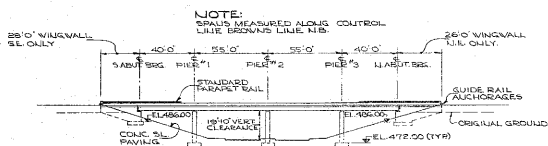




### GENERAL NOTES

<u>CLASS OF CONCRETE</u>	
DECK, PARAPET WALLS & PIERS (CURBS	3,000 P.S.I.
REMAINDER	3,000 P.S.I.

CLEAR COVER ON REINFORCING STEEL	
FOOTINGS, ABUTMENTS & PIERS	- 3"
CURBS	- 2"
DECK	TOP 2", BOTTOM 1 1/2"



ELEVATION   
SCALE = 1" = 40'-0"

[illegible][illegible]

66-F-102

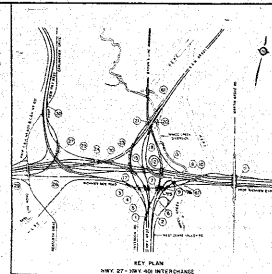
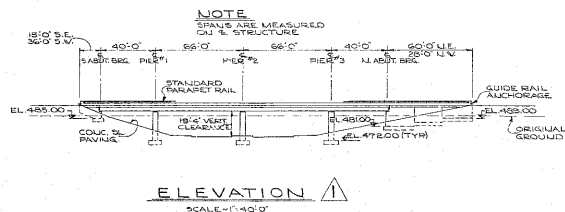
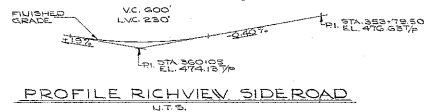
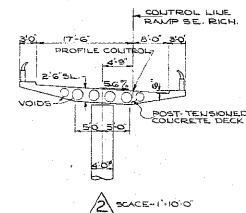
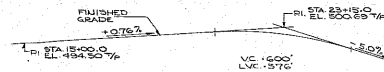
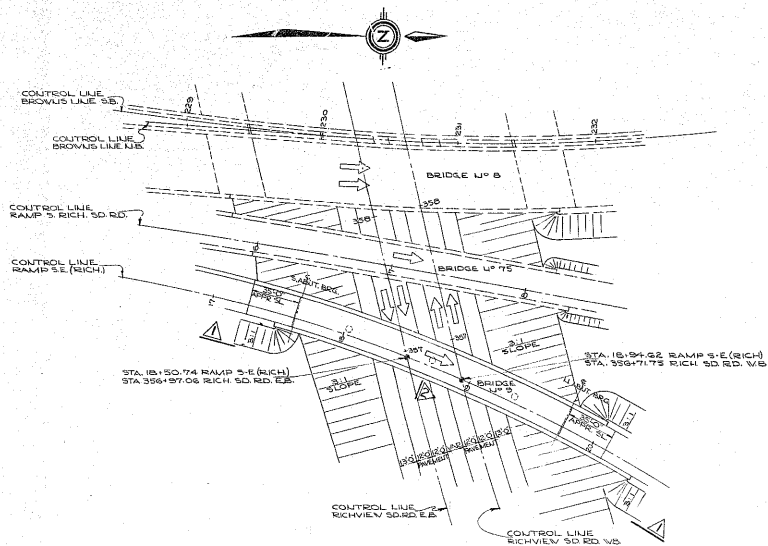
**DEPARTMENT OF HIGHWAYS ONTARIO**  
**BRIDGE DIVISION**

BRIDGE N° 8  
BROWNS LINE N.B., OVER RICHVIEW SO. RD.

KING'S HIGHWAY No. 401 & 27 DIST. No. 6  
CO. YORK  
TWP. ETOBICOKE LOT CON.

PRELIMINARY

APPROVED _____				SITE No. <b>37-830</b>		W.P. No. <b>379-65</b>	
BRIDGE ENGINEER				CONTRACT No.			
DESIGN		CHECK		DRAWING No.		<b>D-6250-P</b>	
DATE	<b>OCT/67</b>	LOADING	<b>H220-44</b>				



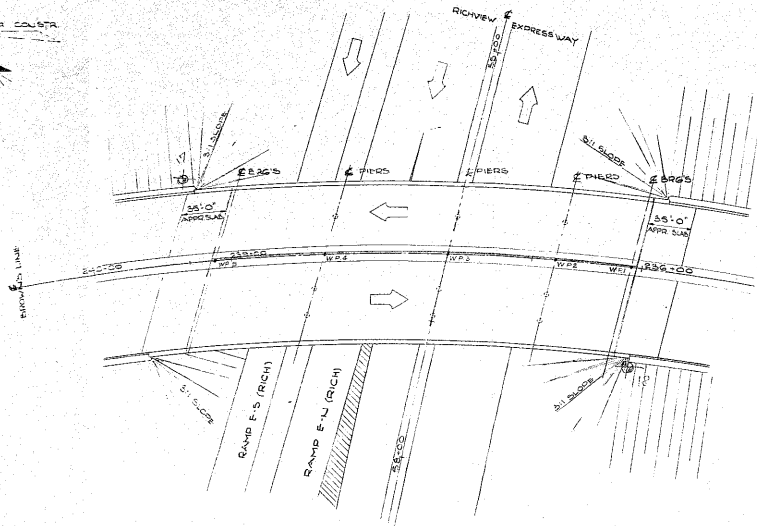
### GENERAL NOTES

CLASS OF CONCRETE	
DECK, CURBS, PARAPET WALLS & PIERS	- 5000 P.S.I.
REMAINDER	- 3000 P.S.I.

