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GEOCRES No. 30M12-64

DIST. 6 REGION Central

W.P. No. 127-66-43

CONT. No. 76-120

W. O. No.

STR. SITE No. 24-330

HWY. No. 401

LOCATION Ramp E-NS Overpass
Over Ramp Dixie Road West
Bridge #47

OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT. 4

REMARKS: documents to be unfolded
before microfilmed

FOUNDATION INVESTIGATION REPORT

For

Ramp E-S Over Ramp Dixie West
Bridge #47W.P. 127-66-43, Site No. 24-330
District #6, TorontoINTRODUCTION

This report contains the results of a foundation investigation carried out at the site of the above mentioned project. Field work was carried out during the period of July 6th to 13th, 1973 using a continuous flight auger machine equipped with 3½ inch I.D. hollow stem augers. BXL core samples (1 21/32 inch diameter) were obtained to prove bedrock.

SITE DESCRIPTION AND GEOLOGY

The site is located about ½ mile east of the existing Hwy 401 and Heart Lake Road interchange in the City of Mississauga.

Topographically, the general area is flat to gently undulating. The land is utilized for farming purposes.

Physiographically, the site is located in the region referred to as the "Peel Plain". Across this plain rivers and streams have cut deep valleys and consequently there are no large undrained depressions, swamps or bogs, although in many of the interstream areas the drainage is imperfect.

The characteristic geological material of this region is a glacial till containing large amounts of shale and limestone fragments. The overburden is underlain by dark grey shale bedrock of the Meaford-Dundas formation.

SUBSURFACE CONDITIONSGeneral

Subsoil conditions in general were found to be uniform at the site. The subsoil consists of a relatively shallow deposit ranging in thickness from 3.5 feet to 17 feet of glacial till which is a heterogeneous mixture of clayey silt, sand and gravel followed by shale bedrock.

The boundaries of the various strata are shown on the Record of Borehole Sheets attached to the Appendix. The estimated stratigraphical profile

of Drawing No. 24-330-2 of the Contract Drawing is based upon this information.

From ground level downward the various strata are described in detail as follows:

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

This material was intersected immediately below a thin layer of topsoil down to the bedrock surface. The thickness of the stratum ranges from 3.5 feet to 17 feet.

The material in this deposit mainly consists of a cohesive matrix of clayey silt with sand and traces of gravel.

Laboratory tests carried out on selected samples revealed the following physical properties.

		<u>Range</u>
Liquid Limit (W_L)	(%)	17-38
Plastic Limit (W_p)	(%)	13-26
Natural Moisture Content (W)	(%)	10-19

Typical grain size distribution curves are included in the Appendix of this report in an envelope form (Figure No. 1).

Standard Penetration tests carried out within this cohesive deposit gave 'N' values ranging from 20 blows/ft. to in excess of 100 blows/ft. generally increasing with depth. The consistency of the overall deposit based on the 'N' values ranges from very stiff to hard.

Shale Bedrock

The glacial till deposit is underlain by a shale bedrock. The surface of the bedrock varies between elevations 526 and 536.

The upper 1 foot to 7 feet of the bedrock appears to be weathered. The bedrock in the weathered portion is composed of dark grey shale with inter-bedded limestone bands. However, below the weathered portion, the bedrock is composed of sound dark grey shale.

Groundwater level observations were carried out during the period of the field investigation (July, 1973) in open boreholes. The results indicate that the groundwater level varies between elevations 529 and 539, which corresponds to levels ranging from 3 feet to 8.5 feet below the existing ground surface. No artesian or downward drainage conditions were encountered.

M. Devata
M. Devata, P. Eng.
Supervising Engineer



MD/gs
December, 1976

HIGHWAY ENGINEERING DIVISION - ENGINEERING MATERIALS OFFICE SOIL MECHANICS SECTION

RECORD OF BOREHOLE NO 2

WP 127-66-43 LOCATION Co-ords. N.15,858,310 E.960,146 ORIGINATED BY VK
 DIST 6 HWY 401 & 403 BORING DATE July 13, 1973 COMPILED BY VK
 DATUM Geodetic BOREHOLE TYPE Drill with tricone, BXL Bits & Cone Test CHECKED BY LD

SOIL PROFILE		SAMPLES			GROUND WATER ELEV	DYNAMIC CONE PENETRATION RESISTANCE PLOT					LIQUID LIMIT w_L PLASTIC LIMIT w_p WATER CONTENT w		UNIT WEIGHT γ	REMARKS
ELEV DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE		VALUES	20	40	60	80	100	w_p		
536.7	Ground Level													
0.0	Net. mix. of clayey silt, some sand, trace of gravel. (Glacial Till)		1	SS	25									
529.7	Hard Brown-Grey		2	SS	130									
7.0	Weathered Grey		3	SS	100									
	Sound		4	BXL	50%									
	Shale bedrock with interbedded limestone layers		5	RC	88%									
			6	BXL	80%									
516.7			7	RC	Rec.									
20.0	End of Borehole													

20
15
10
5
0 % STRAIN AT FAILURE

HIGHWAY ENGINEERING DIVISION - ENGINEERING MATERIALS OFFICE - SOIL MECHANICS SECTION

RECORD OF BOREHOLE NO 3

WP 127-66-43

LOCATION Co-ords. N.15,858,355 E. 960,283

ORIGINATED BY VK

DIST 6 HWY 401 & 403

BORING DATE July 11, 1973

COMPILED BY VK

DATUM Geodetic

BOREHOLE TYPE Drill with tricone, BXL Bits & Cone Test

CHECKED BY SO

SOIL PROFILE			SAMPLES			GROUND WATER ELEV	DYNAMIC CONE PENETRATION RESISTANCE PLOT					LIQUID LIMIT w_L PLASTIC LIMIT w_p WATER CONTENT w			UNIT WEIGHT γ	REMARKS
ELEV DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	"N" VALUES		20	40	60	80	100	w_p	w	w_L		
533.1	Ground Level															
0.0	Met. mix. of clay, silt some sand, trace of gravel. (Glacial Till)		1	SS	20	530										
526.6	Very Stiff to Hard Brown-grey		2	SS	160/9"											
6.5	Grey		3	BXL	Rec. 50%											
	Weathered (interbedded limestone bands)		4	BXL	Rec. 30%	520										
	Sound Shale Bedrock with interbedded limestone layers		5	BXL	Rec. 65%											
512.6			6	BXL	80%											
20.5	End of Borehole					510										

20
15 ϕ 5 % STRAIN AT FAILURE
10

HIGHWAY ENGINEERING DIVISION - ENGINEERING MATERIALS OFFICE - SOIL MECHANICS SECTION

RECORD OF BOREHOLE No 4

WP 127-66-43

LOCATION Co-ords. N.15,858,480 E.960,363

ORIGINATED BY VK

DIST 6 HWY 401 & 403

BORING DATE July 10, 1973

COMPILED BY VK

DATUM Geodetic

BOREHOLE TYPE Drill with tricane, BXL Bits & Cone Test

CHECKED BY 12

SOIL PROFILE			SAMPLES			GROUND WATER ELEV	DYNAMIC CONE PENETRATION RESISTANCE PLOT				LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w		UNIT WEIGHT γ	REMARKS
ELEV DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	'N' VALUES		20	40	60	80	100	w_p		
544.6	Ground Level													
0.0	Heterogeneous mixture of clayey silt, with sand, trace of gravel (Glacial Till)		1	SS	46	540								
	Hard		2	SS	54									
	Brown		3	SS	95									
	Grey		4	SS	73									
527.4	Weathered		5	SS	131	530								
17.2	Sound Shale Bedrock with interbedded limestone layers		6	SS	100/2"									
521.1			7	BXL	100%									
23.5	End of Borehole					520								

