

MEMORANDUM

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

FROM: Foundation Section,
Room 107, Lab. Bldg.

ATTENTION: Mr. S. McCombie,
Bridge Planning Engr.

DATE: June 16, 1971

OUR FILE REF.

IN REPLY TO

JUN 23 1971

SUBJECT:

3011 H - 105
GEOMETRIC No.

FOUNDATION INVESTIGATION REPORT
For

Proposed Structure

At the

Crossing of Belfield Expressway and
Martin Grove Road

District No. 6 (Toronto)

W.O.-71-11035

--

W.P. 270-65

CONT 73-20

218-65-05 (for work)

Site 37-964

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/KdeF

Attach.

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

E. J. Giroux

B. A. Singh

De Leuw, Cather & Co. - R. Barr

Foundations Files

Gen. Files

A. G. Stermac

A. G. Stermac

PRINCIPAL FOUNDATION ENGINEER

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FOUNDATION INVESTIGATION REPORT
For
Proposed Structure
At the
Crossing of Belfield Expressway and
Martin Grove Road
District No. 6 (Toronto)
W.O. 71-11035 -- W.P. 270-65

1. INTRODUCTION:

The Foundation Section was requested to carry out a subsurface investigation at the proposed structure crossing of Belfield Expressway and Martin Grove 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 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.

2. SITE AND GEOLOGY:

The site is located approximately 1,000 ft. south of the intersection of Martin Grove and Belfield Road, in the Borough of Etobicoke, Metropolitan Toronto. The terrain, which is gently undulating in relief between about elevations 552 to 556, is unoccupied and grass-covered. The area immediately to the north, however, has been developed for commercial purposes; many one and two storey factories and warehouses are located there.

The site is located in the physiographic region known as the "Peel Plain". The characteristic deposit in this region is a ground moraine laid down during the Wisconsin glacial age.

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 75 and 85 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 geologic information indicates that the surface of the bedrock varies somewhere between elevations 470 and 475.

3. FIELD AND LABORATORY WORK:

A total of six sampled boreholes, five of which were accompanied by the 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 diamond drill rig and a Penn drill 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.

During sampling and drilling operations, detailed logs of the borings were made; these logs contain a record of drilling and sampling techniques used, together with the soil types encountered.

The location and elevation of all the boreholes are shown in Drawing #71-11035A, together with a number of estimated stratigraphical sections across the site. Surveying at the site was carried out by the personnel from the Foundation Section, Department of Transportation and Communications. The elevations given in this report are referred to a geodetic datum.

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

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 in the Appendix.

4. SUBSOIL CONDITIONS:

4.1) General:

The predominant stratum across the site is composed of a competent glacial till; this stratum was proven to extend a minimum of 61 feet below existing ground surface.

The gradational variations within the glacial till, as determined in the boreholes, are shown on the accompanying borelog sheets. The stratigraphical sections, shown on Drawing No. W.O. 71-11035A, have been inferred from this data.

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

4.2) Glacial Till Stratum:

The glacial till is present immediately beneath a thin topsoil cover (6 inches). This stratum was not fully penetrated at any of the boring locations; it was, however, proven to a depth of 61 feet below existing ground level at B.H. #5. The major portion of the till is cohesive in nature - i.e., it is composed of a matrix of clayey silt binding sand and gravel. A granular zone is sandwiched within the cohesive till. Here the glacial till is composed of a heterogeneous mixture of silt,

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

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

sand and gravel with a trace of clay. The thickness of this granular zone varies randomly from 6.5 to 20 feet; its surface was encountered between elevations 495 and 504.5. At some boring locations (refer to B.H.'s #1 and 5) boulders are present in the lower portion of the glacial till. These boulders generally range from 16 to 24 inches in size. Grain-size distribution curves for samples obtained within the two distinct zones are plotted in envelope form on Figure #1, in the Appendix of this report.

Atterberg limit tests were carried out on samples from the cohesive portion of the glacial till; these are plotted on the Record of Borelog sheets and summarized on the Plasticity Chart, Figure #2. The results are summarized in tabular form below:

	<u>Cohesive Portion</u>	
	<u>Range</u>	<u>(Average)</u>
Liquid Limit (W_L) (%)	18.5 - 28.5	(23)
Plastic Limit (W_P) (%)	12.5 - 18	(15)
Natural Moisture Content (W) (%)	8.5 - 18	(11)

Referring to the table, it can be seen that the cohesive portion of the glacial till is inorganic and has a plasticity in the low range. The corresponding natural moisture content is generally 2 to 3 percent below the plastic limit.

Standard penetration testing was performed within the stratum; the values obtained are plotted on the borelog sheets. The testing gave 'N' values which range from 12 blows/ft., in the upper portion of the stratum, increasing with depth to as many as 150 blows for 6 inches. The 'N' values in the granular zone of the

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

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

glacial till were generally greater than 100 blows/ft. Based on these results, it is estimated that the consistency of the cohesive portion of the till varies from stiff, near ground surface, increasing to hard with depth. It is inferred that the softer upper portion may be due to "reworking" of the glacial till in this area. The granular zone has a very dense relative density.

5. GROUNDWATER CONDITIONS:

Groundwater level observations have been carried out, during the period of the investigation, in the open boreholes. The results are shown on the Record of Borelog sheets and summarized on Drawing No. W.O. 71-11035A. These observations indicate that the groundwater level varies between elevations 515.5 and 518.5, which corresponds to depths of from 15 to 19 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, Atwell Road, 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 underpass structure at the crossing of the Belfield Expressway and Martin Grove Road. Discussions with regard to other structures on the expressway will be covered under separate foundation reports.

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

6.1) General:

The proposed underpass at the Martin Grove and Belfield Road Expressway will be a two-span (75' - 75') structure incorporating a centre pier at the median and perched abutments within the approach fills. The new bridge will be about 100 ft. wide. The profile grade of the Belfield Road Expressway will be at elevation 520 - i.e., be of the order of 11 to 13 ft. below the original ground surface. The proposed grade at the Martin Grove Road, in the vicinity of the structure, varies from elevation 545 to elevation 546, which is some 12 to 14 ft. above the original ground surface. At these grades the maximum height of the approaches will be of the order of 24 ft.

The predominant stratum across the site is an extensive deposit of glacial till extending at least 61 ft. below the ground surface. The major portion of the glacial till stratum is cohesive (heterogeneous mixture of clayey silt, sand and gravel). A granular zone, approximately 6 to 20 ft. thick, is sandwiched within this stratum; the surface of this zone was encountered between elevations 495 and 504.

The piers can be founded within the parent subsoil, while the abutments can be 'perched' within the proposed approach fills. The foundation recommendations for these respective elements are discussed in the sections to follow:

6.2) Pier Foundation: (Ref. B.H.'s #3 and #4):

The natural subsoil (cohesive glacial till) is competent. The centre pier, therefore, can be founded on a spread footing, located within this stratum below the proposed grade (elevation 520) of the Belfield Expressway. Four feet of earth cover should be provided to the underside of the footing for frost protection purposes. Spread footing, founded at or below elevation 516, can be designed using a safe bearing pressure of up to 3.0 t.s.f.

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

6.2) Pier Foundation: (Ref. B.H.'s #3 and #4): (cont'd.) ...

The footing will probably be located below the ground-water level recorded during the period of the investigation. In view of the relatively impervious nature of the cohesive subsoil, no major dewatering problems are anticipated, during the footing excavation phase. Any minor groundwater seepage or surface run-off into the excavation could be handled using standard techniques, such as pumping from sumps, etc.

Settlement of the foundation subsoil will take place due to the induced footing pressure. For a footing, inducing the aforementioned bearing pressure, the settlement will be negligible, since the foundation subsoil is competent. Further, this settlement will be elastic in nature - i.e., take place during or immediately following the construction period.

6.3) Abutment Foundations: (Ref. B.H.'s #1, 2, 5 and 6):

The proposed abutments may be 'perched' within the proposed approaches; two alternative methods are given for the foundation support of the abutments.

i) The abutments may be supported on spread footings placed within the approach fills. The fill material below the tops of the footings should consist of well compacted Granular 'A' material and should extend for a horizontal distance of at least 10 ft. from the footing edges in the plane of the footing tops. This portion of the fill should be built with side slopes of 2:1. The remainder of the fill should be completed to about profile grade for a distance of about 50 ft. behind the abutments before re-excavating for the abutment foundations.

ii) The proposed abutments may be constructed within the approach fills and supported on end-bearing steel H-piles driven into the very dense glacial till stratum. Design loads to be used are dependent on the pile section selected. In any

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

6.3) Abutment Foundations: (Ref. B.H.'s #1, 2, 5 and 6):
(cont'd.) ...

event, the actual proposed safe load of the piles should be checked in the field by means of the Hiley Formula according to D.H.O. Standards DD 1218 and DD 1219. For estimating purposes, the elevation of the pile tips can be assumed to be as follows:

South Abutment - elev. 485 - elev. 490

North Abutment - elev. 490

During construction of the approaches, care should be taken to ensure that no bouldery fill is placed at locations through which piles have to be driven.

6.4) Approach Fills and Cuts:

No stability problems are anticipated for the proposed approaches with standard 2:1 slopes, provided the fill material is properly compacted.

7. MISCELLANEOUS:

The field work was performed during the period of April 26 to May 3, 1971, under the supervision of Mr. S. Ahmad, 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. M. Devata, Supervising Foundation Engineer, who also reviewed this report.

June, 1971

APPENDIX I

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 1

FOUNDATION SECTION

JOB 71-11035

LOCATION Co-ord's: 878,126 N. 980,275 E

ORIGINATED BY S.A.A.

W.P. 270-65

BORING DATE April 26, 1971

COMPILED BY S.A.A.

DATUM Geodetic

BOREHOLE TYPE Washboring - NX-BX Casings

CHECKED BY

SC PROFILE		SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT				LIQUID LIMIT w_L PLASTIC LIMIT w_p WATER CONTENT w			BULK DENSITY Y PC F	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE		SHEAR STRENGTH PSF O UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE				WATER CONTENT % 10 20 30				
534.5	Ground Surface													
0.0	Het. Mix of Clayey silt, sand & gravel.		1	SS 21	530									4 21 55 20
			2	SS 31										
			3	SS 96										5 31 48 16
	Very stiff to hard.		4	SS 90	520									
	Brown changing to Grey below elev. 518.0		5	SS 67										
			6	SS 39										
			7	SS 23	510									
	Glacial Till		8	SS 21										
			9	BXL 100	500									
			10	BXL 100										
495.5	Het. Mix. of sl., sa. & gra., trace of clay		11	SS 100 76"										24 42 31 1
489.0	Co. dense Grey		12	SS 120 76"	490									
445.5														
482.7			13	SS 100 76"										
51.8	End of Borehole				480									

Elev. 515.5
in open BH, Apr. 26 1971

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 2

FOUNDATION SECTION

JOB 71-11035

LOCATION Co-ord's: 878,134 N. 980,376 E.

ORIGINATED BY S.A.A.

W.P. 270-65

BORING DATE Apr 1 27, 1971

COMPILED BY S.A.A.