<u>CLEAR COVER ON REINFORCING STEEL</u>	
FOOTINGS ABUTMENTS & PIERS	-3"
CURBS	-2"
DECK	TOP -2", BOTT -1 1/2"

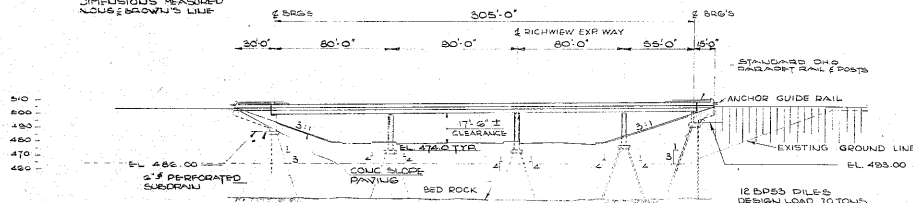
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<b>DEPARTMENT OF HIGHWAYS ONTARIO</b>	
<b>BRIDGE DIVISION</b>	
66-F-102	
<b><u>BRIDGE NO 9</u></b>	
<b><u>RAMP S-E RICH OVER RICHVIEW WIDEROAD</u></b>	
KING'S HIGHWAY NO. 410 E 27	DIST. No. G
CO. YORK	
TWP. ETOBICOKE	LOT                  CON.
<b><u>PRELIMINARY</u></b>	
DATE REC'D.      P.F. No.	
37-507      580-65	
APPROVED _____ CONTACT NAME _____	
(insert title)	
DESIGN                  CHECK	
DRAWING      C.A.B.      CHECK	
DATE      M/04/87      LONDON      H/30-86	DRAWING NO.      D-6227-Y

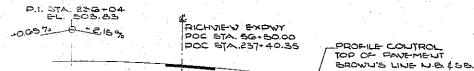


**PLAN**  
SCALE 1" = 40'-0"

NOTE:  
DIMENSIONS MEASURED  
ALONG BROWN'S LINE



**ELEVATION**  
SCALE 1" = 40'-0"



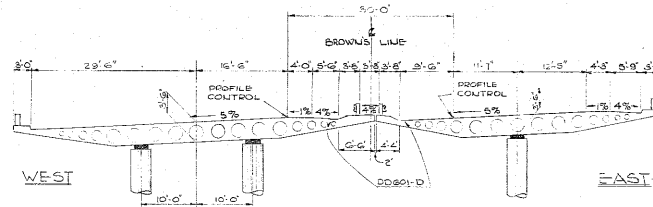
**PROFILE OF BROWN'S LINE**

### CURVE DATA

DC = 4' (HORIZONTAL CURVE)  
LVC = 778'-0"  
V.C. = 1000'

### GEODETIIC DATUM

D.M.O. PRECISE S.M. #718) ELEVATION 201.429  
RICHVIEW BRIDGE OVER HWY #27,  
TABLE IN SOUTHERLY FACE OF EASTERTY  
CONCRETE ABUTMENT, 12 IN. EASTERTY FROM  
WESTERTY FACE AND 12 IN. ABOVE TOP OF  
RETAINING WALL.



**CROSS SECTION**  
SCALE 1" = 1'-0"

### GENERAL NOTES

CLASS OF CONCRETE	
DECK	5,000 psi
CURBS	5,000 psi
PARAPET WALL	5,000 psi
APPROACH SLAB	5,000 psi
PIERS	5,000 psi
PIER FOOTINGS	5,000 psi
ABUTMENTS	3,000 psi
ABUTMENT FOOTINGS	3,000 psi

CHECK COVER TO REIN. STEEL	
ABUTMENT AND PIER FOOTINGS	3"
ABUTMENT AND PIER	5"
CURBS	2"
PARAPET WALL	2"
DECK TOP	2"
DECK BOTTOM	12"

### LIST OF DRAWINGS

GENERAL PLAN	
FOOTING LAYOUT	.....
REINFORCEMENT	.....
ABUTMENT DIMENSIONS	.....
REINFORCEMENT	.....
PIERS DIMS. & REIN.	.....
BEARINGS DETAILS	.....
CABLE DETAILS	.....
DECK DIMENSIONS	.....
REINFORCEMENT	.....
DETAILS OF CONC. SLOTT PAVING	.....
APPROACH SLAB	.....
PARAPET WALL DETAILS	.....
STANDARD STEEL PARAPET RAIL	.....
STANDARD DETAILS	.....
BRIDGE ELECTRICAL DETAILS	.....

