

MEMORANDUM

BA 2611

37

To: Mr. B. R. Davis,
Bridge Engineer,
Bridge Division,
Admin. Bldg.

FROM: Foundation Section,
Materials & Testing Div.,
Room 107, Lab. Bldg.

Attention: Mr. S. McCombie

DATE: June 23, 1967

OUR FILE REF.

IN REPLY TO

JUL 7 1967

SUBJECT:

FOUNDATION INVESTIGATION REPORT
For
Proposed Retaining Walls at the
Dundas St. and Hwy. #27 Interchange
District #6 (Toronto)
W.J. 67-F-37 -- W.P. 275-64-2

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 do not hesitate to contact our Office.

AGS/MdeF
Attach.

cc: Messrs. B. R. Davis (2) ✓
H. A. Tregaskes
D. W. Farren
G. K. Hunter (2)
F. Allen
W. S. Melnyshyn
T. J. Kovich
B. A. Singh
Foundations Files
Gen. Files

A. G. Stermac
A. G. Stermac
PRINCIPAL FOUNDATION ENGINEER



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FOUNDATION INVESTIGATION REPORT
For
Proposed Retaining Walls at the
Dundas St. and Hwy. #27 Interchange
District #6 (Toronto)
W.J. 67-F-37 -- W.P. 275-64-2

1. INTRODUCTION:

In a memo, dated April 28, 1967, a foundation investigation was requested by Mr. W. S. Melinyshyn, Regional Bridge Location Engineer, at the sites of some 15 retaining walls. The construction of these walls is part of the proposed new interchange of Hwy. #27 and Dundas Street.

According to the request, field and laboratory investigations were undertaken by this Section in order to determine subsoil conditions at the locations of the proposed structures. Due to the fact that quite extensive soils surveys were already carried out at this general area in connection with the proposed bridges, rather shallow boreholes only, were drilled for the present project.

In Part One of this report, general descriptions of the site, field and laboratory investigations and soil conditions are given; Part Two contains the recommendations as to the foundations of the proposed structures.

cont'd. /2 ...

PART ONE

2. DESCRIPTION OF THE SITE:

This project covers the section of the proposed improved Hwy. #27 from north of the C.P.R. overhead to north of Bloor Street. The vicinity of the existing Hwy. #27 is generally flat, highly developed urban area with commercial and residential buildings.

Geologically, the terrain belongs to the "Iroquois Plain" physiographic region, having been formed by undulating till plains above the lowland, bordering Lake Ontario. This low-lying area was inundated by a body of water known as Lake Iroquois in late Pleistocene times. At this portion of the region, some alluvial terrace lands may be found behind huge baymouth bars.

3. FIELD AND LABORATORY INVESTIGATION PROCEDURE:

Some 43 boreholes were drilled at the locations of the proposed retaining walls. The general layout of the walls, also the locations and elevations of the boreholes, are shown on Drawing #67-F-37A.

The field work was carried out by means of two Pennsylvania flight augers and one conventional diamond drill rig adapted for soil sampling purposes. Soil specimens were recovered by means of 2-in. O.D. split-spoon samplers. The number of hammer blows necessary to advance the sampler one ft. under an impact of 350 ft.-lbs., was recorded as the Standard Penetration 'N' values.

The boreholes were surveyed in the field by personnel from the construction staff of District #6.

Soil samples were visually examined and identified by simple tests upon recovery, and again in the laboratory. To confirm the visual examinations, further laboratory tests of

3. FIELD AND LABORATORY INVESTIGATION PROCEDURE: (cont'd.) ...

natural moisture content, Atterberg limits and grain-size analyses were performed on representative specimens.

The results of these tests are compiled on the borelog sheets accompanying this report.

4. SOIL CONDITIONS:

4.1) General:

Soils covering the whole area were found to be heterogeneous, unsorted deposits, likely to be transported and dropped by the moving glacials. Because of the very high preconsolidation pressure, such deposits display very dense relative density and hard consistency; consequently, they are regarded as excellent foundation materials. Due to the unsorted nature of the soils, layers are difficult to identify. For practical purposes, however, two main strata were differentiated: one containing more than 50% fine grains, and one with more than 50% coarse-size particles.

A brief description of the soils is given as follows:

4.2) Clayey Silt:

The fine-grained or cohesive portion of the subsoils was identified to be clayey silt with a fair amount of sand-size particles and traces of gravel. This layer usually appears as the uppermost stratum, but occasionally, was observed to be overlain by granular deposits. The clayey silt exhibits slight consistency, yielding plastic limits between 12 and 16% and liquid limits between 22 and 27%. The natural moisture contents of the samples fall below or very near the plastic limits confirming the overconsolidated nature of the material. Within the upper 10 - 15 ft., firm and stiff consistencies were sometimes measured, but the majority of the Standard Penetration tests resulted in 'N' values in excess of 100 blows per ft., corresponding to hard consistency.

cont'd. /4 ...

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

4.3) Silty Sand to Sandy Silt:

The coarse or granular layers are listed on the borelogs and soil profiles as silty sands, sandy silts, sand with gravel, etc. Apart from one or two locations, this layer displays very dense relative density, corresponding to 'N' values in most cases exceeding 100 blows per ft. The natural moisture content of the layers ranges from 7% up to 15%. Due to a small percent of clay-size grains, a few samples exhibited slight plasticity, the index of plasticity being between 3 and 6%. The heterogeneous nature of the soil is well demonstrated by the scatter of the constituent particles, the gravel sizes ranging between 2 and 38%, the sand between 17 and 74%, the clay between 1 and 6%, the remainder being silt-size grains.

4.4) Groundwater Conditions:

Free water level was observed in almost all of the boreholes. The depth of water was established between 1 and 17 ft. below the prevailing ground surface - i.e., between el. 387 ft. and 427 ft. The elevations of the water table are plotted on each borelog, also on the stratigraphical profiles of Drawings #67-F-37B and C.

PART TWO

5. DISCUSSION AND RECOMMENDATIONS:

5.1) General:

a) Soil conditions within the area investigated appear to be favourable for spread footings at shallow depths.

cont'd. /5 ...

