

G.I.-30 SEPT. 1976

GEOCRES No. 30M12-227DIST. 6 REGION W.P. No. 187-94-01/02

GWP 609-89-00

CONT. No. 97-30W. O. No. STR. SITE No. 37-0986HWY. No. 427LOCATION Campus Rd. Overpass
Widening; NBL & SBLNo. of PAGES - =====OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT. REMARKS:

Foundation Investigation Report
for
Highway 427 Overpass Widening at Fasken Drive/Campus Road
W.P. 187-94-01/02, Site 37-0986
Central Region

CONT 97-30

GEOCREP # 30M12-227

The following report is a copy of the factual information from the Foundation Investigation and Design Report for WP 273-66-00, Contract 77-46. The foundation investigation report was prepared for the existing structures by MTO Foundations Unit and represents the subsurface conditions for the proposed widening of the existing structures at Highway 427.

Imperial units of measure are used in the report and on the Record of Borehole sheets. The original ground elevations shown on the borehole logs may differ from present day elevations as a result of the construction of the existing structures.

This report contains the detailed subsurface conditions, the Record of Borehole sheets, and the Foundation Drawing. The Foundation Drawing was updated using the metric coordinate system and metric units of measure.



for.

E. Bennett
D. Dundas, P.Eng.
Sr. Foundation Engineer

**Foundation Investigation Report
for
Proposed Structure at the Crossing of New Hwy 427 and Campus Road
District No. 6 (Toronto)
WO 72-11006 -- WP 273-66**

1. INTRODUCTION

The Foundation Office was requested to carry out a subsurface investigation at the crossing of new Hwy 427 and Campus Road, in the Borough of Etobicoke, York County. The request contained in a memo from the Central Regional Office dated December 29, 1971. Subsequently, an investigation was carried out by this office to determine the subsoil, bedrock and groundwater conditions at the site. The results of the investigation for the structure and approach fills and cuts are presented in this report.

2. DESCRIPTION OF THE SITE AND GEOLOGY

The site is located some 200 feet east of the junction of Campus Road and Indian Line Road, in the Borough of Etobicoke, Metropolitan Toronto. The terrain is gently undulating in relief between elevations 540 and 546. The area has been utilized for small industrial developments; many one and two storey factories and warehouses are located here.

The site is located in the physiographic region known as the Peel Plain. The characteristic deposit in this region is a ground moraine laid down during the Wisconsin Glacial age. In the vicinity of the area under investigation, the moraine is primarily composed of a cohesive, stoney glacial till whose thickness typically ranges between 72 and 88 feet. In this region, the Humber River and Etobicoke Creek have cut deep valleys into the overburden. There is, therefore, no large undrained depression, swamp or bog, although in many of the instream areas drainage is still imperfect.

The overburden is underlain by grey shale bedrock of the Meaford-Dundas formation, Ordovician Period. Available geologic information indicates that the surface of the bedrock varies somewhere between elevation 458 and 473.

3. FIELD AND LABORATORY WORK

A total of six boreholes, all of which were accompanied by a dynamic cone penetration test, was carried out at the site during the course of the field investigation. The boreholes and the cone penetration tests were advanced by means of a continuous flight auger machine or a diamond drill rig, both of which were adapted for soil sampling purposes.

Samples were obtained at required depths in a 2-inch O.D. split spoon sampler which was hammered into the soil. The method of driving the split spoon conformed to the specifications of the Standard Penetration Test. The same method was used to advance the dynamic cone penetration tests. Bedrock was proven at three of the boring locations by obtaining BX size rock core samples.

During sampling and drilling operations, detailed logs of the borings were made; these logs

contain a record of drilling and sampling techniques used, together with the soil types and bedrock encountered.

The location and elevation of all the boreholes are shown on Drawing No. 1879401/02-A, together with a number of estimated stratigraphical sections across the site. Surveying of the site was carried out by the personnel from the Engineering Surveys Section, Central Region. The elevations shown in this report are referred to a geodetic datum.

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

Natural Moisture Content

Atterberg Limits

Grain Size Distribution

The results of these tests are plotted on the Record of Borehole sheets as well as the figures located in the Appendix.

4. SUBSOIL AND BEDROCK CONDITIONS

4.1 General

The predominant stratum across the site is composed of a very stiff to hard cohesive glacial till with a thickness ranging from 71 feet to 85 feet. This glacial deposit is covered in certain areas by fill material composed of clayey silt with sand and gravel; the fill was up to 8 feet thick. Underlying the glacial till is shale bedrock.

From ground surface downward the soil types and bedrock encountered are as follows:

4.2 Fill

On the south side of Campus Road, a fill has been placed over the parent subsoil. The fill material is composed of a clayey silt with sand and gravel. The depth of fill, at BH's 4 and 5, was found to be 8 feet.

Standard Penetration Tests, carried out within the cohesive fill are plotted on the Record of Borehole sheets. This testing gave 'N' values in the order of 11 to 12 blows per foot. Based on these values it is estimated that the fill has been subjected to a moderate degree of compaction.

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

Directly under a thin cover of topsoil or under the fill, is the predominant stratum across the site which is of glacial origin. This glacial till is composed of a heterogeneous mixture of clayey silt, sand and gravel. The thickness of this cohesive stratum varies from 71 feet at BH's 1 and 3, to 85 feet in BH 2. Grain size distribution curves for representative samples of this cohesive deposit are plotted in envelope form on Figure No. 1.

Atterberg limit tests were carried out on samples obtained from the cohesive glacial till. The results of this testing is summarized in tabular form as follows:

Liquid Limit (w_L %)	16 - 39
Plastic Limit (w_p %)	12 - 20
Natural Moisture Content (w %)	6 - 18

Based on these values, it is estimated that the cohesive deposit has a matrix, which is inorganic and of low plasticity.

The Standard Penetration Tests, carried out within this glacial till stratum, are plotted on the Record of Borehole sheets. This testing gave 'N' values which ranged from 16 blows/foot to 100 blows for 1 inch. Based on this testing it is estimated that the consistency of this deposit varies from very stiff to hard.