DATE	BY	DESCRIPTION

66-7-102

DEPARTMENT OF HIGHWAYS ONTARIO  
BRIDGE DIVISION

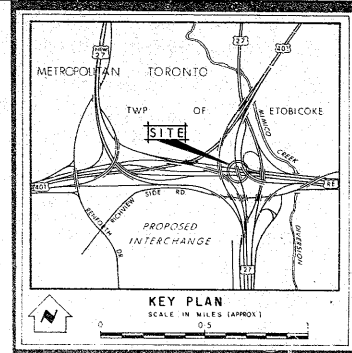
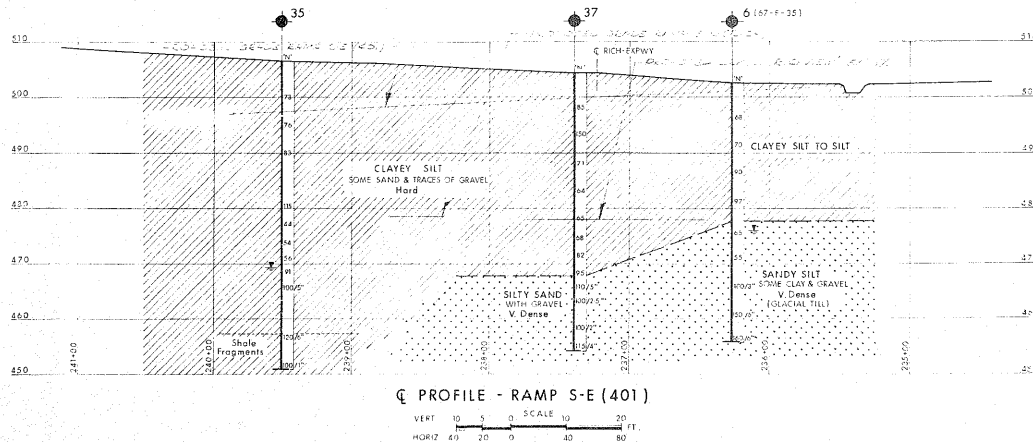
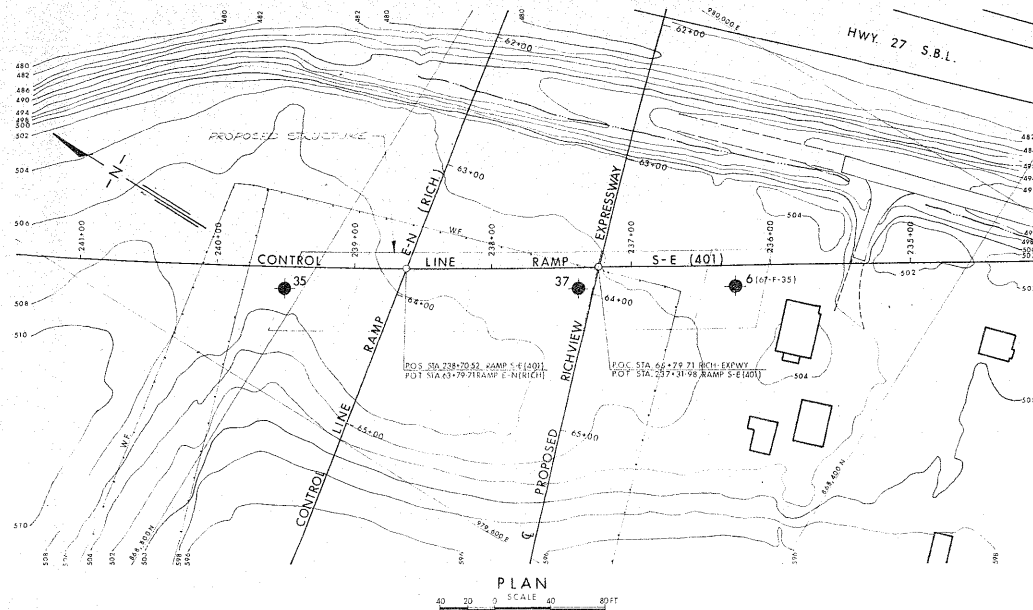
### BRIDGE #13

KING'S HIGHWAY No. HWY #401 & #27 DIST. No. G  
CO. YORK  
TWP. ETOBICOKE LOT CON.

### GENERAL PLAN (PRELIMINARY)

APPROVED	DATE	BY	DESCRIPTION
DRAWING	DATE	BY	DESCRIPTION

D-6231-P



LEGEND					
●	Bore Hole				
⊕	Cone Penetration Hole				
⊕	Bore & Cone Penetration Hole				
—	Water Levels established at time of field investigation April 15, 1967				
NO.	ELEVATION	CO. COORDINATES			
		NORTH	EAST		
1	502.2	4+4 53.2	972.842		
25	502.4	4+4 43.2	976.672		
31	502.3	4+4 12.8	979.784		

**NOTE**

The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence and may be subject to considerable error.

NO.	DATE	DESCRIPTION
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION - FOUNDATION SECTION

**BRIDGE NO 15**

**RAMP S-E (401) OVER RICHVIEW EXPRESSWAY**

KING'S HIGHWAY NO. 401 & 27 INTERCHANGE DIST NO. 8

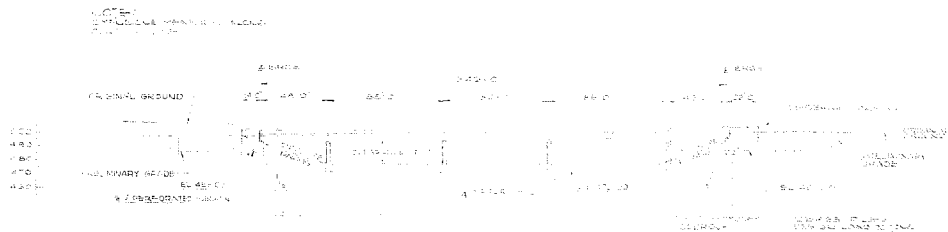
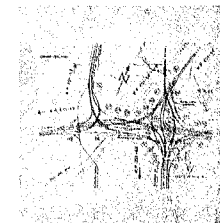
CO. YORK METROPOLITAN TORONTO

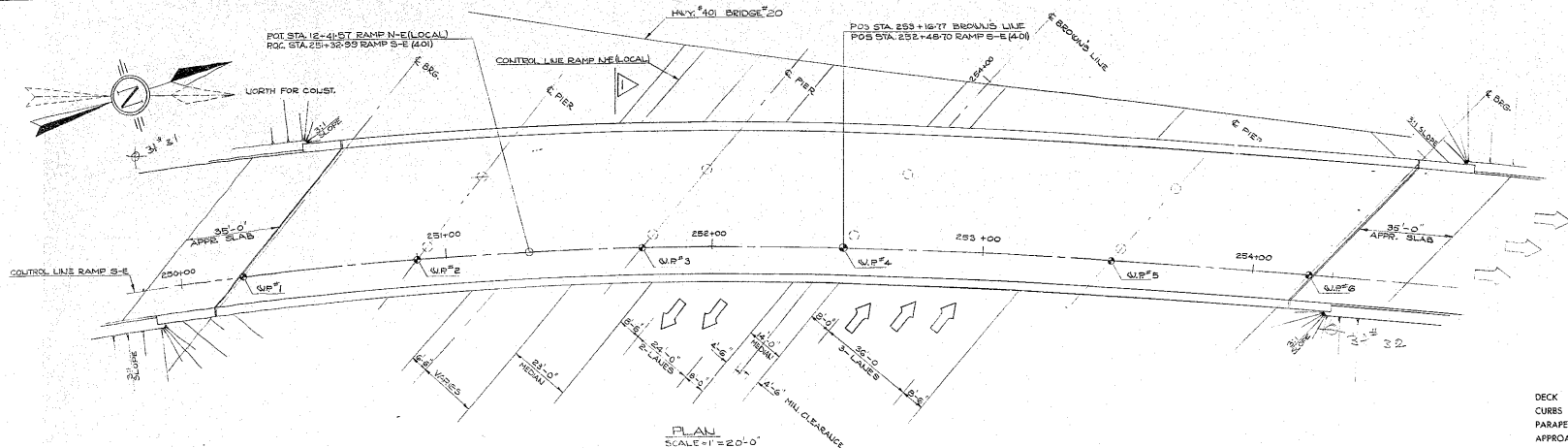
TWP. ETOBICOKE LOT CON.