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

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

b) Recommendations for the structure foundations are given, by assuming the design ground elevations as supplied by Mr. Kolunezic of Deleuw Cather & Co. Canada Ltd., (see Drawings #67-F-16B & C). It is to be emphasized that any modification of the design or any change in the locations or elevations of the walls will likely necessitate changes in the footing recommendations.

c) Dewatering schemes for footing excavations within the granular layers below the water table, will probably be necessary, on account of the susceptibility of such soils to conditions of unbalanced hydrostatic head. In the case of using interlocking sheet piles, they should be driven to a depth below the base of the excavation equal to the height of water above it, to prevent the excavation bottom from boiling.

d) The stability of the walls supported on spread footings, should be checked against sliding along the base of the wall, caused by lateral earth pressure. The sliding force along the bottom of the wall is resisted by a horizontal force, which consists of friction, adhesion, or a combination of both.

In computing the resistance to lateral pressures for walls placed within the in-situ granular layers (sandy silt, silty sand, gravelly sand, silt with sand), a coefficient of friction $\tan \phi = 0.45$ (rough concrete slab sliding on coarse-grained soil with silt) may be used. For walls constructed within the well compacted G.B.C. Class 'A' fill material, the friction coefficient may be increased to $\tan \phi = 0.55$. For walls placed in the cohesive layers (clayey silts), the adhesion between the base and the soil is assumed to be equal to the cohesive strength of the deposit, and ϕ is assumed to be zero. The use of an adhesion value of 3000 p.s.f. is recommended for the calculations.

cont'd. /6 ...

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

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

e) For the backfill of the retaining walls, reference is made to a memo by Mr. A. Rutka, Materials and Testing Engineer, to Mr. A. M. Toye, Bridge Engineer, dated March 27, 1963. The subject of the memo: "Hwy. #401, Toronto Bypass Retaining Wall Backfill."

f) In a few locations, piled foundations are recommended. The working load on the piles should be checked during pile driving by means of the Hiley Formula (D.H.O. Standards DD 1218 and 1219).

5.2) Recommendations for the Individual Walls:

(Soil profiles at the individual walls may be seen on Drawings #67-F-37B and C.)

a) Retaining Wall #1 -

Due to the generally poor compaction of old fills, it appears undesirable to support the wall within the existing approach fill of the Bloor Street structure. Piled foundations are, therefore, recommended. It may be assumed that 12 BP at 53 steel H-piles, driven to approx. el. 410 - 420 ft., will carry safe loads of 70 T/pile. The bottom of the pile cap should be placed some four ft. below design ground line at the low side of the wall.

The easterly approx. 100-ft. length of the wall may also be placed on spread footings at or below el. 425 ft. with a design load of 2.5 t.s.f. A vertical expansion joint should be employed between the section founded on piles and on spread footings.

b) Retaining Wall #2 -

The northerly approx. 75-ft. length of this wall will be placed on new fill, while the remaining portion will be located in a cut. The wall within the cut section, may be supported on spread footings at some four ft. below finished grade, using a design

cont'd. /7 ...

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

5.2) Recommendations for the Individual Walls: (cont'd.) ...

b) Retaining Wall #2 - (cont'd.) ...

pressure of 4 t.s.f. The portion of the wall placed on fill may be founded on footings within well compacted G.B.C. Class 'A' granular fill. The method of construction of the granular fill is shown on Fig. #1, together with the recommended sequence of operations. This sequence should be strictly adhered to, in order to achieve the desired bearing capacity. A safe design load of 2 t.s.f. may be assumed for footings within the fill, constructed according to the specified method. A vertical expansion joint is recommended between the part on natural ground and on compacted fill.

c) Retaining Wall #3 -

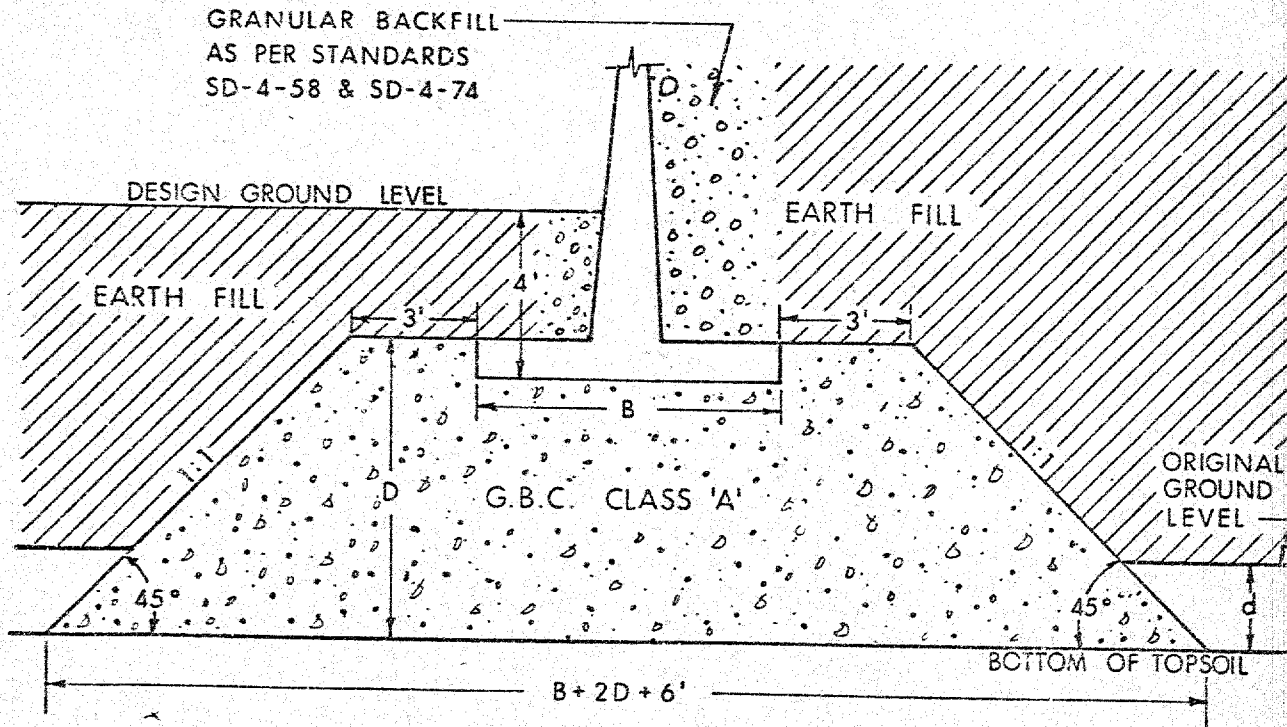
The geometry of this wall is similar to Wall #1. Here, the south portion of the wall will be placed on new fill, the remainder being founded within the natural ground. Spread footings, some four ft. below finished ground level, are recommended. Footings placed on natural soil below el. 424 ft., will safely support loads of 4 t.s.f. For footings placed above el. 424 ft., also for footings within the G.B.C. Class 'A' granular fill, 2 t.s.f. design pressures may be assumed. For the construction of the fill below the footings, reference is again made to Fig. #1. Vertical expansion joints should be employed between the sections founded on original soil and for those founded within granular fill.