20
15 \diamond 5 % STRAIN AT FAILURE
10

HIGHWAY ENGINEERING DIVISION - ENGINEERING MATERIALS OFFICE - SOIL MECHANICS SECTION

RECORD OF BOREHOLE NO 5

WP 127-66-43

LOCATION

Co-ords. N.15,858,585 E.960,484

ORIGINATED BY VK

DIST 6 HWY 401 & 403

BORING DATE

July 9, 1973

COMPILED BY VK

DATUM Geodetic

BOREHOLE TYPE

Drill with tricone, BXL BITS & Cone Test

CHECKED BY SO

SOIL PROFILE		SAMPLES			GROUND WATER ELEV	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 SHEAR STRENGTH ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE	LIQUID LIMIT w_L PLASTIC LIMIT w_p WATER CONTENT w w_p w w_L WATER CONTENT % 20 40 60	UNIT WEIGHT γ	REMARKS
ELEV DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE					
542.7	Ground Level								
0.0	Heterogeneous mixture of clayey silt, with sand, trace of gravel (Glacial Till)		1	SS	56				
			2	SS	102				
	Hard		3	SS	115				
528.7	Brown Grey		4	SS	110				
14.0	Weathered		5	BXL	70%				
			6	BXL	50%				
	Sound		7	BXL	95%				
			8	BXL	Rec 80%				
	Shale Bedrock with interbedded limestone layers		9	BXL	95%				
512.2			10	BXL	Rec 90%				
30.5	End of Borehole								

20
15 ϕ 5 % STRAIN AT FAILURE
10

HIGHWAY ENGINEERING DIVISION - ENGINEERING MATERIALS OFFICE - SOIL MECHANICS SECTION

RECORD OF BOREHOLE NO 6

WP 127-66-43

LOCATION Co-ords. N.15,858,614 E.960,582

ORIGINATED BY VK

DIST 6 HWY 401 & 403

BORING DATE July 6, 1973

COMPILED BY VK

DATUM Geodetic

BOREHOLE TYPE Drill with tricone, BXL Bits & Cone Test

CHECKED BY

SOIL PROFILE		STRAT. PLOT	SAMPLES			GROUND WATER ELEV	DYNAMIC CONE PENETRATION RESISTANCE PLOT					LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w			UNIT WEIGHT γ	REMARKS
ELEV DEPTH	DESCRIPTION		NUMBER	TYPE	'N' VALUES		20	40	60	80	100	w_p	w	w_L		
545.0	Ground Level															
0.0	Heterogeneous mixture of clayey silt, with sand, trace of gravel (Glacial Till)		1	SS	54											
			2	SS	58											
			3	SS	74											
	Hard Brown Grey		4	SS	102											
528.0			5	SS	122											
17.0	Weathered Sound Shale Bedrock with interbedded limestone layers		6	SS	100/4											
			7	BXL	90%											
520.5			8	BXL	Rec. 70%											
24.5	End of Borehole															

20
15 ϕ 5 % STRAIN AT FAILURE
10

RECORD OF BOREHOLE No 7

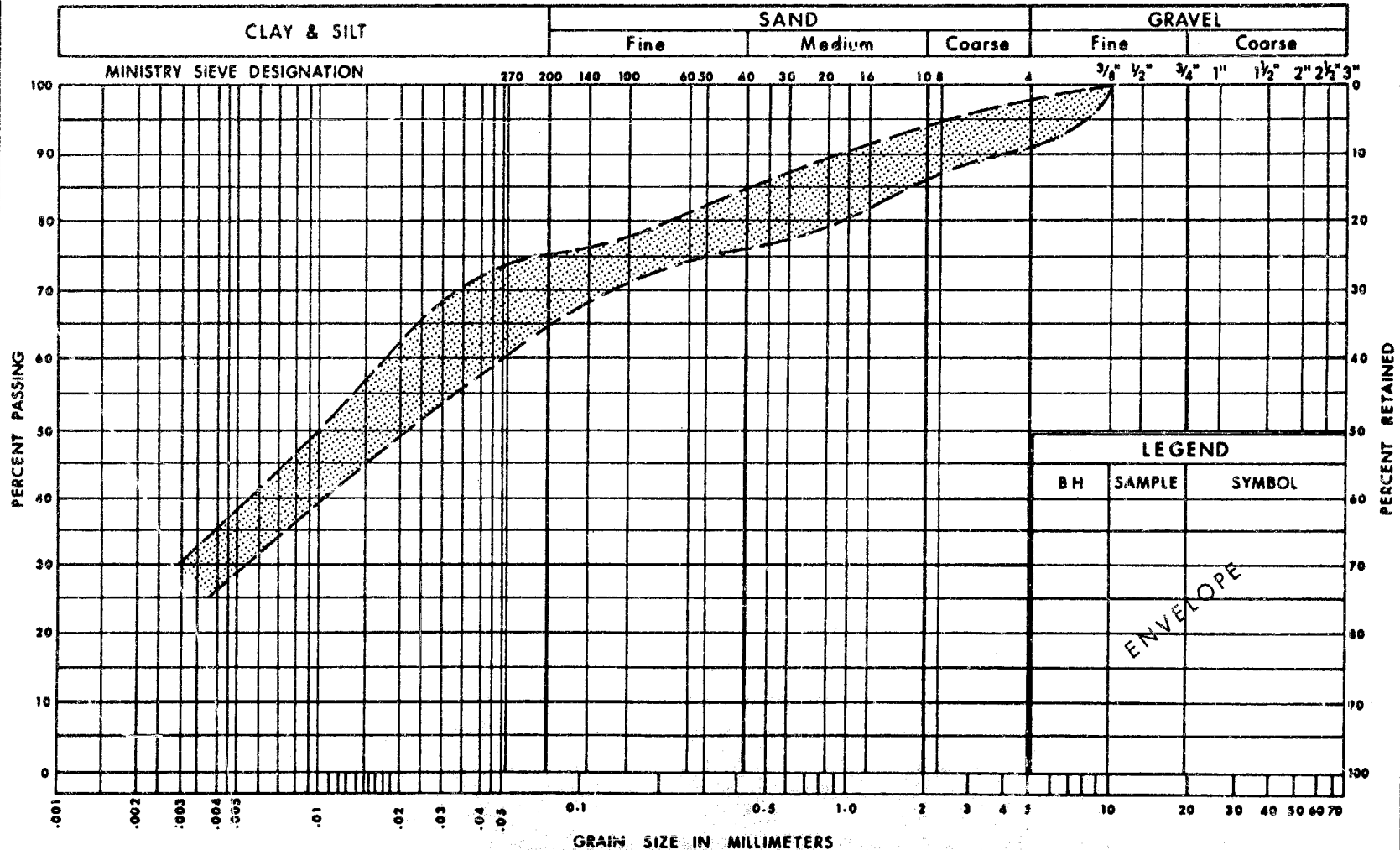
ORIGINATED BY VK

COMPILED BY: YK

CHECKED BY

20
15 ϕ 5 % STRAIN AT FAILURE
10

UNIFIED SOIL CLASSIFICATION SYSTEM



Ontario
ENGINEERING SERVICES BRANCH

GRAIN SIZE DISTRIBUTION
GLACIAL TILL
HET. MIXTURE OF CLAYEY SILT, SAND & GRAVEL

FIG No	1
W P	127-66-43

30M12-64

GEOCRES No.