**BORE HOLE LOCATIONS & SOIL STRATA**

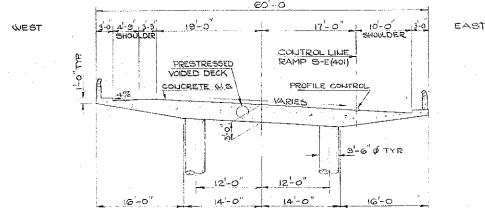
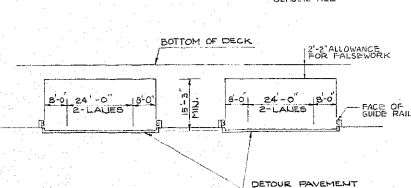
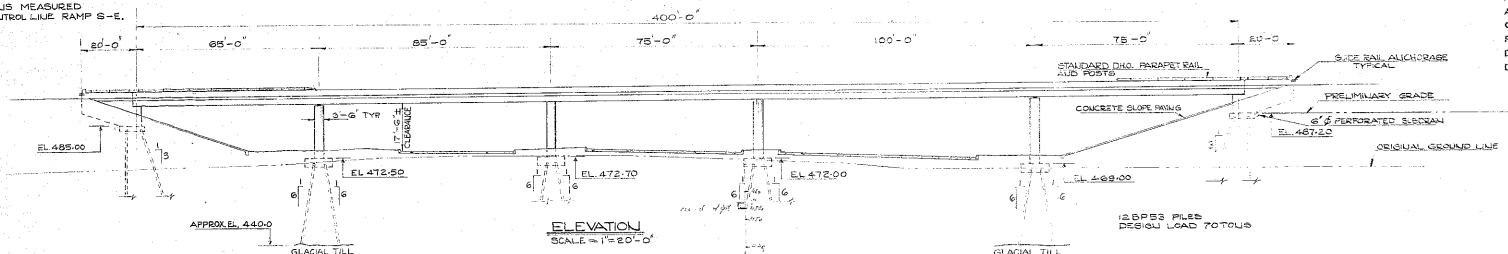
SUBMD. A.B.	CHECKED	W.P. NO. 380-62	N.B.T. DRAWING NO.
DRAWN S.O.	CHECKED	JOB NO. 66-F-102	<b>66-F-102D</b>
DATE 28 JULY 1967		SITE NO.	BRIDGE DRAWING NO.
APPROVED <i>[Signature]</i>		CONT NO.	



[illegible][illegible]



NOTE:  
DIMENSIONS MEASURED  
ALONG CONTROL LINE RAMP S-E.



CONST. CLEARANCE  
UNITS

SCALE = 1" = 10'-0"

#### LIST OF DRAWINGS D-6234-10

GENERAL PLAN  
FOOTING LAYOUT  
FOOTING REINFORCEMENT  
ABUTMENT DIMENSIONS  
ABUTMENT REINFORCEMENT  
PIERS DIMS. & REINF.  
BEARING DETAILS  
CABLE DETAILS  
DECK DIMENSIONS  
DECK REINFORCEMENT  
DETAILS OF CONC. SLOPE PAVING  
APPROACH SLAB  
PARAPET WALL DETAILS  
STANDARD STEEL PARAPET RAIL  
STANDARD DETAILS  
FINGER PLATE DETAILS  
BRIDGE ELECTRICAL DETAILS

#### GENERAL NOTES

##### CLASS OF CONCRETE

DECK	5,000 psi
CURBS	5,000 "
PARAPET WALL	5,000 "
APPROACH SLAB	5,000 "
PIERS	5,000 "
PIER FOOTINGS	5,000 "
ABUTMENTS	3,000 "
ABUTMENT FOOTINGS	3,000 "

##### CLEAR COVER TO REINFORCING STEEL

ABUTMENT & PIER FOOTINGS	3"
ABUTMENT & PIERS	3"
CURBS	2"
PARAPET WALL	2"
DECK TOP	2"
DECK BOTTOM	1 1/2"