DATUM Geodetic

BOREHOLE TYPE Continuous Flight Auger

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	SHEAR STRENGTH P.S.F.	WATER CONTENT %			
533.2	Ground Surface										
0.0	Het. Mix. of clayey silt, sand and gravel. Stiff to Hard. Brown changing to grey below elev. 517.0		1	SS 13	530						4 26 50 20
			2	SS 42							4 21 54 21
			3	SS 70/6"			125				Elev. 516.2
			4	SS 70/6"	520						in open BH
			5	SS 65							Apr. 27/71
			6	SS 38							
	Glacial Till		7	SS 15	510						
			8	SS 23							
			9	SS 100/3"	500						50 30 (20)
498.2											
35.0	Het. Mix. of silt sand & gravel, trace of clay. very dense - grey		10	SS 100/3"	490						
			11	SS 175/5"							
484.2											
49.0	End of Borehole				480						

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 3

FOUNDATION SECTION

JOB 73-11035

LOCATION Co-ordinates: 87P, 193 N 980, 254 E

ORIGINATED BY S.A.A.

W.P. 270-65

BORING DATE April 28, 1971

COMPILED BY S.A.A.

DATUM Geodetic

BOREHOLE TYPE Washboring - NX-BX Casing

CHECKED BY

SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT — w_L		PLASTIC LIMIT — w_p		WATER CONTENT — w		BULK DENSITY γ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAIT PLOT	NUMBER	TYPE	BLOWS / FOOT	ELEV. SCALE	SHEAR STRENGTH P.S.F.		WATER CONTENT %					
							<div><div>20</div><div>40</div><div>60</div><div>80</div><div>100</div></div>							
							<div><div><input type="radio"/> UNCONFINED</div><div><input checked="" type="radio"/> QUICK TRIAXIAL</div></div> <div><div>+ FIELD VANE</div><div>x LAB. VANE</div></div>							
									<div><div>w_p</div><div>w</div><div>w_L</div></div>					
									10		20		30	
534.7	Ground Surface													GR SA SI CL
0.0	Het. Mix. of clayey silt, sand and gravel.		1	SS	16	530								
			2	SS	40									
	Very Stiff to Hard		3	SS	45									
	Brown changing to Grey below elev. 515.0		4	SS	65	520								6 31 49 14
			5	SS	22									8 30 47 15
			6	SS	42									516.7
	Glacial Till		7	SS	18	510								in open
			8	SS	29									BH
			9	SS	160	500								Apr. 28/7
499.7			10	SS	150/6"									18 64 (18)
35.0	Het. Mix. of silt, sand and gravel, trace of clay.		11	SS	175/6"	490								
	Very dense - grey		12	SS	120/6"									
481.7			13	SS	100/6"									
53.0	End of Borehole					480								

6 31 49 14

8 30 47 15

516.7

in open

BH

Apr. 28/71

18 64 (18)

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 4

FOUNDATION SECTION

JOB 71-11035

LOCATION Co-ord's: E78,194 N. 980,360 E.

ORIGINATED BY S.A.A.

W.P. 270-65

BORING DATE April 28, 1971

COMPILED BY S.A.A.

DATUM Geodetic

BOREHOLE TYPE Continuous 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 Y P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE		20	40	60	80	100	w_p	w	w_L		
534.4	Ground Surface														
0.0	Het. Mix. of clayey silt, sand and gravel.		1	SS	27										
			2	SS	53										
	Very Stiff - Hard		3	SS	50										
	Brown changing to Grey below elev. 519.0		4	SS	90 7/8"										
			5	SS	71										
	Glacial Till		6	SS	12 7/5"										
			7	SS	28										
504.4			8	SS	39										
30.0	Het. Mix. of silt, sand and gravel, trace of clay.		9	SS	110										
	Dense to very dense. Grey		10	SS	100 7/4"										
489.4			11	SS	150 7/6"										
45.0			12	SS	116 7/6"										
483.4															
51.0	End of Borehole														

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 5

FOUNDATION SECTION

JOB 71-11035

LOCATION Co-ord's: 878,276 N. 980,231 E.

ORIGINATED BY S.A.A.

W.P. 270-65

BORING DATE April 29, 1971

COMPILED BY S.A.A.

DATUM Geodetic

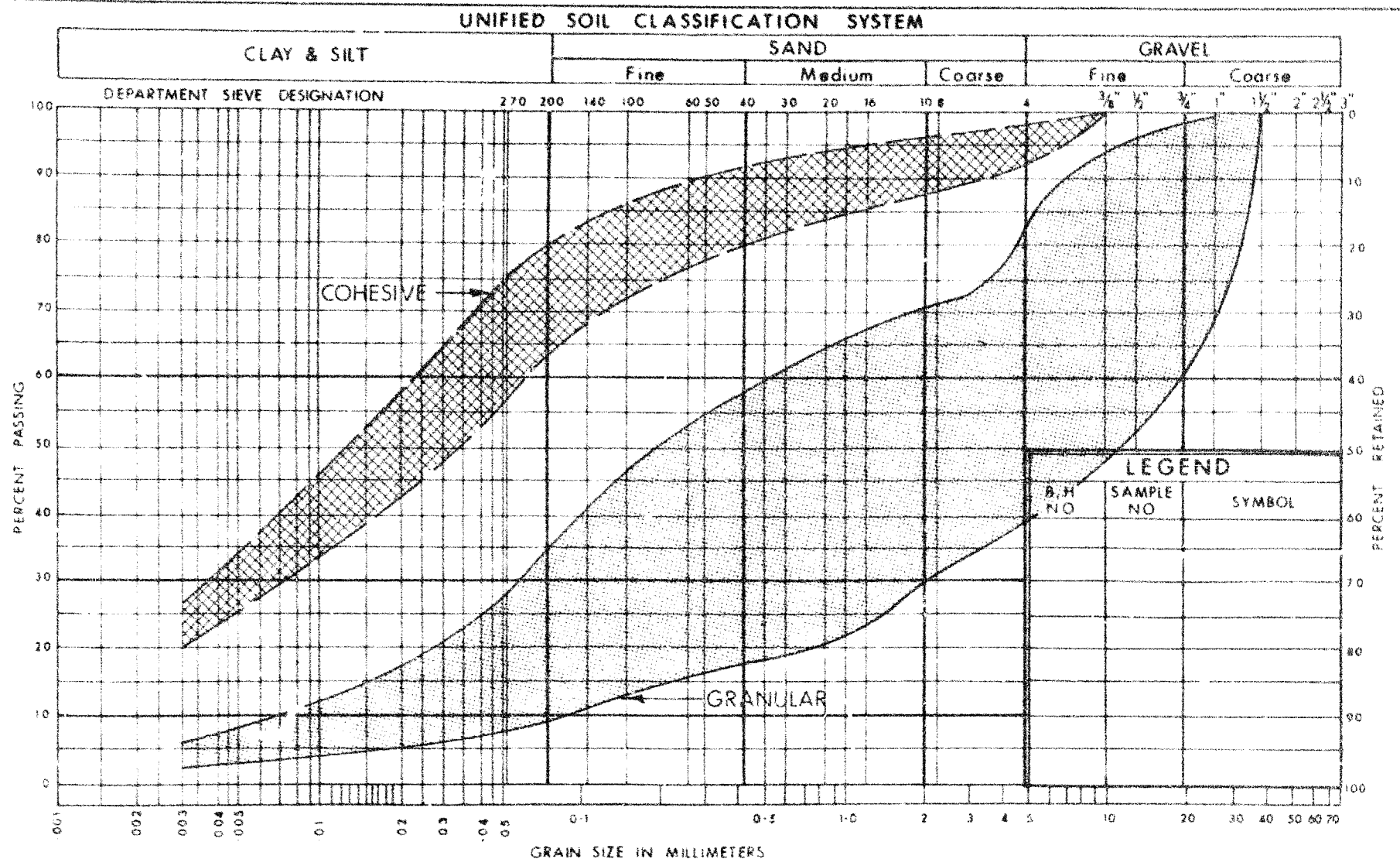
BOREHOLE TYPE Washboring - NX & BX Casing

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 Y	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE		20	40	60	80	100	w_p	w	w_L		
534.4	Ground Surface														
0.0	Net. Mix. of clayey silt, sand and gravel.		1	SS	12										1 30 51 18
			2	SS	50										3 32 52 13
			3	SS	43					125					
	Stiff to Hard		4	SS	97										
	Brown changing to Grey below elev. 518.0		5	SS	45										518.4 in open BH Apr. 29/71
			6	SS	50										
			7	SS	38										
	Glacial Till		8	SS	16										
499.4			9	SS	100/6										61 30 (9)
35.0	Net. Mix. of silt, sand & gravel, trace of clay.		10	SS	100/5"										
	Glacial Till		11	S	100/5"										
	-Occasional Boulders up to 24" in size below elev. 485.0 V. Dense		12	RC	Rec										
479.4	Grey		13	BXL	200/1.60										
55.0	(Occasional Boulders up to 16" in size)		14	SS	100/6"										
			15	RC	Rec										
473.9			16	BXL	300/6"										
60.5	End of Borehole														

DEPARTMENT OF HIGHWAYS- ONTARIO		RECORD OF BOREHOLE No. 6		FOUNDATION SECTION	
MATERIALS & TESTING OFFICE					
JOB 71-1127	LOCATION Co-ords: 778,316 N. 980,330 E.	ORIGINATED BY S.A.A.			
W.P. 270-65	BORING DATE April 29, 1971	COMPILED BY S.A.A.			
DATUM Geodetic	BOREHOLE TYPE Continuous Flight Auger	CHECKED BY			

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE	LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w			BULK DENSITY γ	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FOOT		BLOWS/FOOT 20 40 60 80 100	SHEAR STRENGTH P.S.F. ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE				
533.1	Ground Surface											P.C.F. GR. SA. SI. CL.
0.0	Het. Mix. of clayey silt, sand and gravel. Stiff to Hard. Brown changing to Grey below elev. 513.0		1	SS	12	530						28 51 15
			2	SS	30							28 50 19
			3	SS	75							
			4	SS	29	520						
			5	SS	129							518.4 in oper
			6	SS	55							Apr. 29/71
	Glacial Till		7	SS	28	510						
			8	SS	68							23 52 22 3
498.1			9	SS	100	500						
35.0	Het. Mix. of silt, ss. & grs. trace of cl. - v. dense - grey		10	SS	110/6"							
493.1			11	SS	120/5"	490						
40.0			12	SS	120/3"							
477.1			13	SS	130/6"	480						
56.0	End of Borehole					470						