FOUNDATION INVESTIGATION & DESIGN REPORT

W.P. 127-66-43

DIST. 6

HWY. 401

STR. SITE 24-330

Ramp E-NS Overpass Over Ramp
Dixie Road West Bridge #47

DISTRIBUTION

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GEOCRES 30M12-64

DATE

OCT 18 1976

INTRODUCTION

The present proposals for the construction program of Hwy. 401 - Hwy. 403 - Hwy. 410 complex will require a major interchange in this area. This is designated as 401/410/403 interchange and will incorporate some twenty-one structures.

A request for a foundation investigation at the site of the proposed Bridge #47 (Ramp E-NS over Ramp Dixie West), in the above complex was received from Mr. G.C.E. Burkhardt, Regional Structural Planning Engineer, in a memorandum dated July 3, 1973. Following this request a field investigation was carried out by the Foundations Office to determine the subsoil, bedrock and groundwater conditions existing at the site.

This report contains the results of this investigation and our recommendations pertaining to the design of the proposed structure foundations and the stability of the approach fills and cuts.

DESCRIPTION OF THE SITE AND GEOLOGY

The site of the proposed structure is located about $\frac{1}{2}$ mile east of the existing Hwy. 401 and Heart Lake Road interchange in the town of Mississauga.

Topographically, the general area is flat to gently undulating. The land is utilized for farming purposes.

Physiographically, the site is located in the region referred to as the "Peel Plain". Across this plain rivers and streams have cut deep valleys and consequently there are no large undrained depressions, swamps or bogs, although in many of the interstream areas the drainage is imperfect.

The characteristic geological material of this region is a glacial till containing large amounts of shale and limestone. The overburden is underlain by dark grey shale bedrock of the Meaford-Dundas formation.

FIELD AND LABORATORY INVESTIGATION

A total of six sampled boreholes, each accompanied by a dynamic cone penetration test, was carried out during the course of the field work. Boring was achieved by means of auger machine (CME-55) adapted for soil sampling purposes. During the field work, disturbed samples were obtained by means of a 2" O.D. split spoon sampler. The energy used in driving it conformed to the requirements of the Standard Penetration Test.

The bedrock was proven at all borehole locations by obtaining BXL size core samples.

The soil, bedrock and groundwater conditions encountered at the boring locations, are presented in the Record of Borehole Sheets. The locations and elevations of the various boreholes were surveyed by District #6, Toronto, construction personnel. The elevations in the report are referenced to a Geodetic Datum. Boring locations, tied into a co-ordinate system, and elevations, together with estimated stratigraphical sections are shown on Drawing No. 1276643-A.

All samples were subjected to a careful examination in the field and laboratory, following which tests were carried out on selected samples to determine the following physical properties:

Atterberg Limits

Grain Size Distributions

Natural Moisture Contents

The test results are summarized on the Record of Borehole Sheets contained in the Appendix of this report.

SOIL TYPES AND SOIL CONDITIONS

General

Subsoil conditions in general, were found to be uniform at the site. The subsoil consists of a relatively shallow deposit ranging in thickness from 3.5 ft. to 17 ft. of glacial till which is a heterogeneous mixture of clayey silt, sand and gravel, followed by shale bedrock.

The boundaries of the various strata are shown on the Record of Borehole Sheets attached to the Appendix. The estimated stratigraphical profile of Drawing No. 1276643-A is based upon this information.

From ground level downward, the various strata are described in detail with regard to soil types and physical properties as follows:

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

This material was intersected in all boreholes and extends from immediately below a thin layer of topsoil down to the bedrock surface. The thickness of the stratum ranges from 3.5 ft. (Borehole No. 7) to 17 ft. (Borehole No. 6).

The material in this deposit mainly consists of a cohesive matrix of clayey silt with some sand and traces of gravel.

Laboratory tests carried out on selected samples revealed the following physical properties.

		<u>Range</u>
Liquid Limit (W_L)	(%)	17-38
Plastic Limit (W_P)	(%)	13-26
Natural Moisture Content (W)	(%)	10-19

Typical grain size distribution curves are included in the Appendix of this report in an envelope form (Figure No. 2).

Standard Penetration tests carried out within this cohesive deposit gave 'N' values ranging from 20 blows/ft. to in excess of 100 blows/ft. generally increasing with depth. The consistency of the overall deposit based on the 'N' values, range from very stiff to hard.

Shale Bedrock

The glacial till deposit is underlain by a shale bedrock. The surface of the bedrock varies between elevation 526 ft. and 536.

The core recovery ranged from 30% to 100% in the borehole. Based on the core recovery and inspection of the core samples, it is concluded that the upper 1 foot to 7 feet of the bedrock appear to be weathered. The bedrock in the weathered portion is composed of dark grey shale with interbedded limestone bands. However, below the weathered portion, the bedrock is composed of sound dark grey shale.

GROUNDWATER CONDITIONS

Groundwater level observations were carried out during the period of the field investigation (July, 1973) in open boreholes. The observed water levels are presented on the individual Record of Borehole Sheets, as well as on Drawing No. 1376643-A. The results indicate that the groundwater level varies between elevations 529 and 539, which correspond to levels ranging from 3 feet to 8.5 feet below the existing ground surface. No artesian or downward drainage conditions were encountered.

DISCUSSION AND RECOMMENDATIONS

General

It is proposed to construct a single span overpass structure (Bridge #47) where Ramp E-S/N crosses Ramp "Dixie-West".

Bridge #47 will be part of the proposed Hwy. 401/403/410 interchange complex.

The proposed profile grade of Ramp "Dixie-West" in the vicinity of the structure will vary from elev. 543 to elev. 538. The proposed profile grade of Ramp E-S/N varies between elevations 554 and 560. The existing ground level ranges between elevations 530 to 544. In order to accommodate these grades, fills up to 34 feet and cuts up to 10 feet will be required.

As described previously, the subsoil at the site consists of a relatively shallow deposit (3.5 to 17 feet) of glacial till, underlain by shale bedrock.

Foundations

Abutment footings: The proposed structure will be a 48 foot wide single span having a total length of about 290 ft. It is recommended that the abutment should be supported on spread footings within the glacial till with a minimum cover of 4 feet to the underside of the footing for frost protection purposes. The ground elevation and subsurface conditions are such that it may be necessary to step down the footings specifically in the area of the west limits (Sta. 178 + 60 to Sta. 170+ 20 Ramp "Dixie-West") of the structure to elev. 529. Alternatively, this portion of the footing can be extended down to the weathered shale bedrock. The allowable bearing pressures for abutment footing design are as follows:

Glacial Till	4.0 t.s.f.
Weathered Shale	5.0 t.s.f.

In locations where the footing excavations will extend down below the observed groundwater level, seepage into the excavation can be anticipated. This could be readily handled by employing conventional methods such as pumping from sumps. If the structure is designed as a rigid frame, then a coefficient of earth pressure at rest (K_0) of 0.5 should be assumed for the granular backfill behind the wall when designing the abutments. However, if some movement of the top of the wall is permitted, then a coefficient of active earth pressure (K_a) of 0.33 can be used. In computing the horizontal resistance of the footings, the following values may be used between the rough concrete surface and the cohesive glacial till or weathered shale bedrock:

Glacial Till: adhesion value 2000 p.s.f.