REVISIONS	DATE	BY	DESCRIPTION

#### DEPARTMENT OF HIGHWAYS ONTARIO BRIDGE DIVISION

#### BRIDGE #18 RAMP S-E (40) OVER BROWN'S LINE

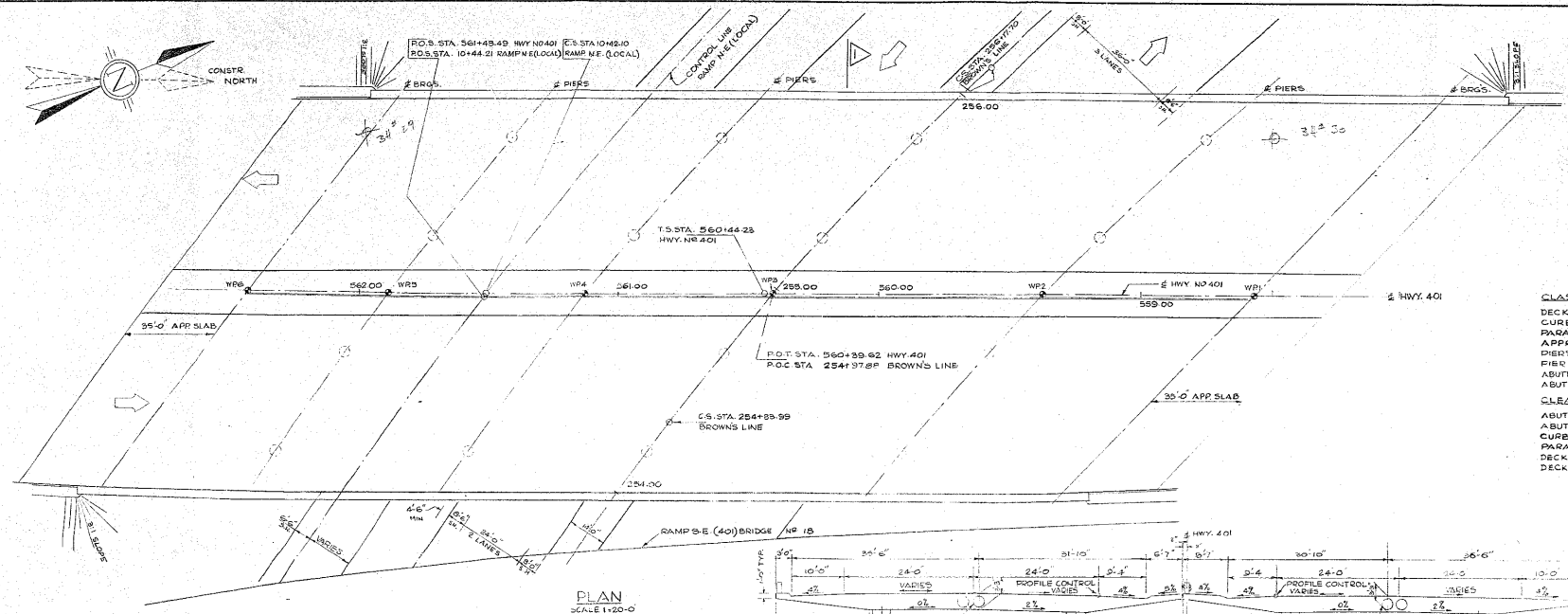
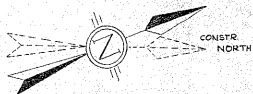
KING'S HIGHWAY No. 401 E 27 INTERCHANGE DIST. No. 9  
CO. YORK  
TWP. BORDEN OF BORDEN LOT CON.

#### GENERAL PLAN PRELIMINARY

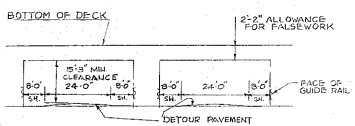
APPROVED	DATE	BY	DATE	BY
DESIGN				
DRAWING				
DATE				

D-6234-P

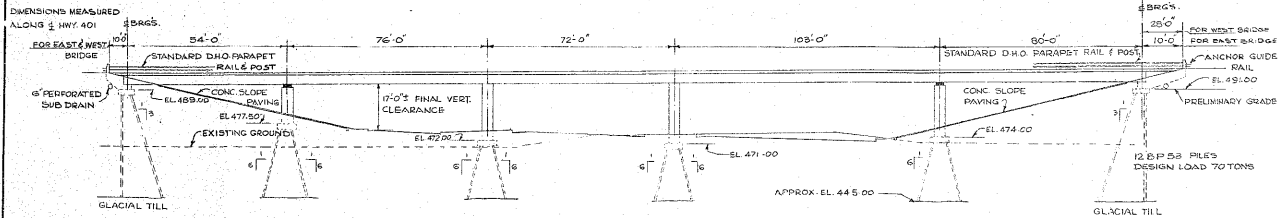




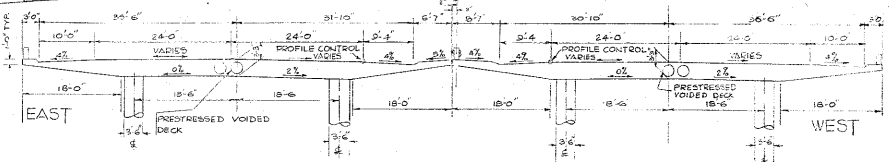
PLAN  
SCALE 1"=20'-0"



CONST. CLEARANCE  
SCALE 1"=20'-0"



ELEVATION  
SCALE 1"=20'-0"



CROSS SECTION  
SCALE 1"=10'-0"

LIST OF DRAWINGS

GENERAL PLAN	1
FOOTING LAYOUT	1
REINFORCEMENT	1
ABUTMENT DIMENSIONS	1
PIER DIMS. & REINFORCEMENT	1
CABLE DETAILS	1
DECK DIMENSIONS	1
REINFORCEMENT	1
DETAILS OF CONC. SLOPE PAVING	1
APPROACH SLAB	1
PARAPET WALL DETAILS	1
STANDARD STEEL PARAPET RAIL	1
FINGERPLATE DETAILS	1
BRIDGE ELECTRICAL DETAILS	1