d) Retaining Walls #4 and #5 -

Both walls will be placed partly in a cut, partly on new fill. The walls can be built with spread footings, the base being four ft. below finished ground. In this case, the footings will lie either within the natural soil, or the fill. The fill below the footings should be constructed of well compacted granular G.B.C. Class 'A' material as specified on Fig. #1. Footings placed

cont'd. /8 ...

FIGURE 1



LEGEND

- B = BREADTH OF FOOTINGS
- D = DEPTH OF G.B.C. CLASS 'A' BACKFILL
- d = DEPTH OF TOPSOIL

SEQUENCE OF OPERATION

- 1 - STRIP TOPSOIL
- 2 - CONSTRUCT G.B.C. CLASS 'A' TO FULL HEIGHT AS SHOWN
- 3 - CONSTRUCT REMAINDER OF FILL TO CONVENIENT HEIGHT
- 4 - RE-EXCAVATE FOR RETAINING WALL FOOTING

TYPICAL SECTION OF A RETAINING WALL SUPPORTED ON SPREAD FOOTINGS WITHIN THE FILL MATERIAL

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

5.2) Recommendations for the Individual Walls: (cont'd.) ...

d) Retaining Walls #4 and #5 - (cont'd.) ...

not higher than three ft. below the existing ground level will support loads of 4 t.s.f. For footings above this depth, or within the granular fill, 2 t.s.f. safe pressure may be assumed. As an alternative, sections of the walls within the proposed fill may also be supported on piles. No granular fill would be necessary for the piled foundation. It is believed that either 12-3/4" O.D. steel tubes or 12 BP at 53 steel H-piles will develop safe bearing capacities of 70 T/pile, when driven to approx. el. 415 - 420 ft. at the location of Wall #4, and to approx. el. 405 - 410 ft. at Wall #5.

Expansion joints should be installed between the sections supported on natural ground and those supported on piles or on fill material.

e) Retaining Wall #6 -

The design ground level at this wall closely follows the existing ground line. Spread footings, placed not higher than four ft. below the average ground level, appear to be feasible. Up to 4 t.s.f. design load may be used on the footings at or below the suggested depth. Some dewatering problems may be encountered below the south portion of the wall, due to the sandy silt subsoil.

f) Retaining Wall #7 -

Since the proposed grade at the low side of the wall is well below the existing ground surface, a spread footing foundation is the obvious answer. Footings placed four ft. below finished grade may be designed for 4 t.s.f. safe loads. The location of the larger part of the wall coincides with the existing pavement of the Municipal Road (See Drawing #67-F-37A); consequently, borings had

cont'd. /9 ...

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

5.2) Recommendations for the Individual Walls: (cont'd.) ...

f) Retaining Wall #7 - (cont'd.) ...

to be offset from the exact location. It is suggested that the footing excavation be inspected and approved by the Foundation Section, prior to commencing the pouring of concrete. Dewatering schemes may be necessary within the sandy silt to silty sand stratum.

g) Retaining Walls #8 and #9 -

In view of the much lower design grades than the existing ones, spread footings are the most economical for both walls. At Wall #8, 4 t.s.f. safe pressure may be used at or below el. 413 ft., and 2 t.s.f. between el. 413 ft. and the existing ground level.

The footings of Wall #9 will carry loads of up to 4 t.s.f. at or below el. 412 ft., and 1.5 t.s.f. between el. 412 ft. and the existing ground. Dewatering of the excavations might become problematic due to the presence of the susceptible, granular material. In such a case, a dewatering scheme should be provided as described under Section (5.1), para. (c).

h) Retaining Wall #10 -

Spread footings may be employed for this wall, at four ft. below finished grade with design pressures of up to 4 t.s.f. The elevation of the footing base should, however, not be higher than el. 393 ft. at the west end of the wall, and el. 397 ft. at the east end. The bottom of the excavation will likely lie within the clayey silt stratum; hence, no major dewatering problems are foreseen.

cont'd. /10 ...

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

5.2) Recommendations for the Individual Walls: (cont'd.) ...

i) Retaining Walls #11 and #12 -

A stiff to hard clayey silt fill material forms the uppermost layer at the location of both walls. The consistency of this fill varies considerably: the material contains pockets of organic matter. According to the information supplied by Deleuw Cather & Co., however, the design ground at both walls lies below this fill; consequently, spread footings may be constructed with the provision of four-ft. cover. Footings will support up to 4 t.s.f. design load, but it is essential that the base of the footings be below el. 405 ft. The sandy silt layer is susceptible to conditions of unbalanced hydrostatic head; a dewatering scheme, therefore, might be necessary.

j) Retaining Walls #13B and #14B -

The design ground line at both of these long retaining walls will closely follow the existing ground level. Soil conditions appear to be favourable for spread footings. The depth of the base of the footings should be some four ft. below existing ground level along the length of both walls, except around the south end of Wall #13B. At this location (B.H. #89), some soft to firm clayey silt was found which was observed to be contaminated with organic matter. The depth of this material is believed to be not greater than 4 - 6 ft.; nevertheless, complete excavation of this layer is essential. Footings should be constructed - after the excavation of the contaminated layer - on the inorganic subsoil. Safe pressures of 4 t.s.f. may be assumed on the footing bases for design purposes.

No major dewatering problems are anticipated.

cont'd. /11 ...

