

Ontario
Department of Transportation and Communications

~~XXXXXXXXXXXXXXXXXXXX~~

MEMORANDUM

Mr. G. C. E. Burkhardt,
Regional Bridge Planning Engr.,
Central Region (Toronto).

FROM: Foundation Section,
Design Services Branch,
Room 107, Lab. Bldg.

ATTENTION:

DATE: July 21, 1971

OUR FILE REF:

IN REPLY TO

JUL 29 1971

SUBJECT:

30NH-114

GEOCRES No.

FOUNDATION INVESTIGATION REPORT
For
Proposed Structure
At the
Crossing of Belfield Expressway and
Attwell Rd. (Bridge #116)
District No. 6 (Toronto)
W.O. 71-11039 -- W.P. 275-65
CONT 73-020 site 37-968

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

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

AGS/M3eP
Attach.

A. G. Stornac
A. G. Stornac
PRINCIPAL FOUNDATION ENGINEER

cc: Messrs. E. R. Davis
F. G. Allen
D. W. Farren
G. K. Hunter (2)
H. Greenland
G. C. E. Burkhardt (2)
T. J. Kovich
B. J. Giroux
B. A. Singh
Foundations Files
Gen. Files

TABLE OF CONTENTS

1. INTRODUCTION.
 2. SITE AND GEOLOGY.
 3. FIELD AND LABORATORY WORK.
 4. SUBSOIL AND BEDROCK CONDITIONS:
 - 4.1) General.
 - 4.2) Glacial Till.
 - 4.3) Shale Bedrock.
 5. GROUNDWATER CONDITIONS.
 6. DISCUSSION AND RECOMMENDATIONS:
 - 6.1) General.
 - 6.2) Abutment Foundations.
 - 6.3) Southwest Retaining Wall.
 - 6.4) Approach Embankments and Cuts.
 7. MISCELLANEOUS.
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FOUNDATION INVESTIGATION REPORT
For
Proposed Structure
At the
Crossing of Belfield Expressway and
Attwell Rd. (Bridge #3)
District No. 6 (Toronto)
W.O. 71-11039 -- W.P. 275-65

1. INTRODUCTION:

The Foundation Section was requested to carry out a subsurface investigation at the crossing of proposed Belfield Expressway and Attwell Road, in the Borough of Etobicoke, York County. The request was contained in a memo from the Bridge Office (Mr. G. C. E. Burkhardt, Regional Bridge Planning Engineer), dated April 23, 1971. Subsequently, an investigation was carried out by this Section to determine the subsoil, bedrock and groundwater conditions at the site.

The results of the investigation are presented in this report, together with our recommendations for the design of the structure foundations as well as the stability and settlement considerations associated with the approach fills and its.

2. SITE AND GEOLOGY:

The site is located approximately 400 ft. south of Belfield Road between existing Hwy. #27 on the east and Farlingview Drive on the west, in the Borough of Etobicoke, Metropolitan Toronto. The terrain is gently undulating in relief between about elevations 521 to 526. The area has been developed 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 Wisconsinian Glacial Age.

2. SITE AND GEOLOGY: (cont'd.) ...

In the vicinity of the area under investigation, the moraine is primarily composed of a basically cohesive, stoney glacial till whose thickness typically ranges between 65 and 70 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 interstream areas drainage is still imperfect.

The overburden is underlain by grey shale bedrock of the Meaford-Dundas formation, Ordovician Period. Available geological information indicates that the surface of the bedrock varies somewhere between elevations 460 and 465.

3. FIELD AND LABORATORY WORK:

A total of ten sampled boreholes, nine 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 (Penn drill) or a diamond drill, 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 for the Standard Penetration Test. The same method was used to advance the dynamic cone penetration tests. Bedrock was proven at one of the boring locations by obtaining AXT 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 and bedrock types encountered.

The location and elevation of all the boreholes are shown on Drawing #71-11039A, together with a number of estimated

3. FIELD AND LABORATORY WORK: (cont'd.) ...

stratigraphical sections across the site. Surveying at the site was carried out by the personnel from the Draughting Section, Materials and Testing Office, Department of Transportation and Communications. The elevations given 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 Borelog sheets as well as on the figures located in the Appendix.

4. SUBSOIL AND BEDROCK CONDITIONS:

4.1) General:

The predominant stratum across the site is composed of a component glacial till; this stratum was proven to extend up to 61.5 feet below existing ground surface. The glacial till is underlain by shale bedrock.

The gradational variations within the glacial till, as determined at the various borehole locations, are shown on the accompanying borehole sheets. The stratigraphical sections, shown on Drawing No. W.O. 71-11039A, have been inferred from this data.

A brief description of the glacial till is presented in Subsection 4.2.

4. SUBSOIL AND BEDROCK CONDITIONS: (cont'd.) ...

4.2) Glacial Till:

The glacial till is present immediately beneath a thin topsoil cover (6 inches). The stratum was fully penetrated at B.H. #3 only, here it was 60 feet thick. At borehole #1, however, it was proven to extend 61.5 feet below the ground surface. The upper 25 to 35 feet of the stratum is cohesive; it is composed of a matrix of clayey silt, binding sand and gravel. Below this cohesive zone the glacial till is granular in nature - i.e., it is composed of a heterogeneous mixture of silt, sand and gravel with a trace of clay. A layer of gravelly sand approximately 4 to 5 feet thick, was encountered within the lower granular portion of the glacial till at B.H.'s #1 and 3. The surface of this layer varies between elevations 476 and 477. Grain-size distribution curves for samples obtained within the two distinct zones are plotted in envelope form on the figures listed below.

Figure No. 1 - Upper Cohesive Glacial Till

Figure No. 2 - Lower Granular Glacial Till

These figures are located in Appendix I of this report.

Atterberg limit tests were carried out on samples from the glacial till. These are plotted on the Borelog sheets and are summarized on the Plasticity Chart, Figure No. 3. The results are tabulated below.