DEPARTMENT OF HIGHWAYS
MATERIALS and
TESTING
DIVISION

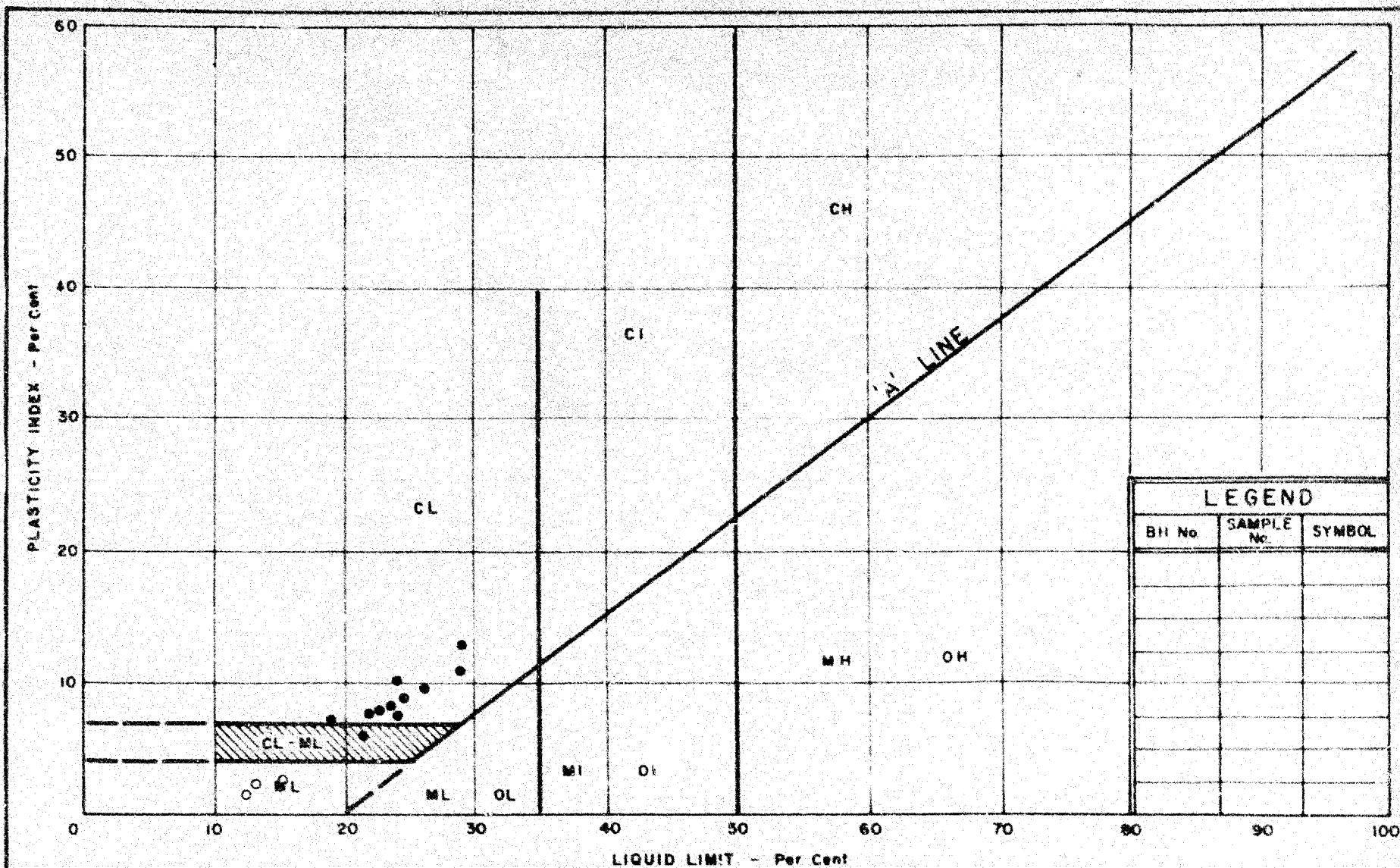
GRAIN SIZE DISTRIBUTION

GLACIAL TILL

WP No. 270 - 65

JOB No: 71-11035

FIG. 1



DEPARTMENT OF HIGHWAYS
MATERIALS and
TESTING
DIVISION

PLASTICITY CHART

● COHESIVE ○ GRANULAR

WP No. 270 - 65

JOB No. 71-11035

FIG. 2

~~DEPARTMENT OF HIGHWAYS AND BRIDGES~~

MEMORANDUM

To: Mr. G. C. E. Burkhardt,
Regional Bridge Planning Eng.,
Central Region,
90 Floral Pkwy., Downsview.

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

ATTENTION:

DATE: February 10, 1972.

OUR FILE REF.

IN REPLY TO

FEB 15 1972

SUBJECT:

ADDENDUM TO THE
FOUNDATION INVESTIGATION REPORT
For

Proposed Structure at the Crossing of
Belfield Expressway and Martingrove Rd.
And Related Retaining Wall #3
District #6 (Toronto)

W.O. 71-11035 -- W.P. 270-65

Since the submission of our Foundation Investigation Report (W.O. 71-11035) on June 23, 1971, we have been requested to carry out an additional investigation at the above-mentioned location in the area of Retaining Wall No. 3. Subsequently, an investigation consisting of two sampled boreholes with dynamic cone penetration test was carried out.

These borings revealed that the predominant stratum across the site is composed of a competent glacial till extending at least 36.5 feet below the existing ground surface. The gradational variations within the glacial till, as determined in the boreholes, are shown on the accompanying borelog sheets (Boreholes A and B). The stratigraphical section shown on Drawing No. W.O. 71-11035 B, is based on this information.

Groundwater level observations have been carried out in the open boreholes during the period of the investigation.

These observations indicate that the groundwater level varies from elevation 523 to 526, which corresponds to depths of from 2 to 5 feet below existing ground surface.

DISCUSSIONS AND RECOMMENDATIONS:

It is proposed to construct a retaining wall (Wall #3) at the Martingrove Rd. and Belfield Expressway (Ewy. #409) interchange, between stations 40+00 and 41+50 east side of ramp E-MG.

The details of retaining wall height and the related base elevation are not available at the time of writing this memo. The subsoil conditions are generally favourable for spread footing type of support. In order to provide sufficient cover for frost protection purposes, the footing for the retaining structure should be located at least 4 feet below the finished ground. Spread footing, located at or below elevation 524 supporting Retaining Wall #3 can be designed using an allowable bearing pressure of 2.5 tons/ft.². However, if higher bearing pressures are required, the footing will have to be located below elevation 520 with an allowable load of up to 4 tons/ft.².

Excavations for the footing may be carried out below the prevailing groundwater level. In view of the relatively impervious nature of the cohesive subsoil at the footing formation level, no major dewatering problems are anticipated. Any minor groundwater seepage or surface runoff into the excavations could be handled by normal pumping methods from sumps.

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

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

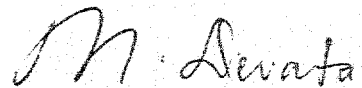
Coefficient of active earth pressure $K_a = 0.33$ (Some movement at the top of wall permitted)

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

In order to relieve the build-up of excess hydrostatic pressure behind the retaining structures, 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 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.

MD/ao



M. Devata,
SUPERVISING FOUNDATION ENGINEER.

cc: Messrs. B. R. Davis
G. C. E. Burkhardt. (4)
A. Rutka
D. W. Farren
G. K. Hunter
H. Greenland
B. J. Giroux
T. J. Kovich
B. A. Singh
DeLeuw, Cather (R. Barr)

Foundations Files ✓
Documents

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. A

FOUNDATION SECTION

JOB 71-11035

LOCATION Belfield & Martin Grove (Ret. Wall for

Ramp E-MG) 878,611 N, 980,670 E.

ORIGINATED BY V.K.

W.P. 270-65

BORING DATE June 15, 1971

COMPILED BY H.T.

DATUM Geodetic

BOREHOLE TYPE Auger

CHECKED BY *So*

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		BLOWS / FOOT					SHEAR STRENGTH P.S.F.					WATER CONTENT %
							20	40	60	80	100	○ UNCONFINED	+ FIELD VANE	● QUICK TRIAXIAL			
527.7	Ground Level.																
	Het. Mix. of clayey silt, sand & gravel.		1	SS	23												
			2	SS	71												
	Very stiff to hard.		3	SS	157												
			4	SS	175												
	Brown changing to grey below elev. 513.		5	SS	95												
			6	SS	50												
			7	SS	94												
	Glacial Till.		8	SS	166												
498.7																	
20.0	Het. Mix. of silt ss. & gra., trace of Clay.		9	SS	171												
491.2	Very dense. Grey		10	SS	145												
36.5	End of borehole.																

525.3
W.L. in
open B.H.
June 16/71

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. B

FOUNDATION SECTION

JOB 71-11035

Belfield and Martin Grove (Ret. Wall for Ramp E-MG)
LOCATION Co-Ord's 878,570 N; 980,763 E.

ORIGINATED BY V.K.

W.P. 270-65

BORING DATE June 15, 1971

COMPILED BY A.E.D.

DATUM Geodetic

BOREHOLE TYPE Continuous Flight Auger (Pen drill)

CHECKED BY *So*

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		BLOWS / FOOT 20 40 60 80 100					SHEAR STRENGTH P.S.F.					WATER CONTENT % w_p ——— w ——— w_L		
526.6	Ground level.																		
	Het. Mix. of clayey silt, sand and gravel.		1	SS	37														
			2	SS	74	520													
	Brown changing to grey below elev. 515.		3	SS	158														
			4	SS	101														
	Glacial Till.		5	SS	93	510													
			6	SS	54														
			7	SS	60														
			8	SS	137	500													
499.6																			
27.0	Het. mix. of silt sa. & gravel, trace of clay.		9	SS	140/6"														
190.1	Very dense. Grey		10	SS	120/6"	490													
36.5	End of borehole.					480													

522.3
W.L. in
open B.H.
June 16/71

MEMORANDUM

TO: Mr. G.C.E. Burkhardt,
Regional Structural Planning Engineer,
Central Region,
90 Floral Parkway.

FROM: Foundations Office,
Design Services Branch,
Downsview, Ontario.

ATTENTION:

DATE: June 7, 1972.

OUR FILE REF.

IN REPLY TO JUN 9 1972

SUBJECT: Proposed Retaining Wall #R-3 near the Crossing
of Belfield Expressway (Hwy. #409) and
Martingrove Rd.
District No. 6 (Toronto)
W.O. 71-11035 - W.P. 270-65

Since the submission of our foundation report (W.O. 71-11035) for the structure, this Office was requested to carry out an additional investigation for the associated Retaining Wall #R-3. The geometric details of this retaining wall were provided by the Regional Structural Planning Section. A supplementary investigation was carried out by this Office to determine the subsoil and groundwater conditions at the location of Retaining Wall #R-3. The results of this investigation, together with the recommendations pertaining to the design of the Retaining Wall #R-3 were submitted in a memo (dated February 15, 1972) by this Office.

Since the submission of this memo, the length of Retaining Wall #R-3 was increased by about 60 feet at the north end and by about 150 feet at the south end. As a result of this two additional borings (B.H.'s #C and #D) were carried out in April, 1972.

The recent borings revealed similar subsoil conditions to those encountered in the previous investigation. Based on these results it is concluded that the recommendations contained in our memo (dated February 15, 1972) will be applicable, for the additional portion of the Retaining Wall #R-3. The enclosed additional borehole log sheets and the revised drawing 71-11035B, together with this memo, should be included in our Foundation Report.

June 7, 1972

Should you require any further information with regard to this project, please feel free to contact this Office.

MD/ht
Attach.

M. Devata
M. Devata
SUPERVISING FOUNDATIONS ENGINEER

c.c. B.R. Davis
H. Greenland
A. Rutka
D.W. Farren
P.J. Harvey
C.A. Wrong
B.J. Giroux
T.J. Kovich
B.A. Singh
Deleuw, Cather Ltd. (R. Barr)

Foundations Files
Documents

FOUNDATION SECTION

CHECKED BY *[Signature]*

15-5 % STRAIN AT FAILURE

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS
DESIGN SERVICES BRANCH

RECORD OF BOREHOLE No. D

FOUNDATION SECTION

JOB 71-11035

LOCATION Co-ords. 878,551 N. 980,913 E.

