

72-F-168	127-66-28	HWY. 401 & ETOBICOKE CREEK	30M12-50
W.O.	W.P.	LOCATION	GEOCRES NO.

• DATA ON FILE IN SOIL MECHANICS SECTION

REFER TO: W.P. FILE

CONT 74-109

[Signature]
REMARKS _____

GEOCRES INDEXING CARD FOR REPORTS NOT MICROFILMED

GI-20 AUG. 74

SUPERIMPOSED DOCUMENT MAY
APPEAR AS MULTI-FEED ON FILM.

MEMORANDUM

72-11168

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

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

ATTENTION: M. Devata

DATE: February 14, 1973.

OUR FILE REF.

IN REPLY TO

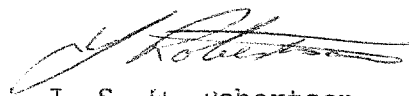
SUBJECT: Etobicoke Creek Bridge,
(Bridge #8, 9 & 10),
Site 24-184, W.P. 127-66-28,
Highway 401, District 6.

The following drawings, marked as required, details the approximate location of footings to accommodate the above noted structure.

Co-ordinated Site Plan	3983-14T-1
Graphical Alignment Plan (Partial)	3983-2A-1
Numbering Key Plan	
Contract Key Plan	
Highway 401 Core Profile	3983-2B-1
Highway 401 W.B. Collector Profile	3983-2B-2
Highway 401 E.B. Collector Profile	3983-2B-3

Would you kindly arrange to have a foundation investigation of sufficient magnitude to allow the Structural Office to proceed with the bridge design.

JSTR:lc
Encl.


J. S. T. Robertson,
STRUCTURAL PLANNING SUPERVISOR,
for:
G. C. E. Burkhardt,
REG. STRUCTURAL PLANNING ENG.

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

ENGINEERS AND PLANNERS

March 6, 1973.

Mr. M. Devata,
Regional Materials Engineer,
Materials & Testing Office,
Ministry of Transportation & Communications,
3501 Dufferin St.,
Downsview, Ontario.

Dear Sir:

Re: W.P. 127-66-30
Foundation Investigation of Trunk Sewer

We are enclosing two copies of the following plans for your use in the foundation investigation of the proposed trunk sewer along the north side of Highway 401 from west of Dixie Road to Etobicoke Creek:

- 1" = 100' plan showing the trunk sewer location.
- Proposed profile of the trunk sewer.

The location of the trunk sewer has been staked in the field at 100' stations.

Please contact me if you have any questions concerning the work.

Yours very truly,

Russell Barr

R.J.A. Barr,
Project Manager.

RJAB/nmd
Encl.

cc: W. C. Friedmann

Note: Proper request will come from Systems Design, Central Region.
M.A.

May 28, 1973

Mr. W.H. Roters
Senior Project Design Engineer
Ministry of Transportation & Communications
3501 Dufferin Street
Downsview, Ontario

Attention Mr. N. Sen

Dear Sirs/

HIGHWAY 401 - HIGHWAY 410 INTERCHANGE
W.Ps. 127-66-32, -35, -36 and -37
EARLY PLACEMENT OF FILL

The following confirms our discussions with Mr. Devata, Supervising Foundations Engineer of the Ministry for placement of early fill in the vicinity of Etobicoke Creek.

1. For maximum height of fill of 40 feet, the side slope should be 3:1 slope and protected with sod as soon as possible.
2. Strip all organic material for embankment construction including the areas where new embankment must be keyed into the existing side slopes. Due to probability of ground water, sub-drainage should be located in the transition section.
3. Since settlement of the embankment is anticipated, surcharge of approximately 5 feet is recommended. In addition, a surcharge of 5 feet is recommended in particular, at the location of the proposed bridge abutments.

*For how long?
ACS*

Mr. W. H. Roters
Ministry of Transportation & Communications
May 28, 1973
Page 2

4. The embankment should be graded with an additional 2 feet of surcharge from the proposed subgraded level and crowned to ensure drainage at the surface.
5. Where fill is placed for the proposed abutment, no rock shall be placed within 50 feet of the abutment.

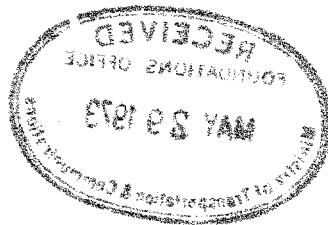
Yours very truly,
FOUNDATION OF CANADA ENGINEERING
CORPORATION LIMITED



R.S. Adachi, P.Eng.
ASSISTANT CHIEF ENGINEER
TRANSPORTATION

RSA/bam
3983-101-1

cc: Mr. M. Devata
Mr. R. Barr



Copy made for R. Roters 5/28/73
CJH

MEMORANDUM

30M12-50

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

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

ATTENTION:

DATE: May 29, 1973.

OUR FILE REF.

IN REPLY TO JUN 14 1973

SUBJECT:

FOUNDATION INVESTIGATION REPORT

For

Structures No. 8, 9 & 10 at the Crossing of
Hwy. No. 401 and Relocated Etobicoke Creek
Town of Mississauga, County of Peel
Site No. 24-184, District #6 (Toronto)
W.O. 72-11168 -- W.P. 127-66-28

30M12-50
GEOCRETS No.

CONT. 74-109

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

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

AGS/ao

Attch.

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

A. G. Stermac
A. G. Stermac,
PRINCIPAL FOUNDATIONS ENGINEER.

Foundations Files
Documents

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- - - - -

FOUNDATION INVESTIGATION REPORT
For
Structures No. 8, 9 & 10 at the Crossing of
Hwy. No. 401 and Relocated Etobicoke Creek
Town of Mississauga, County of Peel
Site No. 24-184, District #6 (Toronto)
W.O. 72-11168 -- W.P. 127-66-28

1.) INTRODUCTION:

The Foundations Office was requested to carry out a subsurface investigation at the crossing of Hwy. #401 and Etobicoke Creek (Bridges #8, #9 and #10) for the construction program of Hwy. #401 - Hwy. #403 complex.

The request was contained in a memo from the Regional Structural Office (Mr. G.C.E. Burkhardt, Regional Structural Planning Engineer) dated February 14, 1973. Subsequently, an investigation was carried out by this Office to determine the subsoil and groundwater conditions at the site.

The result of the investigation are presented in the report, together with our recommendations for the design of the structure foundations and stability considerations associated with approach fills.

2.) SITE DESCRIPTION AND ECOLOGY:

The area under investigation is located at the crossing of Hwy. #401 and Etobicoke Creek in the Town of Mississauga, County of Peel. Topographically, the area can best be described as a broad plain with the Etobicoke Creek cutting deep into the overburden. The resulting valley is approximately 400 feet wide with a depth of 40 feet. The land is primarily used for farming

purposes.

The site is located in the physiographic region known as the "Peel Plain". The characteristic deposit, in the vicinity of the area under investigation is composed of a cohesive glacial till whose thickness is quite variable. In the region, the Credit River, Oakville and Etobicoke Creeks have cut deep valleys into the overburden. There is, therefore, no large undrained depression, swamp or bog in this area, although in many of the interstream areas drainage is still imperfect.

The overburden is underlain by grey shale bedrock of the Meaford-Dundas formation, Ordovician Period.

3.) FIELD AND LABORATORY WORK:

3.1) Field Investigation:

Fifteen sampled boreholes, each accompanied by a dynamic cone penetration test, were put down at the structure site. The borings were advanced by means of a continuous flight auger, (commercially known as CME-45), adapted for soil sampling purposes.

Samples of the overburden were recovered by means of a standard 2-inch O.D. split-spoon sampler driven into the soil with an energy of 350 ft.-lb. per blow according to the specifications for the Standard Penetration Test. The same method was used to advance the dynamic cone penetration test. Bedrock was proven in all boring locations by obtaining AXT or BXL size rock core samples.

Groundwater level observations were carried out during the period of the investigation by reading the water levels in the open boreholes.

The locations and elevations of all the borings were surveyed in the field by personnel from District #6 (Toronto), they are shown on Drawing No. 72-11168A, together with inferred stratigraphic sections. All elevations in the report are referenced to a geodetic datum.

3.2) Laboratory Procedures:

All samples were subjected to careful visual examination in the field and subsequently in the laboratory. Following the examination, laboratory tests were carried out on selected representative samples to determine the engineering properties of the various soil types encountered; namely,

Atterberg Limits
Natural Moisture Contents
Grain-size Distributions.

4.) SUBSOIL CONDITIONS:

4.1) General:

The extent and composition of the overburden, within the area under investigation is uniform. The predominant stratum across the site is composed of a heterogeneous mixture of clayey silt, sand and gravel (Glacial till). The thickness of this cohesive glacial till stratum varies from 4 ft. to 30 ft. In the boreholes put down in the vicinity of the existing creek channel, a deposit composed of gravel with sand, trace of silt was found overlying the glacial till. This stratum varied in thickness from 5 ft. to 10 ft. In the boreholes put down through the approach embankments of the existing Etobicoke Creek Bridge, fill material up to 15 feet thick was found overlying the glacial till deposit.

The overburden is underlain by shale bedrock.

The stratigraphical sequence encountered in the borings is plotted on the Records of Borehole sheets. Stratigraphical sections have been inferred from this data and plotted on Drawings No. 72-11168B. The subsoil and bedrock encountered from the ground surface downward, is presented in the following subsections:

4.2) Fill Material - Clayey Silt with some Sand and Gravel:

Several boreholes were put down either through

the approach embankments to the existing Hwy. 401 - Etobicoke Creek Bridge or through the river bank. At these locations, fill material up to 15 feet (B.H. #16) in thickness was encountered. The fill material is composed of clayey silt with some sand and gravel, which is similar in composition to the underlying glacial till deposit.

Typical Grainsize distribution curves for the samples of the fill material, are plotted on Figure 1. Results of the Atterberg Limit testing, carried out on the samples recovered from this stratum, are plotted on the Record of Borehole sheets, as well as on the Plasticity Chart (Figure #4). They are also summarized below.

		<u>Range</u>	<u>(Average)</u>
Liquid Limit (W_L)	%	20 - 33	(26)
Plastic Limit (W_P)	%	15 - 21	(18)
Natural Moisture Content (W)	%	12 - 36	(21)

Standard Penetration testing was carried out within the fill material. The results gave 'N' values ranging from 6 to 16 blows per foot. Based on these values, it is estimated that moderate compaction effort has been provided for the fill material.

4.3) Surficial Granular Deposit:

This surficial granular deposit was encountered at the boreholes put down close to the existing Etobicoke Creek channel. It is composed of gravel, some sand and traces of silt. Organics and wood chips are present randomly within this deposit. According to available geological information the surficial material was recently laid down by the action of the river or creek and consequently this deposit is of alluvial nature.* The thickness of the surficial deposit varies between 5 feet at BH #6 and 10 feet at BH #1.

Typical grain size distribution curves for samples recovered within this deposit, are shown on Figure #2, contained in the Appendix of this report.

* "Pleistocene Geology and Groundwater Resources, Township of Etobicoke," By Watt, A.K., Geological Report 59; O.D.M.

Standard Penetration testing, carried out within this deposit, gave 'N' values ranging from 5 to 32 blows per foot, with the lower values being dominant. Based on these values, it is estimated that the relative density of this granular deposit is in general, loose to compact.

4.4) Heterogeneous mixture of clayey silt, sand and gravel (Glacial Till):

This is the predominant stratum across the site. It is found in most of boring locations directly below the fill material or the surficial granular deposit where they exist, or below a thin layer of topsoil (maximum 1.5 feet) elsewhere. It is a heterogeneous mixture of clayey silt, sand and gravel. The thickness of this glacial till deposit varies between 4 feet (B.H. #10) and 29 feet (B.H. #8). Fragments of shale and limestone are present in the lower portion of this deposit. This zone is found to be as thick as 22 feet (B.H. #8).

Grain-size distribution curves, for the samples of this stratum, are plotted on Figure 3 of the Appendix.

Results of Atterberg Limit Tests, performed on samples recovered in this stratum were plotted on the Record of Borehole sheets, as well as on the Plasticity chart, Figure 2. They are also tabulated below:

			Range	(Average)
Liquid Limit	(W _L)	%	18 - 32	(25)
Plastic Limit	(W _P)	%	12 - 21	(17)
Natural Moisture Content	(W)	%	7 - 19	(13)

Standard Penetration Testing was carried out within this cohesive stratum and the results were plotted on the Borelog sheets. The 'N' value varies from 10 blows/foot to 100 blows per three inches. It is estimated that the consistency of this cohesive material generally ranges from stiff to hard.

4.5) Bedrock:

Bedrock was proven in all of the boreholes by obtaining 5 to 15 feet of AXT or BXL size of core samples. The core samples were inspected carefully by Mr. K.W. Ingham, Geologist.

A detailed description of the bedrock was presented in Mr. Ingham's memo to this office dated May 15, 1973, a copy of which is appended to this report.

The bedrock intersected in the boreholes put down at this site is typical of the Dundas formation. It is primarily a thin to medium bedded dark grey shale with occasional layers of limestone and silty limestone generally ranging in thickness from 1 to 4 inches. The upper 1 to 10 feet of the bedrock is, in general, in a weathered condition.

The bedrock surface was found to vary between elevation 459 (B.H. #4) and 466 (B.H. #16).