GENERAL NOTES

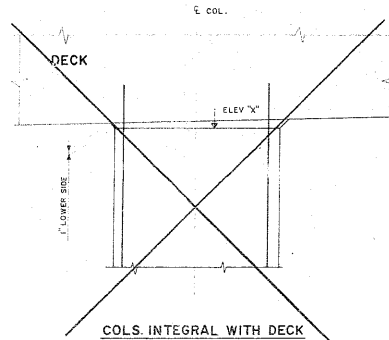
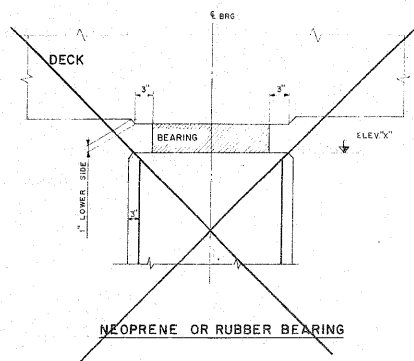
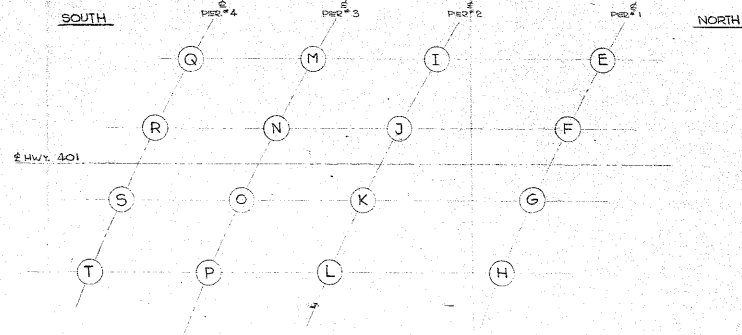
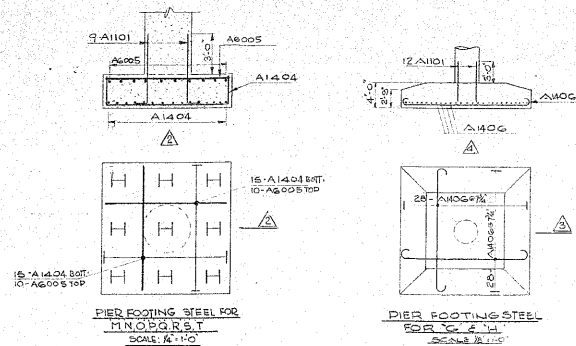
CLASS OF CONCRETE	
DECK	5000 psi
CURBS	5000 psi
PARAPET WALL	5000 psi
APPROACH SLABS	5000 psi
PIERS	5000 psi
PIER FOOTINGS	5000 psi
ABUTMENTS	5000 psi
ABUTMENT FOOTINGS	5000 psi
CLEAR COVER TO REINF. STEEL	
ABUTMENTS & PIER FOOTINGS	12"
ABUTMENTS & PIERS	12"
CURBS	12"
PARAPET WALLS	12"
DECK TOP	12"
DECK BOTTOM	12"

PRINT RECORD		
No.	FOR	DATE

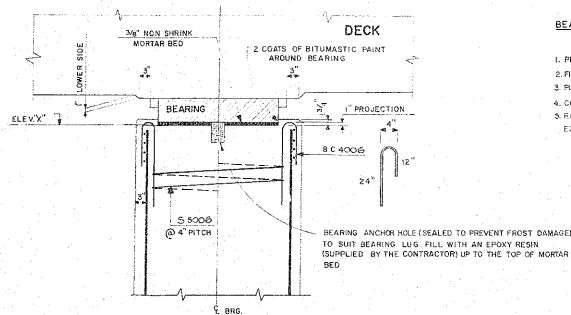
DATE	BY	DESCRIPTION

DEPARTMENT OF HIGHWAYS ONTARIO			
BRIDGE DIVISION			
BRIDGE # 20			
KING'S HIGHWAY No. 401 & No. 27		DIST. No. G	
CO. YORK		TWP. BOROUGH of ETOBICOKE	
LOT		CON.	
PRELIMINARY			
APPROVED	SUB. NO.	CONTRACT	W.P. No. 390-65
DESIGN	CHECK	No.	
DRAWING	CHECK	No.	
DATE	JUNE 67	DRAWING	D-6235-P





COLUMN	ELEV "X"	HEIGHT	MAIN REF.	SPIRALS	BEARING DETAILS	CL
E	495'35	20'-10 1/2"	9-C1101	5 5001	AR 14529/100/20	
F	495'01	20'-2 1/2"	9-C1102	5 5002	DO	
G	494'79	27'-2 1/2"	9-C1103	5 5003	DO	
H	494'22	21'-5 1/2"	9-C1103	5 5003	DO	
I	494'20	22'-10 1/2"	9-C1104	5 5004	AR 14529/650/20	
J	494'31	21'-2 1/2"	9-C1104	5 5004	DO	
K	494'14	21'-7 1/2"	9-C1104	5 5004	DO	
L	494'38	21'-10 1/2"	9-C1104	5 5004	DO	
M	493'74	20'-9 1/2"	9-C1103	5 5003	AR 14529/500/20	
N	493'81	22'-10 1/2"	9-C1101	5 5001	DO	
O	493'71	20'-2 1/2"	9-C1102	5 5002	DO	
P	494'11	21'-1 1/2"	9-C1105	5 5005	DO	
Q	492'94	20'-11 1/2"	9-C1101	5 5001	AR 14529/550/20	
R	492'28	21'-3 1/2"	9-C1105	5 5005	DO	
S	492'16	21'-10 1/2"	9-C1105	5 5005	DO	
T	492'59	21'-5 1/2"	9-C1104	5 5004	DO	



### BEARING SETTING PROCEDURE

ROTA B. ROTAFELON

1. PLACE A 3/8" MORTAR BED.
2. FILL ANCHOR HOLE WITH EPOXY.
3. PLACE BEARING DEAD LEVEL.
4. CONCRETE RING AROUND BEARING.
5. ROTAFLOM BEARING TO BE PLACED SUCH THAT EXPANSION TAKES PLACE

NOTE : BEARINGS TO BE SUPPLIED  
BY THE DEPARTMENT.