ORIGINATED BY H.S.

W.P. 270-65

BORING DATE March 30, 1972

COMPILED BY H.S.

DATUM Geodetic

BOREHOLE TYPE Continuous Flight Auger (Penn Drill)

CHECKED BY

SOIL PROFILE		STRAT. PLOT	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		NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F.					WATER CONTENT %				
							○ UNCONFINED ● QUICK TRIAXIAL		+ FIELD VANE x LAB. VANE			w_p — w — w_L				
527.5	Ground level.															
	Het. mixture of clayey silt, sand and gravel.		1	SS	13											
			2	SS	35	520										
	Very stiff to hard.		3	SS	98											
	Brown changing to grey below El. 513.5		4	SS	104	6"										
	Glacial Till		5	SS	164											
			6	SS	48	510										
			7	SS	39											
			8	SS	101	500										
			9	SS	110	6"										
492.5			10	SS	46											
35.0	Het. mixture of silt sand and gravel.					490										
	Trace of clay.		11	SS	21										9 42 39 10	
	Compact to very dense		12	SS	100	5"									8 41 45 6	
			13	SS	100	0"										
468.5						470										
59.0	End of borehole.					460										

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS, ONTARIO

MEMORANDUM

TO: Mr. G.C.E. Burkhardt,
Reg. Structural Planning Engineer,
Central Region,
90 Floral Pkwy.

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

ATTENTION:

DATE: December 27, 1972.

OUR FILE REF.

IN REPLY TO

JAN 2 1973

SUBJECT:

*Proposed Retaining Wall #R-3 Extension Near
the Crossing of Belfield Expressway (Hwy. #409)
and Martingrove Rd.
District No. 6 (Toronto)
W.O. 71-11035 -- W.P. 218-65-05*

In response to a request contained in a memo of October 13, 1972 received from Mr. G.C.E. Burkhardt, Regional Structural Planning Engineer, a supplementary investigation was carried out by this Office to determine the subsoil and groundwater conditions at location of extended Retaining Wall #R-3.


Since the submission of our last letter (June 7, 1972) to Regional Structural Planning Section, the length of Retaining Wall #R-3 has been increased by about 480 ft. at the east end. In order to investigate this additional area four new borings (E, F, G, H) were carried out in October, 1972.

The new borings revealed similar subsoil conditions to those encountered in our previous investigations. Based on these results it is concluded that the recommendations contained in our memo (dated February 15, 1972) will be applicable for the additional portion of the Retaining Wall #R-3.

The enclosed additional borehole log sheets and the revised drawing 71-11035B, together with this memo, should be included in our Foundation Report (W.O. 71-11035)

December 27, 1972.

Should you require any further information with regard to this project please feel free to contact this Office.



V. Korlu,
Project Foundations Engineer.
M. Devata,
Supervising Foundations Engineer.

VK/ck
Encl.

For:

c.c. B. 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
 De Leuw, Cather & Co. - R. Barr

Foundations Files ✓
Gen. Files

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO'E'

JOB 71-11035

LOCATION Co-ords. 878,582 N; 981,020 E.

ORIGINATED BY JK

W.P. 218-65-05

BORING DATE Oct. 20, 1972

COMPILED BY VK

DATUM Geodetic

BOREHOLE TYPE Wash & Bore with BX Casing

 CHECKED BY *OK*

SOIL PROFILE			SAMPLES		ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE				LIQUID LIMIT w_L			BULK DENSITY	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE		BLOWS / FOOT	20	40	60	80	100	WATER CONTENT w		
526.0	Ground Level													
523.0	Clayey silt with sand & some gravel (Fill)		1	SS	16									
3.0	Het. mix. of clayey silt sand and gravel.		2	SS	30									
			3	SS	93									
			4	SS	171									
	Brown		5	SS	129									
	Grey		6	SS	69									
	Glacial Till		7	SS	175									
498.0	Very Stiff to Hard													
28.0	Het. mix. of silt, sand & grav. tr. clay. V. Dense													
495.0														
31.0	End of Borehole													

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO F

JOB 71-11035

LOCATION Co-ords. 878,629 N; 981,143 E.

ORIGINATED BY VK

W.P. 218-45-05

BORING DATE Oct. 19, 1972

COMPILED BY JLC

DATUM Geodetic

BOREHOLE TYPE Wash and Bore with BX Casing

CHECKED BY JLC

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT		LIQUID LIMIT — W _L PLASTIC LIMIT — W _P WATER CONTENT — W		BULK DENSITY P.C.F.	REMARKS		
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FOOT		20	40	60	80			100	W _P
524.3	Ground Level													
0.0	Clayey silt with sand & some gravel (Fill)													
520.3	Hard		1	SS	34	520								
4.0	Het. mix. of clayey silt, sand & gravel.		2	SS	53									
			3	SS	65									
			4	SS	114	510								
	Brown Grey		5	SS	162									
			6	SS	69									
	Glacial Till		7	SS	35	500								
496.3	Hard		8	SS	140									
28.0	Het. mix. of silt, sand & gravel, tr. of clay.		9	SS	157									
493.3														
31.0	End of Borehole					490								

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO G

JOB 71-11035

LOCATION Co-ords. 878,681 N; 981,263 E.

ORIGINATED BY VK

W.P. 218-65-05

BORING DATE Oct. 17, 1972

COMPILED BY VK

DATUM Geodetic

BOREHOLE TYPE Wash and Bore with BX Casing

 CHECKED BY *SK*

SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION RESISTANCE				LIQUID LIMIT — WL			BULK DENSITY	REMARKS		
ELEV. DEPTH	DESCRIPTION	STRAT. PLT	NUMBER	TYPE	BLOWS/FOOT	ELEV. SCALE	BLOWS / FOOT				PLASTIC LIMIT — WP					
							20	40	60	80	100	WATER CONTENT — W				
							SHEAR STRENGTH P.S.F.				Wp — W — WL			WATER CONTENT %		
							O UNCONFINED + FIELD VANE				10 20 30			P.C.F. GR SA SI CL		
							X QUICK TRIAXIAL X LAB VANE									
519.7	Ground Level															
0.0	Brown															
	het. mix. of clayey silt, sand and gravel		1	SS	24										515.7	
			2	SS	53										15 25 44 16	
	Glacial Till		3	SS	158	510										
			4	SS	118										0 42 42 16	
502.7	Very Stiff to Hard		5	SS	72											
17.0	het. mix. of silt, sand & gravel, trace of clay		6	SS	113	500									0 49 49 2	
497.2	Very Dense		7	SS	181											
22.5	End of Borehole															
						490										