		Upper Cohesive Zone Range (Average)		Lower Granular Zone Range (Average)	
Liquid Limit (%)	(W _L)	16 - 34	(23)	15 - 18	(16)
Plastic Limit (%)	(W _p)	12 - 21	(15)	13 - 16	(14)
Natural moisture Content (%)	(W)	6.5 - 17.5	(12)	5 - 13.5	(9)

Referring to the table, it can be seen that the upper cohesive portion of the glacial till is inorganic with a plasticity

4. SUBSOIL AND BEDROCK CONDITIONS: (cont'd.) ...

4.2) Glacial Till: (cont'd.) ...

in the low range. The limited number of tests carried out on the granular portion of the glacial till, however, indicate that this material is basically non-plastic. The natural moisture content throughout the stratum is typically 2 to 5 percent below the plastic limit.

Standard penetration testing was performed within the stratum; the values are plotted on the Borelog sheets. In the upper cohesive portion of the glacial till the 'N' values range randomly from 4 to 100 blows/foot. Based on these results, it is estimated that the consistency of this zone generally varies from firm to hard. The lower values were encountered near the ground surface at B.H. #1B; it is inferred that this located area has been reworked. The 'N' values in the lower granular zone of the glacial till vary between 58 blows/foot and 200 blows for two inches. The relative density of this material is, therefore, very dense.

4.3) Shale Bedrock:

Bedrock was proven at B.H. #3 by obtaining 5 feet of AXT size rock core samples. The surface of the bedrock at this location, was found to be at elevation 461.5.

The bedrock is composed of a grey shale. At this particular location, it was sound as evidenced by the high percentage of core recovered.

5. GROUNDWATER CONDITIONS:

Groundwater level observations have been carried out during the period of this investigation, in the open boreholes. The results are shown on the Record of Borelog sheets and summarized on Drawing No. W.C. 71-1139A. These observations indicate that the groundwater level varies between elevations 513 and 521, which corresponds to depths of from 1.5 to 12.5 feet below existing ground surface, being typically about 3 feet below ground surface.

6. DISCUSSION AND RECOMMENDATIONS:

6.1) General:

It is proposed to construct an east-west expressway in the vicinity of Belfield Road, which will connect Hwy. #401 in the Islington/Kipling area with the Toronto International Airport. The new Belfield Expressway will be 3.3 miles long and will require interchanges at Kipling Ave., Martin Grove Road, Attwell Drive, new Hwy. #427 and Airport Road. In addition, structures will be required at the crossings of Iron Road, Canadian National Railways, old Hwy. #27 and Mimico Creek with the proposed expressway.

This discussion deals with the proposed overpass structure at the crossing of the Belfield Expressway and the Attwell Drive Revision. Discussions with regard to other structures on the expressway will be covered under separate foundation reports.

The proposed underpass at the Attwell Drive Revision and Belfield Road Expressway will be a single-span (55 feet) structure, incorporating closed-end abutments. The new bridge will be approximately 140 ft. wide. The profile grade of the Belfield Expressway at the overpass location will be at about elev. 535 - i.e., of the order of 10 to 14 ft. above the existing ground surface. The proposed grade of the Attwell Drive Revision within the structure limits, varies from elev. 515 to elev. 510, which is some 6 to 15 ft. below the original ground surface. At these grades the maximum height of approaches in the longitudinal direction will be of the order of 25 ft.

The predominant stratum across the site is an extensive deposit of glacial till extending at least 61 ft. below existing ground surface. The glacial till is underlain by shale bedrock.

The proposed abutment footing for the overpass structure and the related retaining wall footings at the southwest portion of the crossing of Belfield Expressway and Attwell Drive Revision

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

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

can be supported within the parent subsoil. The foundation recommendations for these respective elements are discussed in the sections to follow:

6.2) Abutment Foundations (Ref. to E.H.'s #1, 2, 3, 4, 5 & 6):

The natural subsoil (glacial till) is competent enough to provide adequate support for the footings. The abutments, therefore, can be founded within the glacial till stratum below the finished grade (elev. 515 to elev. 510) of Attwell Drive Revision. In all cases, a minimum of 4 ft. of earth cover should be provided to the underside of the footings for frost protection purposes. Spread footings, meeting the aforementioned requirements, can be designed using an allowable safe bearing pressure of 3 t.s.f.

Excavations will be carried out below the prevailing groundwater level for the major portions of the abutment footings. In view of the relatively impervious nature of the cohesive subsoil at the footing formation level, no major dewatering problems are anticipated, during the excavation phase. Any minor groundwater seepage or surface run-off into the excavations could be handled using standard techniques, such as pumping from sumps. During construction of the abutment footings, care should be taken to ensure that the foundation subsoil will not be softened by surface run-off. A lean concrete working slab should be placed at the footing formation level immediately after the completion of the excavations.

Settlements induced due to the footing pressure will be elastic in nature. These settlements will be negligible and will take place during or immediately following the construction of the structure.

If the structure is designed as a rigid frame, then a coefficient of earth pressure at rest (K_0) of 0.5 should be assumed for the granular fill behind the wall, when designing the abutments. However, if some movement of the top of the wall

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

6.2) Abutment Foundations (Ref. to B.H.'s #1, 2, 3, 4, 5 and 6):

is permitted, then a coefficient of active earth pressure (K_a) of 0.33 can be used.

It is recommended that a value of 2,000 p.s.f. be used in the computations to determine the sliding resistance between the concrete base of the footing and the underlying cohesive stratum.

6.3) Southwest Retaining Wall (Ref. to B.H.'s #1A, 1B, 1C & 3):

This wall, which will be approximately 470 ft. in length, will retain the south side of the west approach fill of the proposed Belfield Expressway. The top of the wall will vary from elev. 536 (east end) to elev. 541 (west end). The existing ground surface within the length of the wall varies from elev. 521 to elev. 525, which indicates that the maximum height of fill to be retained would be of the order of 20 ft.