5.) GROUNDWATER CONDITIONS:

Groundwater level observations were carried out, during the period of the investigation, by recording the water levels in the open boreholes. These observations, which are recorded on the Borelog sheets, are also summarized on Drawing No. 72-11168A. These observations indicate that the groundwater level ranges between elevations 469 and 490, which corresponds to a level at the existing ground surface to 5 feet below ground surface.

6.) DISCUSSIONS AND RECOMMENDATIONS:

6.1) General:

In conjunction with the construction program of Hwy. 401 and Hwy. 403, the existing Hwy. 401 from Hwy. 27 westerly to Hwy. 10 is to be developed as a 16-lane basic core-collector. A number of interchanges are proposed for this portion of Hwy. 401, specifically:

- i) Hwy. 401/Hwy. 403/Hwy 410 Complex
- ii) Hwy. 401/Dixie Road Interchange
- iii) Hwy. 401/Airport Entrance/ Etobicoke Creek Complex
- iv) Hwy. 401/First Line Interchange

This report will deal with the proposed Bridges -

No. 8 (Hwy. 401, E.B. Collector over relocated Etobicoke Creek), No. 9 (Hwy. 401 core over relocated Etobicoke Creek) and No. 10 (Hwy. 401 W.B. collector over relocated Etobicoke Creek) in the Hwy. 401/Airport Entrance/Etobicoke Creek complex. These three structures are to have 3 spans (83' - 90' - 83'). The profile grade of Hwy. 401 in the vicinity of the proposed creek crossing will vary from elevations 509 to 511. The relocated creek bed will be at elevation 466. The existing creek valley floor is at elevation 472. Based on these values, approach fills of 38 feet and 45 feet high in the transverse and longitudinal directions respectively, will be required for the proposed structures.

The predominant stratum across the site is composed of a 5 to 29 foot thick cohesive glacial till which is underlain by shale bedrock. At some locations the glacial till is covered by fill material or alluvial granular deposit.

In the subsections to follow the foundation support for the structures and the stability considerations associated with the approach fills will be discussed.

6.2) STRUCTURE FOUNDATIONS:

6.2.1) Piers:

At the pier locations, a loose to compact alluvial deposit was found overlying a thin layer of glacial till followed by shale bedrock at a depth ranging from 5 to 15 feet below the ground surface. It is recommended that the proposed piers be supported on spread footings founded on or within the weathered shale bedrock. The appropriate founding elevations for the respective footings are given in the following table.

Structure No.		Founding Elevation	
		West Pier	East Pier
8	North End	460 (B.H. #6)	460 (B.H. #7)
	South End	461 (B.H. #2)	465 (B.H. #3)
9	North End	460 (B.H. #14)	461 (B.H. #15)
	Middle	460 (B.H. #10)	462 (B.H. #11)
	South End	460 (B.H. #6)	460 (B.H. #7)
10		460 (B.H. #14)	461 (B.H. #15)

Footings founded on weathered shale bedrock may be designed using an allowable pressure of 7 t.s.f.

Alternatively the footings for the northern portion of east pier of Bridge #9 and the east pier of Bridge #10 may be founded within the hard glacial till stratum at or below elevation 465, using an allowable bearing pressure of up to 5 t.s.f.

The excavation for the pier footings will be carried out through the surficial granular deposit and the glacial till to the weathered shale bedrock. The prevailing groundwater level, as recorded during the period of field investigation is up to 10 feet above the bottom of the excavation. The alluvial granular deposit is pervious, therefore, excess groundwater seepage into the excavations is expected. However, it is believed that the seepage into the excavations can be handled by pumping from sumps, provided the creek is temporarily diverted during the construction period. To ensure the stability of the existing river bank during construction, it may be necessary to carry out the excavations for the pier foundations within a sheeted cofferdam. This is particularly true at the east pier location.

The settlement of the footings will be negligible in magnitude, provided that measures are exercised to prevent the weathered shale and/or glacial till from being softened by groundwater seepage or uncontrolled surface runoff. It may be advantageous to protect the weathered shale and/or till at the footing founding level, by covering it with a lean concrete working slab immediately after the completion of the excavation.

6.2.2) Abutments:

The abutments may be perched within the approach fills. The footings for these abutments can be supported on end-bearing piles driven to practical refusal within the hard glacial till stratum or driven to the bedrock surface. For estimating purposes, the pile tip elevations at various locations are tabulated below.

Structure No.		West Abutment		East Abutment	
		Estimated Pile tip elevation	Bearing Stratum	Estimated Pile tip elevation	Bearing Stratum
8	North end	458 (B.H. #5)	Bedrock	475 (B.H. #8)	Glacial till
	South end	462 (B.H. #1)	"	470 (B.H. #4)	" "
9	North end	460 (B.H. #13)	Bedrock	465 (B.H. #16)	Bedrock
	Middle	458 (B.H. #9)	"	- -	- -
	South end	458 (B.H. #5)	"	475 (B.H. #8)	Glacial till
10		460 (B.H. #13)	Bedrock	465 (B.H. #16)	Bedrock

The design load for the piles will depend on the particular pile section chosen, e.g. 12 B.P. 74 steel H-piles may be designed for a safe load of 95 tons/pile. For those piles terminated within the glacial till stratum, pile driving during construction should be controlled by the use of Hiley formula as per current M.T.C. Standards.

In the area piles are to be driven, bouldery or rock fill should not be used.

6.3) APPROACH EMBANKMENTS:

6.3.1) Stability Considerations:

The glacial till deposit is competent. Therefore, no deepseated failures are anticipated provided that the fill material itself will be stable. Stability analyses of the fill material itself have been carried out both in terms of total stresses ($\phi = 0$) as well as effective stresses with the following assumptions:

Width of embankment	-	400 feet
Maximum height	-	45 feet

Fill Material:

Type of embankment fill - Shale or glacial till.

Bulk density - 140 p.c.f.

Apparent cohesion in
terms of Total Stresses

(C_U) - 1,200 p.s.f.

Apparent cohesion inter- -
cept in Terms of Effective

stresses (C') - 0 p.s.f.

Apparent angle of shearing
resistance in Terms of

Effective Stresses (ϕ') - 30 degrees

Average pore pressure

Ratio (R_U) * - 0.25

As a result of the stability analysis of the approach embankment the following conclusions have been drawn:

- 1) Fill up to 35 feet in height will be stable with standard 2:1 slopes. Fills from 35 to 45 feet high will be stable with 3:1 slopes (or standard 2:1 slopes with mid height berm of sufficient length so that the overall slope is not steeper than 3:1).
- 2) Prior to placing any fill in this area all topsoil should be stripped from within the plan limits of the embankments between station 98 + 00 and station 108 + 00 (Hwy. 401). It is suggested that the Central Region Material Section should provide necessary information with regard to the depth of topsoil in this area.
- 3) The fill should be properly keyed to the existing river banks in accordance with current M.T.C Standard No. DD-414.

* "Stability Coefficient for earth slopes" by A.W. Bishop and N. Morgenstern. 1960 Geotechnique p.p. 129-150.

6.3.2) Settlement Considerations:

The glacial till is competent, therefore no long term settlement is anticipated due to the induced loads of the approach fills. However, compacted fill material may settle due to its own weight. It is extremely difficult to estimate the magnitude and time rate of settlement of compacted material, because the magnitude depends on the compactive efforts and the control of moisture content during the placement of the fill. As a rough estimate, it can be assumed that the fills up to 25 feet in height may settle as much as $\frac{1}{2}$ per cent of the total height, and up to 1% for fills higher than 25 feet. It is believed that the majority portion of the settlement will take place in a relatively short period of time. In order to minimize post construction maintenance problems, fills should be constructed and left in place for as long a period as possible, prior to paving operations.

6.3.3) Other Considerations:

If the embankments are constructed and left in place for a long period of time prior to the paving operations, it will be necessary to protect the subgrade and the slopes. This can be accomplished by constructing an over-sized embankment and carrying out necessary stripping prior to paving operations and the sodding of the slopes.

At the interface between the existing river banks and the embankment fills, it may be necessary to provide a drainage system with the objective of preventing the perched water within the natural overburden from entering the fill material, which may lead to the softening of the fill material (shale), and buildup of excess pore pressure within the fill material, hence endangering the stability of the embankments.

The aforementioned comments were discussed with Mr. R. Adachi of Foundation Engineering Corporation of Canada (FENCO). It was agreed that the pertinent details will be

incorporated in the design drawings and also provisions will be made during construction for further drainage requirement if needed.

7. MISCELLANEOUS:

The field work was carried out between March 1 and March 21, 1973, under the supervision of Mr. V. Korlu, Project Foundations Engineer.

Drilling equipment was owned and operated by Master Soil Investigation Co., Ltd., Toronto.

This report was prepared by Mr. C. S. Poon, Project Foundations Engineer, and was reviewed by Mr. M. Devata, Supervising Foundations Engineer.

C. S. Poon

C. S. Poon, P. Eng.

M. Devata

M. Devata, P. Eng.



CSP/ks
May 25, 1973.

APPENDIX 1

MEMORANDUM

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

FROM: K. W. Ingham

ATTENTION:

DATE: May 15, 1973

OUR FILE REF.

IN REPLY TO

SUBJECT: Foundation Investigation 72-11168;
Hwy. 401 and Hwy. 410 Interchange

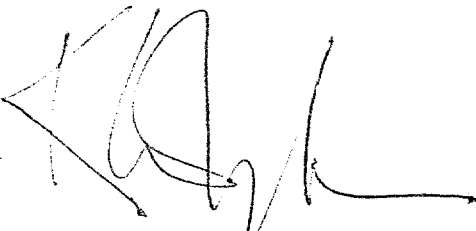
The bedrock intersected in 15 boreholes drilled at this site was found to be typical of the Dundas formation, which is in itself the characteristic bedrock in the general area. It is primarily a thin to medium bedded dark grey shale with occasional layers of limestone and silty limestone generally ranging in thickness from 0.1 to 0.3 ft. and rarely exceeding 0.5 ft.

The formation is generally weathered in the upper layers and frequently transitional with a thin overlying till layer containing frequent shale and limestone fragments. Occasional shale layers near the top of the bedrock may be weathered to a clay-like consistency but normally shale in the badly weathered zone is soft, platy bedded and fractured. The badly weathered material grades through a zone of moderate weathering into the fresh bedrock.

The bedrock elevation for each hole is given below together with the depth of weathered rock.

<u>Hole No.</u>	<u>Bedrock Elevation</u>	<u>Depth of Weathering</u>
1	462.3	4.4
2	455.6	0.4
3	464.9	7.8
4	459.2	5.0
5	458.1	0.6
6	453.8	0.5

<u>Hole No.</u>	<u>Bedrock Elevation</u>	<u>Depth of Weathering</u>
7	455.0	0.8
8	459.2	4.0
9	458.3	3.7
10	458.6	4.9
11	457.8	4.3
13	459.2	3.0
14	454.0	-
15	461.4	-
16	465.6	11.0



K. W. Ingham,
Geologist.

KWI:mv

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO 1

JOB: 72-11168

LOCATION Co-ords. 861,763 N; 967,298 E.

ORIGINATED BY VK

W.P. 127-66-28

BORING DATE March 1, 1973

COMPILED BY JB

DATUM Geodetic

BOREHOLE TYPE Auger, Cone Test and BXL Rock Core

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 $w_p \quad w \quad w_L$	BULK DENSITY γ P.C.F.	REMARKS
ELEV. / DEPTH	DESCRIPTION	STRAT. PLT	NUMBER	TYPE	BLOWS/FOOT					
472.3	Ground Level									
0.0	Gravel, with sand, traces of clayey silt		1	SS	5	470				
464.8	Loose to Compact		2	SS	11					
462.3	with fragments of shale		3	SS	100%					
10.0			4	BXL	47%	460				
457.9	weathered		5	BXL	99%					
14.4	sound		6	BXL	100%					
450.3	Shale Bedrock									
22.0	End of Borehole									

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO 2

JOB 72-11168

LOCATION Co-ords. 861,818 N; 967,368 E.

ORIGINATED BY VK

W.P. 127-66-28

BORING DATE March 2, 1973

COMPILED BY JB

DATUM Geodetic

BOREHOLE TYPE Auger, Cone Test and BXL Rock Core

CHECKED BY *SKL*

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	BULK DENSITY γ	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT					
470.6	Ground Level									
0.0	Gravel, with sand & traces of silt.	00000	1	SS	21	470				
461.6	Compact	00000	2	SS	16					
9.0			3	SS	1602	460				
455.6	Weathered		4	AS						
15.0	Sound		5	RC						
	Shale Bedrock			BXL	100%	450				
445.6			6	BXL	100%					
25.0	End of Borehole					440				

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO 3

JOB 72-11168

LOCATION Co-ords. 861,875 N; 967,1113 E.

ORIGINATED BY VK

W.P. 127-66-28

BORING DATE March 7, 1973

COMPILED BY JB

DATUM Geodetic

BOREHOLE TYPE Auger, Cone Test and BXL Rock Core

 CHECKED BY *CB*

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			PLASTIC LIMIT — w_p						
							20	40	60	80	100	WATER CONTENT — w				
							SHEAR STRENGTH P.S.F.			WATER CONTENT %						

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO 4

JOB 72-11168

LOCATION Co-ords. 861,928 N; 967,515 E.