Shale Bedrock (weathered) - coefficient of friction 0.5

Approaches

The maximum height of the approach fills will be in the order of about 34 feet and in addition at certain locations cuts up to 10 feet deep will be required. The underlying subsoil (glacial till) is competent to support the proposed embankment with forward and side slopes of 2:1. The cuts should be stable also with 2:1 slopes.

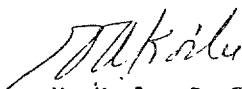
The glacial till will settle due to the embankment loading. This settlement will be of elastic in nature and will take place during or immediately following the fill placement. In addition, the fill material itself will settle due to its own weight. The magnitude of the settlement will depend upon the composition and moisture content of the fill material. However, for an approximate estimate the settlement may be of the order $\frac{1}{2}\%$ of the total height of the fill.

MISCELLANEOUS

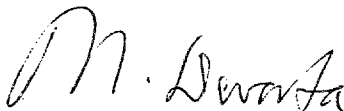
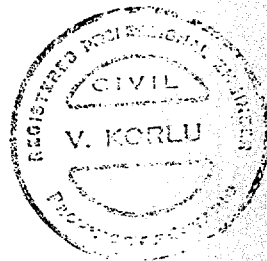
The field investigation was carried out during the period of July 6 to 13, 1973, under the supervision of Mr. V. Korlu, Project Engineer, who also prepared this report.

Equipment was owned and operated by Canadian Longyear Limited.

The entire project was under the general supervision of Mr. M. Devata,
Supervising Engineer, who also reviewed this report.



V. Korlu, P. Eng.
Project Engineer



M. Devata, P. Eng.
Supervising Engineer

MD/VK/gs
October, 1976

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO 1

JOB 73-11049

LOCATION Co-ord's. 15. 858.232N; 960.030E

ORIGINATED BY V.K.

W.P. 127-66-43

BORING DATE July 13, 1973

COMPILED BY V.K.

DATUM Geodetic

BOREHOLE TYPE Drill with Tricone and EXL bits

CHECKED BY *[Signature]*

SOIL PROFILE		SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT					LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w			BULK DENSITY γ P.C.F. GR SA SI.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE		20	40	60	80	100	w_p	w	w_L		
542.8	Ground Level														
0.0	Het. mixture of clayey silt, sand (glacial till)		1	SS	44										
536.3	Hard Brown-grey		2	SS	120										
6.5	Grey														
532.2	Weathered														
10.6	Sound Shale		3	EXL	70%										
					100%										
523.8			4	EXL	Rec.										
19.0	End of Borehole.														

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO 2

JOB 73-11049 LOCATION Concord's 15,852,310N; 960,146E
 W.P. 127-66-43 BORING DATE July 13, 1973
 DATUM Geodetic BOREHOLE TYPE Drill with tri-cone and BXL bits

ORIGINATED BY V.K.
 COMPILED BY V.K.
 CHECKED BY C.H.

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT					LIQUID LIMIT W_L PLASTIC LIMIT W_P WATER CONTENT W			BULK DENSITY γ	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FOOT		20	40	60	80	100	W_P	W	W_L		
536.7	Ground Level															
0.0	Het. mixture of clayey silt, some sand, trace of gr (gl. till) Hard		1	SS	25											
529.7	Brown gr		2	SS	130	530										
7.0	Grey		3	SS	100	528										
526.2	Weathered		4	BXL	50%											
10.5	Sound Shale		5	BXL	80%											
			6	BXL	100% Rec.	520										
516.7			7	BXL	100%											
20.0	End of Borehole.					510										

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO 3

JOB 73-11049

LOCATION Co-ord's 15,85N, 355N; 960,283E

ORIGINATED BY V.K.

W.P. 127-66-43

BORING DATE July 11, 1973

COMPILED BY V.K.

DATUM Geodetic

BOREHOLE TYPE Drill with tricone and BXL bits

CHECKED BY

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT					LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w			BULK DENSITY γ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLT	NUMBER	TYPE	BLOWS/FOOT		20	40	60	80	100	w_p	w	w_L		
533.1	Ground Level															
0.0	Het. mix. of cl. silt, some sand, tr. gr. (gl. till)		1	SS	20	530										
526.6	V. stiff to hard Brown st.		2	SS	160	49"										
6.5	Grey. Weathered (interbedded limestone bands)		3	EXL	Rec.											
	Sound		4	BXL	Rec.	520										
512.6	Shale bedrock		5	BXL	Rec.											
20.5	End of Borehole.		6	BXL	Rec.											

DESIGN SERVICES BRANCH

RECORD OF BOREHOLE NO 4

FOUNDATIONS OFFICE

JOB 73-11049

LOCATION Co-ord's 15,858,480N; 960,363E

ORIGINATED BY V.K.

W.P. 127-66-43

BORING DATE July 10, 1973

COMPILED BY V.K.

DATUM Geodetic

BOREHOLE TYPE Drill with tricone and BXL bits

CHECKED BY

SOIL PROFILE		SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS/FOOT 20 40 60 80 100	LIQUID LIMIT w_L PLASTIC LIMIT w_p WATER CONTENT w w_p — w — w_L WATER CONTENT % 20 40 60	BULK DENSITY γ P.C.F. GR. SA. SI. CL.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLT	NUMBER	TYPE					
544.6	Ground Level								
0.0	Heterogeneous mixture of clayey silt, with sand, trace of gravel. (glacial till) Hard.		1	SS	46				
			2	SS	54				
			3	SS	95				
			4	SS	73				
530.6	Brown		5	SS	131				
14.0	Grey		6	SS	100, 2"				
527.4	Weathered								
526.4	Solid shale bedrock		7	BXL Rec					
18.2									
521.1									
23.5	End of Borehole.								

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO 5

JOB 73-11049

LOCATION Co-ord's. 15, 85E, 585N; 960,484E

ORIGINATED BY V.K.

W.P. 127-66-43

BORING DATE July 9, 1973

COMPILED BY V.K.

DATUM Geodetic

BOREHOLE TYPE Drill with tricone and BXL bits

CHECKED BY

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT					LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w			BULK DENSITY γ	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLT	NUMBER	TYPE	BLOWS/FOOT		20	40	60	80	100	w_p	w	w_L		
542.7	Ground Level															
0.0	Heterogeneous mixture of clayey silt, with sand, trace of gravel. (glacial till) Hard		1	SS	56	540										
			2	SS	102											
530.7	Brown		3	SS	115											
12.0	Grey		4	SS	116	530										
528.7			5	BXL	702											
14.0	Weathered		6	BXL	502											
525.7			7	BXL	952											
17.0	Sound shale bedrock		8	BXL Rec.	802	520										
			9	BXL	852											
					902											
512.2			10	BXL Rec.												
30.5	End of Borehole.															

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO 6

JOB 72-11049

LOCATION Co-ord's. 15,858,614N; 960,582E

ORIGINATED BY V.K.

W.P. 127-66-43

BORING DATE July 6, 1973

COMPILED BY V.K.