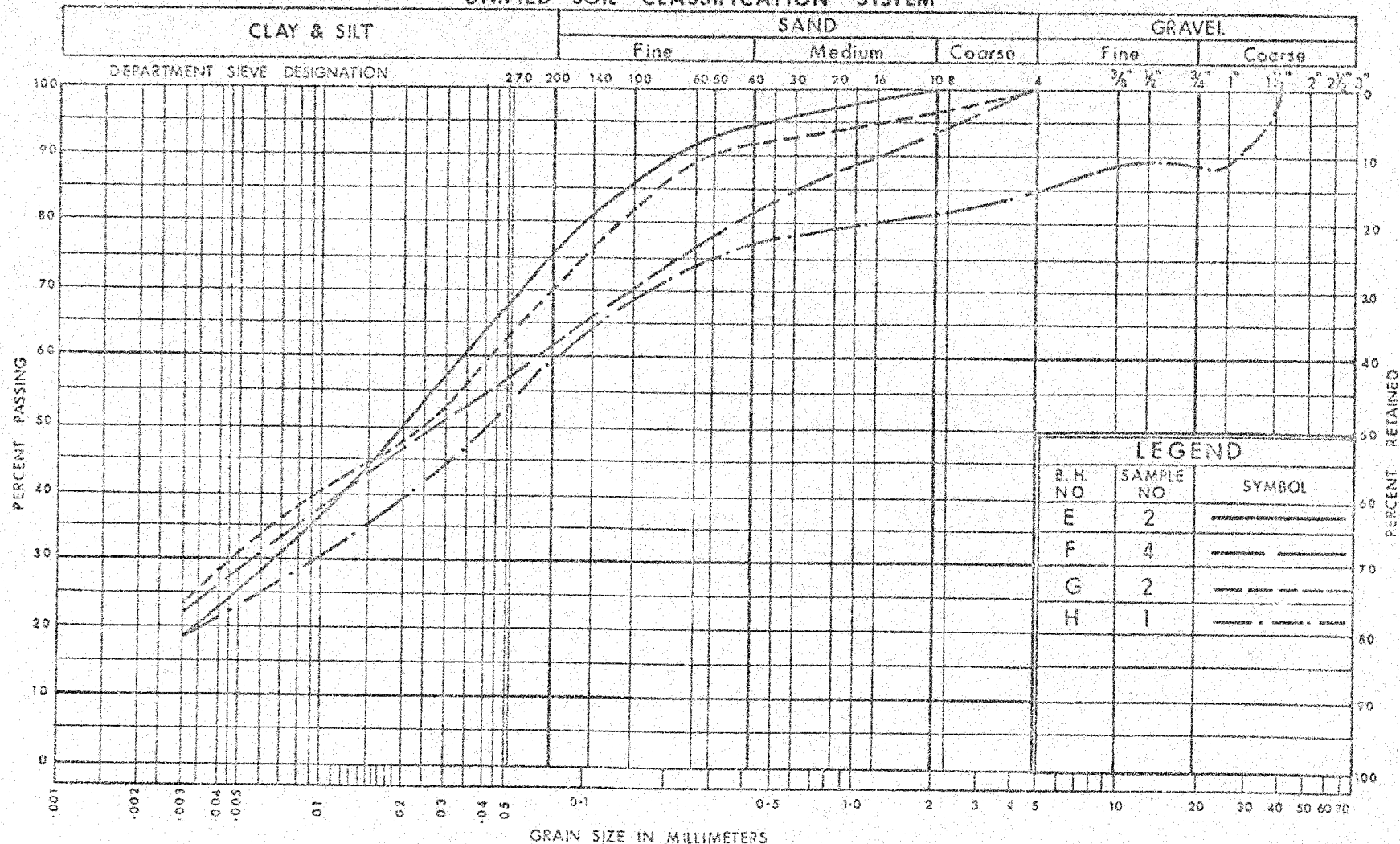
OFFICE REPORT ON SOIL EXPLORATION

FOUNDATIONS OFFICE

CHECKED BY

20
15 5 % STRAIN AT FAILURE
10

UNIFIED SOIL CLASSIFICATION SYSTEM



DEPARTMENT
OF
TRANSPORTATION AND COMMUNICATIONS



DESIGN SERVICES
BRANCH

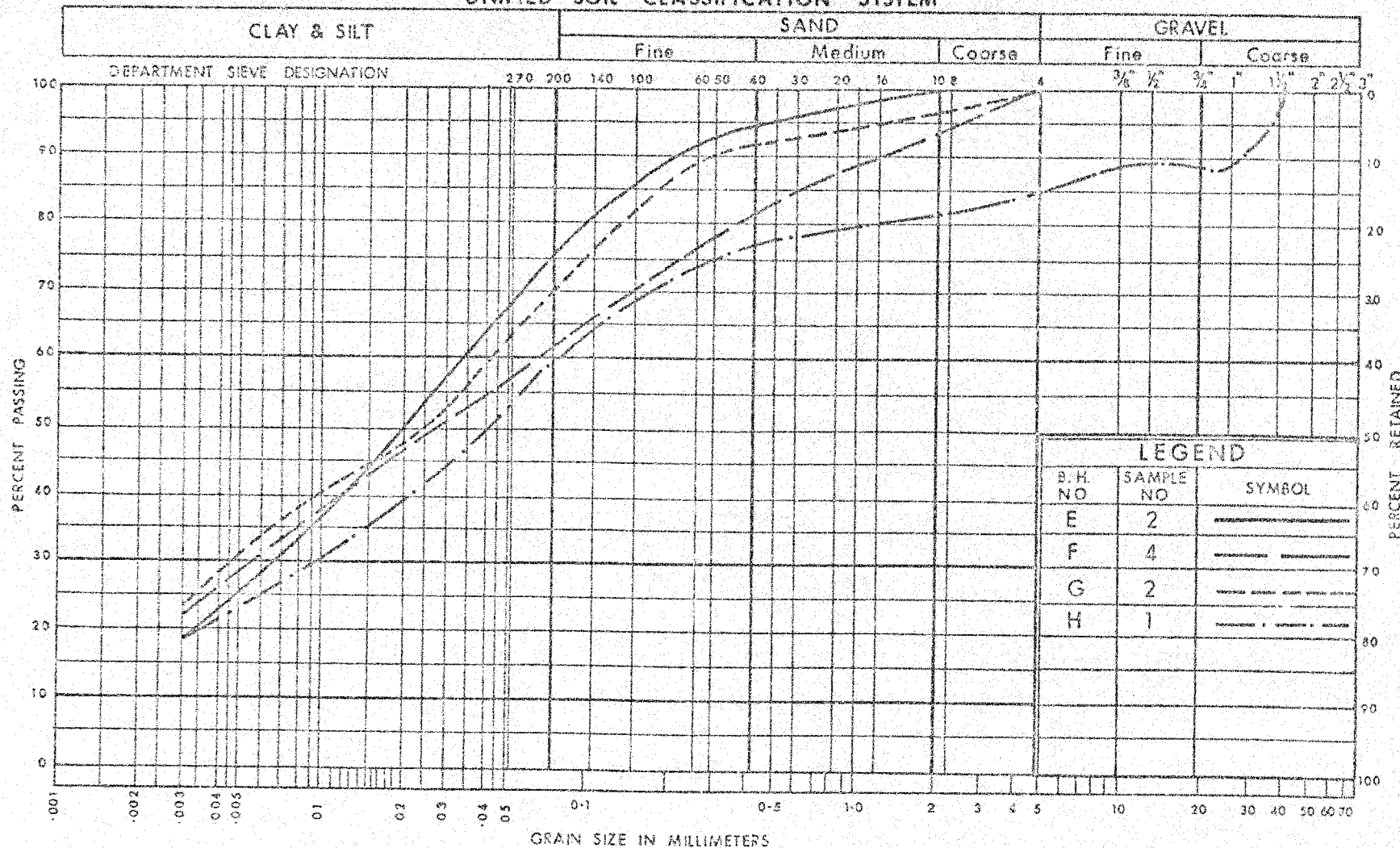
GRAIN SIZE DISTRIBUTION
GLACIAL TILL (COHESIVE)
CLAYEY SILT WITH SOME SAND AND GRAVEL

W.P. No. 218-65-05

JOB No. 71-11035

FIG. No. 1

UNIFIED SOIL CLASSIFICATION SYSTEM



DEPARTMENT
OF
TRANSPORTATION AND COMMUNICATIONS



DESIGN SERVICES
BRANCH

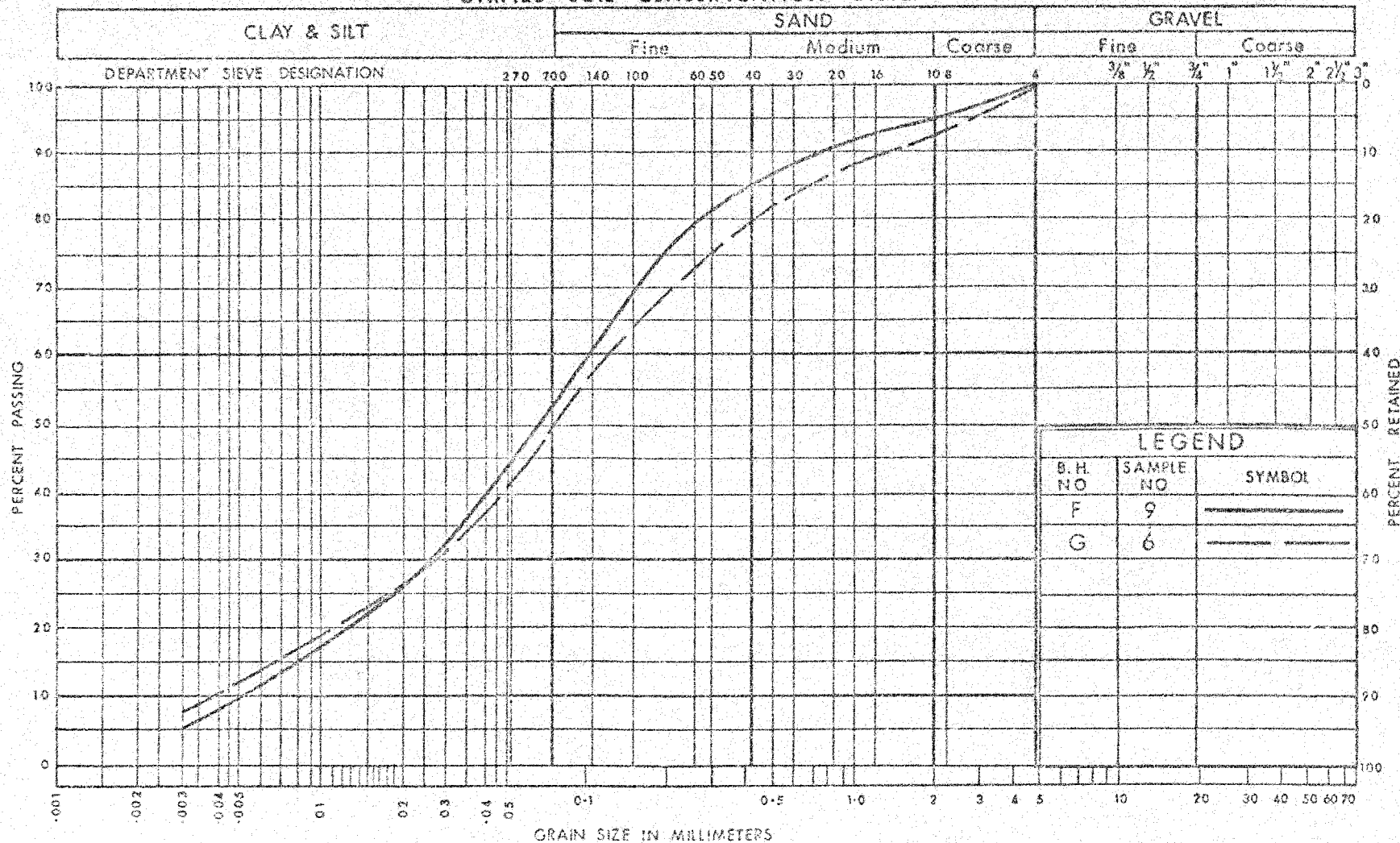
GRAIN SIZE DISTRIBUTION
GLACIAL TILL (COHESIVE)
CLAYEY SILT WITH SOME SAND AND GRAVEL

W.P. No. 218-65-05

JOB No. 71-11035

FIG. No. 1

UNIFIED SOIL CLASSIFICATION SYSTEM



DEPARTMENT
OF
TRANSPORTATION AND COMMUNICATIONS



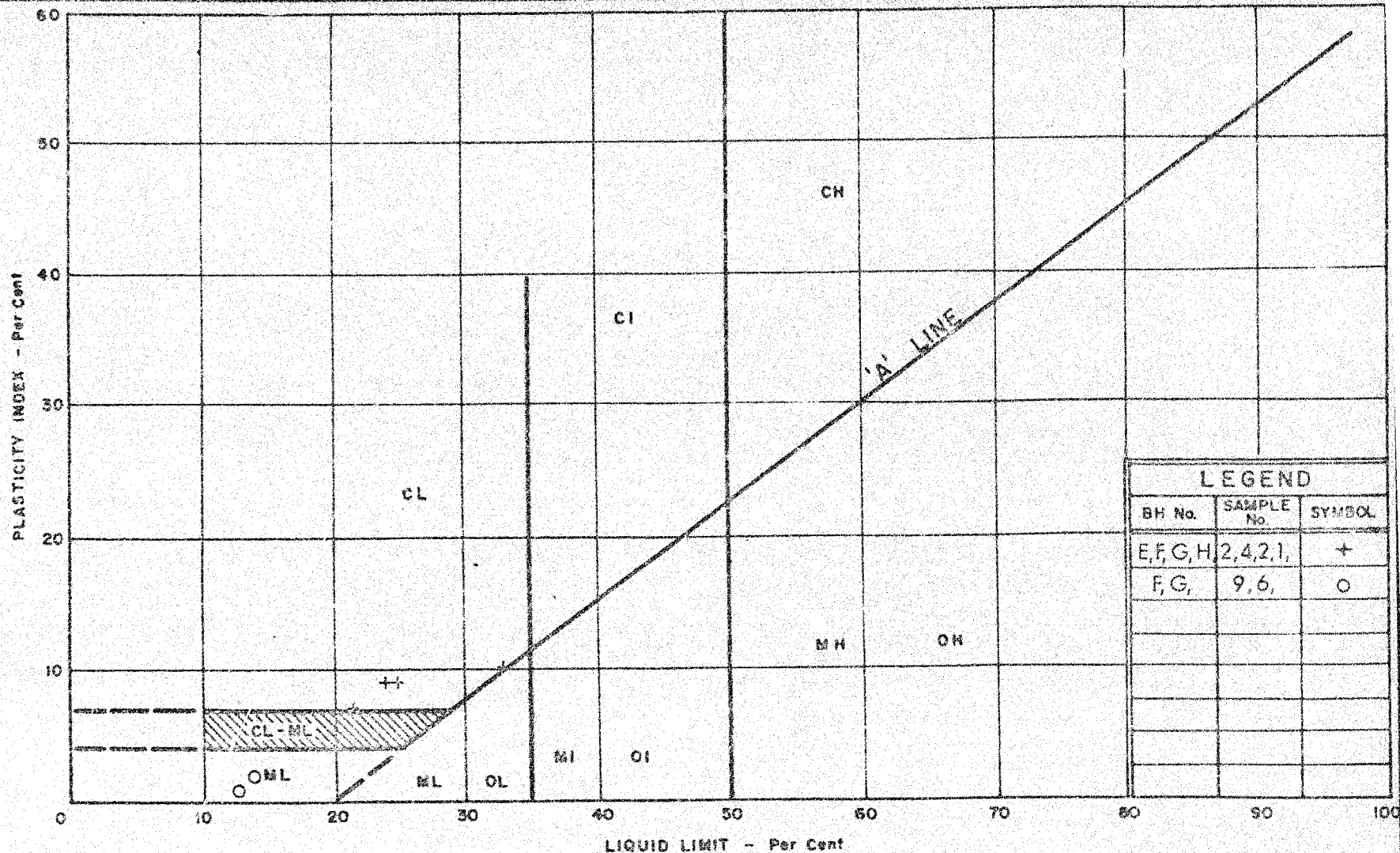
DESIGN SERVICES
BRANCH

GRAIN SIZE DISTRIBUTION
GLACIAL TILL (NON COHESIVE)
SILTY SAND WITH SOME GRAVEL AND TRACE OF CLAY

W.P. No. 218-65-05

JOB No. 71-11035

FIG. No 2



DEPARTMENT OF HIGHWAYS
MATERIALS and
TESTING
DIVISION

PLASTICITY CHART

+ COHESIVE
o NON-COHESIVE

WP No. 218-65-05

JOB No. 71-11035

FIG. No. 3

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS, ONTARIO

MEMORANDUM

TO: Mr. G.C.E. Burkhardt,
Reg. Structural Planning Engineer,
Central Region,
90 Floral Pkwy.