ORIGINATED BY VK

W.P. 127-66-28

BORING DATE March 2, 1973

COMPILED BY JB

DATUM Geodetic

BOREHOLE TYPE Auger, Cone Test and BXL Rock Core

CHECKED BY *SK*

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		
493.2	Ground Level															
0.0	Clayey silt, trace of sand & gravel & organics (Fill Material) Stiff		1	SS	8	490										488.2
488.2																5 31 53 11
5.0	Het. mix. of clayey silt, sand & gravel (Glacial Till)		2	SS	27											
			3	SS	77											
			4	SS	79	480										15 37 43 5
	Very Stiff to Hard		5	SS	100 1/2"											
475.2			6	SS	100 5/8"											
18.0			7	SS	100 7/8"	470										
	with fragments of shale & limestone		8	SS	100 3/4"											
			9	SS	100 7/8"											
459.2						460										
34.0			10	BXL	25%											
454.2	weathered															
39.0	sound															
450.2	Shale Bedrock		11	BXL	77%											
43.0	End of Borehole					450										

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO 5

JOB 72-11168 LOCATION Co-ords. 861,822 N; 967,209 E. ORIGINATED BY VK
 W.P. 127-66-28 BORING DATE March 2, 1973 COMPILED BY JB
 DATUM Geodetic BOREHOLE TYPE Auger, Cone Test and BXL Rock Core CHECKED BY JK

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	
472.6	Ground Level														
0.0	Topsoil														
1.5	Het. mix. of clayey silt, sand & gravel (Glacial Till)		1	SS	21	470									
			2	SS	21										
			3	SS	55										
460.6	Stiff to Hard		4	SS	100/6"	460									
12.0	Weathered Sound														
457.5															
15.1	Shale Bedrock		5	BXL	96%										
453.1															
19.5	End of Borehole					450									

JOB 72-11168

LOCATION Co-ords. 861,885 N; 967,300 E.

ORIGINATED BY VK

W.P. 127-66-28

BORING DATE March 7, 1973

COMPILED BY JB

DATUM Geodetic

BOREHOLE TYPE Auger, Cone Test and BXL Rock Core

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. PLOT	NUMBER	TYPE	BLOWS/FOOT		20	40	60	80	100	W_P	W	W_L		
468.8	Ground Level															
0.0	Sand with gravel and some clay.															
463.8	Brown Compact		1	SS	14											
5.0	Het. mix. of clayey sil. sand & grav. (Glac. Till)		2	SS	68											
459.8	Hard		3	SS	100.5	460										
9.0	with fragments of shale		4	AS	-											
453.8	weathered sound		5	RC	100%	450										
445.8	Shale Bedrock		6	BXL	100%											
23.0	End of Borehole															

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO 7

JOB 72-11168

LOCATION Co-ords. 861,932 N; 967,359 E.

ORIGINATED BY VK

W.P. 127-66-28

BORING DATE March 9, 1973

COMPILED BY JB

DATUM Geodetic

BOREHOLE TYPE Auger, Cone Test and BXL Rock Core

CHECKED BY

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT	LIQUID LIMIT w_L PLASTIC LIMIT w_p WATER CONTENT w	SHEAR STRENGTH P.S.F. ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE	WATER CONTENT % 10 20 30	BULK DENSITY γ P.C.F. GR. SA. SI. CL.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FOOT							
470.0	Ground Level											
0.0	Silty sand with some gravel.											
465.0	Brown Loose		1	SS	6							
5.0	Het. mix. of clayey silty sand and gravel.		2	SS	17							
460.0	(Glac. Till) Very Stiff		3	SS	100	460						
10.0			4	AS	-							
454.0	Weathered Sound		5	RG BXL	74%	450						
16.0			6	BXL	96%							
446.1	Shale Bedrock											
23.9	End of Borehole					440						

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO 8

JOB 72-11168

LOCATION Co-ords. 861,990 N; 967,442 E.

ORIGINATED BY VK

W.P. 127-66-28

BORING DATE March 16, 1973

COMPILED BY JB

DATUM Geodetic

BOREHOLE TYPE Auger, Cone Test and AXT Rock Core

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. PLOT	NUMBER	TYPE	BLOWS/FOOT		20	40	60	80	100	W _P	W	W _L	
494.2	Ground Level														
0.0	Brown clayey silt, some sand & grav. & trace of organics. Fill mat.		1	SS	10	490									▽ 490.2
489.2			2	SS	14										7 29 44 20
5.0	Het. mix. of clayey silt with sand & gravel (Glacial Till)		3	SS	100/5"										
481.7	Hard		4	SS	100/2"										
12.5			5	SS	100/5"	480									
	with fragments of shale		6	SS	100/5"										
			7	SS	160/3"										
			8	SS	100/5"	470									
			9	SS	100/3"										
459.7						460									
34.5	weathered		10	RC AXT	17										
455.2															
39.0	sound		11	AXT	93										
449.6	Shale Bedrock		12	AXT	90	450									
44.6	End of Borehole														
						440									

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO 9

JOB 72-11168

LOCATION Co-ords. 861,867 N; 967,142 E.

ORIGINATED BY VK

W.P. 127-66-28

BORING DATE March 5, 1973

COMPILED BY JB

DATUM Geodetic

BOREHOLE TYPE Auger, Cone Test and BX Rock Core

CHECKED BY JK

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		
473.3	Ground Level															
0.0	Topsoil															
1.5	Het. mix. of clayey silt, sand & gravel (Glacial Till) Stiff to Hard		1	SS	10	470										470.3
			2	SS	36											
			3	SS	71											
458.3			4	SS	100.5	460										
15.0			5	RC BX	88%											
454.6	weathered															
18.7	sound															
449.5	Shale Bedrock		6	BX	99%	450										
23.8	End of Borehole															
						440										

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO 10

JOB 72-11168

LOCATION Co-ords. 861,920 N; 967,215 E

ORIGINATED BY VK

W.P. 127-66-28

BORING DATE March 8, 1973

COMPILED BY JB

DATUM Geodetic

BOREHOLE TYPE Auger, Cone Test and BX Rock Core

CHECKED BY

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT —WL			BULK DENSITY	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLT	NUMBER	TYPE	BLOWS/FOOT		BLOWS / FOOT	20	40	60	80	100	PLASTIC LIMIT —WP	WATER CONTENT —W		
169.0	Ground Level															
0.0	Gravel with some sand and clay. Brown Compact to Dense		1	SS	32											
464.0			2	SS	28											
5.0	Het. mix. of clayey si. with sand & gravel. (Glec. Till) Very Stiff		3	SS	10-12	460										
460.0			4	RC												
9.0	weathered			EX	12%											
454.0	sound															
15.0	shale bedrock		5	EX	100%	450										
115.5			6	EX	100%											
23.5	End of Borehole					440										

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO 11

JOB 72-11168

LOCATION Co-ords. 861,976 N; 967,291 E.

ORIGINATED BY VK

W.P. 127-66-28

BORING DATE March 9, 1973

COMPILED BY JB

DATUM Geodetic

BOREHOLE TYPE Auger, Cone Test and BXL Rock Core

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 % 10 20 30	BULK DENSITY γ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLT	NUMBER	TYPE	BLOWS/FOOT					
472.3	Ground Level									
0.0	Clayey silt, sand and grav. & trace of organics. (Fill mat.) Firm		1	SS	4	470				
467.3			2	SS	35					
5.0	Het. mix. of clayey silt, sand & gravel. (Glec. Till) Hard		3	SS	100/20"					
462.3			4	AS	-	460				
10.0			5	BXL	50%					
453.5	weathered		6	BXL	34%					
18.8	sound									
448.3	Shale Bedrock		7	BXL	100%	450				
24.0	End of Borehole					440				

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO 13

JOB 72-11168

LOCATION Co-ords. 861,914 N; 967,078 E.

ORIGINATED BY VK

W.P. 127-66-30

BORING DATE March 6, 1973

COMPILED BY JE

DATUM Geodetic

BOREHOLE TYPE Auger, Cone Test and BXL Rock Core

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. PLOT	NUMBER	TYPE	BLOWS/FOOT		20	40	60	80			100	w_p ——— w ——— w_L	WATER CONTENT % 10 20 30
474.2	Ground Level														
0.0	Clayey silt, sand & few grav. & trace of organics. (Fill Mater.)		1	SS	13										471.2
469.2	Stiff		2	SS	5										
5.0	Het. mix. of clayey silt, sand & gravel. (Glacial Till)		3	SS	78										
462.2	Firm to Very Stiff		4	SS	100.5"										
12.0															
459.2	weathered					160									
15.0	sound														
454.2	Shale Bedrock		5	RC BXL	90%										
20.0	End of Borehole					150									

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO 14

JOB 72-11168

LOCATION Co-ords. 861,972 N; 967,158 E.

ORIGINATED BY VK

W.P. 127-66-30

BORING DATE March 13, 1973

COMPILED BY JB

DATUM Geodetic

BOREHOLE TYPE Auger, Cone Test and BXL Rock Core

CHECKED BY C/L

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				PLASTIC LIMIT ——— w_p				
							20	40	60	80	100	WATER CONTENT ——— w			
SHEAR STRENGTH P.S.F.							w_p ——— w ——— w_L			WATER CONTENT %			γ	P.C.F.	GR. S.A. S.I. CL.
○ UNCONFINED + FIELD VANE															
● QUICK TRIAXIAL x LAB VANE															
469.0	Ground Level														
0.0	Gravel with sand & some clayey silt.	○○○○○	1	SS	27										72 17 (11)
459.5	Compact to Very Dense	○○○○○	2	SS	100.5"	460									
9.5		○○○○○	3	SS	100.2"										
454.0	weathered	○○○○○	4	AS	-										
15.0	sound	○○○○○		RC											
449.0	Shale Bedrock	○○○○○	5	BXL	100.8"	450									
20.0	End of Borehole					440									

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO 15

JOB 72-11168

LOCATION Co-ords. 862,015 N; 967,228 E.

ORIGINATED BY VK

W.P. 127-66-28

BORING DATE March 14, 1973

COMPILED BY JB

DATUM Geodetic

BOREHOLE TYPE Auger, Cone Test and BXL Rock Core

CHECKED BY *SK*

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT — w_L			BULK DENSITY	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PILOT	NUMBER	TYPE	BLOWS/FOOT		BLOWS / FOOT					PLASTIC LIMIT — w_p				
							20	40	60	80	100	WATER CONTENT — w				
												w_p	w	w_L		
SHEAR STRENGTH P.S.F.							+ FIELD VANE			WATER CONTENT %			γ			
○ UNCONFINED × LAB VANE										10 20 30			P.C.F.	GR. SA. SI. CL.		
476.4	Ground Level															
0.0	Brown clayey silt with some sand & few gravel.		1	SS	16	470									473.4	
468.4	Fill Material Firm to Very Stiff		2	SS	7											
8.0	Het. mix. of clayey silt, sand & gravel. (Glacial Till)		3	SS	50											
461.4	Grey Hard					460									24 19 41 16	
15.0	weathered		4	RC BXL	30%											
459.0	sound															
16.4	Shale Bedrock		5	BXL	60%											
448.4			6	BXL	98%	450										
28.0	End of Borehole					440										

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO 16

JOB 72-11168

LOCATION Co-ords. 862,055 N; 967,290 E.

ORIGINATED BY VK

W.P. 127-66-28

BORING DATE March 21, 1973

COMPILED BY JB

DATUM Geodetic

BOREHOLE TYPE Auger, Cone Test and HXL Rock Core

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	BULK DENSITY γ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER TYPE					
481.1	Ground Level							
0.0	Fill Material		1 SS 14	480			17 55 21 7 6 29 46 19	
	Clayey silt with some sand & gravel and traces of organics.		2 SS 9	470				
			3 SS 4					
			4 SS 6					
465.6	Firm to Stiff		5 SS 100%					
15.5	weathered		6 RC 21%	460				
455.1	sound		7 BXL 45%					
26.0	Shale Bedrock		8 BXL 100%	450				
449.8	End of Borehole							
31.3								