DATUM Geodetic

BOREHOLE TYPE Drill with tricone and BXL bits

CHECKED BY

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT — w_L			BULK DENSITY	REMARKS	
ELEV. DEPTH	DESCRIPTION	STRAT. PLT	NUMBER	TYPE	BLOWS/FOOT		BLOWS / FOOT					PLASTIC LIMIT — w_p					WATER CONTENT %
							20	40	60	80	100	WATER CONTENT — w					
SHEAR STRENGTH P.S.F.							w_p — w — w_L										
○ UNCONFINED + FIELD VANE																	
■ QUICK TRIAXIAL x LAB VANE																	
545.0	Ground Level																
0.0	Heterogeneous mixture of clayey silt, with sand, trace of gravel (glacial till) Hard.		1	SS	54	540											
			2	SS	58												
			3	SS	74												
			4	SS	102												
531.5	Brown					530											
13.5	Grey		5	SS	122												
528.0			6	SS	100												
527.0	Weathered		7	BXL	90												
19.3	Sound Shale bedrock		8	BXL	Rec.												
520.5																	
24.5	End of Borehole.																

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO 7 (8., 73-11002)

JOB 73-11049

LOCATION Co-ord's, 15, 858,350N; 960,259E

ORIGINATED BY V. K. [unclear]

W.P. 127-66-43

BORING DATE April 11, 1973

COMPILED BY V.K.

DATUMGeodetic

BOREHOLE TYPE Auger and Core with CME Machine

CHECKED BY _____

[illegible]

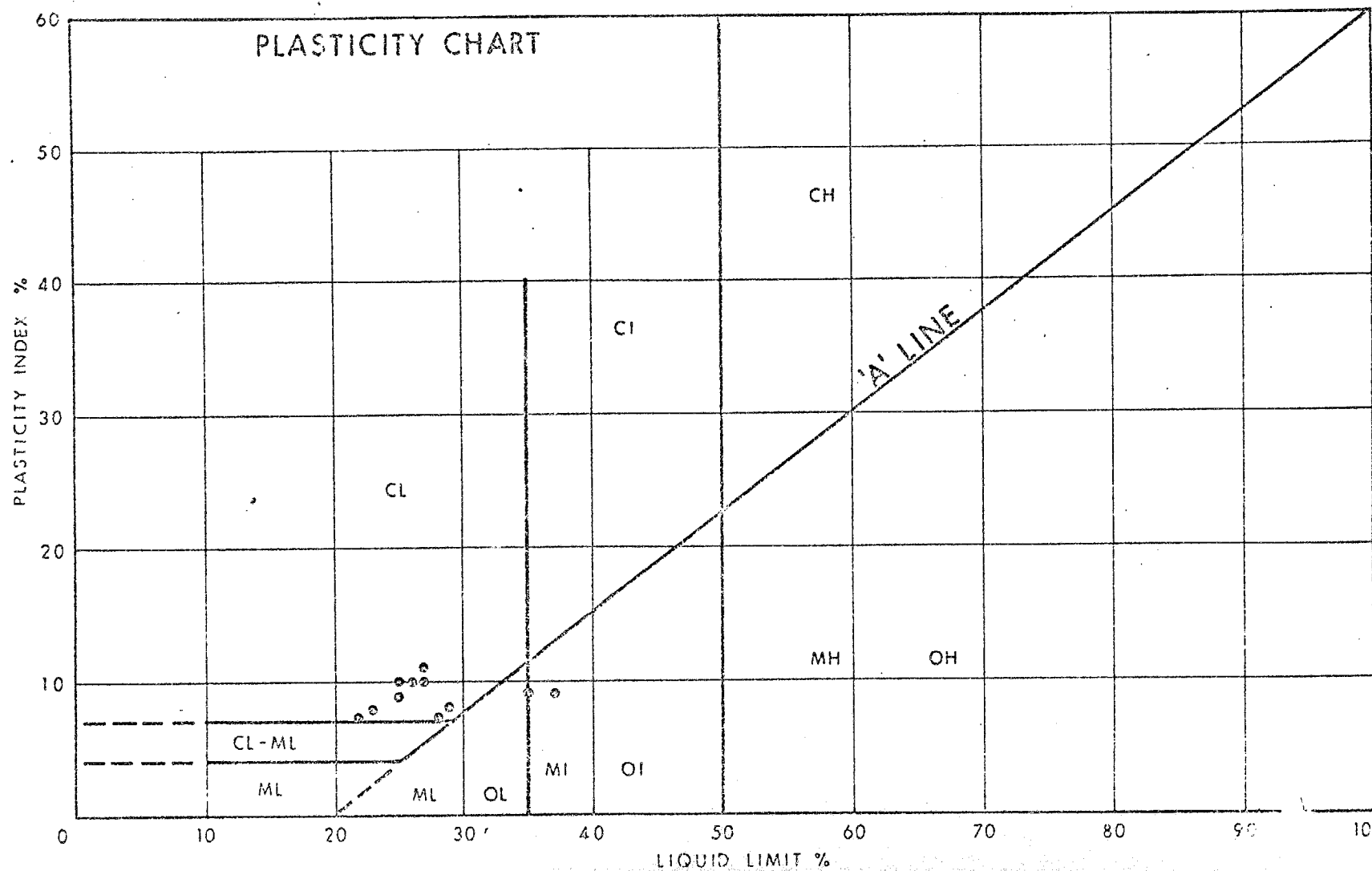
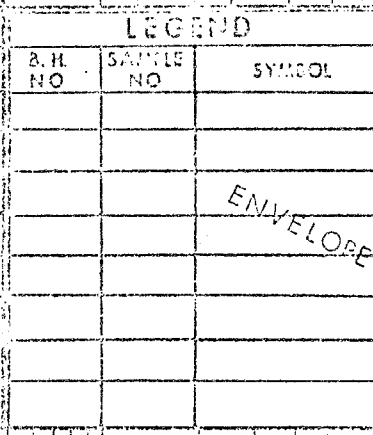


FIG. 1

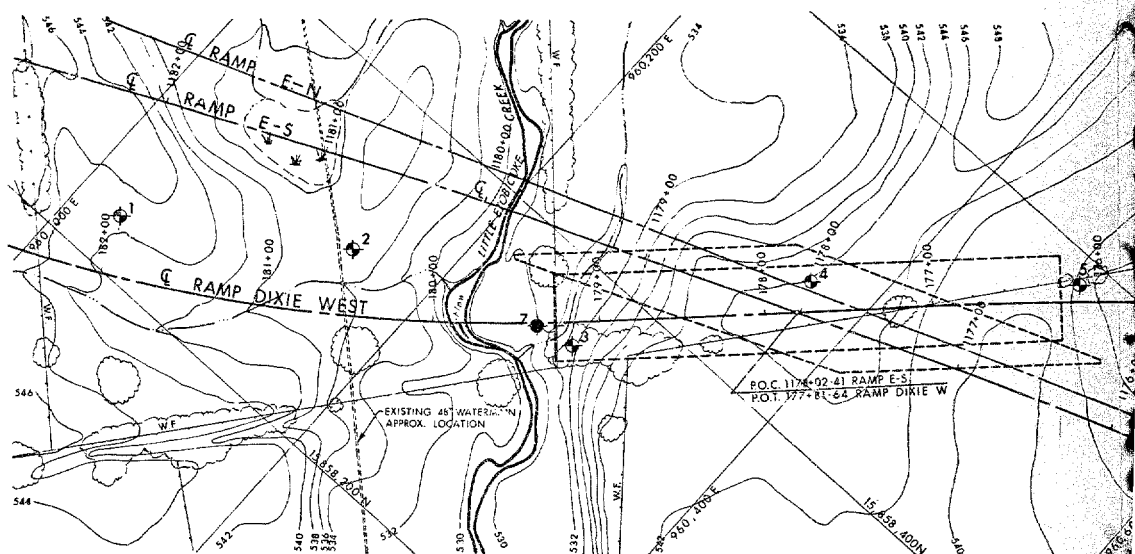
CLAY & SILT	SAND			GRAVEL	
	Fine	Medium	Coarse	Fine	Coarse