4.4 Shale Bedrock

The cohesive parent glacial till is directly underlain by bedrock, which was proven in 3 of the boreholes by obtaining up to 16 feet of BX size rock core samples. Over the site the bedrock surface was found to vary between elevations 473 and 458 which corresponds to depths below ground surface ranging from 71 to 85 feet. The bedrock is composed of a grey shale; the upper 6 to 8 feet of which is in a weathered state. Below this zone the bedrock is in a sound condition, as evidenced by the high percentage of core recovered.

The bedrock core samples were examined by Mr. K.W. Ingham, Geologist, Department of Transportation and Communications. Mr. K.W. Ingham presented the results of his bedrock examination in a memo to this office, dated February 29, 1972; this letter is appended to this report.

5. Groundwater Conditions

Groundwater level observations have been carried out, during the period of the investigation, in the open boreholes. These observations indicate that the groundwater level varies between elevations 540 and 542, which correspond to depths below ground surface of from 3 to 10 feet.

6. Miscellaneous

The field work, performed during the period of January 6 to January 10, 1972, was carried out under the immediate supervision of Mr. V. Korlu, Project Foundation Engineer.

The drilling equipment was owned and operated by Master Soil Investigations Ltd., Toronto.

This report was prepared by Mr. S. Ahmad, Project Foundation Engineer. This project was under the general supervision of Mr. M. Devata, Supervising Foundation Engineer, who also reviewed this report.

March 3, 1972

APPENDIX

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

23

MEMORANDUM

TO: Mr. M. Devata,
Sup. Foundation Engr.

FROM: K. W. Ingham

ATTENTION:

DATE: March 10, 1972

OUR FILE REF.

IN REPLY TO

SUBJECT:

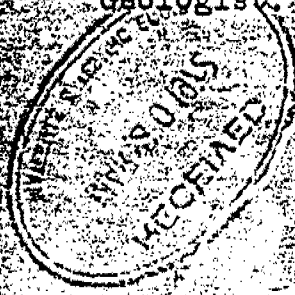
Foundation Investigation 72-11006;
Bridge Footing; Highway 427

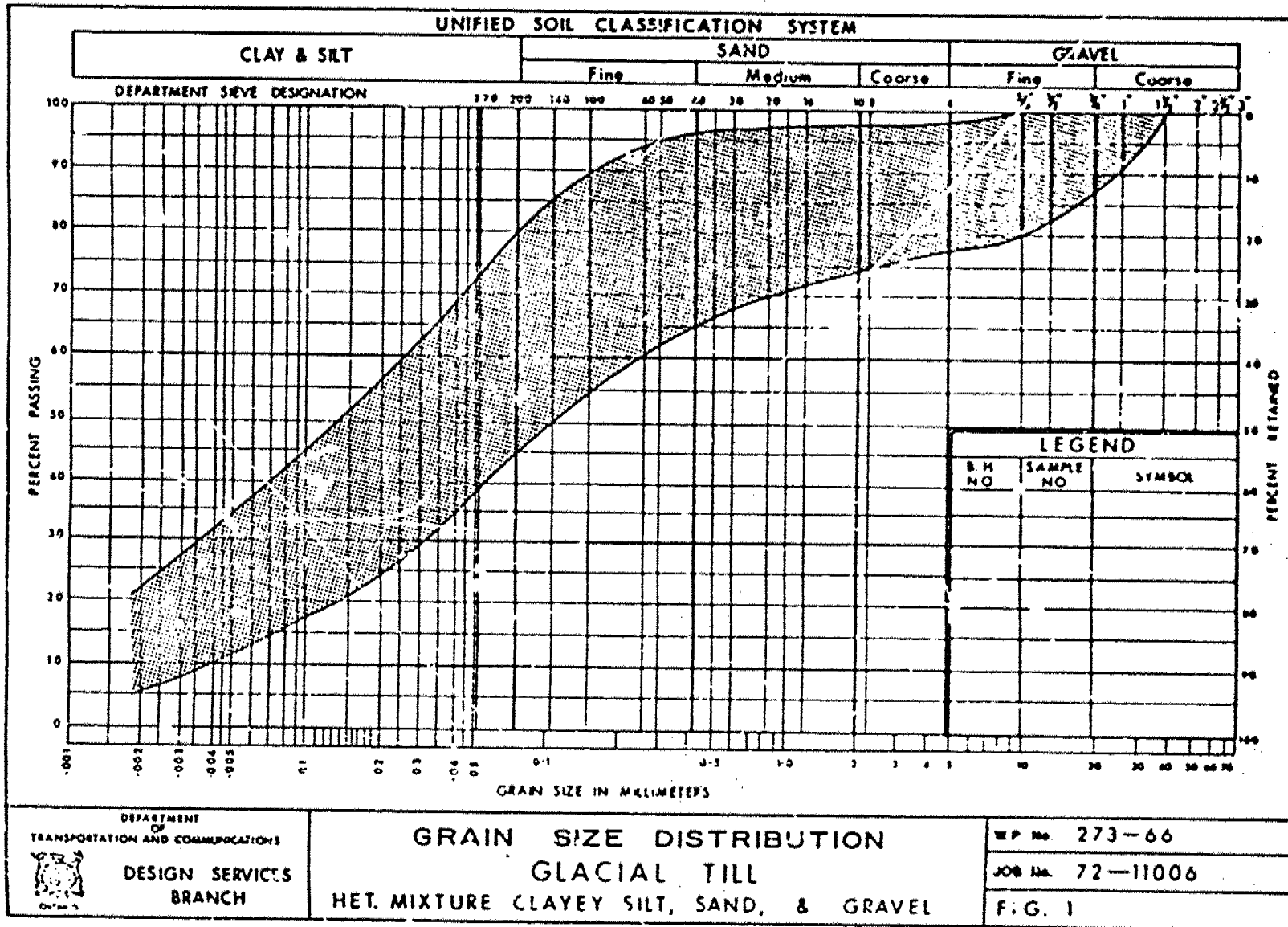
Three boreholes, Nos. 1, 2 and 3 intersected bedrock at the site. The rock is a dark grey shale with thin bands of calcareous shale and beds of limestone and siltstone. A small amount of till was recovered at the top of each hole and this appears to be underlain by 2.0 to 8.0 ft. of moderately fractured bedrock and then the undisturbed shale. The depth to bedrock and corresponding elevation for each hole is given below.