UNIFIED SOIL CLASSIFICATION SYSTEM

CLAY & SILT

SAND

GRAVEL

Fine

Medium

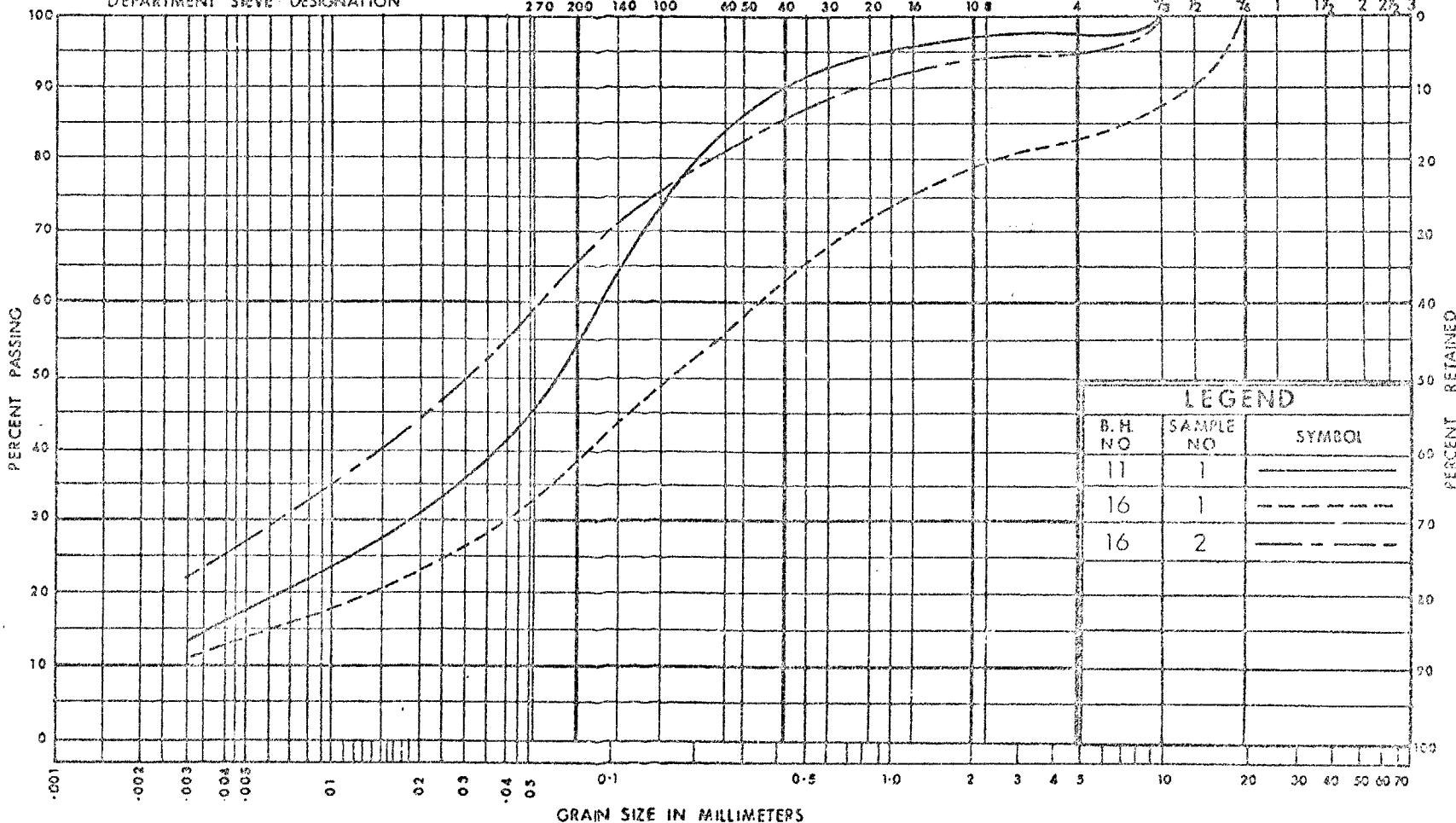
Coarse

Fine

Coarse

DEPARTMENT SIEVE DESIGNATION

270 200 140 100 60 50 40 30 20 16 10 8 4 3/8 1/2 3/4 1 1 1/2 2 2 1/2 3



DEPARTMENT
OF
TRANSPORTATION AND COMMUNICATIONS



DESIGN SERVICES
BRANCH

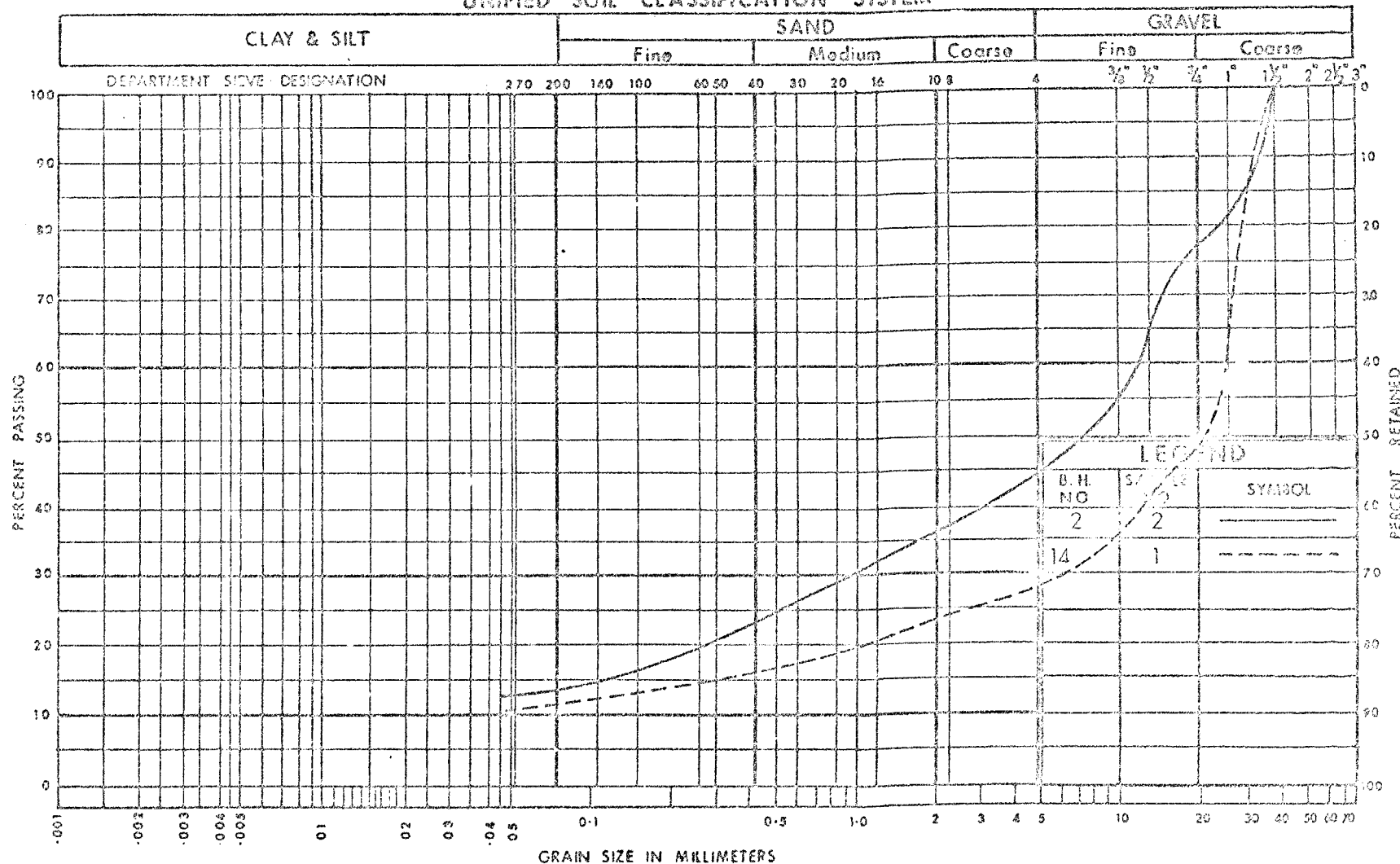
GRAIN SIZE DISTRIBUTION
FILL MATERIAL
CLAYEY SILT, SOME SAND & GRAVEL

W.P. No. 127-66-28

JOB No. 72-11168

FIG. 1

UNIFIED SOIL CLASSIFICATION SYSTEM



DEPARTMENT
OF
TRANSPORTATION AND COMMUNICATIONS

DESIGN SERVICES
BRANCH

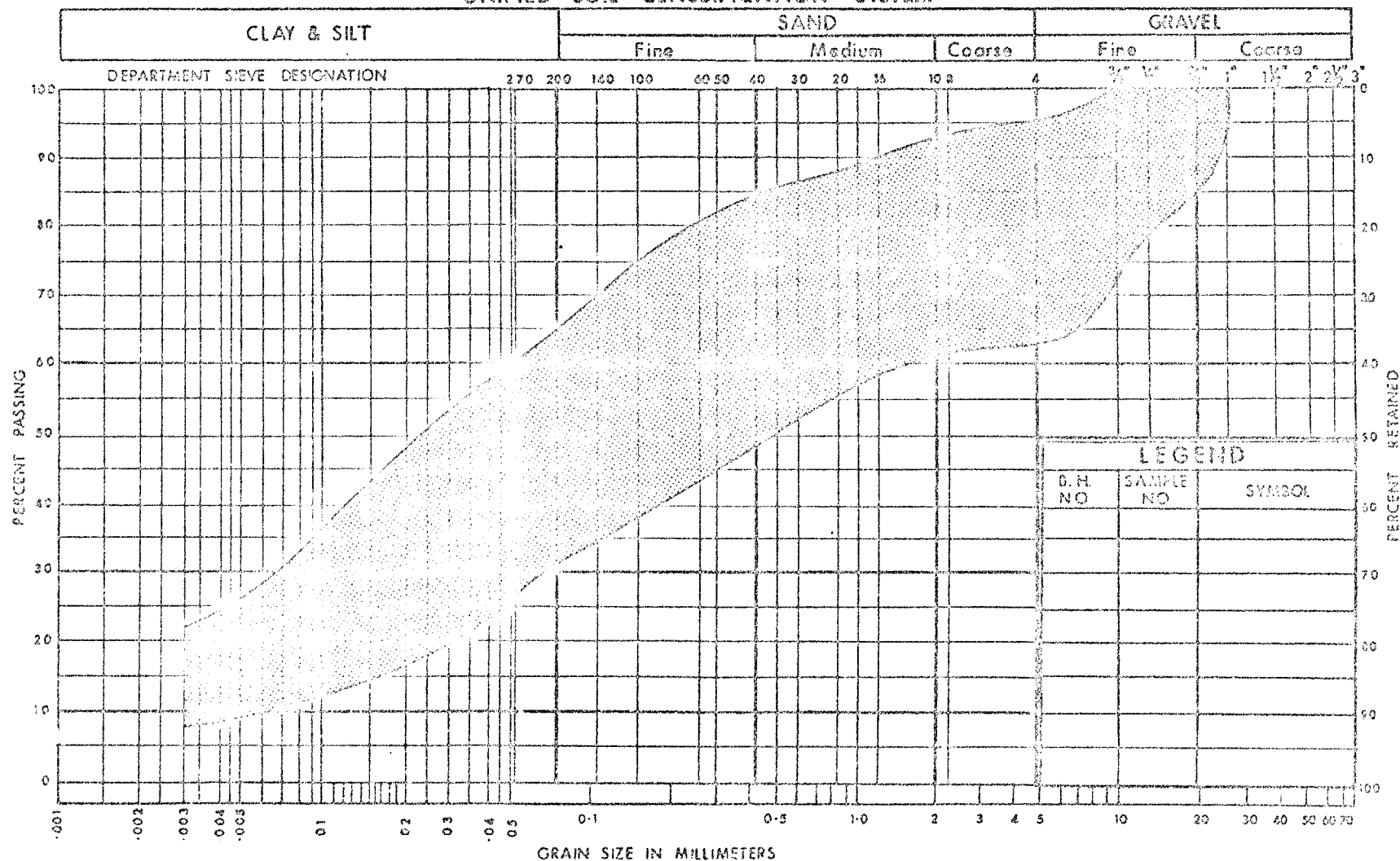
GRAIN SIZE DISTRIBUTION
SURFICIAL GRANULAR DEPOSIT
GRAVEL - WITH SAND & TRACES OF SILT