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

5.2) Recommendations for the Individual Walls: (cont'd.) ...

k) Retaining Wall #15 -

The proposed design grade at the low side of this wall varies between el. 415 ft. at the south end, and el. 418 ft. at the north. At or below these elevations, the subsoil has sufficient strength to support the structure on spread footings, placed four ft. below finished grade. A design load of 4 t.s.f. may be employed on the footings. Boiling of the excavation bottom may not occur - regardless of the presence of the granular material - since the water level was found to be at a somewhat low elevation.

6. SUMMARY:

The results of the foundation investigation at the site of some 15 retaining walls at the proposed Hwy. #27 and Dundas St. interchange are reported.

The report is divided into two parts. Part One deals with the description of the site, together with the procedure of the investigation and the soils description. In Part Two, general and detailed recommendations are presented pertaining to the foundations.

Special attention should be given to Section (5.1), where general remarks and recommendations are made concerning all the footings. These recommendations are not repeated again in the sections for the individual walls; nevertheless, they should be considered and incorporated into the design of the walls, if applicable.

cont'd. /12 ...

7. MISCELLANEOUS:

The field work was carried out during the period May 2 - 3, 1967, by Messrs. A. M. Seppala and A. Prakash, Project Foundation Engineers, under the supervision of Mr. A. K. Barsvary, Senior Foundation Engineer, who also prepared this report.

Equipment used was owned and operated by Canadian Longyear Ltd., and Dominion Soil Investigation Ltd., Toronto.

The report was reviewed by Mr. K. G. Selby, Supervising Foundation Engineer.

June 1967

DEPARTMENT OF HIGHWAYS - ONTARIO

RECORD OF BOREHOLE NO. 3

FOUNDATION SECTION

MATERIALS & TESTING DIVISION

JOB 66-F-103

LOCATION Co-ords. N 184,056 E 206,788

ORIGINATED BY P. Mc

W.P. 275-64-02

BORING DATE October 28, 1965

COMPILED BY

DATUM GSC

BOREHOLE TYPE Penn drill and Washboring - Nx and Bx Casing

CHECKED BY

SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT — WL PLASTIC LIMIT — WP WATER CONTENT — W			BULK DENSITY P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT	ELEV. SCALE	BLOWS / FOOT	25	50	75	100	125	WP			WL
414.9	Ground Level														
0.5	Top Soil														
	Silty sand with traces of gravel and clay to clayey silt with sand and traces of gravel (Glacial till)		1	SS	14	410									
			2	SS	71										
			3	SS	80										
			4	SS	90										
			5	SS	60	400									
			6	SS	132										
			7	SS	200	390									
			8	SS	84										
			9	SS	84	380									
			10	SS	81										
			11	SS	104	370									
365.9															
49.0	Boulders			Drill											
				Drill	12%										
359.9															
55.0	End of Borehole					360									

Gr. 5%
Sa 45%
Sl 44%
Cl 5%

GWL 7.2'

Gr 25%
Sa 62%
Sl 13%
Cl

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

66-F-103

LOCATION Co-ords. N. 183.847 E. 206.857

ORIGINATED BY P. Mc

W P 275-64-02

BORING DATE October 27, 1965

COMPILED BY A. K. B.

DATUM

BOREHOLE TYPE Penn Drill and Washboring - Nx and Bx Casing

CHECKED BY

SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT	Liquid Limit ——— WL Plastic Limit ——— WP Water Content — W	BULK DENSITY	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	SHEAR STRENGTH P.S.F.		P.C.F.	
421.7 0.0	Ground Level							
	Silty sand with Traces of gravel And clay to clayey Silt with sand and Traces of gravel (glacial till) very stiff to hard and very dense		1	SS	15			Gr 2% Sa 30% Sl 46% Cl 22%
			2	SS	30			GWL = 11.6'
			3	SS	41			Gr 6% Sa 28% Sl 49% Cl 17%
			4	SS	97			
			5	SS	89			Gr 11% Sa 44% Sl 37% Cl 8%
			6	SS	100			
			7	SS	79			Gr 6% Sa 30% Sl 53% Cl 11%
			8	SS	57			Gr 2% Sa 54% Sl & Cl 14%
			9	SS	75			
			10	SS	50			
			11	SS	117			
			12	SS	107			
366.3 55.4	End of Borehole		13	SS	89			

DEPARTMENT OF HIGHWAYS - ONTARIO

RECORD OF BOREHOLE NO. 6

FOUNDATION SECTION

MATERIALS & TESTING DIVISION

JOB 66-F-103 LOCATION Co-ords. N. 186.724 E. 206.834 ORIGINATED BY P. Mc
W.P. 275-64-02 BORING DATE November 15, 1965 COMPILED BY A. K. B.
DATUM _____ BOREHOLE TYPE Washboring - Nx Casing CHECKED BY AB

SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT — WL PLASTIC LIMIT — WP WATER CONTENT — W			BULK DENSITY P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT	ELEV. SCALE	25	50	75	100	125	WP	W			WL
429.8	Ground Level														
0.0			1	SS	20										
			2	SS	13										
	Silty sand with		3	SS	44	420									
	traces of gravel		4	SS	118										
	and clay to clayey		5	SS	51										
	silt with sand		6	SS	74	410									
	and traces of gravel		7	SS	75										
	(glacial till)				for 6"										
					for 4"										
			8	SS	75	400									
					for 5"										
393.3	Stiff to hard and		9	SS	89										
36.5	very dense														
	End of Borehole					390									

GWL 15'

Gr 3%
Sa 45%
Sl 43%
Cl 9%

Gr 15%
Sa 78%
Sl&Cl 7%

GEOTECHNICAL DATA SHEET FOR BOREHOLE . 20 .

OUR REFERENCE NO. 6-12-13
Your Ref. No. W.J. 66-F-103
CLIENT D. H. O.
PROJECT NORTH OF C.P.R. C'HEAD TO NORTH OF BLOOR ST.
LOCATION 185,570 N; 206,660 E
DATUM ELEVATION G.S.C.

METHOD OF BORING AUGERING
DIAMETER OF BOREHOLE 3 1/2"
DATE JAN 10-12, 1966
WP 275-64-2

ENCLOSURE NO.