<u>Hole No.</u>	<u>Depth to Bedrock - ft.</u>	<u>Bedrock Elevation - ft.</u>
1	85.6	456.4
2	77.0	467.1
3	75.5	469.8

KWI:mv

K. W. Ingham,
Geologist





WP 187-94-01/02

DEPARTMENT OF HIGHWAYS - ONTARIO			RECORD OF BOREHOLE No. 1			FOUNDATION SECTION									
MATERIALS & TESTING OFFICE			Co-ords: N 4858 602.1; E 296 518.6			ORIGINATED BY VE									
JOB 72-11006			LOCATION Co-ords. 15,874,679 N; 972,830 E.			COMPILED BY TJ									
W.P. 273-66			BORING DATE Jan. 3 & 4, 1972			CHECKED BY [Signature]									
DATUM Geodetic			BOREHOLE TYPE Perc. Drill and Diamond Drill												
ELEV. DEPTH	SOIL PROFILE	STRAIT MOT	SAMPLES		ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT — % PLASTIC LIMIT — % WATER CONTENT — %			BULK DENSITY Y P.C.F.	REMARKS
			NUMBER	TYPE		BLows/FOOT	20	40	60	80	100	10	20		
Sub. 1	Ground Level														
0.0	Het. mix. of clayey silt, sand & gravel, ooc. clayey silt seams		1	SS	23										
			2	SS	34										
	Very Stiff to Hard		3	SS	47										
			4	SS	46										
	Brown Grey		5	SS	34										
			6	SS	17										
	Glacial Till		7	SS	36										
			8	SS	11										
			9	SS	11										
			10	SS	14										
			11	SS	100 1/2										
			12	SS	100 3/4										
			13	SS	187										
			14	SS	21										
473.1			15	SS	100 1/2										
71.0	Shale Bedrock														
	Weathered Sound		16	BI	100%										
461.1															
83.0	End of Borehole														

20
15-3 % STRAIN AT FAILURE
10

WP 187-94-01/02

DEPARTMENT OF HIGHWAYS - ONTARIO			RECORD OF BOREHOLE No. 2			FOUNDATION SECTION									
MATERIALS & TESTING OFFICE			Co-ORDS: N 4838 524.8; E 296 468.0			ORIGINATED BY <u>VK</u>									
JOB 72-11006			LOCATION Co-ords. 15,874,655 N; 972,665 E.			CO-APPROVED BY <u>TS</u>									
W.P. 273-66			BORING DATE Jan. 6 & 7, 1972			CHECKED BY <u>CK</u>									
DATUM Geodetic			BOREHOLE TYPE Penn Drill and Diamond Drill												
ELEV. DEPTH	SOIL PROFILE DESCRIPTION	STRAT. NO.	SAMPLES		ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE				LIQUID LIMIT — % PLASTIC LIMIT — % WATER CONTENT — %			BULK DENSITY γ _p	REMARKS	
			NUMBER	TYPE		BLOWS/FOOT	BLOWS/FOOT	20	60	100	100	WATER CONTENT %			10
544.0	Ground Level														
0.0	Ret. mix. of clayey silt, sand & trace of gravel		1	SS	30	590									Feb. 4/72
	occ. clayey silt seam		2	SS	37										539.5
	Ulaical Till		3	SS	62										4.31 49 18
	Very Stiff to Hard		4	SS	50	530									
	Brown		5	SS	29										
	Gray		6	SS	37										
			7	SS	37	520									
			8	SS	40										
			9	SS	50	510									
			10	SS	160	500									5.27 50 18
			11	SS	100	490									
			12	SS	100	480									
			13	SS	133	470									
			14	SS	100	460									
458.5	Shale bedrock		15	SS	100	450									5.43 45 7
454.0	Sound		16	EX	100										
90.0	End of Borehole														

20
15-5 % STRAIN AT FAILURE
10

WP 187-94-01/02

DEPARTMENT OF HIGHWAYS - ONTARIO MATERIALS & TESTING OFFICE			RECORD OF BOREHOLE No. 4				FOUNDATION SECTION							
JOB 72-11005		LOCATION Co-ords: N 4 836 605.2; E 296 492.4		ORIGINATED BY VE										
W.P. 723-66		BORING DATE Jan. 5, 1977		COMPILED BY TE										
DATUM Geodetic		BOREHOLE TYPE Pan Drill & Cone		CHECKED BY										
ELEV. DEPTH	SOIL PROFILE DESCRIPTION	STRAT. NO.	SAMPLES		ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT — % PLASTIC LIMIT — % WATER CONTENT — %	SUN. DENSITY P.C.F.	REMARKS	
			NUMBER	TYPE		BLOWS/FOOT	20	40	60	80				100
849.2	Ground Level													
0.0	Fill		1	SS	17									23 27 30-1
841.7	Stiff to Very Stiff		2	SS	17									52.2
7.5	Glacial Till		3	SS	35									Feb. 4/72
	Brown		4	SS	42									
	Grey		5	SS	51									
	Glacial Till		6	SS	32									
	Hot mix. of clayey silt, sand & gravel		7	SS	120/9"									
	Hard		8	SS	100/3"									
			9	SS	61									
			10	SS	77									
			11	SS	95									
			12	SS	95									
498.8			13	SS	150/5"									
50.4	End of Borehole													