W.P. No. 127 - 66 - 28

Q.C. No. 72 - 11168

FIG. 2

UNIFIED SOIL CLASSIFICATION SYSTEM



DEPARTMENT
OF
TRANSPORTATION AND COMMUNICATIONS

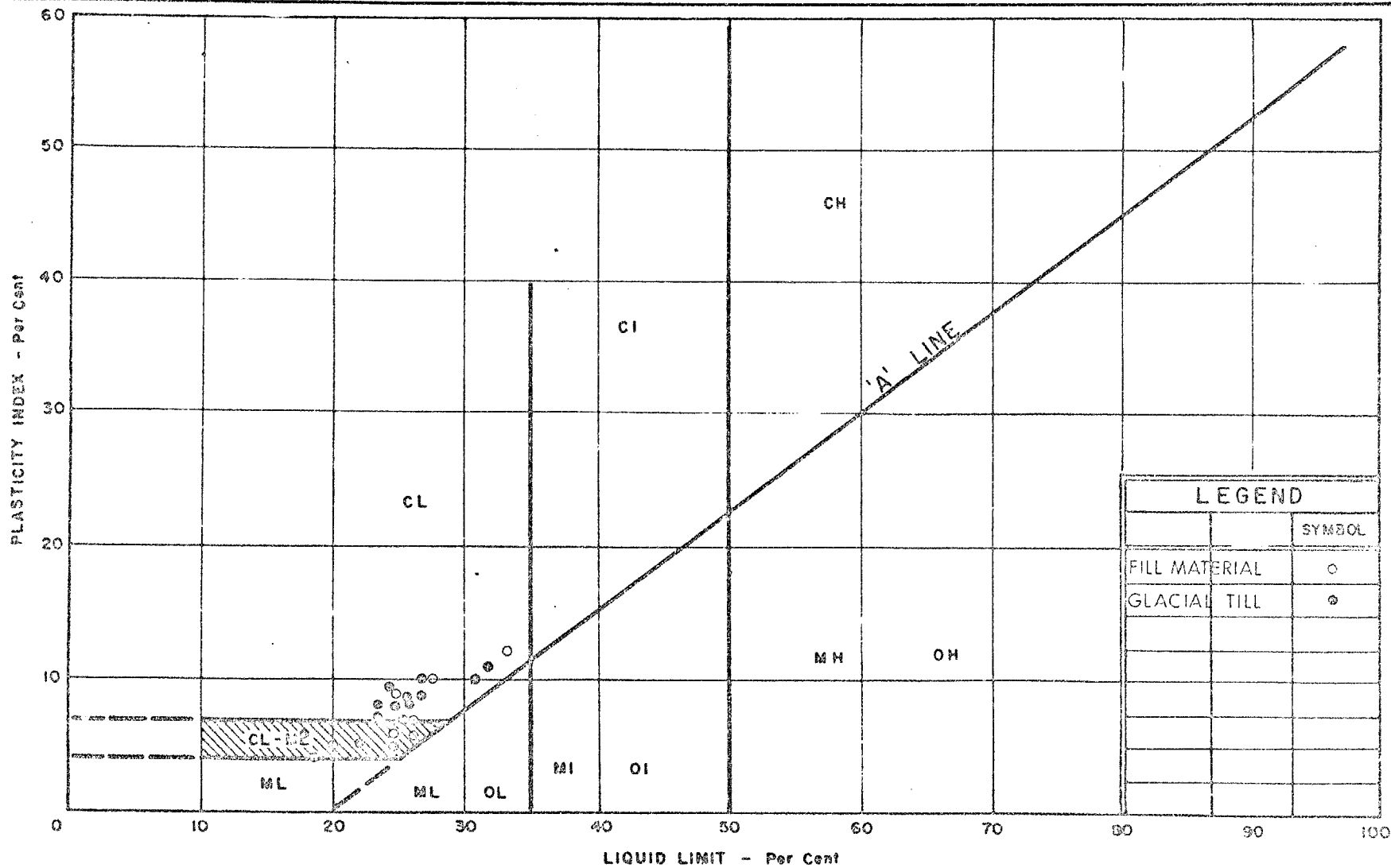
DESIGN SERVICES
BRANCH

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

REP. NO. 127 - 66 - 28

DOT NO. 72 - 11168

FIG. 3



DEPARTMENT OF HIGHWAYS
MATERIALS and
TESTING
DIVISION

PLASTICITY CHART

FILL MATERIAL - CLAYEY SILT, SOME SAND & GRAVEL

GLACIAL TILL - HET. MIX. OF CLAYEY SILT, SOME SAND & GRAV.

YIP No. 127 - 66 - 28

JOB No. 72 - 11168

FIG. 4

ABBREVIATIONS & SYMBOLS USED IN THIS REPORTPENETRATION RESISTANCE

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

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

DESCRIPTION OF SOIL

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

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

TERMS TO BE USED IN DESCRIBING SOILS:-

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

TYPE OF SAMPLE

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

P.H. SAMPLE ADVANCED HYDRAULICALLY

P.M. SAMPLE ADVANCED MANUALLY

SOIL TESTS

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

ABBREVIATIONS & SYMBOLS USED IN THIS REPORT

SOIL PROPERTIES

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

GENERAL

π	$= 3.1416$
e	BASE OF NATURAL LOGARITHMS 2.7183
$\log_e a$ OR $\ln a$	NATURAL LOGARITHM OF a
$\log_{10} a$ OR $\log a$	LOGARITHM OF a TO BASE 10
t	TIME
g	ACCELERATION DUE TO GRAVITY
V	VOLUME
W	WEIGHT
M	MOMENT
F	FACTOR OF SAFETY

STRESS AND STRAIN

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

EARTH PRESSURE

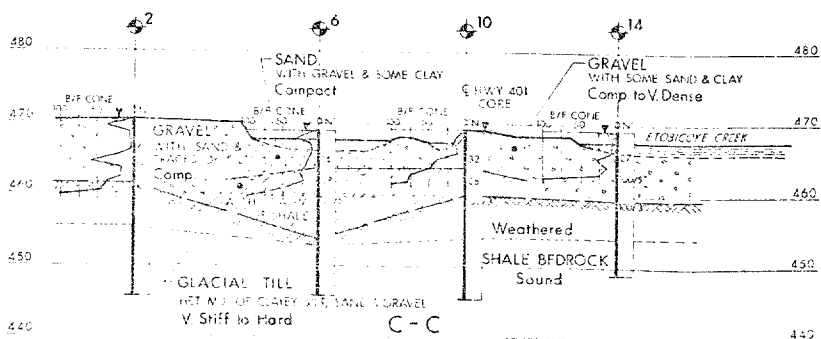
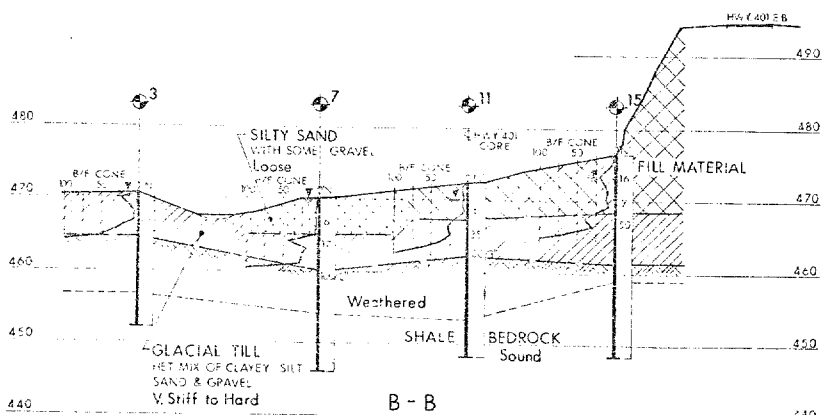
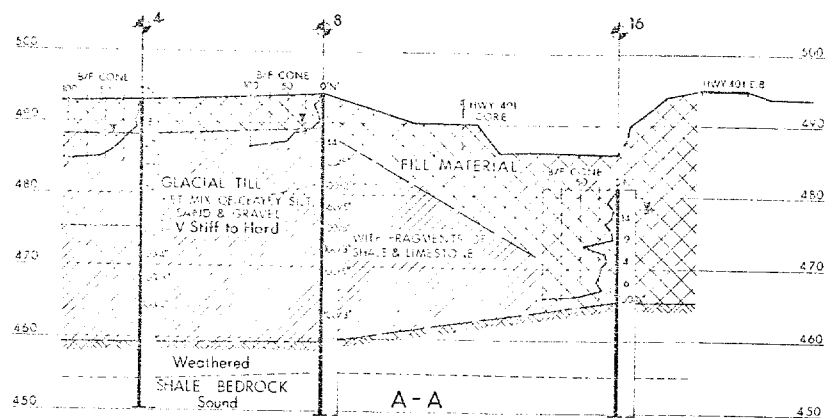
d	DISTANCE FROM TOP OF WALL TO POINT OF APPLICATION OF PRESSURE
δ	ANGLE OF WALL FRICTION
K	DIMENSIONLESS COEFFICIENT TO BE USED WITH VARIOUS SUFFIXES IN EXPRESSIONS REFERRING TO NORMAL STRESS ON WALLS
K_0	COEFFICIENT OF EARTH PRESSURE AT REST

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

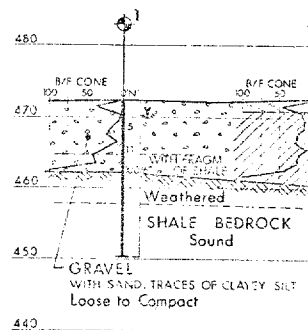
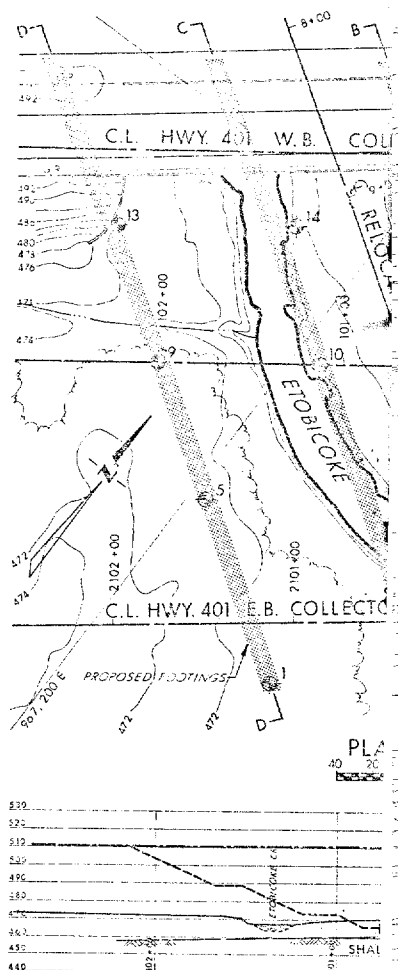
SLOPES

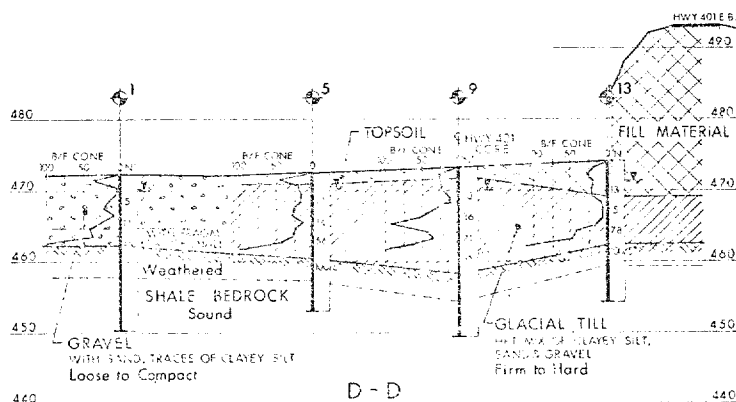
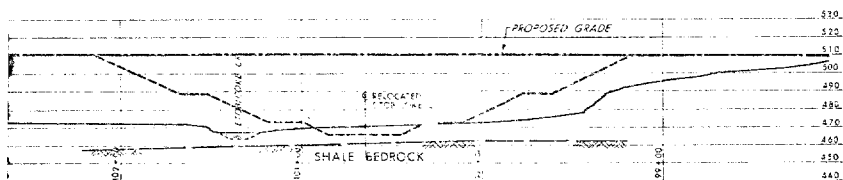
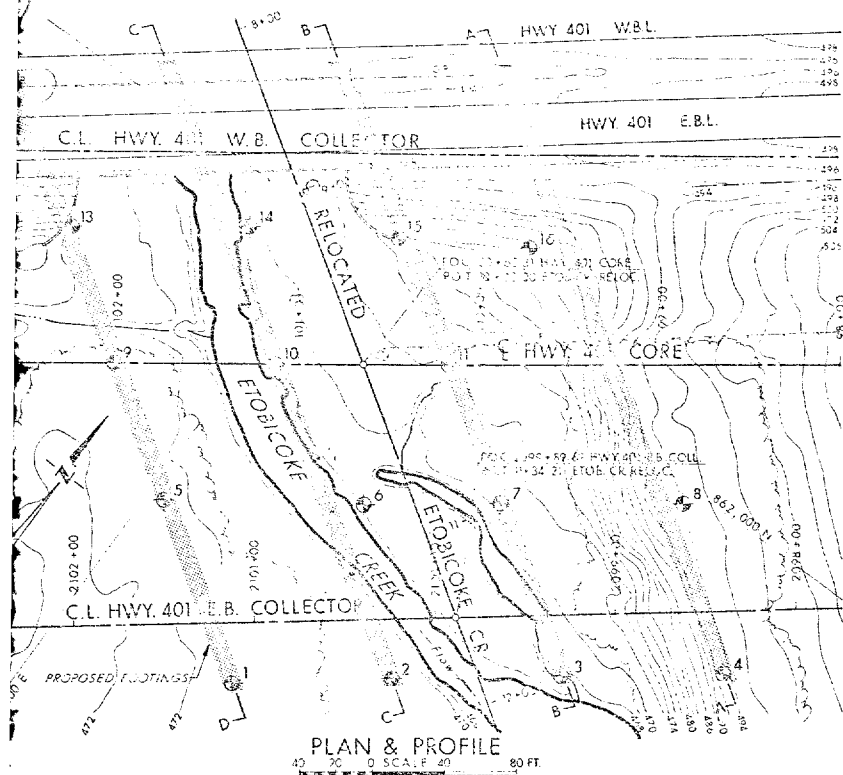
H	VERTICAL HEIGHT OF SLOPE
D	DEPTH BELOW TOE OF SLOPE TO HARD STRATUM
β	ANGLE OF SLOPE TO HORIZONTAL



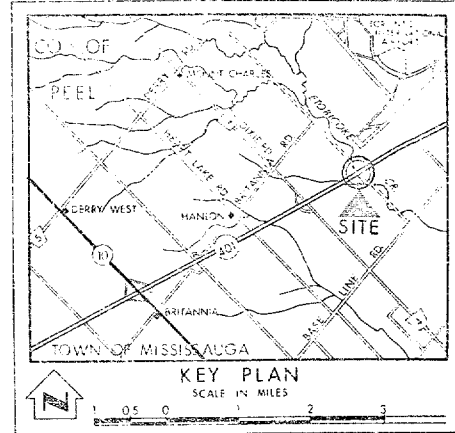
SECTIONS

HOR Z: 1" = 20' VERT: 1" = 20'





KFF No. Pen 881-05.8
 PENN. 3043-1471



LEGEND			
	Bore Hole		
	Cone Penetration Test		
	Bore Hole & Cone Test		
	Water Levels established at time of field investigation March 1973.		
NO.	ELEVATION	CO-ORDINATES	
		NORTH	EAST
1	472.3	861,763	967,298
2	470.6	861,818	967,368
3	470.9	861,875	967,443
4	473.2	861,928	967,515
5	474.6	861,822	967,209
6	468.8	861,885	967,300
7	470.0	861,932	967,359
8	494.2	861,990	967,442
9	473.3	861,867	967,142
10	469.0	861,920	967,215
11	472.3	861,976	967,291
13	474.2	861,914	967,078
14	467.0	861,972	967,158
15	476.4	862,015	967,228
16	481.1	862,055	967,290

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

REVISIONS	DATE	BY	DESCRIPTION

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

BRIDGES No. 8, 9 & 10
 HWY. 401 OVER ETOBICOKE CREEK
 HIGHWAY NO. 401 & 403 DIST. NO. 6
 CO. PEEL
 TOWN OF MISSISSAUGA LOT CON.