270	100	140	160	180	200	220	240	260	280	300	320	340	360	380	400	420	440	460	480	500	520	540	560	580	600	620	640	660	680	700	720	740	760	780	800	820	840	860	880	900	920	940	960	980	1000
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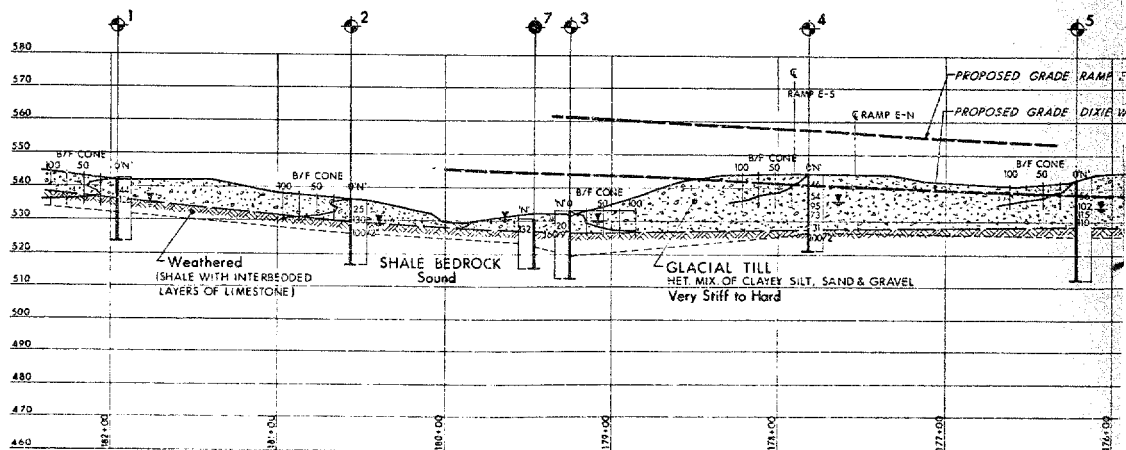
GRAIN SIZE DISTRIBUTION
GLACIAL TILL
HET. MIX. OF CLAYEY SILT, SAND & GRAVEL

FIG. 2



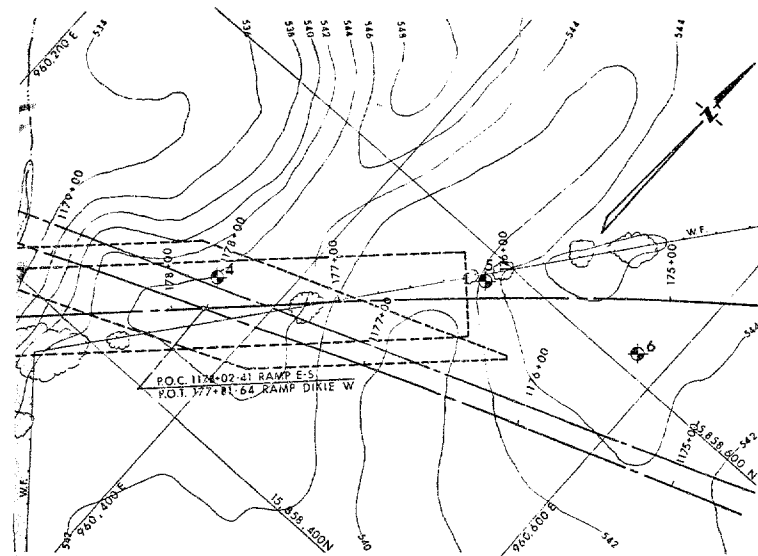
PLAN

0 SCALE 40 80 FT.



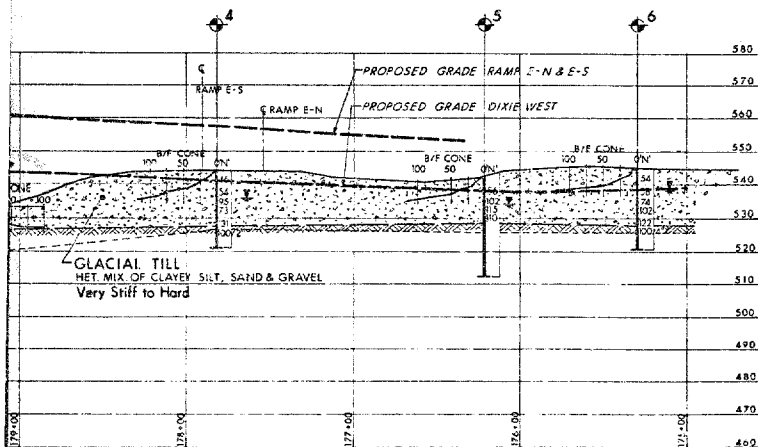
PROFILE - RAMP DIXIE W

HORIZ 40 20 0 SCALE 40 80 FT.
VERT 20 10 0 20 40 FT.



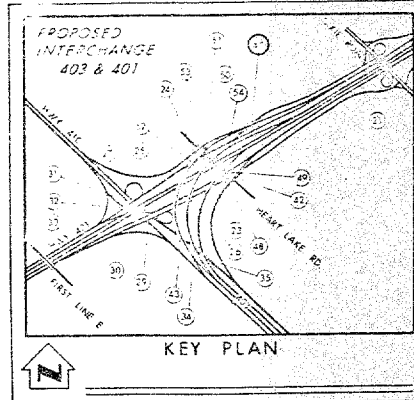
PLAN

0 SCALE 40 80 FT.



CROSS-SECTION - RAMP DIXIE W

0 SCALE 40 80 FT.



KEY PLAN

LEGEND

- Bore Hole
- ⊕ Cone Penetration Test
- ⊕ Bore Hole & Cone Test
- ⬇ Water Levels established at time of field investigation, April & July 1973

NO.	ELEVATION	CO-ORDINATES	
		NORTH	EAST
1	542.8	15,858,232	960,030
2	536.7	15,858,310	960,146
3	533.1	15,858,355	960,263
4	544.6	15,858,480	960,363
5	547.7	15,858,585	960,484
6	545.0	15,858,614	960,582
7	530.6	15,858,350	960,259

NOTE

"The complete foundation investigation file for this project may be examined at the Geotechnical Office, Downsview, information contained in this file and any supplementary files specifically excluded in accordance with the conditions of Section 102-2 of Form 100."