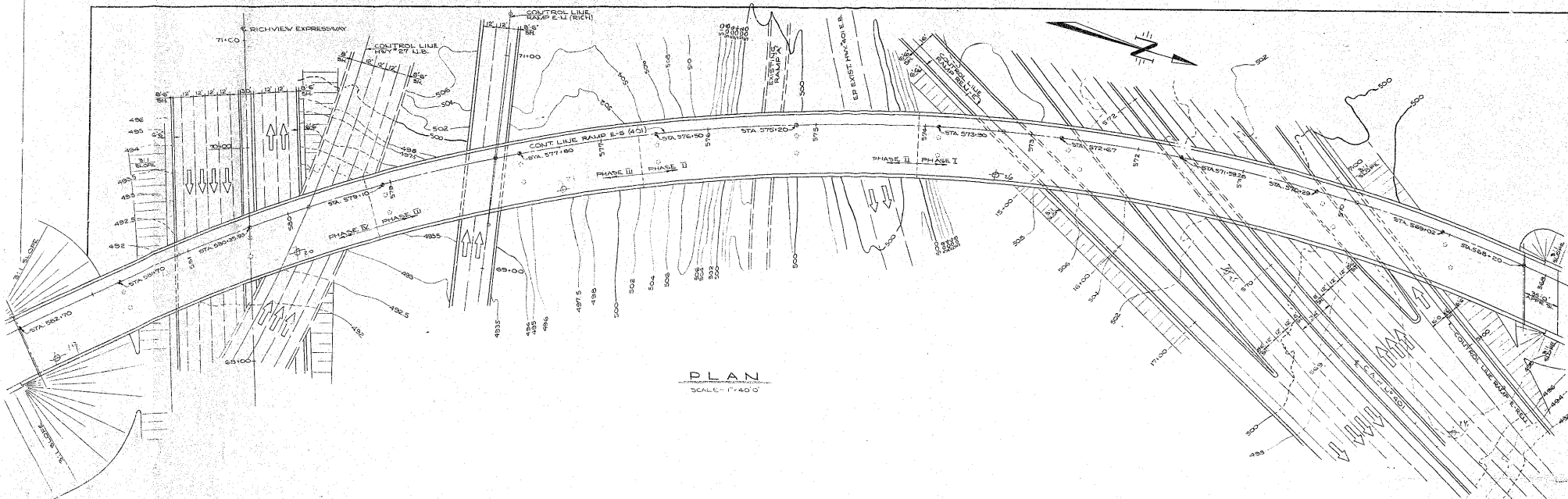
DRAWING NOT TO BE SCALED

REVISIONS	DATE BY		DESCRIPTION

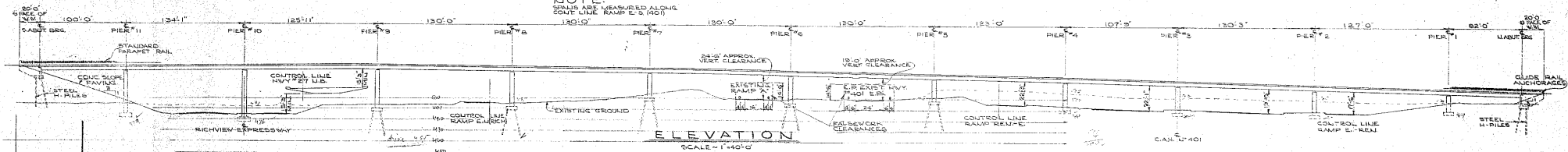
66-7-162

DEPARTMENT OF HIGHWAYS ONTARIO			
BRIDGE DIVISION			
<u>BRIDGE # 20</u>			
KING'S HIGHWAY NO. 401 & 27		DIST. NO. 6	
CO. YORK			
TWP. BLOORSH OF ETOBICOKE		LOT	CON.
<u>PIER FOOTINGS REINFORCING AND DETAILS</u>			
APPROVED:		DATE:	BY:
BRIDGE NUMBER		57-415	390-68
DESIGN	CHECK	CONTRACT	
DRAWING	BY		
DATE	LOADING	DRAWING NO.	
12-4-68	12-22-68	D6235-3	

[illegible]

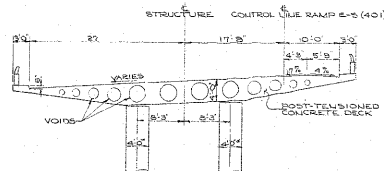


NOTE:  
STAKES ARE MEASURED ALONG  
CONT LINE RAMP E-S (401)



#### GENERAL NOTES

CLASS OF CONCRETE  
DECK, PARAPET WALLS AND PIERS - 2500 P.S.I.  
REINFORCING - 3000 P.S.I.  
CLEAR COVER ON REINFORCING STEEL  
FOOTINGS, ABUTMENTS AND PIERS - 3"  
DECK - TOP 2", BOTTOM 1 1/2"



PRINT RECORD  
No. FOR DATE

REVISIONS	DATE	BY	DESCRIPTION

DEPARTMENT OF HIGHWAYS ONTARIO  
BRIDGE DIVISION

#### BRIDGE N° 23

RAMP E-S (401) OVER HWY 401 & RICHVIEW EXPWY.