ELEVATION ft	DEPTH ft	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot					CONSISTENCY water content %				REMARKS
				NUMBER	TYPE	Advancement ft per 100 lb	20	40	60	80	100	Wp	W	WL		
428.7	0	GROUND SURFACE														
	1.0	Clayey Silt FILL														
425	5	CLAYEY SILT with sand (Glacial Till) Brown	V Stiff Hard	1	S.S.	16										
				2	S.S.	52										
420	10			3	S.S.	100/6"										
415	14.0	cobble														
	15			4	S.S.	70/3"									6 46 43 5	
410	20	SAND and SILT with trace of clay and gravel Very Dense Grey		5	S.S.	80										
405	25			6	S.S.	70/5"										
400	30	sand increasing		7	S.S.	50/3"										
395	33.0															
	35	SAND with some silt Very Dense cobble silt seams		8	S.S.	50/3"									0 83 12 0	
390	40			9	S.S.	80/4"										
385	45	trace of shale fragments		10	S.S.	100/4"										
45.3		END OF BOREHOLE														

GR SA SI CL

— per cent —

VERTICAL SCALE 1 IN TO 5 FT

DOMINION SOIL INVESTIGATION LIMITED

MADE D.A.M. CHD

GEOTECHNICAL DATA SHEET FOR BOREHOLE . 21 .

OUR REFERENCE NO. 6-12-13
Your Ref. No. WJ 66-F-103

CLIENT D. H. O.

PROJECT FROM N. OF C.P.R. O'HEAD TO N. OF BLOOR ST.

LOCATION 184, 145 N. ; 206, 710 E.

DATUM ELEVATION G.S.S.

METHOD OF BORING AUGERING

DIAMETER OF BOREHOLE 3 1/2"

DATE JAN 9-10, 1967

ENCLOSURE NO.

W.P. 275-64-2

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot					CONSISTENCY water content %				REMARKS
				NUMBER	TYPE	Advance- ment of Sampler	2,0	4,0	6,0	8,0	10,0	WP	W	WL		
417.9	0	GROUND SURFACE														
		3" TOPSOIL														
415	5	CLAYEY SILT with sand and trace of gravel. (Glacial Till) Brown		1	S.S.	30										
				2	S.S.	37										
410	10			3	S.S.	75										
405	12.5			4	S.S.	70/4"										
400	15	SANDY SILT with some clay and trace of gravel. (Glacial Till) Very Dense Grey		5 A B	S.S.	90/10"										
395	20			6	S.S.	50/3"										
390	25	sand layers		7	S.S.	60/3"										
385	30	CLAYEY SILT with sand. (Glacial Till) Hard		8	S.S.	70/6"										
380	35			9	S.S.	60/6"										
375	40	SAND with some silt. Very Dense		10	S.S.	90										
370	45			11	S.S.	95										
365	50	END OF BOREHOLE														

417.9
12.5
395.4

417.9
28.0
389.9

3 37 50 10

417.9
36.9
380.9

417.9
51.5
366.4

0 80 20 0

GR SA SI CL

— per cent —

VERTICAL SCALE 1 IN TO 5 FT

DOMINION SOIL INVESTIGATION LIMITED

MADE D.A.M. CHO

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 34 (66-F-103)

FOUNDATION SECTION

JOB 67-F-37

LOCATION 184,450 N; 208,560 E.

ORIGINATED BY Dom. Soil

W.P. 275-64-2

BORING DATE Dec. 27-28/66 & Jan. 13/67

COMPILED BY Bom. Soil

DATUM Geodetic

BOREHOLE TYPE Augering

CHECKED BY

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT					LIQUID LIMIT — WL PLASTIC LIMIT — WP WATER CONTENT — W			BULK DENSITY P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLT	NUMBER	TYPE	BLOWS / FOOT		20	40	60	80	100	WP	WL	W		
413.9	Ground Level															
0.0	4" Topsoil															
	Clayey silt with sand (glacial till)															
409.4	Hard Layered		1	SS	35	410										10 43 35 12
4.5			2	SS	71											
						405										
	Sand and silt with some clay and gravel (glacial till)		3	SS	100 76"											
						400										
			4	SS	80 75"											
						395										
	Very dense		5	SS	70 74"											
						390										
			6	SS	80 74"											
						385										
			7	SS	70 73"											
						380										
			8	SS	80 75"											
						375										
373.6			9	SS	90 73"											
40.3	End of Borehole															

SUPERIMPOSED DOCUMENT MAY
APPEAR AS MULTIFIELD ON FILM.

GEOTECHNICAL DATA SHEET FOR BOREHOLE . 3.7..

OUR REFERENCE NO. 6 - 12 - 13
Your Ref. No. WJ 66-F-103

CLIENT D. H. O.

PROJECT FROM N. OF C.P.R. O'HEAD TO N. OF BLOOR ST.

LOCATION 184,330 N 208,688 E

DATUM ELEVATION G. S. C

METHOD OF BORING AUGERING

DIAMETER OF BOREHOLE 3 1/2"

ENCLOSURE NO

DATE DEC. 27 - 28, 1966 & JAN. 16, 1967.

W. P. 275-64-2

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot					CONSISTENCY water content %				REMARKS
				NUMBER	TYPE	N-6 Advance of Sampler	2.0	4.0	6.0	8.0	10.0	W _p	W	W _L		
415.3	0	GROUND SURFACE														
		4" TOPSOIL														
		Gravelly SAND (FILL) Compact		1	S.S.	15										
410.8	4.5	CLAYEY SILT with SAND and trace of Gravel (glacial till) Hard Brown		2	S.S.	39										
405.3	10			3	S.S.	110/6"										
405		Brown Grey		4	S.S.	90/6"										
400	15	SANDY SILT with some Clay and trace of Gravel (glacial till) Very Dense		5	S.S.	100/6"										
395	20			6	S.S.	50/2"										
392.3	23			7	S.S.	100/6"										
390	25			8	S.S.	100/6"										
385	30	SAND and SILT with some Gravel and trace of Clay (glacial till) Very Dense		9	S.S.	80/3"										
380	35			10	S.S.	90/3"										
375	40.3	END OF BOREHOLE														
370	45															

W.L. E1. 401.0 ft.
DEC. 29, 1966. and
JAN. 5, 1967.