20
15-5 % STRAIN AT FAILURE
10

WP 187-94-01/02

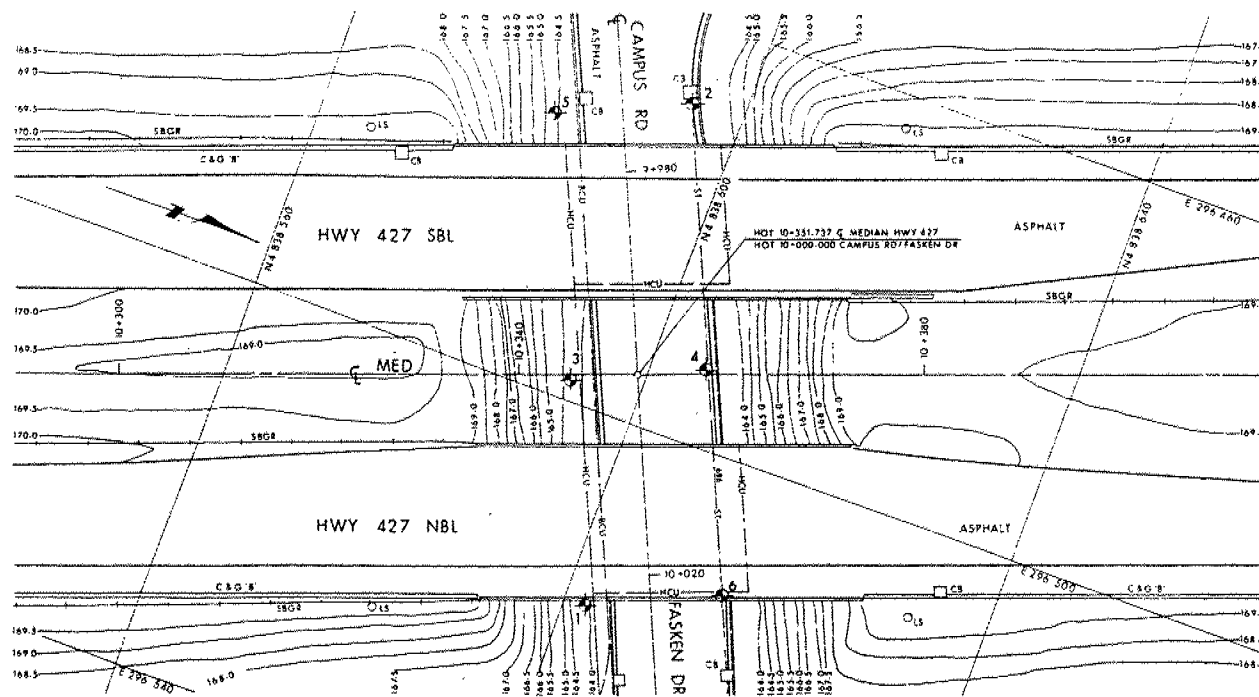
DEPARTMENT OF HIGHWAYS - MINNESOTA			RECORD OF BOREHOLE No. 5			FOUNDATION SECTION								
MATERIALS & TESTING OFFICE			Co-ords: N 4838 382.3; E 216 473.5			ORIGINATED BY								
JOB 72-11006			LOCATION Co-ords: 15, 176, 614 N; 972, 682 E.			COMPILED BY								
WP 87-1/4			BORING DATE Jan. 5, 1972			CHECKED BY								
DATUM Ogishville			BOREHOLE TYPE Test Drill & Core											
F.L.S. DEPTH	SOIL PROFILE DESCRIPTION	STRAT. NO.	SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT PLASTIC LIMIT WATER CONTENT	BULK DENSITY Y	REMARKS
			NUMBER	TYPE	BLOWS/FOOT		20	40	60	80	100			
0.0	Ground Level													
	Mixture of silty clay, sand & gravel. Very Stiff to Hard		1	SS	11	520								4.27 51.18 539.5 Feb. 6/72
			2	SS	12									
			3	SS	12									
	Brown Grey		4	SS	51	530								
			5	SS	32									
			6	SS	11									
	Glacial Till		7	SS	18									
			8	SS	31	520								
			9	SS	18									
			10	SS	102	510								
			11	SS	27									
	Occ. silt seams		12	SS	102	500								
422.5			13	SS	104	490								
51.5	End of Borehole													

20
15-3 % STRAIN AT FAILURE
10

WP 187-94-01/02

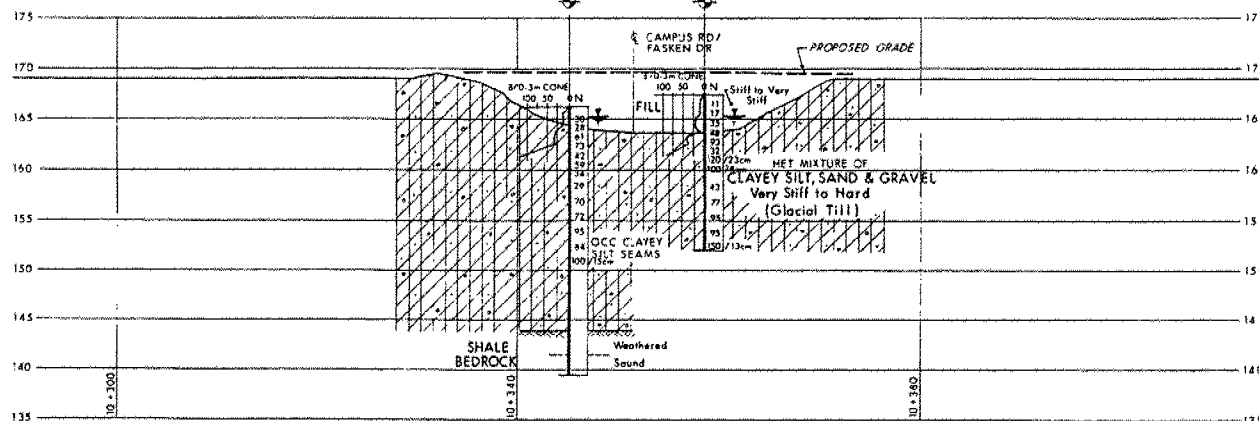
DEPARTMENT OF HIGHWAYS - ONTARIO		RECORD OF BOREHOLE No. 6		FOUNDATION SECTION															
MATERIALS & TESTING OFFICE		Co-ORDS: N 4838 614.3; E 296 513.1		ORIGINATED BY <u>YK</u>															
JOB <u>72-11006</u>	LOCATION <u>Co-ords. 15,876,719 N; 972,812 E</u>	BORING DATE <u>Jan. 4, 1972</u>		COMPILED BY <u>TF</u>															
W.P. <u>271-66</u>	DATUM <u>Geodetic</u>	BOREHOLE TYPE <u>Pen Drill & Core</u>		CHECKED BY <u>[Signature]</u>															
SOIL PROFILE	SAMPLES	DYNAMIC PENETRATION RESISTANCE				LIQUID LIMIT — % PLASTIC LIMIT — % WATER CONTENT %		BULK DENSITY Y P.C.F.	REMARKS										
ELEV. DEPTH	STRAT. NO.	NUMBER	TYPE	BLOWS/FOOT	ELEV. SCALE	20	40			60	80	100	10	20	30				
589.1	Ground Level																		
0.0	Fill																		8.35 h3 1b
581.6	Stiff to Very Stiff																		582.1
7.5																			Feb. 4/72
	Brown Gray																		
	Glacial Till																		
	Ret. mix. of clayey silt, sand & gravel.																		
	Very Stiff to Hard																		
492.6																			
56.5	End of Borehole																		