The subsoil conditions are generally favourable for spread footing type of support. The retaining wall foundation can be supported on spread footings within the glacial till stratum using an allowable bearing pressure of 2.5 t.s.f. at the following elevations:

East end to Sta. 648+00 - Elev. 515.0 or below
Sta. 648+00 to West end - Elev. 518.0 or below

A minimum earth cover of 4 ft. should be provided to the underside of the footing for frost protection purposes. Comments made with regard to dewatering of the excavations of the abutment footings are applicable for retaining wall foundations.

The following values can be used in the design of the retaining structure:

Coefficient earth pressure at rest $K_0 = 0.5$ (Rigid Wall)

Coefficient of active earth pressure $K_a = 0.33$ (Some movement at the top of wall permitted)

Sliding resistance between the concrete and the soil -
2,000 p.s.f.

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

6.3) Southwest Retaining Wall (Ref. to B.H.'s #1A, 1B, 1C & 3):
(cont'd.) ...

In order to relieve the build-up of excess hydrostatic pressure behind the retaining structure, suitable drainage measures should be provided. If the embankments are not constructed of a relatively free-draining type of granular material, the following measures should be taken:

An 8-ft. wide vertical strip of free-draining granular material should be provided behind the wall; the remainder of the backfill could consist of locally available earth material similar to that used for embankment construction. In addition to the 8-ft. wide gravel strip behind the wall, a horizontal layer of gravel, 4 feet thick, should be built into the backfill at half the height of the wall, and should extend for a distance equal to one-half the height of the wall. No horizontal drains would be required for that portion of the retaining wall having a height of less than 12 feet. Suitable weep holes should be provided at the base of the wall at a maximum spacing of 10 ft. Department Standard SD-4-58, prepared for various retaining wall backfilling requirements for Hwy. 401 Toronto Bypass, may be used for design and construction purposes.

6.4) Approach Embankments and Cuts:

The proposed profile grade of the Belfield Expressway will be at elev. 535 - elev. 541, and the Attwell Drive Revision will be approximately at elev. 510 - elev. 515. In order to achieve these grades, embankments up to a maximum height of 14 ft., and cuts to a depth of 15 ft. will be necessary. No stability problems are anticipated for the proposed approach fills and cuts with standard 2:1 slopes.

The glacial till subsoil will settle due to the surcharge loading of the approach fills. The settlement will be elastic in nature and negligible in magnitude.

7. MISCELLANEOUS:

The field work was performed during the period of May 3 to May 10, 1971, under the supervision of Mr. V. Korlu, Project Foundation Engineer.

Equipment used was owned and operated by F. E. Johnston Drilling Co. Ltd., Toronto.

The investigation was carried out under the general supervision of Mr. K. Devata, Supervising Foundation Engineer, who also reviewed this report.