0 20 70 100

2 19 69 100

14 41 37 8

2 50 40 8

GR SA SI CL
— per cent —

VERTICAL SCALE 1 IN TO 5 FT

DOMINION SOIL INVESTIGATION LIMITED

MADE: D. A. M. CHD

GEOTECHNICAL DATA SHEET FOR BOREHOLE 38.

OUR REFERENCE NO. 6-12-13
Your Ref. No. W.J. 66-F-103

CLIENT D. H. O.

PROJECT FROM N. OF CPR. O'HEAD TO N. OF BLOOR ST.

LOCATION 184,286 N 206,570 E

DATUM ELEVATION: G. S. C.

METHOD OF BORING AUGERING

DIAMETER OF BOREHOLE 3 1/2"

ENCLOSURE NO.

DATE DEC. 22, 1956 & JAN. 13, 1967.

W. P. 275-64-2

ELEVATION ft	DEPTH ft	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot				CONSISTENCY water content %				REMARKS
				NUMBER	TYPE	N Advance of Sampler	210	410	610	810	100	W _p	W	W _L	
413.4	0	GROUND SURFACE													
	2	GRAVEL, SAND FILL	•••••												
410	5	CLAYEY SILT with SAND (glacial till)	•••••	1	SS	42									
		hard - brown													
405	9			2	SS	100/5									
	10														
400	15	SAND and SILT to		3	SS	90/6"									
		SANDY SILT													
395	20	with a trace of CLAY		4	SS	100/5"									
		probably layered structure													
390	25	(glacial till) traces of Gravel Very Dense Grey		5	SS	100/4"									
385	30			6	SS	100/5"									
380	35			7	SS	100/2"									
375	38	cobbles	•••••												
	40	CLAYEY SILT with SAND	•••••	8	SS	90/6"									
	40.5	Hard (glacial till)													
		END OF BOREHOLE													
370	45														

W. L. S. 399.1
Dec. 29, 1966
& JAN. 5, 1967.

11 41 42 6

5 24 58 13

W. L. E. 391.4
Dec. 22, 1966

9134
38
754
4134
405
729

GR SA SI CL
— per cent —

VERTICAL SCALE: 1 IN TO 5 FT.

DOMINION SOIL INVESTIGATION LIMITED

MADE: D. A. M. CHD. Rocks

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 50

FOUNDATION SECTION

JOB 67-F-37 LOCATION Hwy. 27, 182,195 N, 207,973 E.


ORIGINATED BY KAL

W.P. 275-64-2 BORING DATE May 2, 1967

COMPILED BY _____ AP

DATUM Geodetic BOREHOLE TYPE Cont. Flight Auger

CHECKED BY

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT ——— WL		BULK DENSITY	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT	BLows / Foot	PLASTIC LIMIT ——— WP	WATER CONTENT ——— W		
391.5	GROUND LEVEL											
0.0	Clayey silt with sand & gravel.		1	SS	7 1/4	390						
	Hard		2	SS	50 1/2"	380						
375.9	(Boulders)		3	SS	50 1/4"							
15.6	End of Borehole					370						

MATERIALS & TESTING DIVISION

FOUNDATION SECTION

ORIGINATED BY AP

COMPILED BY _____ AP

BOREHOLE TYPE Bombardier Flight Auger

CHECKED BY

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT _____	Liquid Limit ——— WL	BULK DENSITY γ_p	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F.	P.L. ——— WP			WATER CONTENT % WP W WL |-----| 10 20 30
392.7	GROUND LEVEL									
0.0	<div style="text-align: center;">Clayey silt with some gravel.</div> <div style="text-align: center;">Hard</div>					390				P.C.F.
			1	SS	53					
			1	SS	110/6"					
379.0						380				
13.7	End of Borehole		3	SS	100/3"					

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 52

FOUNDATION SECTION

JOB 67-F-37

LOCATION Hwy. 27. 182.570 N: 207.875 E.

ORIGINATED BY KAL

W. P. 275-64-2

BORING DATE May 2 1967

COMPILED BY _____ AP

DATUM Geodetic

BOREHOLE TYPE Cont. Flight Auger

CHECKED BY

[illegible]

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 53

FOUNDATION SECTION

JOB 67-F-37 LOCATION Hwy. 27, 182,775 N; 207,805 E.ORIGINATED BY APW.P. 275-64-2 BORING DATE May 2, 1967COMPILED BY APDATUM Geodetic BOREHOLE TYPE Bombardier Flight AugerCHECKED BY JFL

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE				LIQUID LIMIT ——— WL			BULK DENSITY	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT	SHEAR STRENGTH P.S.F.				PLASTIC LIMIT ——— WP	WATER CONTENT ——— W		
399.8	GROUND LEVEL														
0.0	Silt to sandy silt, traces of gravel.		1	SS	71										
			2	SS	100/4"										
	Very dense.		3	SS	100/1 1/2"										
380.7			4	SS	100/6"										
19.1	End of Borehole														

▼ 392.8
May 8/67Gr.1, Sa.12
Si.85, Cl.2

MATERIALS & TESTING DIVISION

FOUNDATION SECTION

LOCATION Hwy. 27, 183.155 N: 207.720 E.

ORIGINATED BY AP

W. P. 275-64-2

BORING DATE May 2, 1967

COMPILED BY _____ AP

DATUM _____ Geodetic

BOREHOLE TYPE Bombardier Blight Auger

CHECKED BY

[illegible]

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 56

FOUNDATION SECTION

JOB 67-F-37

LOCATION Hwy. 27, 182,070 N; 207,750 E.

ORIGINATED BY KAL

W. P. 275-64-2

BORING DATE May 3, 1967

COMPILED BY **AP**

DATUM Geodetic

BOREHOLE TYPE Cont. Flight Auger

CHECKED BY _____

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT ——— WL		BULK DENSITY	REMARKS
ELEV DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT	SHEAR STRENGTH P.S.F.	PLASTIC LIMIT ——— wp	WATER CONTENT ——— w		
390.9	GROUND LEVEL											
0.0	Clayey silt with some sand and gravel					390						
	Hard		1	SS	110							
			2	SS	100	1 1/2"	380					
374.8			3	SS	129	1 1/2"						
16.1	End of Borehole					370						

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 57

FOUNDATION SECTION

JOB 67-F-37

LOCATION Hwy. 27, 182,350 N; 207,660 E.