20
15-5 % STRAIN AT FAILURE
10



PLAN

SCALE
0 5m



PROFILE MED HWY 427

SCALE
0 5m

METRIC

DIMENSIONS ARE IN METRES
ENDS/OF MILLIMETRES UNLESS
OTHERWISE SHOWN. STATIONS
IN KILOMETRES + METRES.

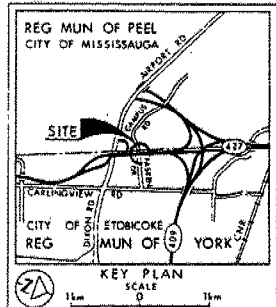
CONT No 97-30
WP No 187-94-01/02

FASKEN DR/CAMPUS RD

BORE HOLE LOCATIONS & SOIL STRATA



SHEET



LEGEND

- Bore Hole
- Dynamic Cone Penetration Test (Cone)
- Bore Hole & Cone
- N Blows/0.3m (Std Pen Test, 475 J/blow)
- CONE Blows/0.3m (60° Cone, 475 J/blow)
- WL at time of investigation 1972.01

NOTE:
For Soil Details of
BH's 1, 2, 5 & 6 Refer
to Record of Borehole
Sheets

No	ELEVATION	CO-ORDINATES	
		NORTH	EAST
1	165.8	4 838 602.1	296 518.6
2	165.6	4 838 594.8	296 468.0
3	166.2	4 838 593.0	296 497.9
4	167.4	4 838 605.2	296 492.4
5	165.8	4 838 582.3	296 473.5
6	167.4	4 838 614.3	296 513.1

NOTES

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

NOTE: The complete foundation investigation and design report for
this project and other related documents may be examined at the
Engineering Materials Office, Downsview. Information contained in
this report and related documents is specifically excluded in
accordance with the conditions of Section GC 2.01 of OHS Gen Code