July, 1971

APPENDIX I

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 1

FOUNDATION SECTION

JOB 71-11039

LOCATION

Belfield Expy. & Atwell St. 877,485 N; 975,366 E

ORIGINATED BY VK

W.P. 275-65

BORING DATE

May 3, 1971

COMPILED BY

WA

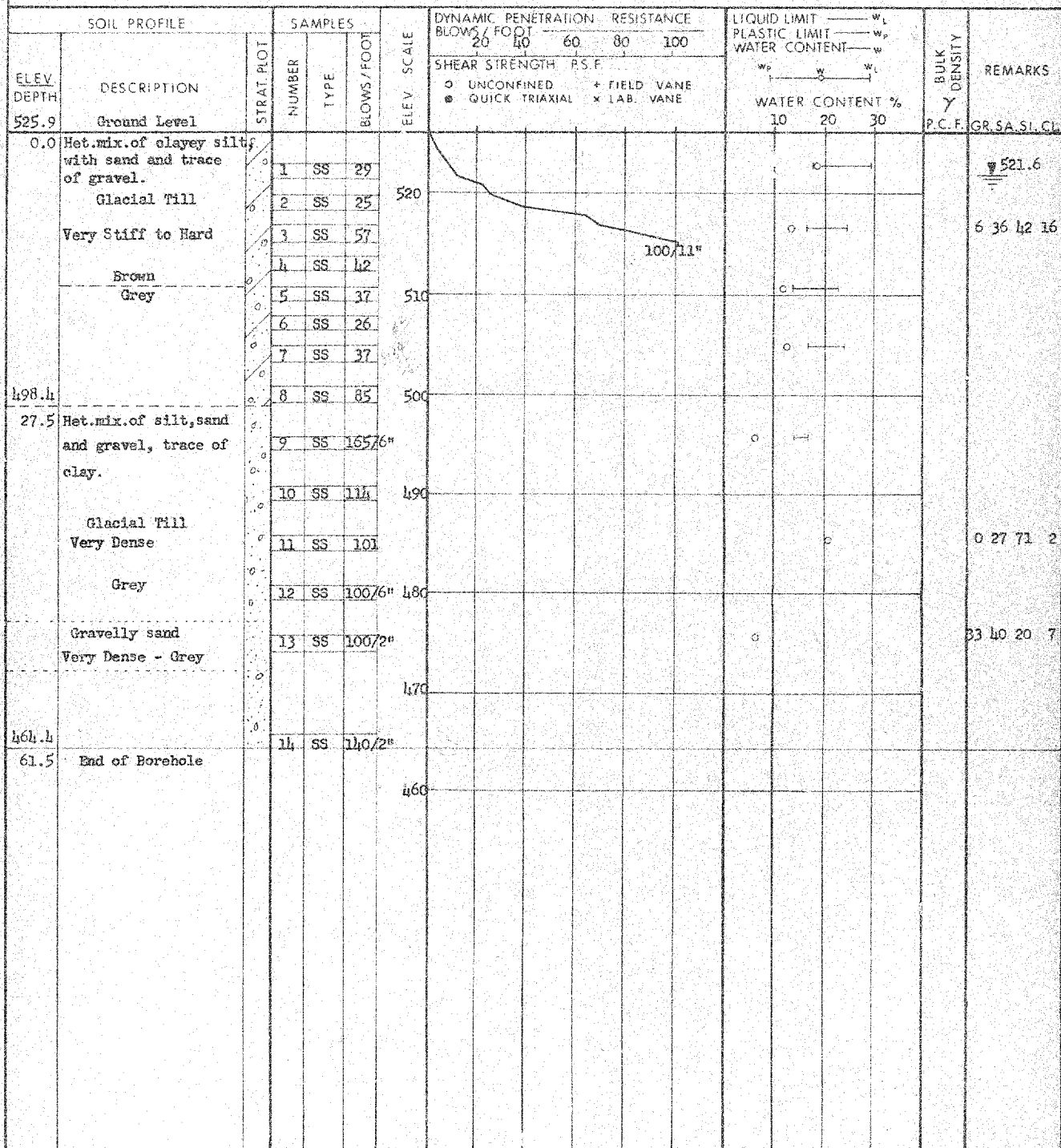
DATUM Geodetic

BOREHOLE TYPE

Cont. Flight Auger; Cone

CHECKED BY

WA



DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 1A

FOUNDATION SECTION

JOB 71-11039

LOCATION 877,342 N; 975,327 E.

ORIGINATED BY SA

W.P. 275-65


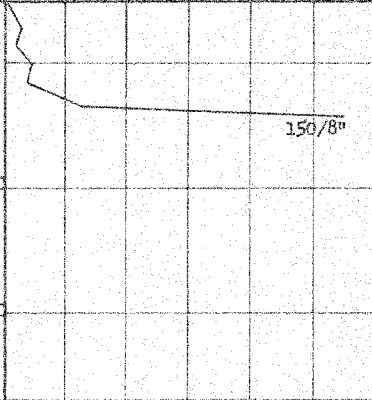
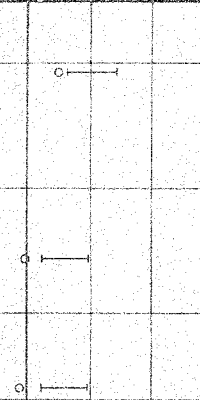
BORING DATE May 4, 1971

COMPILED BY KW

DATUM Geodetic

BOREHOLE TYPE Auger

CHECKED BY LL

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		20	40	60	80	100	SHEAR STRENGTH P.S.F. ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE					WATER CONTENT % 10 20 30			
524.8	Ground Level																		
0.0	Ret. mix. of clayey silt with sand and trace of gravel		1	SS	13	520										521.6 May 10/71			
	Glacial Till		2	SS	15														
	Stiff - Hard		3	SS	63	510													
	Brown - Grey		4	SS	140														
			5	SS	33	500													
			6	SS	33														
			7	SS	88														
493.3			8	SS	420/6"														
31.5	End of Borehole																		

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 18

FOUNDATION SECTION

JOB 71-11039 LOCATION 877,338 N; 975,226 E. ORIGINATED BY VK
 W.P. 275-65 BORING DATE May 5, 1971 COMPILED BY KW
 DATUM Geodetic BOREHOLE TYPE Cont. Flight Auger 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		20	40	60	80	100	w_p	w	w_L		
522.6	Ground Level					SHEAR STRENGTH P.S.F.					WATER CONTENT %				
						○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE 1000 2000					10 20 30				
0.0	Het. mix. of clayey silt with sand and trace of gravel. Firm to Hard Brown Grey Glacial Till	0'	1	SS	6	520									GR. SA. SI. CL.
		0'	2	SS	4										May 10/71
		0'	3	SS	73										3 35 44 18
		0'	4	SS	84	510									
		0'	5	SS	68										
		0'	6	SS	140										
		0'	7	SS	105	500									
497.6		0'	8	SS	126/6"										
25.0	Het. mix. of silt, sand & gravel, with some clay occ. layers of clayey silt. Very Dense	0'	9	SS	205/6"	490									
481.1		0'	10	SS	163/6"										7 20 61 12
41.5	End of Borehole														

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 10

FOUNDATION SECTION

JOB 71-11039 LOCATION 877,352 N; 975,101 E. ORIGINATED BY VK
 W.P. 725-65 BORING DATE May 6, 1971 COMPILED BY KW
 DATUM Geodetic BOREHOLE TYPE Auger CHECKED BY

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT					LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w			BULK DENSITY γ	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLT	NUMBER	TYPE	BLOWS / FOOT		20	40	60	80	100	w_p	w	w_L		
521.1	Ground Level															
0.0	Het. mix. of clayey silt with some sand and gravel. occ. layers of sandy silt.		1	SS	28	520										516.7
			2	SS	36											
			3	SS	46											
	Very Stiff to Hard		4	SS	48	510										
	Brown		5	SS	53											
	Grey		6	SS	42											8 40 44 8
	Glacial Till		7	SS	93	500										
			8	SS	200/5"											
			9	SS	200/5"	490										
486.1																
35.0	Het. mix. of silt, sand and gravel, trace of clay		10	SS	174											0 85 15 0
	occ. layers of clayey silt.		11	S3	96	480										17 76 7 0
	Very Dense															
			12	SS	100/3"	470										
464.6																
56.5	End of Borehole		13	SS	200/6"											

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 1D

FOUNDATION SECTION

JOB 71-11039 LOCATION 877,305 N; 974,995 E. ORIGINATED BY VK
 W.P. 275-65 BORING DATE May 7, 1971 COMPILED BY KW
 DATUM Geodetic BOREHOLE TYPE Auger CHECKED BY