BORE HOLE LOCATIONS & SOIL STRATA

STAMP V.K. CHECKED	W.P.N.D. 127-66-28	DRAWING NO.
DRAWN S.R. CHECKED	W.P.N.D. 72-11168	72-11168 A
DATE 3/12/74	SITE NO.	BRIDGE DRAWING NO.
APPROVED	CONT. NO.	

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS, ONTARIO

MEMORANDUM

TO: Mr. C.G.E. Burkhardt, (3) FROM: Soil Mechanics Section,
Reg. Structural Planning Eng., Geotechnical Office,
Central Region, Toronto. West Building, Downsview.

ATTENTION: DATE: March 18th, 1974.

OUR FILE REF.

IN REPLY TO

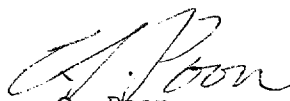
MAR 22 1974

SUBJECT: RE: Additional Borings at Structures #8, #9 & #10
at the Crossing of Hwy. 401 and Relocated
Etobicoke Creek,
Town of Mississauga, County of Peel,
Site #24-184, District #6 (Toronto),
W.O. 72-11168 W.P. 127-66-28

One of the four boreholes (namely BH#6) put down for the proposed west pier of the abovementioned structures, was located some 20 feet away from the proposed footing location. In addition, the bedrock elevation encountered at this boring location was somewhat lower than that elsewhere. In order to delineate the bedrock surface at the footing location, two additional boreholes (BH's #21 and #22) were put down after the submission of the Foundation Report W.O. 72-11168.

Attached are the Record of Borehole Sheets for the additional borings and the revised Drawing No. 72-11168 A. Please include these in your Foundation Report (W.O. 72-11168).

Should you have any queries regarding this project, please contact this Office.



C. Poon,
Project Engineer,
For: M. Devata,
Supervising Engineer.

CP/mj
Attach.

C.C. E.J. Orr
B.R. Davis
R.S. Pillar
H. Greenland
B.J. Giroux
C. Mirza
G.A. Wrong
B.A. Singh

Files ✓

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE No 21

JOB 72-11168

LOCATION Co-ord's. 861, 851N; 967, 317 E

ORIGINATED BY JB

W.P. 127-66-28

BORING DATE November 14, 1973

COMPILED BY JB

DATUM Geodetic

BOREHOLE TYPE CME - Hollow Stem Auger

CHECKED BY SP

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			PLASTIC LIMIT ——— w_p				
							SHEAR STRENGTH P.S.F.			WATER CONTENT ——— w				

OFFICE REPORT SOIL EXPLORATION

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO 22

JOB 72-11168

LOCATION Co-ord's. 861, 891N; 967, 264 E

ORIGINATED BY JB

W.P. 127-66-28

BORING DATE November 14, 1973

COMPILED BY JB

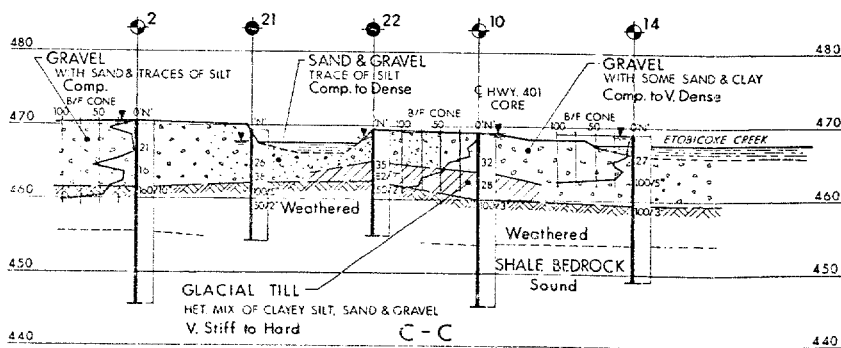
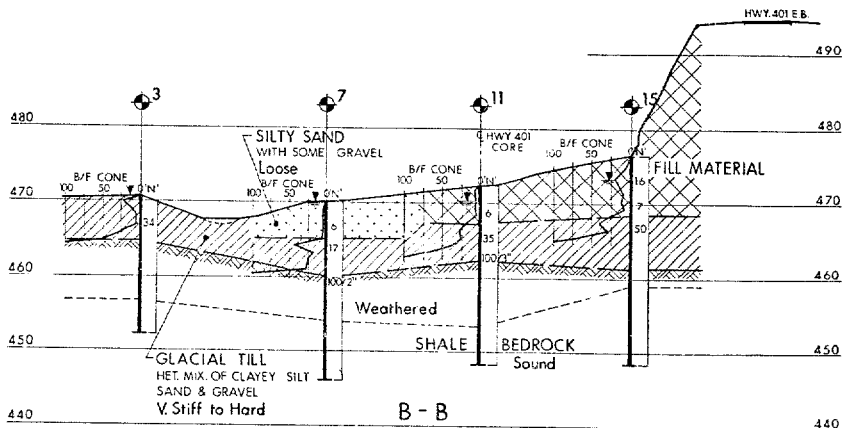
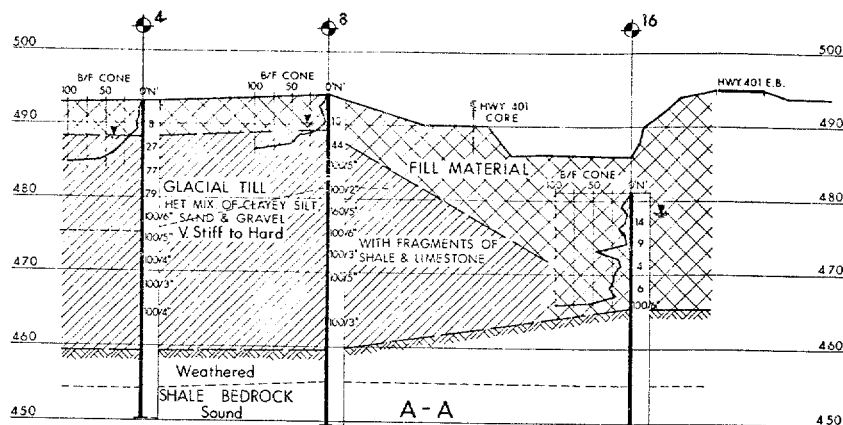
DATUM Geodetic

BOREHOLE TYPE CME - Hollow Stem Auger

CHECKED BY

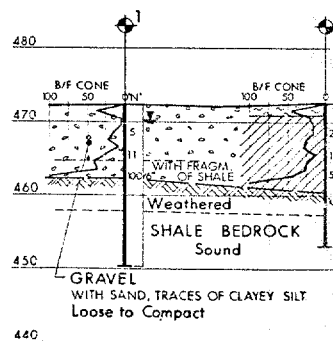
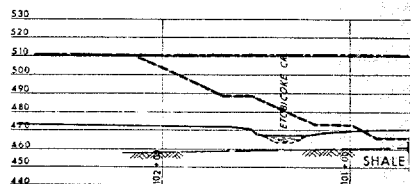
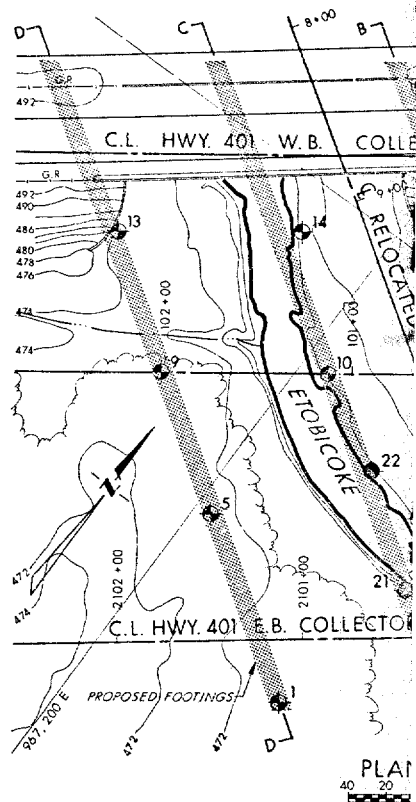
SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT		LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w w_p — w — w_L		BULK DENSITY γ P.C.F.	REMARKS
ELEV. DEPTH ft.	DESCRIPTION	STRAT. PLT	NUMBER	TYPE	BLOWS/FOOT		SHEAR STRENGTH P.S.F. O UNCONFINED + FIELD VANE ● QUICK TRIAXIAL X LAB VANE		WATER CONTENT %			
469.5	Ground Level											
465.0	sand & gravel, trace of silt dense		1	SS	35	460						elev. 468.5
4.5	sil. mix. clayey silt		2	SS	32							
462.5	shale fragments hard		3	SS	50							
7.0	Shale Bedrock		4	RC	47							
455.0	Weathered grey											
14.5	End of Borehole					450						

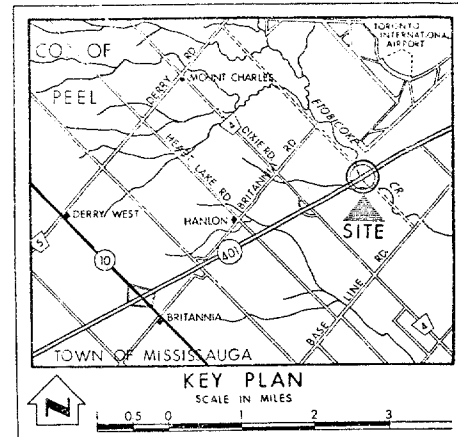
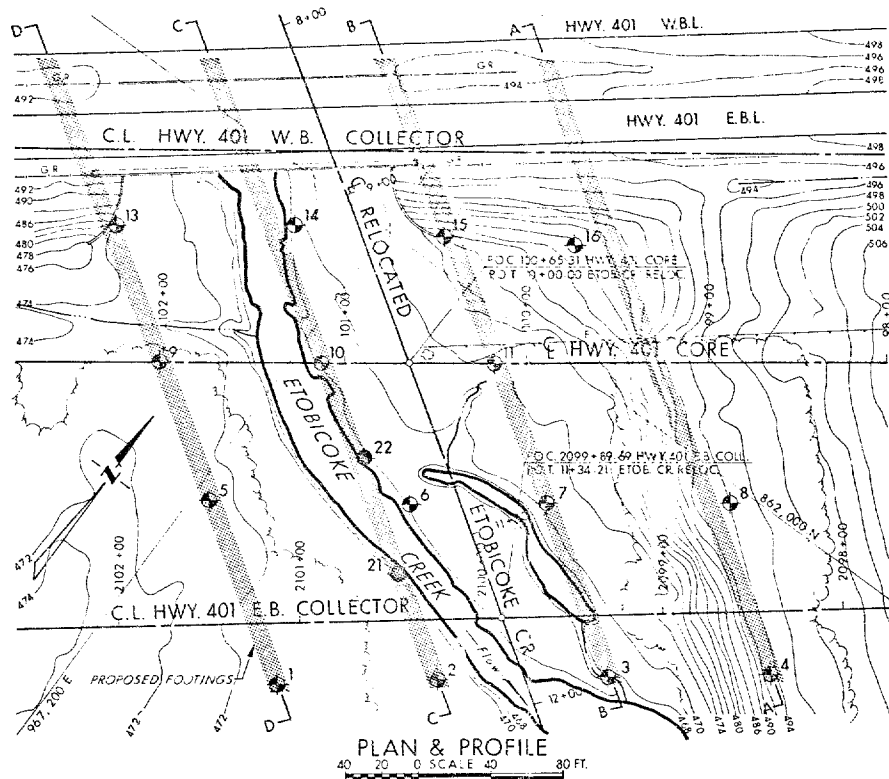
OFFICE REPORT OF SOIL EXPLORATION



NOTE FOR CONTRACT DOCUMENT:

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





LEGEND			
	Bore Hole		
	Cone Penetration Test		
	Bore Hole & Cone Test		
	Water Levels established at time of field investigation, March & Nov. 73.		
NO.	ELEVATION	CO - ORDINATES	
		NORTH	EAST
1	472.3	861,763	967,298
2	470.6	861,818	967,368
3	470.9	861,875	967,443
4	493.2	861,928	967,515
5	472.6	861,822	967,209
6	468.8	861,885	967,300
7	470.0	861,932	967,359
8	494.2	861,990	967,442
9	473.3	861,867	967,142
10	469.0	861,920	967,215
11	472.3	861,976	967,291
13	474.2	861,914	967,078
14	469.0	861,972	967,158
15	476.4	862,015	967,228
16	481.1	862,055	967,290
21	469.2	861,851	967,317
22	469.5	861,891	967,264