DATE	BY	DESCRIPTION
1995 07 04	1081 CB	1081 CB
1995 07 04	1081 CB	1081 CB
1995 07 04	1081 CB	1081 CB

Geotex No 30M12-227

Drawn No 227

Superv. E.A. (checked) Date 1995 07 04

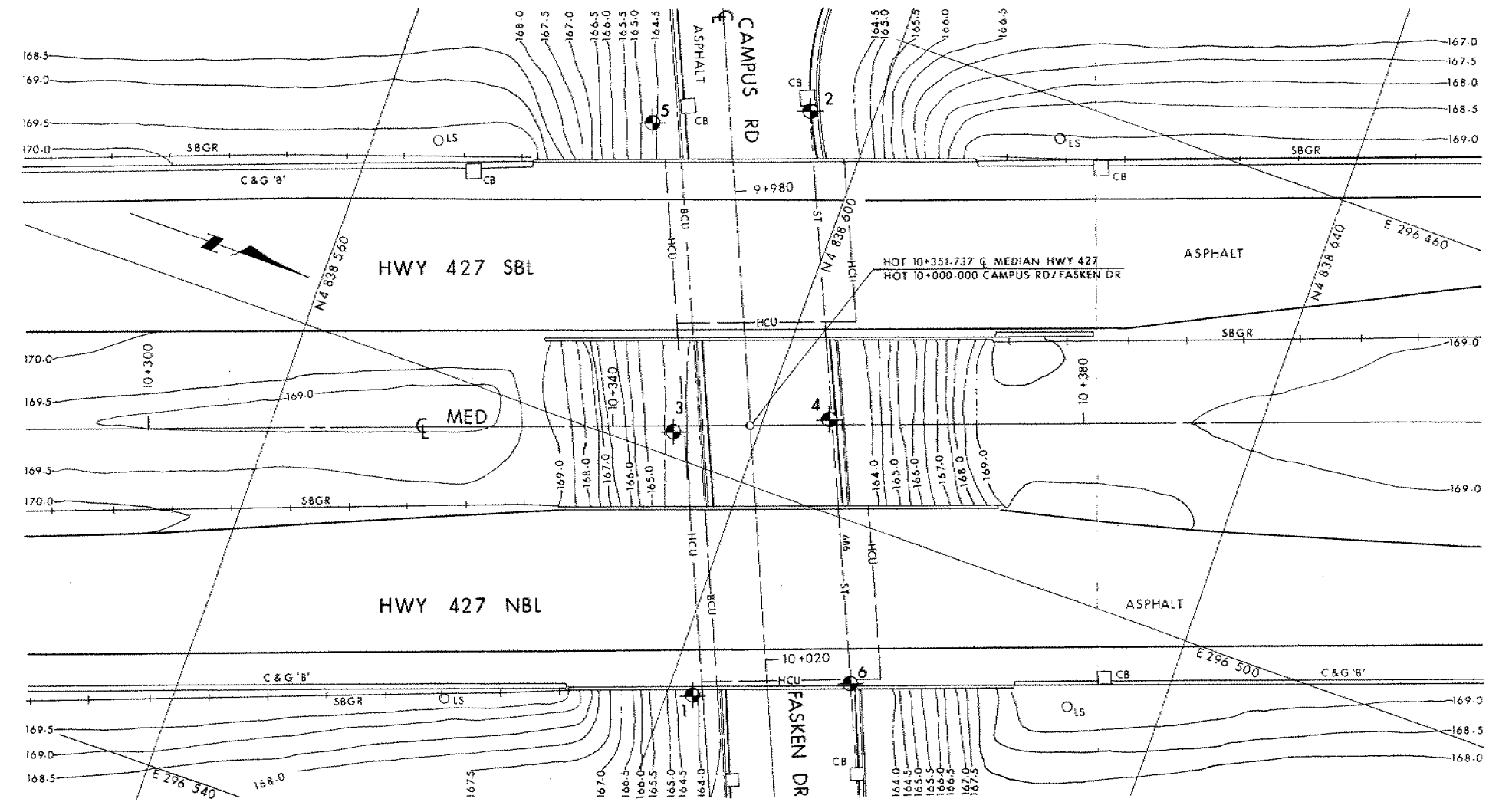
Drawn D.T. (checked) Date 1995 07 04

1081 CB

1081 CB

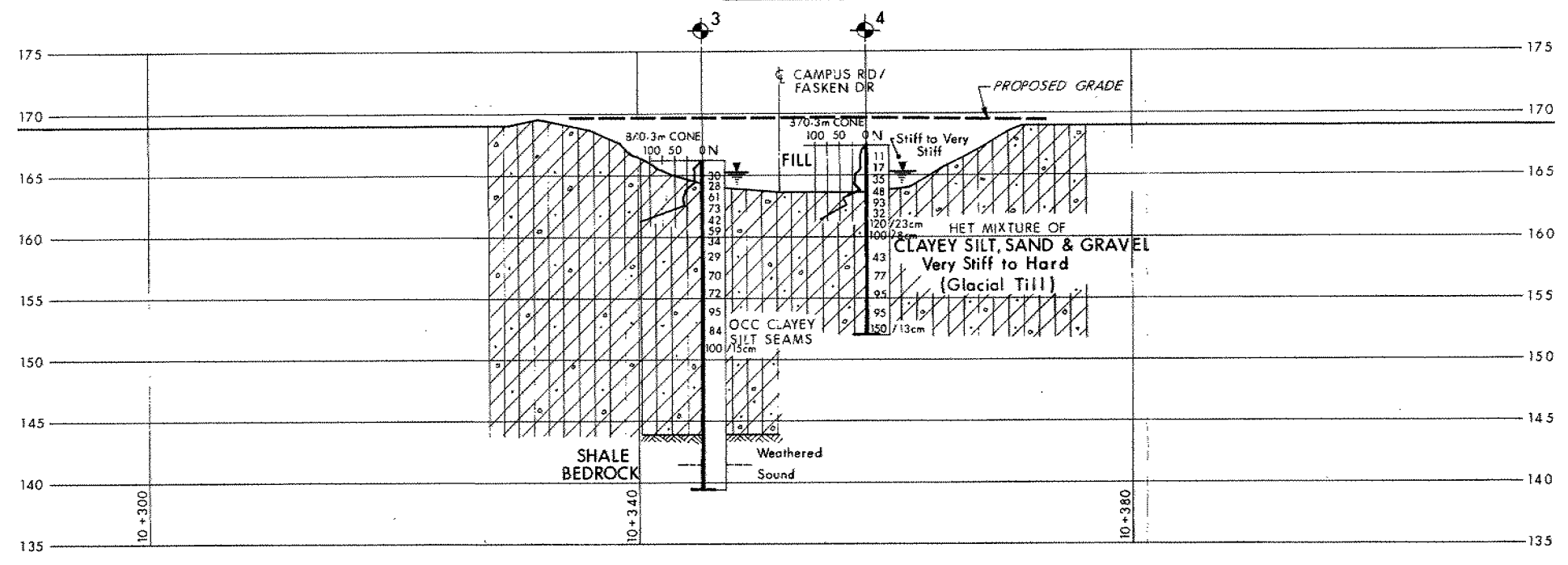
1081 CB

1081 CB



PLAN

SCALE
5m 0 5m



PROFILE MED HWY 427

SCALE
5m 0 5m

METRIC
DIMENSIONS ARE IN METRES
AND / OR MILLIMETRES UNLESS
OTHERWISE SHOWN. STATIONS
IN KILOMETRES + METRES.

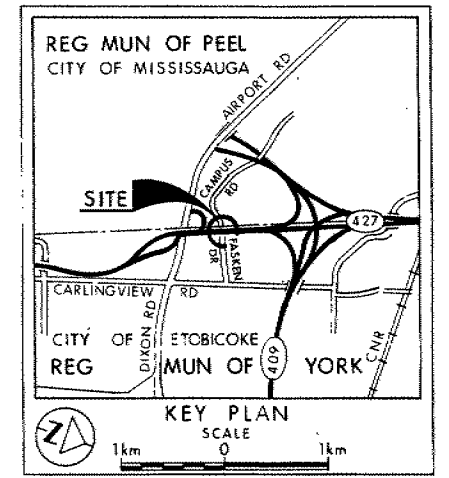
CONT No 97-30
WP No 187-94-01/02

FASKEN DR/CAMPUS RD

BORE HOLE LOCATIONS & SOIL STRATA



SHEET



LEGEND

- Bore Hole
- ⊕ Dynamic Cone Penetration Test (Cone)
- ⊕ Bore Hole & Cone
- N Blows/0.3m (Std Pen Test, 475 J/blow)
- CONE Blows/0.3m (60° Cone, 475 J/blow)
- W.L. at time of investigation 1972 01

NOTE:
For Soil Details of
BH's 1, 2, 5 & 6 Refer
to Record of Borehole
Sheets

No	ELEVATION	CO-ORDINATES	
		NORTH	EAST
1	165.8	4 838 602.1	296 518.6
2	165.8	4 838 594.8	296 468.0
3	166.2	4 838 593.0	296 497.9
4	167.4	4 838 605.2	296 492.4
5	165.8	4 838 582.3	296 473.5
6	167.4	4 838 614.3	296 513.1

NOTE

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

NOTE: The complete foundation investigation and design report for this project and other related documents may be examined at the Engineering Materials Office, Downsview. Information contained in this report and related documents is specifically excluded in accordance with the conditions of Section GC 2.01 of OPS Gen Cond.