SOIL PROFILE		SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT		LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w			BULK DENSITY γ	REMARKS	
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE		BLOWS / FOOT	SHEAR STRENGTH P.S.F.		WATER CONTENT %				
							\circ UNCONFINED \bullet QUICK TRIAXIAL	$+$ FIELD VANE \times LAB. VANE	w_p	w			w_L
						1000	2000		10	20	30	P.C.F.	GR. SA. SI. CL.
521.6	Ground Level												
0.0	Het. mix. of clayey silt trace of sand & gravel occ. layer of silty sand. Very Stiff to Hard		1	SS	16								
			2	SS	36								
			3	SS	75								
			4	SS	117								
			5	SS	56								
			6	SS	156								
	Brown Grey		7	SS	111								
	Glacial Till		8	SS	100/2"								
			9	SS	162								
486.6													
35.0	Het. mix. of silt, sand and gravel, trace of clay occ. layers of clayey silt. Very Dense		10	SS	58								
			11	SS	71								
			12	SS	200/5"								
470.1													
51.5	End of Borehole		13	SS	100/2"								

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 2

FOUNDATION SECTION

JOB 71-11039 LOCATION 877,420 N; 975,390 E. ORIGINATED BY VR
W.P. 275-65 BORING DATE May 1, 1971 COMPILED BY WA
DATUM Geodetic BOREHOLE TYPE Cont. Flight Auger & Cone CHECKED BY /

SOIL PROFILE		SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE		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	SHEAR STRENGTH P.S.F. ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE				WATER CONTENT % 10 20 30
526.1	Ground Level											
0.0	Het. mix. of clayey silt trace of sand & gravel Glacial Till Very Stiff to Hard Brown-Grey		1	SS	27	520					521.8	
		2	SS	31								
		3	SS	23	510							
		4	SS	26								
		5	SS	32	500							
		6	SS	27								
		7	SS	25								
		8	SS	152								
495.1		9	SS	100 1/2"								
31.0	End of Borehole					490						

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 3

FOUNDATION SECTION

JOB 71-11039 LOCATION 877,357 N; 975,443 E. ORIGINATED BY VK
 W.B. 275-65 BORING DATE May 4, 6, 1971 COMPILED BY WA
 DATUM Geodetic BOREHOLE TYPE Diamond drill, washboring, NX Casing & Cone CHECKED BY

SOIL PROFILE		SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT ——— w_L PLASTIC LIMIT ——— w_p WATER CONTENT ——— w		BULK DENSITY Y P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE		BLOWS / FOOT	SHEAR STRENGTH PS F	WATER CONTENT %			
							○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE	10	20		
521.5	Ground Level										
0.0	Ret. mix. of clayey silt trace of sand & gravel Glacial Till Very Stiff - Hard Brown - Grey		1	SS	22						
			2	SS	18						
			3	SS	20						
			4	SS	21						
			5	SS	3						
			6	SS	18						
			7	SS	57						
495.0			8	SS	100/3"						
26.5	Ret. mix. of silt, sand & gravel with trace of clay occ. layers of clayey silt. Glacial Till		9	SS	94						
			10	SS	67						
			11	SS	134						
	Gravelly sand. Very Dense		12	SS	151						
			13	SS	100/3"						
			14	SS	100/3"						
461.5			15	SS	150/2"						
60.0	Shale Bedrock		16	RC	100%						
456.5	Sound Grey		17	RC	100%						
65.0	End of Borehole										

DEPARTMENT OF HIGHWAYS- ONTARIO		RECORD OF BOREHOLE No. 4		FOUNDATION SECTION	
MATERIALS & TESTING OFFICE					
JOB 71-11039	LOCATION 877,378 N; 975,596 E.	ORIGINATED BY VK			
W.P. 275-65	BORING DATE May 5, 1971	COMPILED BY			
DATUM Geodetic	BOREHOLE TYPE Con. Flight Auger, Cone	CHECKED BY			

SOIL PROFILE		SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT ——— w _L PLASTIC LIMIT ——— w _P WATER CONTENT ——— w			BULK DENSITY Y P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE		BLOWS / FOOT 20 40 60 80 100					SHEAR STRENGTH P.S.F. ○ UNCONTAINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE				
522.2	Ground Level														
0.0	Het. mix. of clayey silt with sand and trace of gravel.		1	SS	28	520									519.2
	Glacial Till		2	SS	30										
	Very Stiff to Hard		3	SS	62										
	Brown - Grey		4	SS	30	510									
			5	SS	21										
			6	SS	22										
			7	SS	39	500									
			8	SS	161										4 40 52 4
488.7			9	SS	300/4"	490									
33.5	Het. m' of silt, sand & gravel, trace of clay.		10	SS	19										3 5 88 4
	Glacial Till		11	SS	99	480									
	Compact to Very Dense		12	SS	95										
	Grey		13	SS	100/1"	470									
465.7			14	SS	200/2"										
56.5	End of Borehole					460									

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 5

FOUNDATION SECTION

JOB 71-11039 LOCATION 877,432 N; 975,531 E. ORIGINATED BY VK
W.P. 275-65 BORING DATE May 6, 1971 COMPILED BY WA
DATUM Geodetic BOREHOLE TYPE Cont. Flight Auger & Cone CHECKED BY

SOIL PROFILE		SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w			BULK DENSITY γ P.C.F. GR. SA. SI. CL.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE		20	40	60	80	100	w_p	w	w_L		
525.1	Ground Level														
0.0	Het. mix. of clayey silt, with sand & trace of gravel. Glacial Till Very Stiff to Hard Brown-Grey	0	1	SS	30										520.8
		0	2	SS	76										
		0	3	SS	51										
		0	4	SS	46										
		0	5	SS	34										
		0	6	SS	22										
		0	7	SS	35										
		0	8	SS	57										
496.1		0													
29.0	Het. mix. of silt, sand & gravel, trace of clay. Glacial Till	0	9	SS	100/2"										4 28 62 6
488.6	Very Dense. Grey	0	10	SS	100/5"										
36.5	End of Borehole														

DEPARTMENT OF HIGHWAYS- ONTARIO

MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 6

FOUNDATION SECTION

JOB 71-11039

LOCATION 877,506 N; 975,474 E.