— NOTE —

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

REVISIONS	DATE	BY	DESCRIPTION
1	12-1-73	S.R.	BORE HOLES #18 & 22 ADDED ON PLAN & SECTION C-C

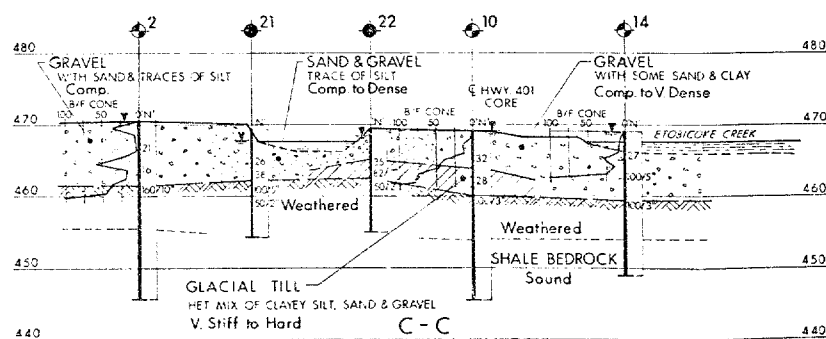
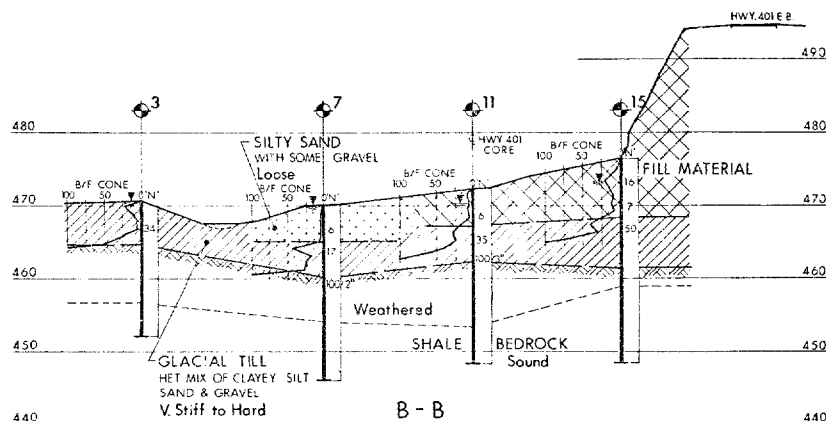
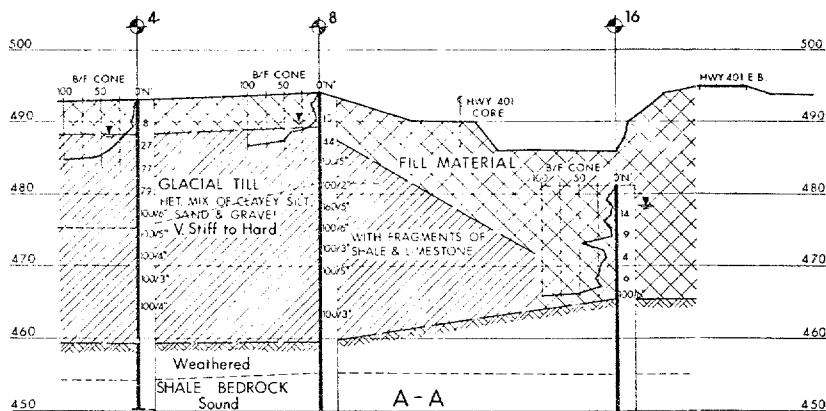
MINISTRY OF TRANSPORTATION AND COMMUNICATIONS—ONTARIO
DESIGN SERVICES BRANCH—FOUNDATIONS OFFICE

BRIDGES No. 8, 9 & 10
HWY. 401 OVER ETOBICOKE CREEK
HIGHWAY NO. 401 & 403 DIST. NO. 6
CO. PEEL
TOWN OF MISSISSAUGA LOT _____ CON. _____

BORE HOLE LOCATIONS & SOIL STRATA

SUBMD V.K.	CHECKED <input checked="" type="checkbox"/>	W.P. NO. 127-66-28	DRAWING NO.
DRAWN S.R.	CHECKED <input checked="" type="checkbox"/>	W.O. NO. 72-111AE	72-11168 A
DATE JUL 4, 1973	STS NO.		BRIDGE DRAWING NO.
APPROVED <i>[Signature]</i>	CONT NO.		

REF No. Plan B 81-65 &
Pence No. 3083-14 F1

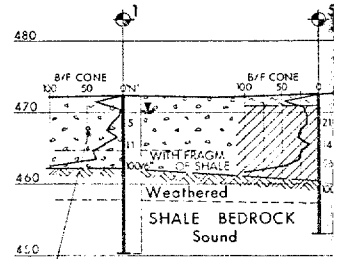
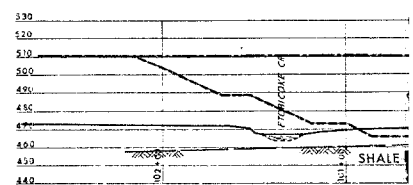
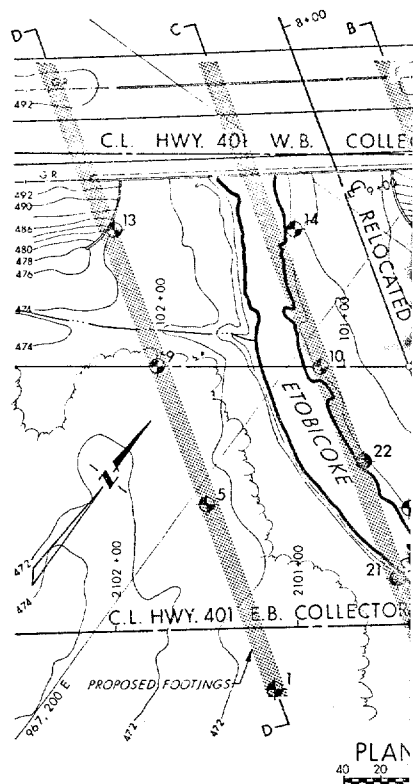


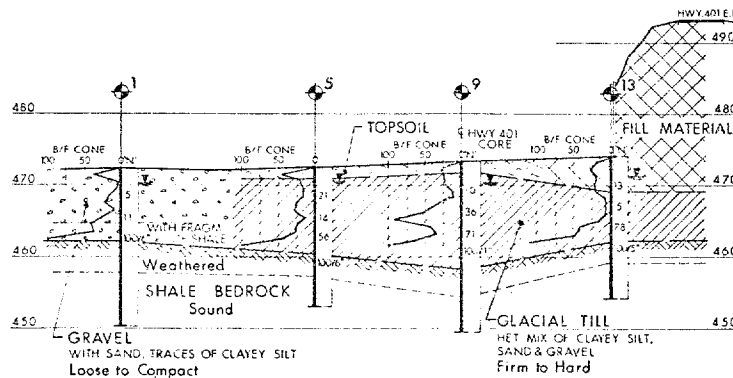
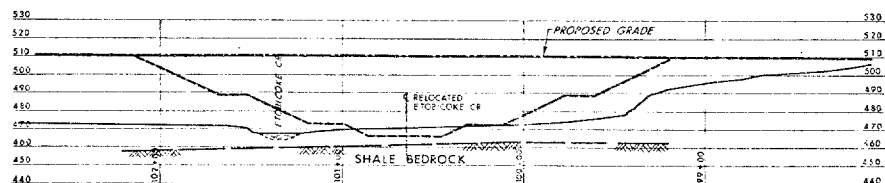
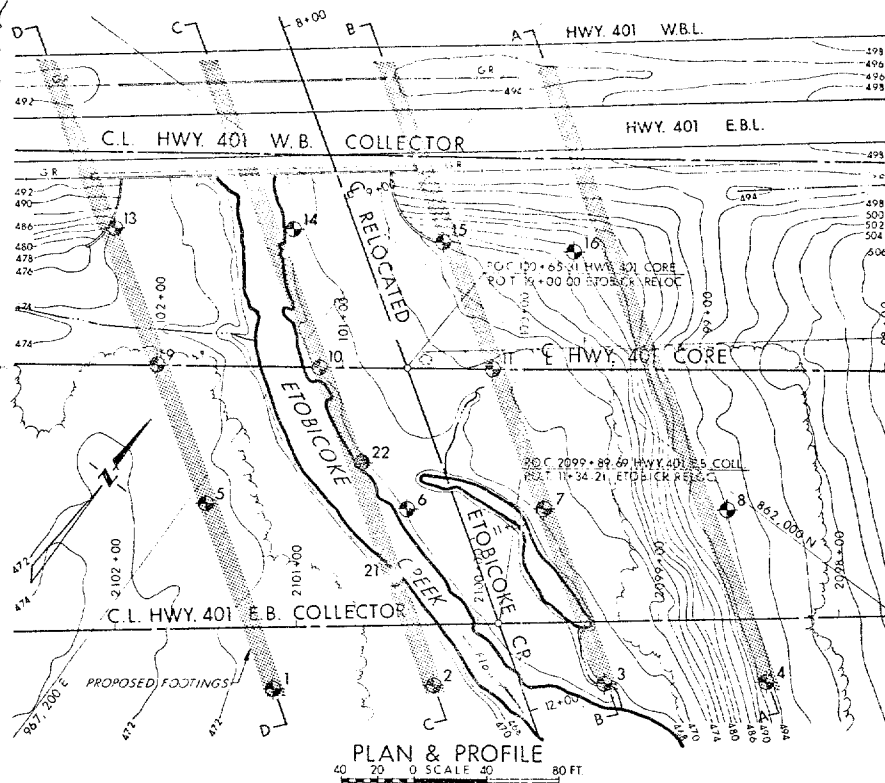
SECTIONS

HORIZ 40 20 0 20 40 80 FT
VERT 10 5 0 10 20 FT

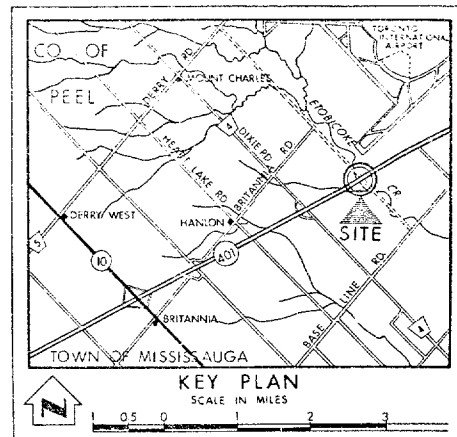
NOTE FOR CONTRACT DOCUMENT

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





D - D



LEGEND

- Bore Hole
- ⊕ Cone Penetration Test
- ⊕ Bore Hole & Cone Test
- ⊕ Water Levels established at time of field investigation, March & Nov. 73.

NO	ELEVATION	CO - ORDINATES	
		NORTH	EAST
1	472.3	861,763	967,298
2	470.6	861,818	967,368
3	470.9	861,875	967,443
4	493.2	861,928	967,515
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6	468.8	861,885	967,300
7	470.0	861,932	967,359
8	494.2	861,990	967,442
9	475.3	861,867	967,142
10	469.0	861,920	967,215
11	472.3	861,976	967,291
13	474.2	861,914	967,078
14	469.0	861,972	967,158
15	476.4	862,015	967,228
16	481.1	862,055	967,290
21	469.2	861,851	967,317
22	469.5	861,891	967,264

NOTE

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REVISIONS	DATE	BY	DESCRIPTION
1	1973	S.R.	BORE HOLES 15, 21 & 22 ADDED ON PLAN & SECTION C-C

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

BRIDGES No. 8, 9 & 10

HWY. 401 OVER ETOIBICOKE CREEK

HIGHWAY NO. 401 & 403 DIST. NO. 6

CO. PEEL

TOWN OF MISSISSAUGA LOT _____ CON _____

BORE HOLE LOCATIONS & SOIL STRATA

SUBMD V.K.	CHECKED BY	W.P. NO. 127-66-28	DRAWING NO.
DRAWN S.R.	CHECKED BY	W.O. NO. 72-11168	72-11168 A
DATE	JUNE 4, 1973	SITE NO.	BRIDGE DRAWING NO.
APPROVED	CONT. NG		

REF No. Plan 8 d1-65 &
Ferra No. 3983-1211

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS - ONTARIO
FOUNDATIONS OFFICE
VISUAL CLASSIFICATION SHEET

PROJECT 7-162 SITE _____ BOREHOLE No. 22 GROUND ELEVATION _____

SAMPLE No.	DEPTH	GRAIN SIZE DISTRIBUTION					DRY STRENGTH	SHINE	DIALATANCY	TOUGHNESS	ODOR	COLOUR	ACID TEST	CONSISTENCY OR UNDRAINED SHEAR STRENGTH	CLASSIFICATION WITH DESCRIPTION	SYMBOL
		LARGEST GRAIN SIZE	SHAPE	PERCENTAGE												
				GRAVEL	SAND	SILT & CLAY										
1A	4'	1	20	20	60		10	10	1		grey	strong		clayey sand with gravel		
2	6'													fine sand		
3	8'													medium sand		
4B	10'		20	20	60			quartz			brassy grey	strong		sand & gravel		

NOTES:- VISUAL CLASSIFICATION MUST BY CARRIED OUT ON ALL SAMPLES BY THE ENGINEER AS SOON AS POSSIBLE AFTER THE SAMPLES REACH THE LABORATORY.