REV.	DATE	BY	DESCRIPTION
1			
Geocres No 30M12-227			
HWY No 427		DIST CR	
SUBMD KA	CHECKED	DATE 1995 07 04	SITE 37-0986
DRAWN DT	CHECKED	APPROVED	DWG 187940102-A

MEMORANDUM

Freeway Engineering Section
MTO Central Region
Atrium Tower, 5th Floor
Downsview, Ontario
Telephone (416) 235-5531
May 1, 1996

To: John Lam, P. Eng.
Senior Structural Engineer
Structural Engineering Section

Re: W.P. 609-89-00, Hwy. 427 Widening From Hwy. 401 Northerly to Campus
Rd./Fasken Dr.; Cont. 96-12

We have to issue an addendum on one of the grading items. The following structural related issues were raised by MTO Construction Office. Kindly review them and provide your input to-day, so that if required, we can address them in the same addendum. This contract will be awarded on May 14, 1996, and thus an addendum will have to be finalized by to-morrow, so that the bidders have adequate notice of any changes, prior to submitting their bids.

1. For the Hwy. 427 NB structure over Hwy. 409 (Cont. 95-46), you advised Construction Office at the handover meeting, that the pre-augured holes at new pile locations be protected with liners or casings before the pile driving operation. This item was dealt with under a force account. If protection liners are also required at any of the structures in this contract, then Construction Office would like this issue dealt with through an addendum, rather than dealing with it under a force account, particularly since there are 118 H piles. Under a force account, it will likely cost lot more. Please check with Foundations Office, and provide your recommendations to-day. On Sheet 189 (bottom right hand side of the page - point 1 under Pile Driving Sequence), it is stated that at piers (Disco Rd.) use steel liners in holes. Is this the only location in this contract where this applies? Do the steel liners remain in place or are they removed after the pile driving operation? How is this activity paid for?

If liners are required, perhaps we can add the following note on P. 173 of the Special Provisions, under Basis of Payment.

"Supply, install, and remove protection liners for pre-augured holes for H - piles". You will have to get the O.K. from Foundations Office.

2. P. 171 of the Special Provisions - Roadway Protection. Does this S.P. contradict with Sheet 188 - Disco Road Overpass Roadway Protection? Would it be helpful to insert a note similar to Note 1 shown on Sheet 230 - Woodbine Racetrack Entrance - Roadway Protection?

H. M. Shah

H. M. Shah, P. Eng.
Senior Project Manager

CC- Betty Bennett

MEMORANDUM



To: V. Boehnke, P.Eng.
Head, Structural Section
Central Region

Date: August 18, 1994

Attn: J. Lam, P.Eng
Sr. Structural Engineer

From: Foundation Design Section
Room 315, Central Bldg.

Tel: (416) 235-3731
Fax: (416) 235-5240

Re: Preliminary Foundation Recommendations for Campus Road Overpass
Hwy 427 Widening from Highway 401 to S. of Hwy 409
G.W.P. 609-89-00, District 6, Toronto

It is proposed to widen the existing Highway 427 between Highway 401 and Highway 409. This will be achieved by incorporating the existing median that separates the northbound and southbound lanes, a width of approximately 14.6m. At present, Highway 427 crosses over Campus Road/Fasken Drive via two rigid frame structures that stand 30m+/- apart (C to C). The widening of Highway 427 will require that an additional structure adjoin the existing bridges.

This memo outlines the general subsurface conditions encountered at this site and the preliminary foundation recommendations for the proposed structure widening. Final recommendations will be provided once the proposed structure design and E-plan for this site become available.

General Site and Subsurface Conditions

The site is located just north of Highway 427 and Dixon Road, in the City of Etobicoke. The area is highly developed with industrial and commercial land use. The terrain is gently undulating in relief.

The site falls within the physiographic region known as the Peel Plain which is glacial in origin. The characteristic deposit of this region is a ground moraine composed of cohesive glacial till that extends for a depth of approximately 25 m. The overburden is underlain by shale bedrock of the Dundas-Meaford Formation.

Subsurface information obtained from a subsurface investigation carried out in January 1972 for the existing structures provides sufficient data for the proposed widening. The investigation consisted of six boreholes advanced at the abutments to the structures. The subsurface material consists largely of very stiff to hard glacial till comprised of a heterogeneous mixture of clayey silt, sand and gravel. Bedrock was proven at three locations and ranged in elevation from 139.7 to 144.2m.

Groundwater levels recorded at the time of the investigation were measured between El. 164.6 and 165.2. The approximate elevation of Campus Road/Fasken Drive at Highway 427 centreline is

163.8. It is expected that the present groundwater level in the immediate area of the structure is at or below El. 163.8.

Discussion and Recommendations

Two 15.8 single span rigid frame structures carry the northbound lanes and southbound lanes of Highway 427 over Campus Rd./Fasken Dr.. Both structures are supported by spread footings founded at El. 162.5 +/- . The profile grade elevation of Highway 427 at the overpass is approximately 169.6 m.

The following recommendations assume that widening will occur in the median and that there will be no significant changes to the profile grades. These recommendations will be finalized when the design details, such as the proposed structural connections and the need for retaining walls, are provided.

Structure Foundations

The structure widening may be founded on spread footings at the approximate elevation of the existing footings, i.e. El. 162.5 m. It is recommended that the footing depths not vary from this elevation to minimize disturbance to the existing foundations. The following design values apply:

North Abutment

Factored Bearing Resistance at ULS	475 kPa
Bearing Resistance at SLS	325 kPa

South Abutment

Factored Bearing Resistance at ULS	600 kPa
Bearing Resistance at SLS	400 kPa

It is anticipated that the magnitude of settlement will be less than 25mm given the competent nature of the glacial till provided that softening of the footing base during excavation does not occur. It is recommended that a 150 mm thick working slab of lean concrete be poured within 2 hours of the completion of footing excavation.