ORIGINATED BY VK

W.P. 275-65

BORING DATE May 6, 1971

COMPILED BY WA

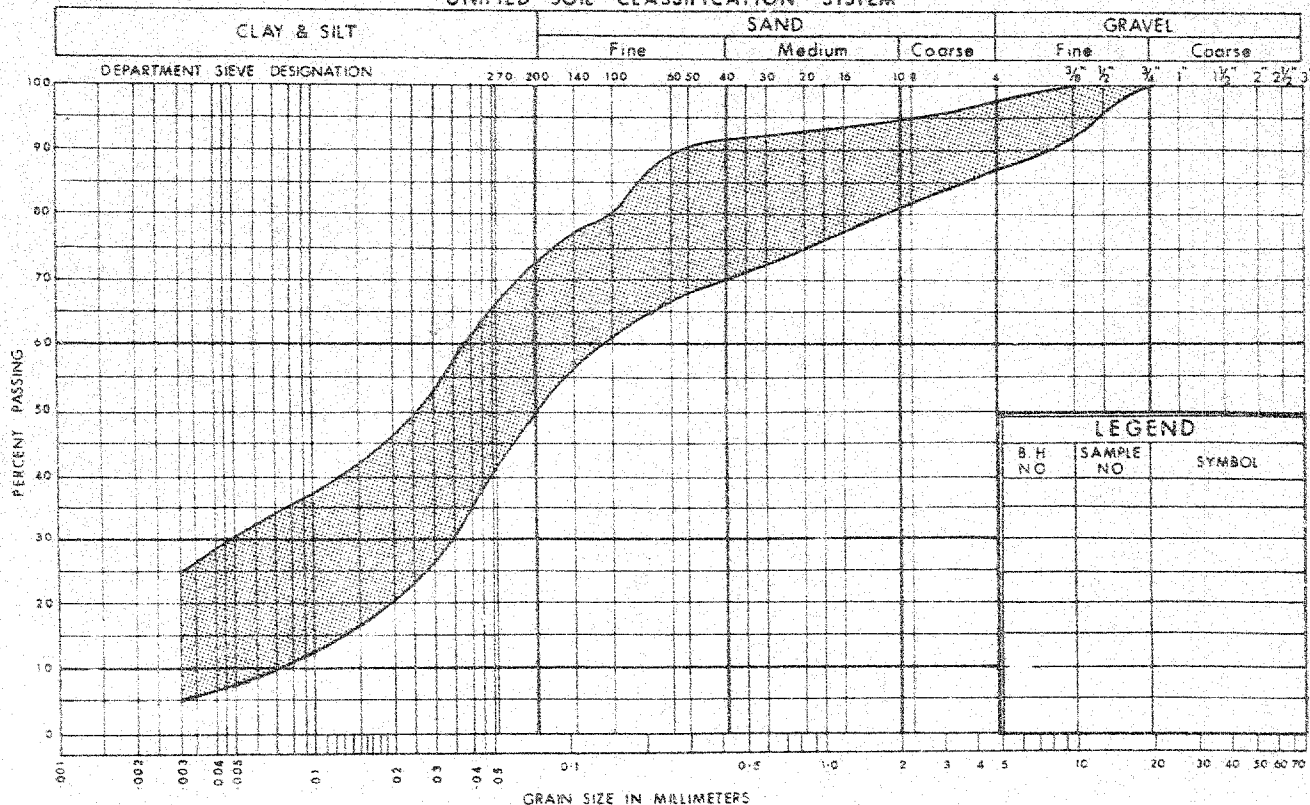
DATUM Geodetic

BOREHOLE TYPE Diamond Drill, washboring, BX Casing

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		SHEAR STRENGTH P.S.F. ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE		WATER CONTENT % 10 20 30				
525.0	Ground Level											
0.0	Het. mix. of clayey silt with sand & trace of gravel.	○	1	SS	47							
	Glacial Till	○	2	SS	33							
	Very Stiff to Hard	○	3	SS	26							
	Brown	○	4	SS	57							
	Gray	○	5	SS	39							
		○	6	SS	22							
		○	7	SS	24							
		○	8	SS	41							
493.0		○	9	SS	150/6"							
32.0	Het. mix. of silt, sand & gravel, trace of clay.	○	10	SS	175/11"							
	Glacial Till	○	11	SS	62							
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UNIFIED SOIL CLASSIFICATION SYSTEM