ORIGINATED BY KAL

W.P. 275-64-2


BORING DATE May 3, 1967

COMPILED BY AP

DATUM Geodetic

BOREHOLE TYPE Cont. Flight Auger

CHECKED BY [Signature]

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.				w_p — w — w_L WATER CONTENT % 10 20 30					
394.0	GROUND LEVEL															
0.0	Clayey silt with some sand and gravel.					390										
	Hard		1	SS	56											
			2	SS	63											
			3	SS	90/60											
						380										
			4	SS	100/40											
375.7																
18.3	End of Borehole					370										

387.2

May 6/07

387.2
May 5/67

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO.58

FOUNDATION SECTION

JOB 67-F-37 LOCATION Hwy. 27. 182,535 N; 207,590 E. ORIGINATED BY KAL
W.P. 275-64-2 BORING DATE May 3, 1967 COMPILED BY AP
DATUM Geodetic BOREHOLE TYPE Cont. Flight Auger CHECKED BY KL

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE				LIQUID LIMIT — WL PLASTIC LIMIT — wp WATER CONTENT — w			BULK DENSITY P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT				WATER CONTENT %				
							SHEAR STRENGTH P.S.F.				10 20 30				
397.0	GROUND LEVEL														
0.0	Clayey silt becoming sandy silt with some clay.		1	SS	13 1/4	390									▽ 393.0
	Very dense & hard		2	SS	100 / 6"										
381.2			3	SS	100 / 3 1/2"										
15.8	End of Borehole					380									Gr. 2, Sa. 35 Si. 56, Cl. 7

MATERIALS & TESTING DIVISION

LOCATION Hwy. 27, 182,928 N; 207,475 E.

BORING DATE May 2, 1967

BOREHOLE TYPE Cont. Flight Auger

FOUNDATION SECTION

ORIGINATED BY **KAL**

COMPILED BY _____ AP

CHECKED BY

SOIL PROFILE			SAMPLES			C'LEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT _____	LIQUID LIMIT ——— WL PLASTIC LIMIT ——— WP WATER CONTENT ——— W				BULK DENSITY P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F.	<p>WP W WL</p> <p>WATER CONTENT %</p>					
402.0	Ground Level												
0.0	Silty sand with gravel.					400							
	Very dense.		1	SS	73								
			2	SS	100	3½"							
						390							
385.7			3	SS	166	9"							
16.3	End of Borehole					380							

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO.60

FOUNDATION SECTION

JOB 67-P-37LOCATION Hwy. 27, 133,180 N; 207,370 E.ORIGINATED BY APW.P. 275-64-2BORING DATE May 3, 1967COMPILED BY BRGDATUM GeodeticBOREHOLE TYPE Cont. Flight AugerCHECKED BY HR

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT					LIQUID LIMIT — WL PLASTIC LIMIT — WP WATER CONTENT — W			BULK DENSITY P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F.					WP	W	WL		
404.7	GROUND LEVEL															
0.0	Sandy silt with traces of gravel and clay.		1	SS	185	400										
	Very dense.		2	SS	170/10"											
			3	SS	100/4 1/2"	390										
386.1			4	SS	200/7"											
18.6	End of Borehole															

403.0
May 3/67

Gr. 6, Se. 41
S1. 47, C1. 6

DEPARTMENT OF HIGHWAYS - ONTARIO

RECORD OF BOREHOLE NO.62

FOUNDATION SECTION

MATERIALS & TESTING DIVISION

JOB 67-F-37LOCATION Hwy.27 184,208 N; 208,335 E.ORIGINATED BY APW.P. 275-64-2BORING DATE May 4, 1967COMPILED BY APDATUM GeodeticBOREHOLE TYPE Bombardier Flight AugerCHECKED BY AK

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT				LIQUID LIMIT — WL PLASTIC LIMIT — WP WATER CONTENT — W			BULK DENSITY Y P.C.F.	REMARKS
ELEV DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F.				WP	W	WL		
413.7	GROUND LEVEL														
0.0	Slightly organic clayey silt with sand.	/ / / / /				410									
408.7	Very Stiff		1	SS	16										
5.0	Sandy silt with traces of clay.	. . . . .				400									
			2	SS	105										
	Very dense.		3	SS	100/2"										
			4	SS	100/3"										
389.9						300									
23.8	End of Borehole		5	SS	100/4"										

▼ 404.7
May 8/67

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 63

FOUNDATION SECTION

JOB 67-F-37 LOCATION Hwy. 27, 184,615 N; 207,388 E. ORIGINATED BY AMS
W.P. 275-64-2 BORING DATE May 3, 1967 COMPILED BY KAL
DATUM Geodetic BOREHOLE TYPE Coredrill CHECKED BY KAL

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE				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		BLOWS / FOOT				w _p ——— w ——— w _L WATER CONTENT %				
							SHEAR STRENGTH P.S.F.				10 20 30				
416.0	GROUND LEVEL														
C.C.	Silty to sandy silt with some clay.	.....				410									▽ 407.0 May 5/67
			1	SS	90										
	Very dense		2	SS	37 1/4"										
399.5			3	SS	87	400									
16.5	End of Borehole														Gr.2, Sa.26 Sl.66, Cl.6

▽ 407.0
May 5/67

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

JOB 67-E-37

W. P. 275-64-2

DATUM _____ Geodetic

LOCATION Hwy. 27, 184,680 N; 207,303 E.