No dewatering concerns are anticipated for the footing excavations. It is expected that any seepage into the excavation can be relieved by sump pumping techniques.

A 1.2 m earth cover is required for spread footings.

The sliding resistance between the base of the concrete footing and the glacial till may be computed using an unfactored friction coefficient of $\tan 22^\circ$. Additional resistance may be developed with the use of keys or footing anchors.

Temporary excavations carried out for the footings may be constructed at 1H:1V or flatter. to a maximum depth of 6.0 m. Excavations deeper than 6.0 m require a 2.0m mid-height bench.

Because of the nature of the subsurface material, the Contractor should be made aware that cobbles/boulders may be encountered during excavation.

Roadway Protection

Excavations adjacent to the existing structures will require temporary shoring. The soil parameters for the calculation of earth pressures are as follows:

	ϕ	γ kN/m ³
<u>North Abutment</u>		
El. 169.5 - 167.4 Fill - local borrow assumed	28°	20.0 kN/m ³
Below El. 167.4 Cohesive glacial till	32°	21.5 kN/m ³
<u>South Abutment</u>		
El. 169.5 - 166.2 Fill - local borrow assumed	28°	20.0 kN/m ³
Below El. 166.2 Cohesive glacial till	32°	21.5 kN/m ³

An at-rest condition should be assumed.

Lateral Earth Pressure

Backfill to the abutments should consist of granular material in accordance with MTO Standard Special Provision 109F03. Computation of earth pressures should be carried out as per Section 6-7.4.5 of the OHBDC, 3rd Ed.. Design parameters of the acceptable granular backfill are as follows.

	<u>Granular "A"</u>	<u>Granular "B"</u>
Angle of Internal Friction (ϕ)	35°	30°
Unit Weight (kN/m ³)	22.8	21.2

If a rigid frame structure is considered then the at-rest condition should be assumed. An active condition may be assumed if soil movement behind the wall is permitted.

If there are any questions or comments regarding these recommendations, please advise.



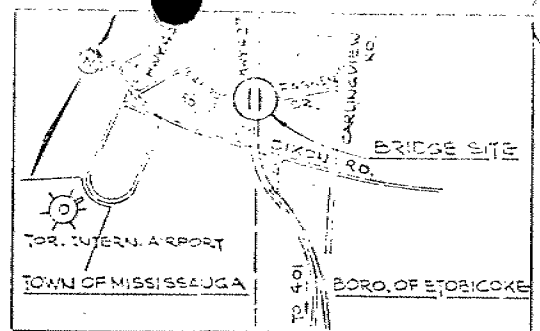
Betty Bennett, P.Eng.
Sr. Foundation Eng. (Acting)

CAMPUS RD.

- 17+00

B.M. EL. 543.36
CUT + CONC. LEADING
RAMP OVER FACTORY 265 FT.
OF STA. 42+50 TO HWY. 427

SKETCH DATA
3° 41' 35"
S.U. - 084 4113
COS. - 937 3234
TAN. - 064 5453
SEC. - 10020303



VR	STA.	COORDINATES
1	345+77.4	4635.754 72723.911 E
2	345+77.4	4635.754 72723.911 E
3	345+77.4	4635.754 72723.911 E
4	345+77.4	4635.754 72723.911 E

FOR TOP OF ASPHALT ELEV.
SEE DETOUR D-38

WEST

EAST

CROSS SECTION
1" = 10'

GENERAL NOTES:

CLASS CONCRETE	3000 PSI
APPROACH SLAB REMAINING	4000
GRADE OF REINFORCING STEEL	
FOOTING, RIGID FRAME & VNC WALLS REMAINING	60
REMAINDER	50
CLEAR COVER TO REIN. STEEL	
DECK	2"
TOP	1 1/2"
SGT.	2"
END POSTS & RIGID WALLS AND/OR AS SHOWN	1 1/2"
FALSEWORK AT VNC WALLS NOT TO BE REMOVED UNTIL DECK CONCRETE IS SET	

CONCRETE QUANTITIES

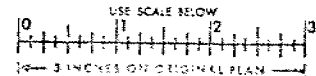
FOR THE LUMP SUM TENDER ITEMS.	
BRIDGES	637.5 cu yd
BARRIER WALLS	13.0
APPROACH SLABS	60.5
THE ABOVE QUANTITIES ARE FOR EACH, NBL & SBL STRUCTURES.	

LIST OF DRAWINGS.

- 37-286-1. GENERAL LAYOUT.
2. BOREHOLE LOCATION & SOIL STRATA.
3. FOOTINGS & VNC WALLS.
4. RIGID FRAME.
5. SKEED ELEVATIONS.
6. BARRIER WALL.
7. STEEL CASING (SINGLE TUBE).
8. 20 FT. APPROACH SLAB.
9. STANDARD DETAILS.
10. AS CONSTRUCTED ELEVATIONS.
11. EMBEDDED WORK (LIGHTING) LAYOUT & DETAILS.
12. EMBEDDED WORK (LIGHTING) STD. DETAILS.



FOR REDUCED PLAN



PLAN
1" = 20'

ELEVATION
1" = 20'

PROFILE OF HWY. 427
N.T.S.

PROFILE OF CAMPUS RD. - FASKEN DR.
N.T.S.

REVISIONS	DATE	BY	DESCRIPTION

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS			
STUDY			
HWY. 427 OVERPASS AT CAMPUS RD. (APPROX. 0.2 MI. NORTH OF DIXON RD.)			
KING'S HIGHWAY No. 427		EST. No. 6	
RES. MUNICIPALITY OF YORK		CON. No. 1	
BORO. OF ETOBICOKE LOT 23		CON. No. 1	
GENERAL LAYOUT			
APPROVED	DATE	BY	DESCRIPTION
DESIGN	W.L.L.	CHECK	ECCL.
DRAWING	W.L.L.	CHECK	ECCL.
DATE	JULY 1977		