DEPARTMENT OF HIGHWAYS
MATERIALS and
TESTING
DIVISION

GRAIN SIZE DISTRIBUTION

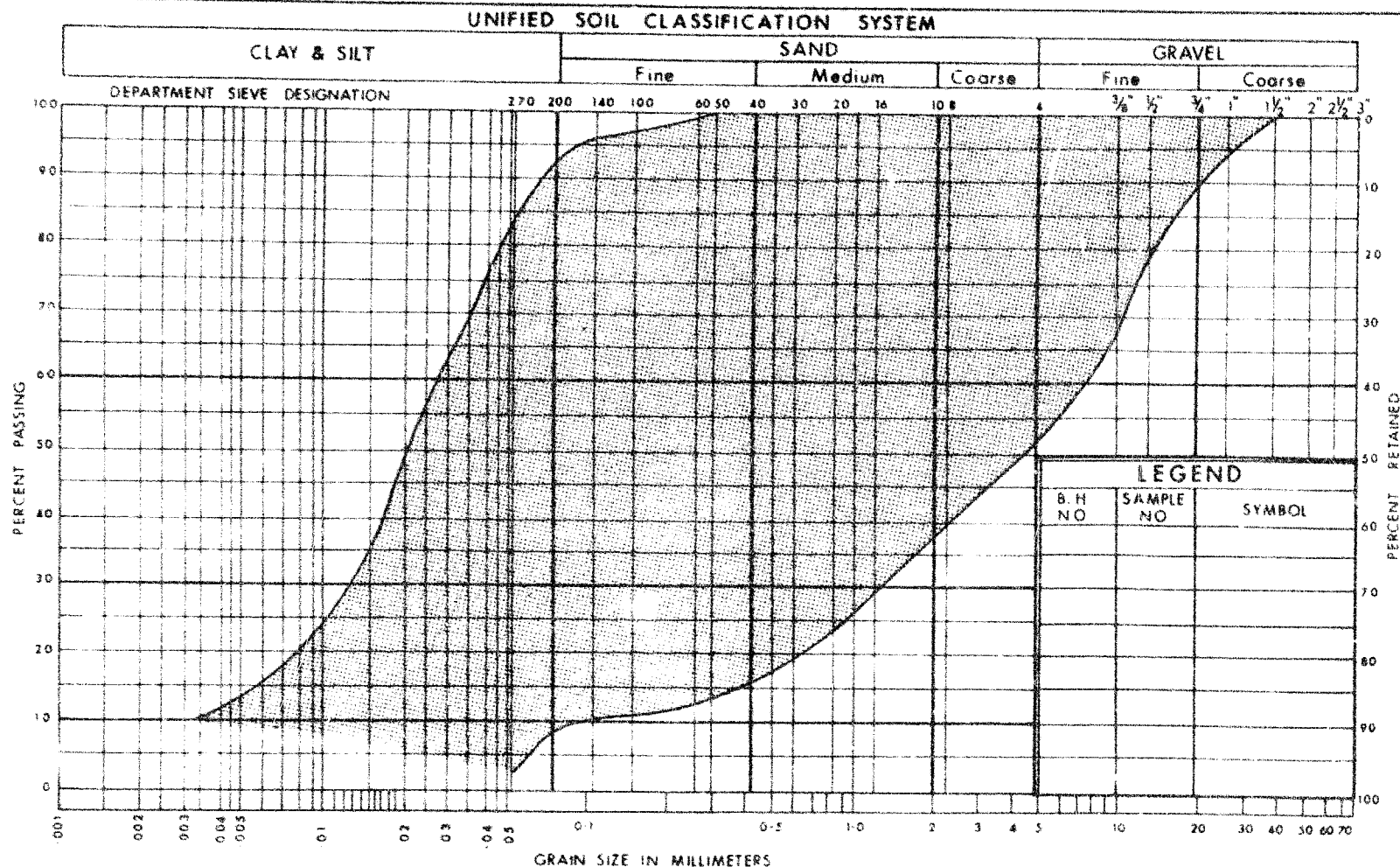
GLACIAL TILL (COHESIVE)