NOTE

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

DATE	BY	DESCRIPTION

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS—ONTARIO
ENGINEERING SERVICES BRANCH—GEOTECHNICAL OFFICE

BRIDGE No. 47
RAMP E-S OVER RAMP DIXIE W

HIGHWAY NO. 401 & 403 DIST. NO. 6

REG. MUN. OF PEEL

CITY OF MISSISSAUGA LOT CON

BORE HOLE LOCATIONS & SOIL STRATA

SUBNO. V.R.	CHECKED	W.P. NO.	27-66-43	DRAWING NO.	1276643-A
DRAWN S.R.	CHECKED	W.P. NO.			
DATE SET	9, 1973	S.P. NO.	13-330	BRIDGE DRAWING NO.	24-330-2
APPROVED		CON. NO.			

REF NO. FENCUL 3983-3A-11

MEMORANDUM

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

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

ATTENTION: Mr. M. Devata

DATE: July 3, 1973.

OUR FILE REF.

IN REPLY TO

SUBJECT: Ramp E-S Over Ramp Dixie Road West,
Bridge #47,
Site 24-330, W.P. 127-66-43,
District 6, Toronto.

The above structure is a part of the Hwy. 401/410/403 Interchange as covered by W.P. 127-66-01. The location is shown on the attached "Scheme of Interchange".

You are requested to carry out the foundation investigation and prepare the Report (due date October 24, 1973).

Attached are also two copies of Fenco Drawing No. 3983-3K-11 on which the following information is shown:

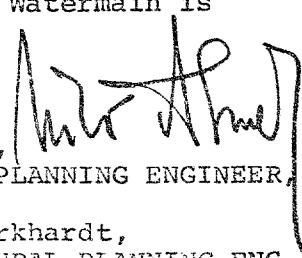
- a) Proposed structure type and footing location (marked in red)
- b) Profile of Ramp E-S
- c) Co-ordinates of control points and alignment.

The location of footings is tight to a line connecting the co-ordinated points 1 and 2 (marked in green) which should have been staked out by Fenco.

The approximate location of the existing 48" Watermain is also shown on the drawing (in blue).

MAA:lc
Attach.

Oct. 24/73

M. A. Almer, 
STRUCTURAL PLANNING ENGINEER,
for:
G. C. E. Burkhardt,
REG. STRUCTURAL PLANNING ENG.

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

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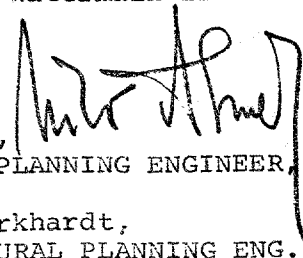
- a) Proposed structure type and footing location (marked in red)
- b) Profile of Ramp E-S
- c) Co-ordinates of control points and alignment.

The location of footings is tight to a line connecting the co-ordinated points 1 and 2 (marked in green) which should have been staked out by Fenco.

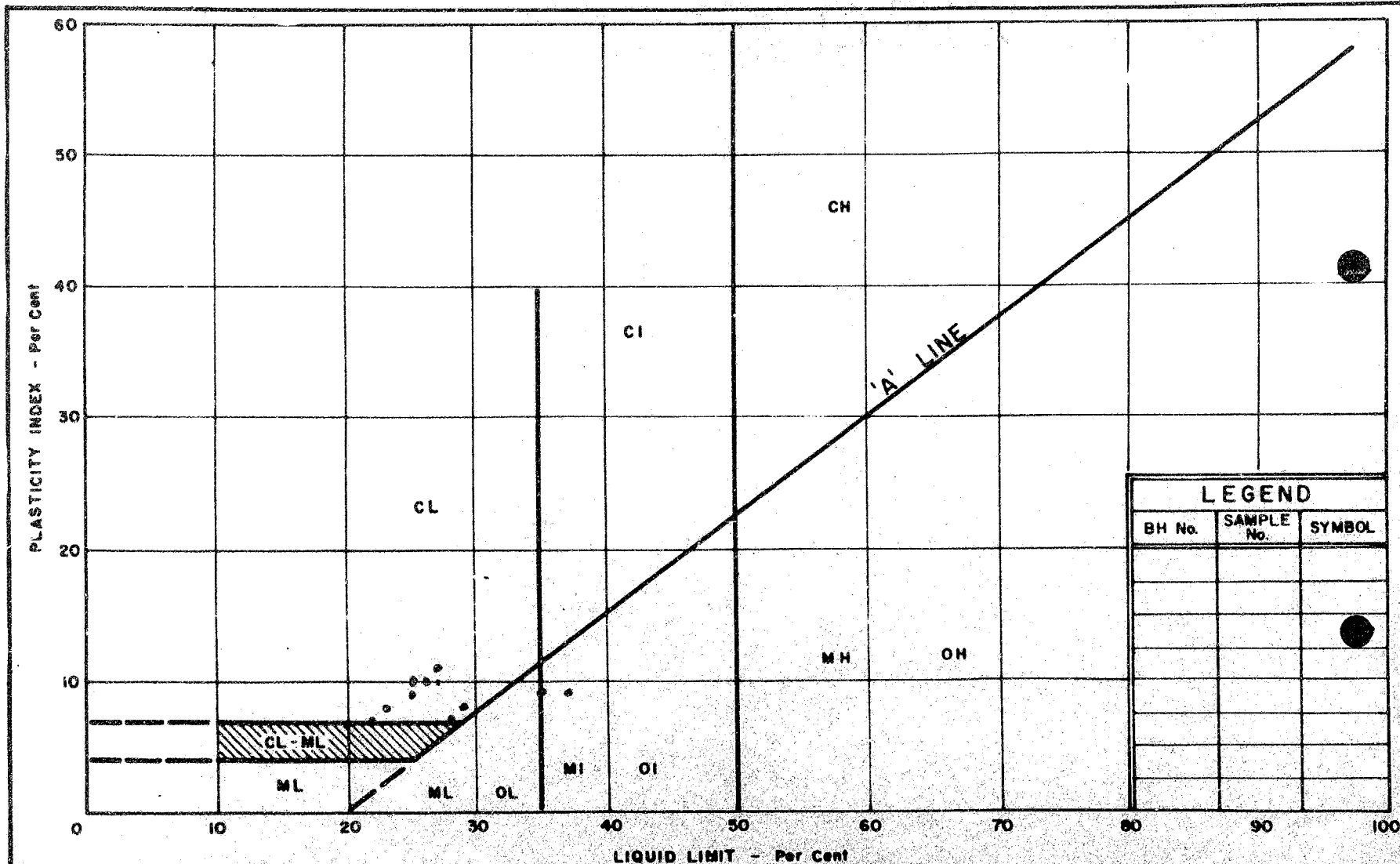
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MAA:lc
Attach.

Oct. 24/73

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for:
G. C. E. Burkhardt,
REG. STRUCTURAL PLANNING ENG.