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

ATTENTION:

DATE: December 27, 1972.

OUR FILE REF.

IN REPLY TO JAN 2-1073

SUBJECT:

*Proposed Retaining Wall #R-3 Extension Near
the Crossing of Belfield Expressway (Hwy. #409)
and Martingrove Rd.
District No. 6 (Toronto)
W.O. 71-11035*

W.P. 218-65-05

In response to a request contained in a memo of October 13, 1972 received from Mr. G.C.E. Burkhardt, Regional Structural Planning Engineer, a supplementary investigation was carried out by this Office to determine the subsoil and groundwater conditions at location of extended Retaining Wall #R-3.

Since the submission of our last letter (June 7, 1972) to Regional Structural Planning Section, the length of Retaining Wall #R-3 has been increased by about 480 ft. at the east end. In order to investigate this additional area four new borings (E, F, G, H) were carried out in October, 1972.

The new borings revealed similar subsoil conditions to those encountered in our previous investigations. Based on these results it is concluded that the recommendations contained in our memo (dated February 15, 1972) will be applicable for the additional portion of the Retaining Wall #R-3.

The enclosed additional borehole log sheets and the revised drawing 71-11035B, together with this memo, should be included in our Foundation Report (W.O. 71-11035)

December 27, 1972.

Should you require any further information with regard to this project please feel free to contact this Office.



V. Korklu,
Project Foundations Engineer.
M. Devata,
Supervising Foundations Engineer.

VK/ck
Encl.

For:

c.c.

B. 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
De Leuw, Cather & Co. - R. Barr

Foundations Files
Gen. Files

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE N^o 'E'

JOB 71-11035

LOCATION Co-ords. 878,582 N; 981,020 E.

ORIGINATED BY VK

W.P. 218-65-05

BORING DATE Oct. 20, 1972

COMPILED BY VK

DATUM Geodetic

BOREHOLE TYPE Wash & Bore with BY Casing

CHECKED BY *[Signature]*

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT					LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w			BULK DENSITY γ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FOOT		20	40	60	80	100	w_p	w	w_L		
526.0	Ground Level															
523.0	clayey silt with sand & some gravel (Fill)		1	SS	24											
3.0	Het. mix. of clayey silt & sand and gravel.		2	SS	30											0.29 55 16
			3	SS	93											
			4	SS	171											
	Brown		5	SS	129											
	Grey		6	SS	69											
	Glacial Till		7	SS	175											
498.0	Very Stiff to Hard															
28.0	Het. mix. of silt, sand & gravel, tr. clay. V. Dense															0.4 66 17
31.0	End of Borehole															

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO F

JOB 71-11035

LOCATION Co-ords. 578,629 N; 981,243 E.

ORIGINATED BY JK

W.P. 218-65-05

BORING DATE Oct. 19, 1972

COMPILED BY JK

DATUM Geodetic

BOREHOLE TYPE Wash and Bore with RE 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	REMARKS
ELEV DEPTH	DESCRIPTION	STRAT. PLT	NUMBER	TYPE	BLOWS/FOOT		20	40	60	80	100	W _p	W	W _L		
524.3	Ground Level															
0.0	Clayey silt with sand & some gravel (Fill)															
520.3	Hard		1	SS	38	520										
4.0	Het. mix. of clayey silt, sand & gravel.		2	SS	35											
			3	SS	38											
			4	SS	114											
	Brown Grey		5	SS	122	510										
			6	SS	52											
	Glacial Till		7	SS	35											
			8	SS	140	500										
496.3	Hard															
20.0	Het. mix. of silt, sand & gravel, tr. of clay, dry															
493.3																
31.0	End of Borehole					490										

DESIGN SERVICES BRANCH

FOUNDATIONS OFFICE

RECORD OF BOREHOLE NO G

JOB 71-11035

LOCATION Co-ords. 878,681 N; 981,263 E.

ORIGINATED BY VK

W.P. 218-65-05

BORING DATE Oct. 17, 1972

COMPILED BY VK

DATUM Geodetic

BOREHOLE TYPE Wash and Bore with BX Casing

CHECKED BY *AK*

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. PLT	NUMBER	TYPE	BLOWS/FOOT					
519.7	Ground Level									
0.0	Brown									
	Het. mix. of clayey silt, sand and gravel.		1	SS	2L					515.7
			2	SS	53					15 25 44 10
	Glacial Till		3	SS	156	510				
			4	SS	149					0 42 42 10
502.7	Very Stiff to Hard		5	SS	66					
17.0	Het. mix. of silt, sand & gravel, trace of clay.		6	SS	113	500				0 49 49 2
497.2	Very Dense		7	SS	107					
22.5	End of Borehole					490				