REMARKS:-

VISUAL CLASSIFICATION SHEET

PROJECT 72-11/68 SITE _____ BOREHOLE No. 21 GROUND ELEVATION _____

SAMPLE No.	DEPTH	GRAIN SIZE DISTRIBUTION					DRY STRENGTH	SHINE	DIALATANCY	TOUGHNESS	ODOR	COLOUR	ACID TEST	CONSISTENCY OR UNDRAINED SHEAR STRENGTH	CLASSIFICATION WITH DESCRIPTION	SYMBOL
		LARGEST GRAIN SIZE	SHAPE	PERCENTAGE												
				GRAVEL	SAND	SILT & CLAY										
1	30-40	1 1/2"	sub-angular	50	40	10			quartz		—	grey	strong		sand & gravel	
2	50-60								—			grey	strong		clay, sand & shale	
3	60-70														weathered shale	
4	70-80														weathered shale	

NOTES:- VISUAL CLASSIFICATION MUST BE CARRIED OUT ON ALL SAMPLES BY THE ENGINEER AS SOON AS POSSIBLE AFTER THE SAMPLES REACH THE LABORATORY.

REMARKS:-

FF-96

REQUESTS FOR
SERVICES OF THE FOUNDATIONS OFFICE

W.O. 72-11168

W.P. NO 127-66-28 CONT. NO _____ SITE NO 24-184

LOCATION: TORONTO - ETOBICOKE CR. BRIDGE

SERVICES REQUESTED: ADDITIONAL INFORMATION
(THIS IS A 1972 JOB — 2 MORE B.H.
WERE PUT DOWN)

REQUESTED BY: DECISION MADE BY M. DEVATS

DATE OF REQUEST: Nov. 14/73

DUE DATE APR. 1/74

Mr. C. Burkhardt, R.S.P.E.
3501 Dufferin St.
Downsview, Ontario

Structural Office
West Building, Downsview

September 5th, 1973

Htobicoke Creek Bridge
Bridge No. 9
H.P. 127-66-28, Site # 24-184
Hwy. #401, District 6

72-11-168

Attached herewith are prints of the Preliminary Bridge
Plan Drawing D-24-184-P1 for the above-mentioned structure.

The estimated cost of the proposed structure is \$800,000
which includes tender, materials, engineering, and sundry
construction.

Any comments or revisions you may have should be submitted
within four weeks.

C.S. Grebski
Structural Design Engineer.

CSG:AMP
Attached

c.c. B.P. Davis
H.B. Birch
A.F. McKim
W. McFarlane
H. Stoyanoff
A. Stermac
J. Anderson
J. Harris
D. Fitzgibbon



no comments
M.S.
J.K.

FOUNDATIONS OFFICE

REVIEW OF DESIGN DRAWINGS:

W.P. ...127-66-28...
W.O. 72-11168.....

Foundation Report By:

.....C. S. Poore.....

Review of Design Drawings By:

.....V. K. 14.....

Design Drawing No.'s:

Site: 24-184... Preliminary Plan

1. Does footing design comply with our report or subsequent memos? - Yes
2. If answer to 1. is No, is present design acceptable? - ~~Yes~~
3. Has sufficient field work been done? - Yes
4. Are estimated pile lengths shown on Drawings correct? If not, make a new list. -
5. If excavation of unsuitable soil is recommended, is this shown on Drawings?
6. Are approaches designed in accordance with our report? Check slopes and berm lengths. -
7. Do you anticipate any construction problems? i.e., dewatering, stability of temporary slopes or excavations. -
8. Summarize your comments; on separate sheet if necessary.

No comments!

Drawings Received19.....

Reviewed ..Sept. 13.....1973.....

Signed

M. K. Able.....

OVERSIZED DRAWINGS

General Layout
Footings

DOCUMENT MICROFILMING IDENTIFICATION

GEOCREs No. 30m12-50

DIST. C REGION CENTRAL

W.P. No. 127-44-28

CONT. No. 74-107

W. O. No. 72-P-168

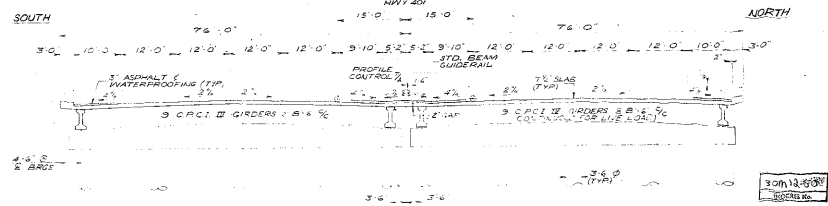
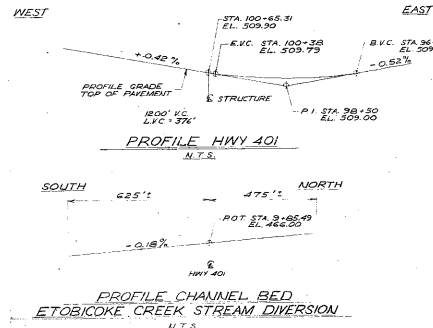
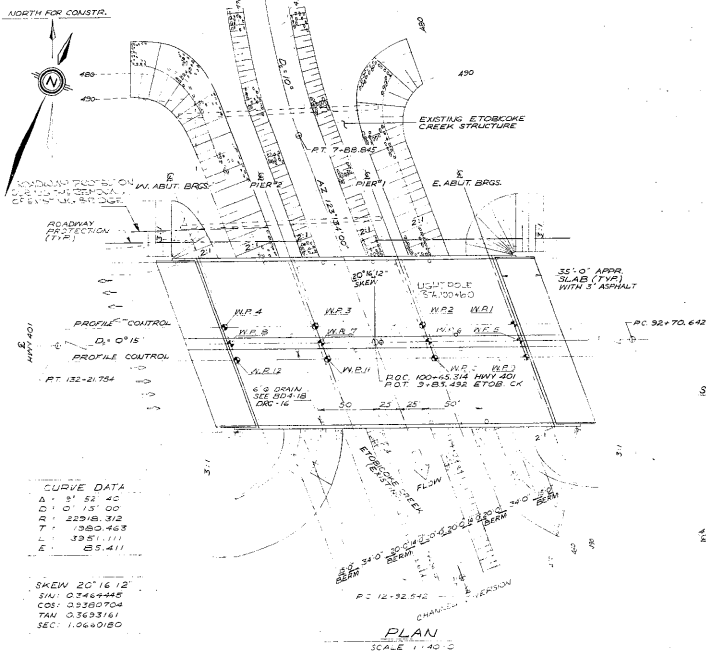
STR. SITE No. 24-114

HWY. No. 401

LOCATION HWY. 401 S ETORICOKE
CREEK

OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT 2

REMARKS: DOCUMENTS TO BE UNFOLDED
BEFORE MICROFILMED



GENERAL NOTES

CLASS OF CONCRETE
 PRETENSIONED MEMBERS: 5000 PSI
 DECK, DIAPHRAGMS, CURBS, PARAPET: 4000 PSI
 1/4" SLT. END POST: 1/2" DIA.
 APPROACH SLAB: 4000 PSI
 FOOTING: 1 ABUTMENT: 3000 PSI

CLEAR COVER ON REINFORCING STEEL

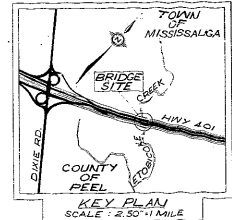
FOOTING & ABUTMENTS	4"
PIER	8"
COLUMNS & WALL	2 1/2"
TOP	1 1/2"
BOTTOM	2"
CURBS	2"
PARAPET WALL & END POST	1 1/2"
APPROACH SLAB	2"

CONSTRUCTION NOTES

THE CONTRACTOR IS RESPONSIBLE FOR FINISHING THE BEARING SEATS TO THE SPECIFIED ELEVATIONS WITH A TOLERANCE $\pm 1/8"$

NO CONCRETE SHALL BE PLACED ABOVE THE BEARING SEATS UNTIL CONCRETE IN THE DECK HAS BEEN POURED.

- LIST OF DRAWINGS**
- | | |
|----|--------------------------------|
| 1 | GENERAL LAYOUT |
| 2 | BORING LOGS |
| 3 | FOOTING LAYOUT |
| 4 | EAST ABUTMENT |
| 5 | WEST ABUTMENT |
| 6 | PIERS |
| 7 | PRESTRESSED GIRDERS & BEARINGS |
| 8 | DECK LAYOUT & JOINED ELEV. |
| 9 | DECK REINFORCING |
| 10 | DECK DETAILS |
| 11 | 36" DECK APPROACH SLAB |
| 12 | PARAPET WALLS & DETAILS |
| 13 | STD. STEEL PARAPET RAIL |
| 14 | STANDARD DETAILS I |
| 15 | STANDARD DETAILS II |
| 16 | STANDARD DETAILS III |

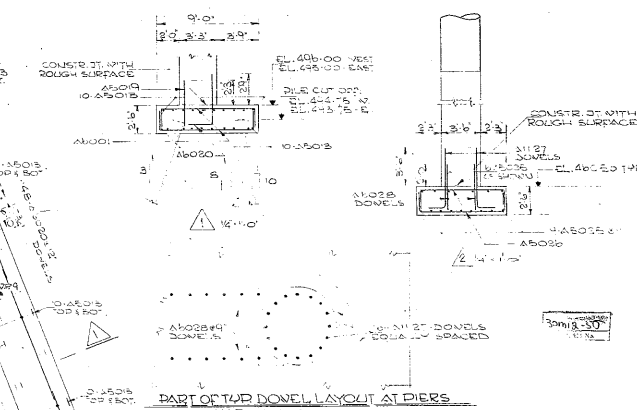
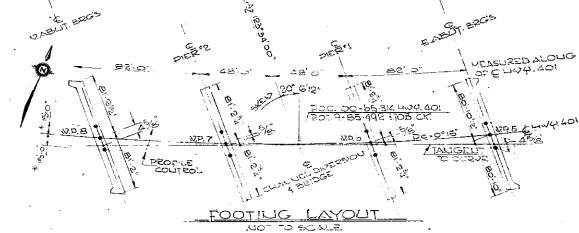


MINISTRY OF TRANSPORTATION AND COMMUNICATIONS ONTARIO	
ETOBICOKE CREEK BRIDGE (BRIDGE # 9)	
KING'S HIGHWAY NO. 401	POST NO. 6
CO. OF PEEL	
TOWN OF MISSISSAUGA LOT 3 CON. II EHS	
GENERAL LAYOUT	
APPROVED: [Signature]	CONTRACT NO. 127-66-28
DRAWN: [Signature]	W.D. NO. 127-66-28
CHECK: [Signature]	
DATE: 12/7/73	SHEET NO. 24-184-SHEET 1



HP 16.74 H-PILES			
LOCATION	ABUT.	PIER	BASTION
1. ABUT.	1. ABUT.	1. ABUT.	1. ABUT.
2. ABUT.	2. ABUT.	2. ABUT.	2. ABUT.
3. ABUT.	3. ABUT.	3. ABUT.	3. ABUT.
4. ABUT.	4. ABUT.	4. ABUT.	4. ABUT.
5. ABUT.	5. ABUT.	5. ABUT.	5. ABUT.
6. ABUT.	6. ABUT.	6. ABUT.	6. ABUT.
7. ABUT.	7. ABUT.	7. ABUT.	7. ABUT.
8. ABUT.	8. ABUT.	8. ABUT.	8. ABUT.
9. ABUT.	9. ABUT.	9. ABUT.	9. ABUT.
10. ABUT.	10. ABUT.	10. ABUT.	10. ABUT.
11. ABUT.	11. ABUT.	11. ABUT.	11. ABUT.
12. ABUT.	12. ABUT.	12. ABUT.	12. ABUT.
13. ABUT.	13. ABUT.	13. ABUT.	13. ABUT.
14. ABUT.	14. ABUT.	14. ABUT.	14. ABUT.
15. ABUT.	15. ABUT.	15. ABUT.	15. ABUT.
16. ABUT.	16. ABUT.	16. ABUT.	16. ABUT.
17. ABUT.	17. ABUT.	17. ABUT.	17. ABUT.
18. ABUT.	18. ABUT.	18. ABUT.	18. ABUT.
19. ABUT.	19. ABUT.	19. ABUT.	19. ABUT.
20. ABUT.	20. ABUT.	20. ABUT.	20. ABUT.

PLAN OF FOOTINGS
SHOWING TOP PILE LAYOUT & REINFORCEMENT
SCALE 1/4" = 1'-0"



REVISION	
NO.	DESCRIPTION
MINISTRY OF TRANSPORTATION AND COMMUNICATIONS OTTAWA	
ETOBICOKE CREEK BRIDGE (BRIDGE #9)	
KIND'S HIGHWAY No. 40	DIST. No. 6
CO. OF P.E.E.	
TWO TOWNS OF MISSISSAUGA LOT 3	FORM 5-1-65
FOOTING LAYOUT	
APPROVED	CONTRACT No.
DESIGN	W.P. No.
DRAWING	127-66-28
DATE	SITE No.
1/27/72	24-184
1/27/72	SHEET 3