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



LEGEND		
BH No.	SAMPLE No.	SYMBOL



DEPARTMENT OF HIGHWAYS
MATERIALS and
TESTING
DIVISION

PLASTICITY CHART

Figure 1
clayey silt

W.P. No. 127-66-43

JOB No. 73-110-49

DOCUMENT INFORMATION

GEOCRES No. 20 H 12-64

DIST. 6 REGION CENTRAL

W. P. No. 127-66-43

CONT. No. 76-120

W. O. No. _____

STR. SITE No. 24-330

HWY. No. 401

LOCATION RAMP E-NS OVERPASS

OVER RAMP DUNE ROAD WEST

BRIDGE # 47

CHANGED ORIGINALLY TO BE BRIDGE WITH TWO HOLES 4

REMARKS: _____

PROFILE CONTROL
LINE CAMP 'E-S'



PROFILE CONTROL
LINE CAMP 'E-U'

CAMP 'E-U'

CAMP 'E-S'

CAMP 'DIXIE-V'

PROFILE CONTROL
LINE CAMP 'DIXIE-V'

Existing 48" Watermain
Approximate Location

856+000 L
280+200 S

POINT OF VILL
CLEARANCE

PLAN
SCALE: 1" = 40'

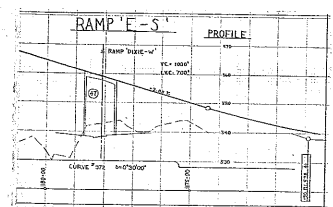


SECTION B-B
SCALE: 1" = 20'

DESCRIPTION OF DRAIN HIGHWAY

POINT	STATION	TYPE	DATE	BY
POINT 523	856+000	E	1977-04-28	
POINT 524	856+000	E	1977-04-28	
POINT 525	856+000	E	1977-04-28	

SECTION A-A
SCALE: 1" = 40'

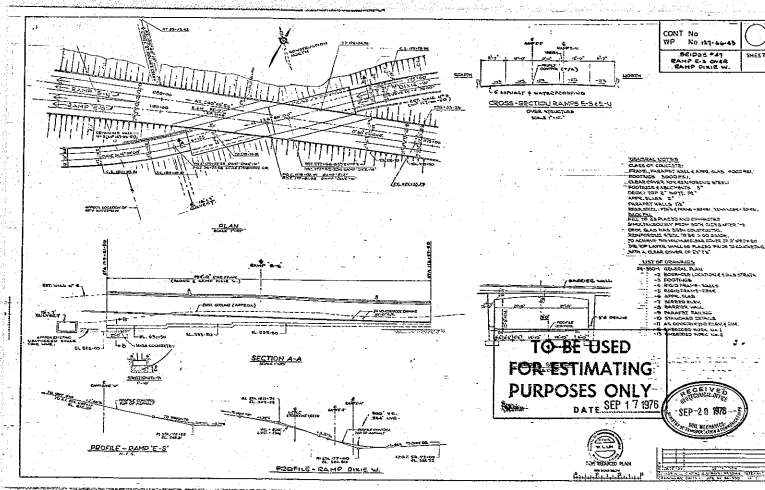


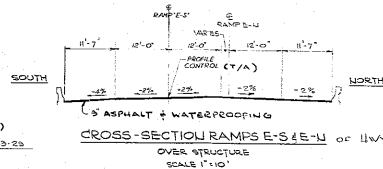
FOR REDUCED PLAN
1" = 3" INCHES ON ORIGINAL PLAN


73-11048
30M12-64

FOR REFERENCE ONLY

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS
CHIEF ENGINEER
FOUNDATION OF CANADA ENGINEERING
CORPORATION LIMITED
HIGHWAYS 401 & 403
WEST LIMITS OF HWY 401-27 INTERCHANGE TO HWY 10
PREDESIGN REPORT
RINO'S HIGHWAY No. _____ DIST. No. _____
CO. _____
TYP. _____
BRIDGES 401 & 403
APPROVED _____
DESIGN _____
DRAWING _____
DATE _____
CHECK _____
CONTRACT _____
DRAWING _____
DATE _____
CONTRACT _____
REVISIONS _____





DISTRICT No. 6	
CONT No	
WP No 127-66-43	
BRIDGE #47	SHEET
RAMP E-3 OVER RAMP DIXIE W.	

GENERAL NOTES:

CLASS OF CONCRETE:

FRAME, PARAPET WALL & APRN SLAB 4000 PSI.

FOOTINGS 3000 PSI.

CLEAR COVER FOR REINFORCING STEEL:

FOOTINGS & EMBLEMENTS 8"

DECK, TOP OF "HOT" 1 1/2"

APRN. SLABS 2"

"PARAPET WALLS 1 1/2"

REIN. STEEL: #7 @ 18" (FRAME & SOLK) MINIMUM @ 20" (SOLK).

BAR PINS:

SHALL BE PLACED AND CONTRACTED SIMULTANEOUSLY FROM BOTH SIDES AFTER THE DECK SLAB HAS BEEN CONCRETED.

REINFORCING STEEL TO BE G 40 GRADE.

TO ACHIEVE THE MINIMUM CLEAR COVER OF 2" SPECIFIED, THE TOP LAYER OF REINFORCING STEEL IN DECK SHALL BE PLACED PRIOR TO CONCRETING WITH A TOLERANCE OF $\pm \frac{3}{8}$ " & 1" CLEARANCE.

LIST OF DRAWINGS

24-350-1 GENERAL PLAN

-2 BOREHOLE LOCATION & SOILS STRATA

-3 FOOTINGS

-4 RIGID FRAME - WALLS

-5 RIGID FRAME - DECK

-6 APRN. SLAB

-7 SCREEN BULK.

-8 CARRIER WALL

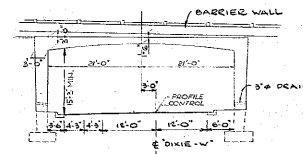
-9 PARAPET RAILING

-10 STANDARD DETAILS

-11 AS CONSTRUCTED ELEV. & DIM.

-12 EMBEDDED WORK, No. 1

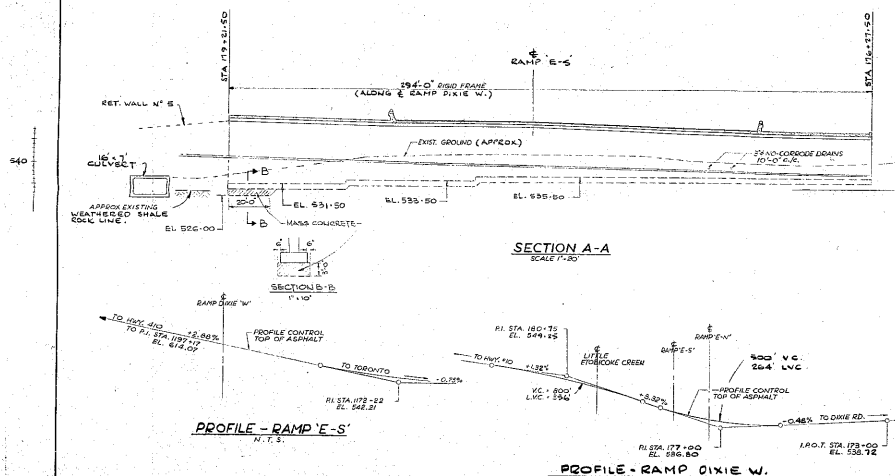
-13 EMBEDDED WORK, No. 2



CROSS SECTION
SCALE 1"=10'

CONCRETE QUANTITIES

CONC. IN BRIDGE: 2280 c.y. 4000 psi
CONC. IN BARRIER WALLS: 24 " " " "
CONC. IN APPROACH SLABS: 180 " " " "



FOR REDUCED PLAN

REV	DATE	BY	DESCRIPTION
			DESIGN N.L. CHECKED G. LOADING HG. 2544 DATE MAY 25
			DRAWING A.K. CHECK W.W. SITE No. 24-350 DWG. 1

30M12-65

CONT No
WP No 127-66-43

BRIDGE = 47
RAMP'S OVER RAMP IN W.
FOOTINGS

SHEET