OFFICE REPORT SOIL EXPLORATION

FOUNDATIONS OFFICE

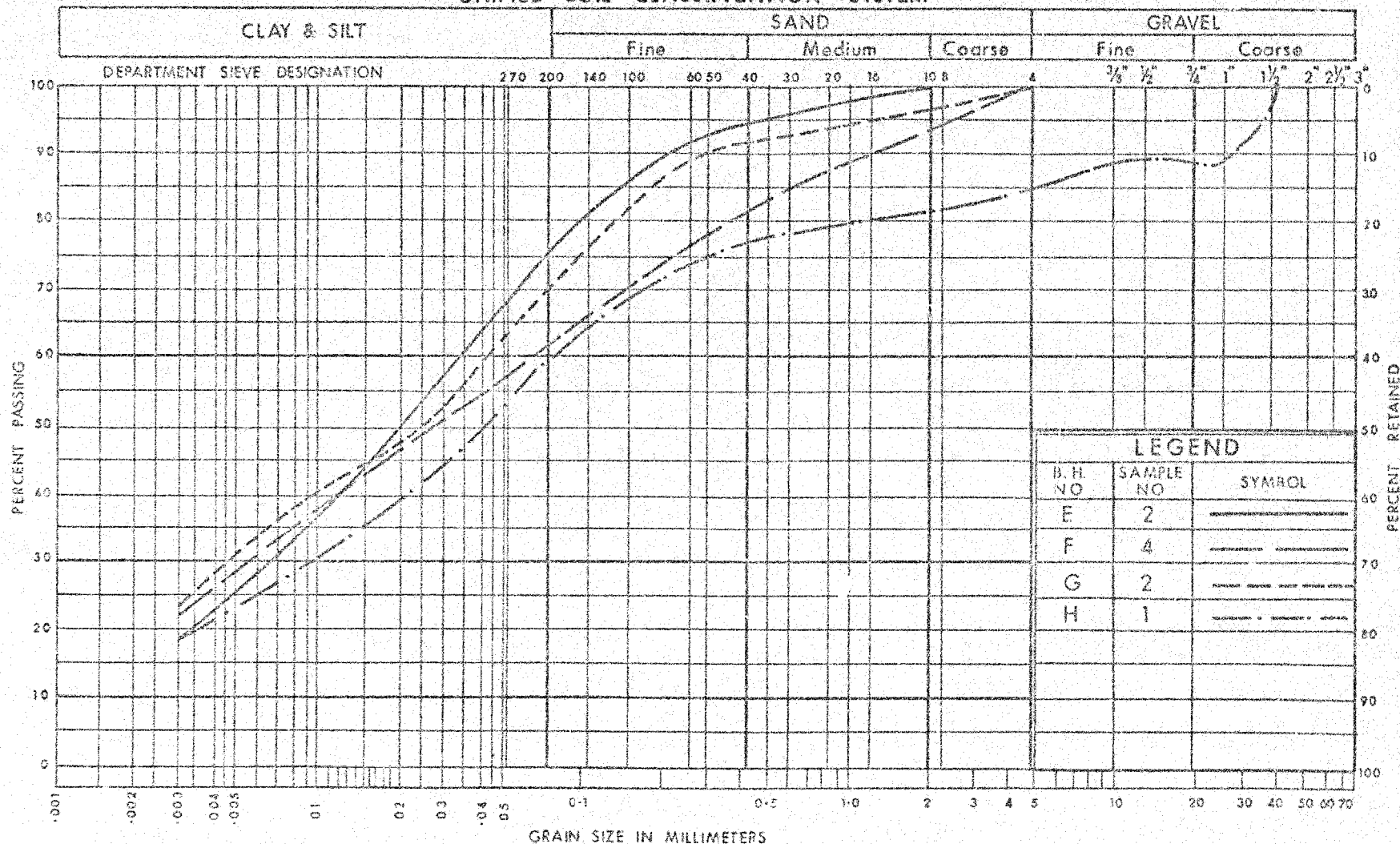
ORIGINATED BY VE

COMPILED BY VK

CHECKED BY /

15 ²⁰ 5 % STRAIN AT FAILURE

UNIFIED SOIL CLASSIFICATION SYSTEM



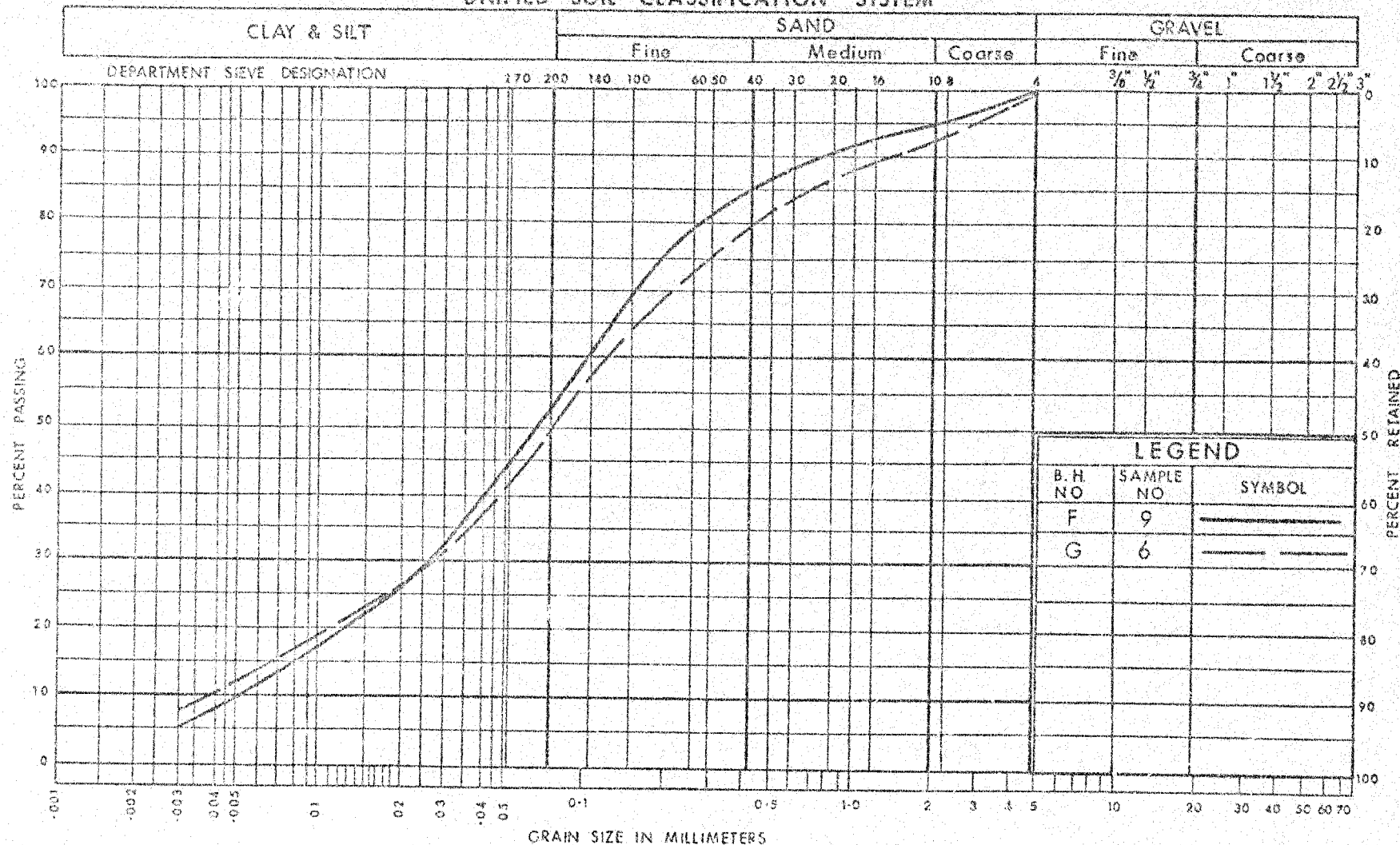
DEPARTMENT
OF
TRANSPORTATION AND COMMUNICATIONS

DESIGN SERVICES
BRANCH

GRAIN SIZE DISTRIBUTION
GLACIAL TILL (COHESIVE)
CLAYEY SILT WITH SOME SAND AND GRAVEL

W.P. No. 218-65-05
JOB No. 71-11035
FIG. No. 1

UNIFIED SOIL CLASSIFICATION SYSTEM



DEPARTMENT
OF
TRANSPORTATION AND COMMUNICATIONS



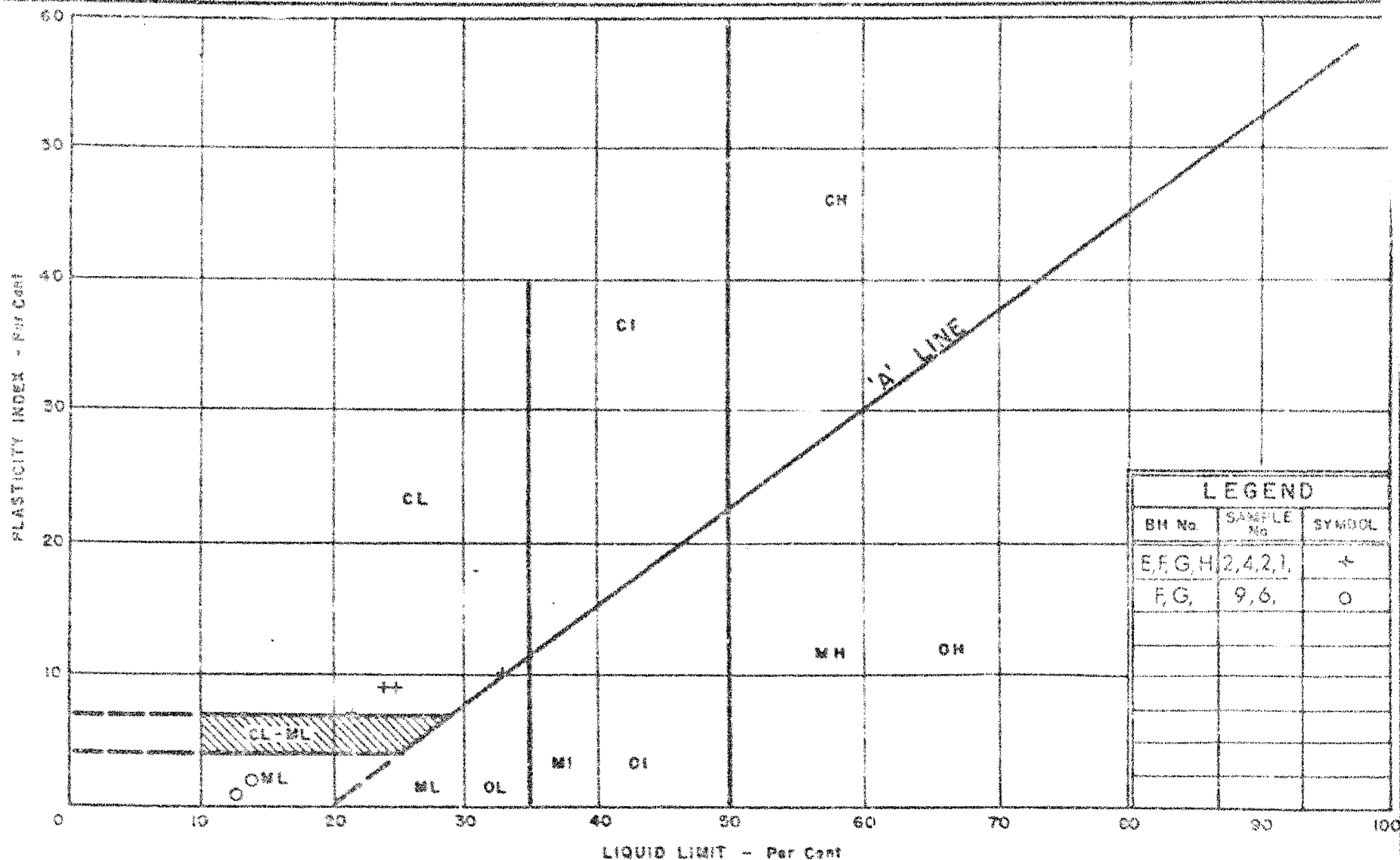
DESIGN SERVICES
BRANCH

GRAIN SIZE DISTRIBUTION
GLACIAL TILL (NON COHESIVE)
SILTY SAND WITH SOME GRAVEL AND TRACE OF CLAY

W.P. No. 218-65-05

JOB No. 71-11035

FIG. No 2



DEPARTMENT OF HIGHWAYS
MATERIALS and
TESTING
DIVISION

PLASTICITY CHART
+ COHESIVE
O NON-COHESIVE

WP No. 218-65-05
JOB No. 71-11035
FIG. No. 3

270-65
71-11035
MINISTRY OF TRANSPORTATION AND COMMUNICATIONS, ONTARIO *Extra documents*

MEMORANDUM

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: October 13, 1972. *73 20*

OUR FILE REF.

IN REPLY TO

SUBJECT: Retaining Wall #3,
Site 37-, W.P. 218-65-05,
Highway 409 (Belfield Expressway), District 6.

The enclosed marked up drawings shows the proposed extension for the above noted Retaining Wall #3. As the original site was investigated by your office and the findings recorded in W.O. 71-11035 we are soliciting your advice as to whether the available existing information will be sufficient to cover the intended extension.

Please advise this office as to your intentions and findings in this matter.

JSTR:lc
Encl.

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

c.c. J. Anderson
R. Fitzgibbon

Verd will be starting this on Monday Oct 16/72

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:

Martin Grove Road Underpass,
Over Hwy. #409,
W.P. #270-65, Site #37-964,
Hwy. #409, District #6.

71-11-035

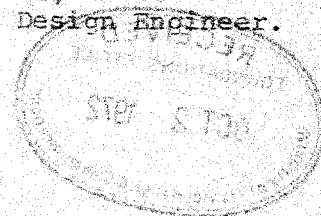
Attached herewith we are submitting the final bridge drawings which show the foundation design for this structure.

Kindly give us your comments at your earliest convenience.

CSG:dp
Attach.

cc. Foundation Office.

C. S. Grebski
C. S. Grebski,
Structural Design Engineer.



No Comments

EAA

Oct 5/72

Sept 30
1972
JH

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS

Copy for the information of

A. Stermac

A. Stermac
Sgt. Bridge Planning Engineer,
90 Floral Parkway.

Structural Office,
West Alder, Townsview.

March 10, 1972.

Re Martin Grove Road Underpass
over Belfield Expressway,
W.P. # 174-63, Site 37 404,
Belfield Expressway, District 16.

71-11-035

Attached herewith are prints of the Preliminary Bridge
Plan drawing 7-7056-21 for the above mentioned structure.

The estimated cost of the proposed structure is
\$303,000.00, which includes tender, materials, engineering and
survey construction.

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

C.B. Skelaki,
Structural Design Engineer.

C.B. Skelaki
Attach.

D.C. J. Davis
J. Davis
A. Stermac (2)
C. Anderson
A. Fitzgibbon

no comments
B.T.D. March 23, 1972
Ch. Devada
March 24/72

Mr. C. S. Grebski,
Structural Design Engineer,
Structural Office,
Design Services Branch,
West Bldg., Downsview.

Foundations Office,
Design Services Branch,
Central Bldg., Downsview.

October 14, 1971.

Proposed Underpass Structure at the
Crossing of the Belfield Expressway and
Martin Grove Road, District No. 6 (Toronto),
W.O. 71-11025, W.P. 270-65.

We have reviewed the Preliminary Bridge Plan Drawing No. B-7006-1 for the above-mentioned structure.

At the founding level shown on the drawing (elevations 520.5 and 522.5 at the south and north abutment locations, respectively) the abutments will be located within the competent cohesive portion of the glacial till stratum. This being the case the abutments should be supported on spread footings rather than the end-bearing steel H-piles proposed. An allowable bearing value of up to 4.0 t.s.f. could be used in the design of the spread footings.

The excavations for the abutments will be carried out above the ground water level recorded at the time of the investigation; therefore, no major dewatering problems are anticipated.

The differential settlements between the abutments and the adjacent pier should not exceed 1/2 inch.

We trust that the aforementioned comments are sufficient for your immediate requirements. If there are any further queries on this project please contact this Office.

BTD/ao

cc: Foundations Files
Documents

BTD
E. T. Darach,
Senior Foundation Engineer,
M. Devate,
Supervising Foundation Engineer.

Department of Highways Ontario

Copy for the information of

Mr. A. Stermac

~~Regional Bridge Planning~~
Regional Bridge Planning
Engineer,
90 Floral Parkway.