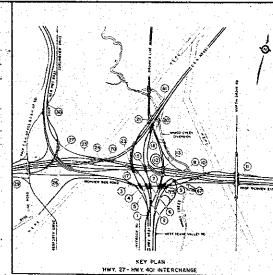
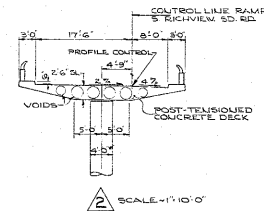
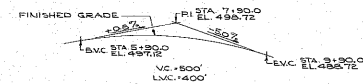
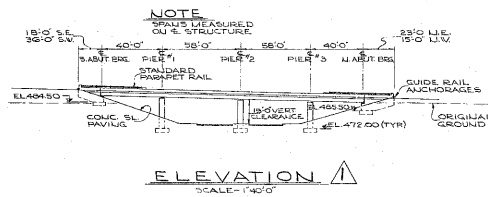
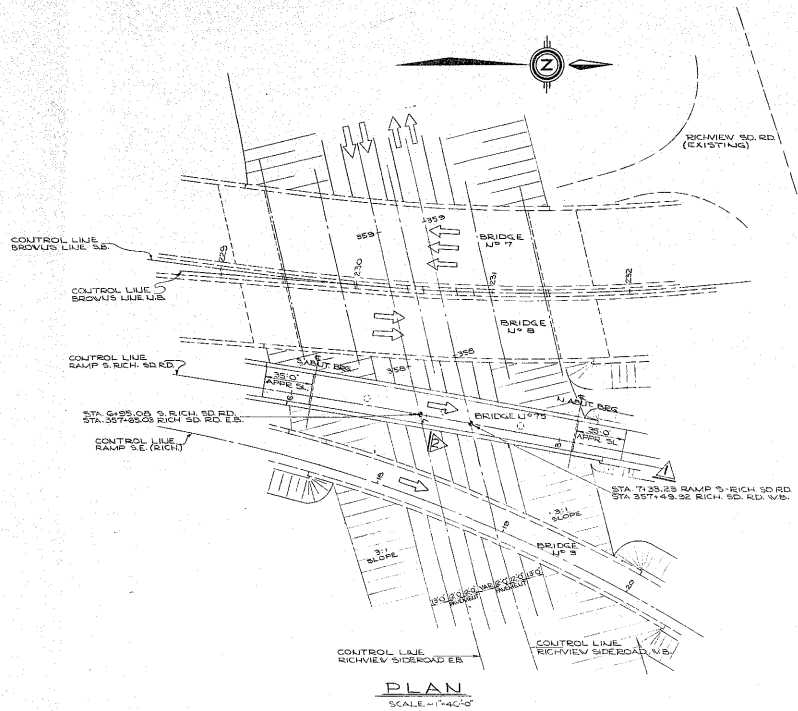
KING'S HIGHWAY No. 401 DIST. No. G  
CO. YORK  
TWP. ETOBICOKE LOT CON.

#### PRELIMINARY

APPROVED	DESIGNER	CONTRACT	NO.
DATE	CHECK	DATE	CHECK
DATE	LOADING	DATE	LOADING

37-817 393-65

D-6242-P



### GENERAL NOTES

<b>CLASS OF CONCRETE</b>	
DECK, PARAPET WALLS & PIERS & CURBS	-5000 R.S.
REMAINDER	-3000 R.S.

<u>CLEAR COVER ON REINFORCING STEEL</u>	
FOOTINGS, ABUTMENTS & PIERS	- 3"
CURBS	- 2"
DECK	TOP 2", BOTT. 1 1/2"

[illegible]

DEPARTMENT OF HIGHWAYS ONTARIO  
BRIDGE DIVISION

66-5-102

BRIDGE N° 75  
5.91CH. RD. OVER RICHVIEW SIDING RD.

KING'S HIGHWAY No. 401 E & 7 DIST. No. G

CO. YORK

TWP. ETOBICOKE LOT CON.

PRELIMINARY

APPROVED .....		SITE No. 37-963	S.P. No. 138-67
DESIGNED .....		CONTRACT No.	DRAWING No.
CHECKED .....			
DRAWING BY DATE	C. H. H. LOADING A-20-44		D-6391-F

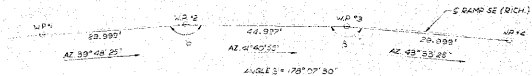
APPROVED _____				SITE No. 37-863		W.P. No. 158-67	
MIDDLE ENGINEER				CONTRACT No.			
DESIGN DRAWING D. H. P.		CHECK		DRAWING No.		D-6391-P	
DATE		LOADING 4-22-44					

DESIGN		CHECK		Not		
DRAWING	D. H. P.	CHECK		DRAWING	D-6391-P	
DATE		LOADING	4-25-44	No.		

DATE		LOADING	4520-44	No.	U-6391-R
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### CO-ORDINATES OF WORKING POINTS & PIER COLUMNS

J.R.#	LOCATION	STATION	W.P. CO-ORDINATES		COLUMN CO-ORDINATES	
			N.	E.	N.	E.
1	S. ABL*	22-19-03	688469.581	860927.078		
2	PIER #1	22-48-03	688436.452	860946.278	688489.785	860942.669 PIER #1
3	PIER #2	22-29-03	688526.652	860976.201	688573.460	860972.716 PIER #2
4	N. ABL*	03-24-03	688514.393	860908.672		

Figure 10 shows a schematic diagram of a rectangular frame structure. The frame consists of two vertical columns and two horizontal beams. The top beam is labeled with a cross-sectional area  $A=1000$  and a height of  $10$  c. The bottom beam is also labeled with  $A=1000$  and  $10$  c. The left column is labeled with a width of  $10$  c and a height of  $10$  c. The right column is labeled with a width of  $10$  c and a height of  $10$  c. A curved arrow indicates a moment of  $24.4$  kN-m at the top of the right column. A horizontal line is labeled "COLUMN BARS".

[illegible]

5

[illegible]

SCALE 1/8" = 1'-0"

SCALE 3/8" = 1'-0"

3  
SCALE 3/8" = 1'-0"

4

REVISIONS			
	DATE	BY	DESCRIPTION

DEPARTMENT OF HIGHWAYS ONTARIO  
BRIDGE DIVISION

BRIDGE #76

RAMP S-E (RICH.) OVER RAMP S-E (W. RICH. S.D. RD.)

KING'S HIGHWAY No. 401427 DIST. No. 6

CO. YORK

TWP. STOBICONE LOT CON.

### FOOTING LAYOUT & DETAILS

APPROVED _____				SITE No. 37-864		W.P. No. 59-67	
NEDCO INQUIRY				CONTRACT No.			
DESIGN B.D.		CHECK R.R.		DRAWING No.		D-6392-2	
DRAWING B.D.		CHECK B.D.		DATE		LOADING	
DATE		LOADING		DATE		LOADING	