HET. MIX. CLAYEY SILT, TRACE OF SAND & GRAVEL

W.P. No. 275-65

JOB No. 71-11059

FIG. 1



DEPARTMENT OF HIGHWAYS
MATERIALS and
TESTING
DIVISION

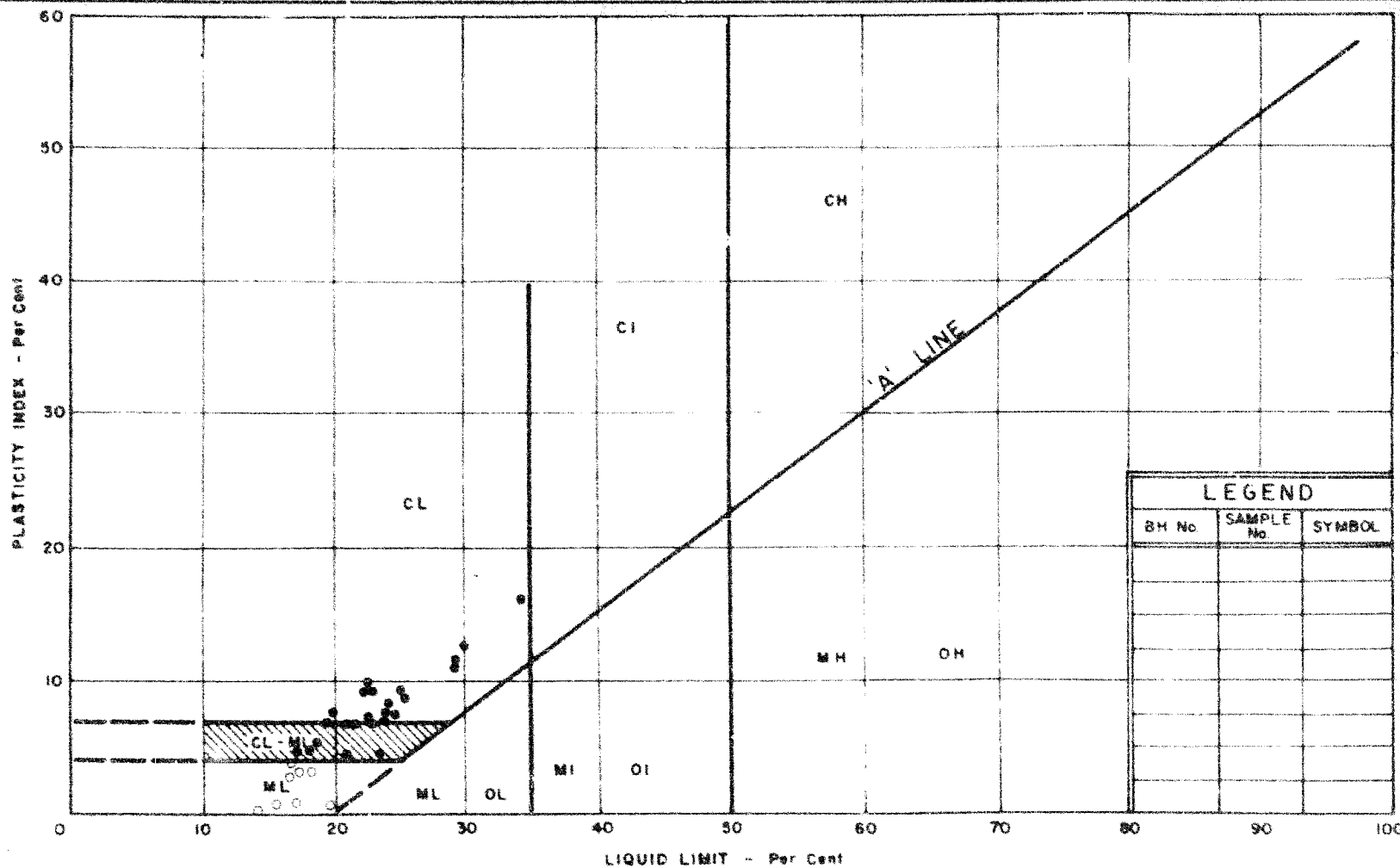
GRAIN SIZE DISTRIBUTION

GLACIAL TILL (NONCOHESIVE)
HET MIX. SILT, SAND & GRAVEL, TRACE OF CLAY

W.P. No. 275-55

JOB No: 71-11039

FIG 2



DEPARTMENT OF HIGHWAYS
MATERIALS and
TESTING
DIVISION

PLASTICITY CHART

● COHESIVE GLACIAL TILL, ○ NONCOHESIVE GLACIAL TILL

WFO No. 275-65

JOB No. 71-11039

FIG. 3

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

Copy for the information of

A. Stermac

C. Surchnert,
Reg. Bridge Planning Engr.,
93 Floral Parkway.

Structural Office,
West Bldg., Downsview.

February 21, 1972.

Re: Attwell Drive Overpass,
(Bridge #6) on Hwy. #409,
W.P. #275-65, Site 37-968,
Hwy. No. 409, District #6.

71-11-039

Attached herewith are revised prints of the Preliminary Bridge Plan Drawing D-37-968-P1 for the above-mentioned structure.

The estimated cost of the proposed structure is \$135,000.00, which includes tender, materials, engineering and sundry construction.

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

C.S. Grabaki,
Structural Design Engineer.

CSG:er
Attach.

c.c. A. Morin
B. Davis
A. Stermac (2)
J. Anderson
E. Pitagibbons

Re Comments
M. Davis
Feb 29/72

Department of Highways Ontario

Copy for the information of

Mr. A. Stermac

~~Mr. C. Macdonald~~

Regional Bridge Planning
Engineer,
90 Floral Parkway.

Structural Office,
West Building,
Downsview.

October 13, 1971.

Attwell Drive Overpass,
W.P. #275-65, Site No. 37-968,
Belfield Expressway, District #6.

71-11-039

Attached herewith are prints of the Preliminary Bridge
Plan Drawing D-7610-P1 for the above-mentioned structure.

The estimated cost of the proposed structure is
\$225,000 which includes tender, materials, engineering
and sundry construction.

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

C. S. Grebski,
Structural Design Engineer.

CSG/mh

ENCL*

CC: A. McKim,
B. Davis,
A. Stermac (2),
J. Anderson,
S. Fitzgibbons.

No comment
M. Davis
Oct 24/71

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS, ONTARIO

MEMORANDUM

TO: Mr. A. Stermac,
Principal Foundation Engineer,
Room 107, West Building,

FROM: Structural Office,
West Building, DOWNSVIEW.

ATTENTION:

DATE: September 29, 1972

OUR FILE REF.

IN REPLY TO

SUBJECT:


Attwell Drive Overpass,
Bridge #6,
W.P. #275-65, Site #37-968,
Hwy. #409, District #6.

71-11-039

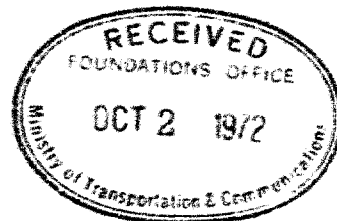
Attached herewith we are submitting the final bridge drawings which show the foundation design for this structure.

Kindly give us your comments at your earliest convenience.

CSG:dp
Attach.


C. S. Grebski,
Structural Design Engineer.

cc. Foundation Office.



No Comments
STA
1/27/72
OK 5/27

Copy to
1/27/72
OK

MEMORANDUM

Mr. A. G. Sternac
Principal Foundation Engineer
Room 107,
Lab. Building.

ATTENTION:

OUR FILE REF.

FROM: G. C. E. Burkhardt
Bridge Planning Section,
Central Building.

DATE: April 23, 1971.

IN REPLY TO

SUBJECT: Attwell Road Overpass,
Site 37-268. W.P. 275-65.
Belfield Expressway,
District 6.

The attached marked up print details the approximate location of the proposed footings for the above detailed structure. Also enclosed are prints taken from the Functional Planning Report showing the proposed grade.

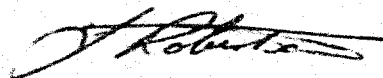
Due to the tight schedule on this project field reconnaissance reports are not available at this time but will be forwarded in the near future.

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

As this project is considered urgent we would appreciate any priority you may be able to extend to it.

JSR:lc
Encl.

c.c. R. Fitzgibbon
R. Strain



J. S. Robertson,
REG. BRIDGE PLANNING SUPERVISOR,
for:
G. C. E. Burkhardt,
REG. BRIDGE PLANNING ENGINEER.

CONT. 73-20

BELFIELD +

ATTWELL RD.

BR. #6 DIST. 6

30M11-114