Structural Office,
West Building, Downsview.

September 23, 1971.

Martin Grove Road Underpass,
H.P. 270-48, Site No. 37-964,
Bulfield Expressway, District 88.

71-1-035

Attached herewith are revised prints of the Preliminary Bridge Plan Drawing B-7965-P1 for the above-mentioned structure.

The estimated cost of the proposed structure is \$260,000 which includes tender, materials, engineering and sundry construction.

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

C. B. Czekalski,
Structural Design Engineer.

CCO/mf
DML*

cc: D. A. Davis,
A. Scain,
A. Stermac (2),
J. Anderson,
B. Fitzgibbon.

Department of Highways Ontario

Copy for the information of

Mr. A. Stermac

Mr. C. Burkhardt.

Regional Bridge Planning Engineer,
90 Floral Parkway.

Structural Office,
West Building.

September 21, 1971.

Martin Grove Road Underpass,
W.P. 270-65, Site #37-964,
Belfield Expressway, District #6.

71-11-035

Attached herewith are prints of the Preliminary Bridge
Plan Drawing D-7006-P1 for the above-mentioned structure.

The estimated cost of the proposed structure is
\$260,000 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: B. Davis,
A. McKim,
A. Stermac (2),
J. Anderson,
R. Fitzgibbons.

Pile tip elevations should not be given on the drawing
since they will be driven to ~~the~~ certain depth to attain
the maximum allowable load by the use of Hiley formula

M. Derata
Sept 28/71

MEMORANDUM

ACB

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

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

ATTENTION:

DATE: May 26, 1971.

CUR FILE REF.

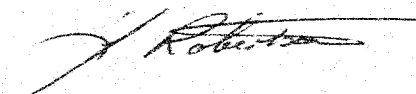
IN REPLY TO

SUBJECT: Retaining Wall on Ramp E-MG
@ Bach - Simpsons Limited,
W.P. 218-65-1, Site 37,
Belfield Expressway, District 6.

The attached marked up print, details the approximate location of the proposed footing for the above noted retaining wall. Due to the proposed location of the retaining wall, which will be partially located where a building is at present standing, borings have to be located in the general vicinity and scaled from the building. Also enclosed are prints taken from the Functional Planning Report showing the proposed grade.

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

JSR:lc
Attach.


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

c.c. R. Fitzgibbon

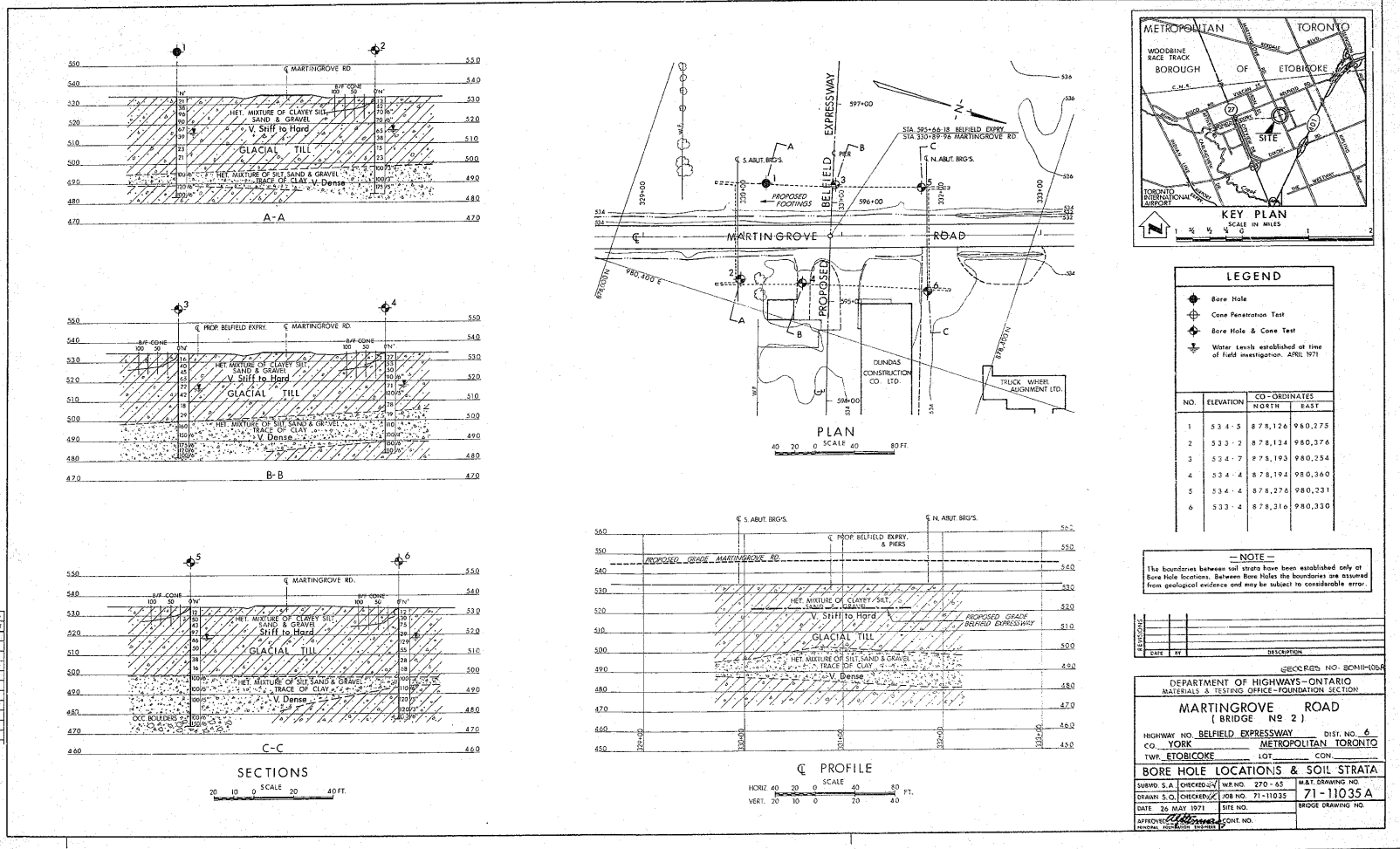
CONT. 73-20

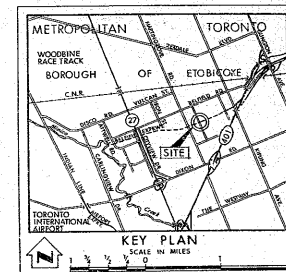
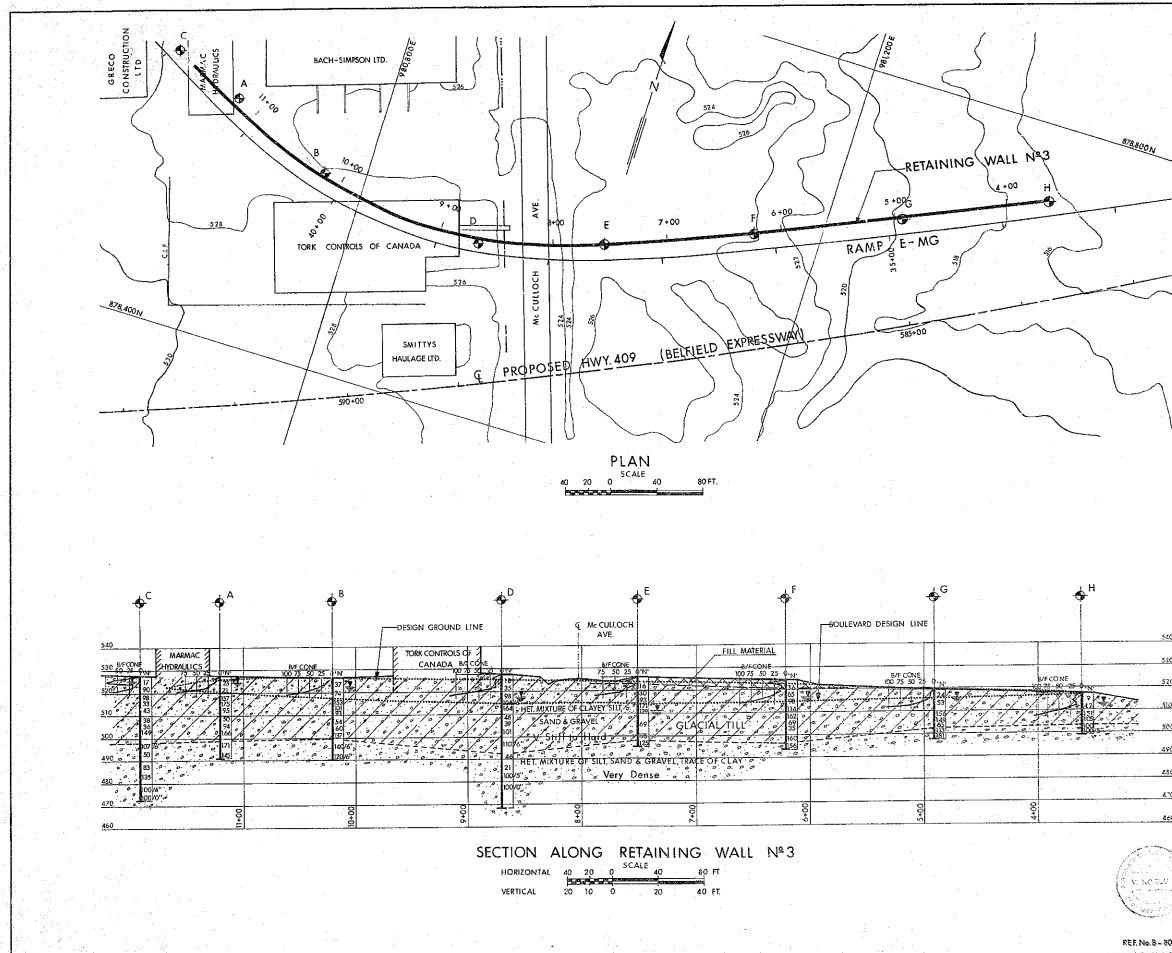
BELFIELD 4

MARTIN GROVE RD.

DIST. 6

30M11-105





LEGEND

- Bore Hole
- ⊕ Core Penetration Test
- ⊕ Bore Hole & Cone Test
- ⊕ Water Levels established at time of field investigation

NO.	ELEVATION	CO-ORDINATES	
		NORTH	EAST
A	527.7	878,611	980,670
B	526.6	878,570	980,763
C	527.8	878,637	980,607
D	527.5	878,551	980,913
E	526.0	878,582	981,020
F	524.3	878,629	981,143
G	519.7	877,681	981,263
H	517.5	875,733	981,282

NOTE

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

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS—ONTARIO DESIGN SERVICES BRANCH—FOUNDATIONS OFFICE	
RETAINING WALL No. 3 (MARTINGROVE ROAD)	
HIGHWAY NO. 409 (BELFIELD EXPRESSWAY)	DIST. NO. 6
CO. YORK	METROPOLITAN, TORONTO
YR. ETOBICOKE	CON.
BORE HOLE LOCATIONS & SOIL STRATA	
DRAWN BY: []	CHECKED BY: []
DATE: NOV 24, 1972	SITE NO. 37
APPROVED BY: []	ENGINEER: []