BORING DATE May 4, 1967

BOREHOLE TYPE Cont. Flight Auger

FOUNDATION SECTION

ORIGINATED BY AMS

COMPILED BY _____ AP

CHECKED BY

[illegible]

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 65

FOUNDATION SECTION

JOB 67-F-37

LOCATION Hwy. 27 & Dundas St. 184,886 N; 207,285 E

ORIGINATED BY AMS

W.P. 275-64-2

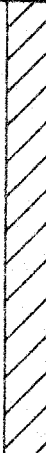

BORING DATE May 3, 1967

COMPILED BY _____ AKB

DATUM _____ Geodetic

BOREHOLE TYPE Washboring, BX Casing

CHECKED BY *dx*

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT				LIQUID LIMIT ——— WL PLASTIC LIMIT ——— WP WATER CONTENT ——— W wp ——— w ——— WL WATER CONTENT % 10 20 30			BULK DENSITY P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F.								
418.2	GROUND LEVEL														
0.0	Clayey silt with sand and traces of gravel		1	SS	83	410									413.7
	Hard		2	SS	66										
405.2	Silty sand with gravel.														
13.0															
401.7	Very Dense		3	SS	75/5"										
16.5	End of Borehole					400									Gr.20, Sa.49 Sl.31, Cl.0

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 66

FOUNDATION SECTION

JOB 67-F-37LOCATION Hwy. 27 & Dundas St., 184,870 N; 207,240 E.ORIGINATED BY AMSW.P. 275-64-2BORING DATE May 3, 1967COMPILED BY AMSDATUM GeodeticBOREHOLE TYPE Cont. Flight AugerCHECKED BY LL

SOIL PROFILE			SAMPLES			ELEV SCALE	DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT — WL PLASTIC LIMIT — WP WATER CONTENT — W			BULK DENSITY P.C.F.	REMARKS	
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT		SHEAR STRENGTH P.S.F.		WATER CONTENT % WP — W — WL 10 20 30			
418.6	GROUND LEVEL													
0.0	Clayey silt with sand & traces of gravel.					410								
	Hard		1	SS	47									
			2	SS	84									
405.6														
13.0	Sandy silt with gravel.					400								
	Very dense.		3	SS	113									
397.1			4	SS	125/3.5"									
21.5	End of Borehole												Gr. 13, Sa. 41 Si. 2 Cl. 46	

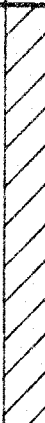
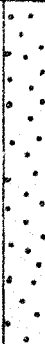
DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 69

FOUNDATION SECTION

JOB 67-F-37 LOCATION Hwy. 27 & Dundas St., 185,327 N; 207,097 E. ORIGINATED BY AMS
W.P. 275-64-2 BORING DATE May 21, 1967 COMPILED BY AMS
DATUM Geodetic BOREHOLE TYPE Cont. Flight Auger CHECKED BY WJH

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE				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		BLOWS / FOOT				w _p ——— w ——— w _L WATER CONTENT %				
							SHEAR STRENGTH P.S.F.				10 20 30				
426.6	GROUND LEVEL														
0.0	Clayey silt with sand and traces of gravel.					420									
	Hard.		1	SS	58										
414.6			2	SS	100/4"										
12.0	Sandy silt with gravel.					410									411.6 Gr.4, Sa.38 Si.57, Cl.1
			3	SS	100/2.5"										
	Very dense.														
405.1			4	SS	100/2"										
21.5	End of Borehole														

411.6
Gr.4, Sa.38
Si.57, Cl.1

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 70

FOUNDATION SECTION

JOB 67-F-37

LOCATION Hwy. 27, 185,489 N; 207,065 E.

ORIGINATED BY AMS

W.P. 275-44-2

BORING DATE May 3, 1967

COMPILED BY KAL

DAT IM Geodetic

BOREHOLE TYPE Continuous Flight Auger

CHECKED BY KA

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE				LIQUID LIMIT _____ w _L PLASTIC LIMIT _____ w _p WATER CONTENT _____ w w _p ————— w _L			BULK DENSITY P.C.F.	REMARKS	
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT				SHEAR STRENGTH P.S.F.					WATER CONTENT % 10 20 30
425.5	GROUND LEVEL															
0.0	Sandy silt with traces of clay and gravel.															
	Very Dense		1	SS	100/2½"	420										
			2	SS	100/3½"											
410.5																
16.0	End of Borehole		3	SS	100/6"	410										

413.5
May 8/67

Gr. 6, Sa. 17
Si. 76, Cl. 1

413.5
May 8/67

Gr. 6, Sa. 17
Si. 76, Cl. 1

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 71

FOUNDATION SECTION

JOB 67-F-37

LOCATION Hwy. 27, 185.469 N; 206.704 E.

ORIGINATED BY AMS

W.P. 275-64-2

BORING DATE May 3, 1967

COMPILED BY _____ KAL

DATUM _____ Geodetic

BOREHOLE TYPE Continuous Flight Auger

CHECKED BY _____

[illegible]

DEPARTMENT OF HIGHWAYS - ONTARIO

RECORD OF BOREHOLE NO. 72

FOUNDATION SECTION

MATERIALS & TESTING DIVISION

JOB 67-E-37 LOCATION Hwy. 27, 186,022 N; 206,578 E. ORIGINATED BY AMS
W.P. 275-64-2 BORING DATE May 4, 1967 COMPILED BY KAB
DATUM Geodetic BOREHOLE TYPE Core Drill CHECKED BY KL

SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT		LIQUID LIMIT — WL PLASTIC LIMIT — WP WATER CONTENT — W		BULK DENSITY P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT	ELEV. SCALE	SHEAR STRENGTH P.S.F.		WP — WL CONTENT %		
427.2	GROUND LEVEL										
0.0	Clayey silt to sandy silt with traces of gravel.		1	SS	86	420					
	Very dense to hard.		2	SS	150/2"						
			3	SS	125/4"	410					
	Boulders		4	SS	150/3"						
401.0			5	SS	100/3"						
26.2	End of Borehole					400					

Gr. 2, Sa. 36
Si. 49, Cl. 13

FOUNDATION SECTION

CHECKED BY AK

[illegible]

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 74

FOUNDATION SECTION

JOB 67-F-37 LOCATION Hwy. 27. 186.315 N; 207.055 E. ORIGINATED BY AP
W. P. 275-64-2 BORING DATE May 19, 1967 COMPILED BY AP
DATUM Geodetic BOREHOLE TYPE Diamond Core Drill CHECKED BY AK

SOIL PROFILE			SAMPLES			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	SHEAR STRENGTH P.S.F.		WATER CONTENT % 10 20 30				
429.7 0.0	Clay silt with traces of sand and gravel. Slightly organic		1	SS	10	420					415.7	
			2	SS	67							
	Stiff to hard		3	SS	115							
410.7 19.0	Gravelly sand with some silt Very dense		4	SS	135/6"	410					Gr. 35, Sa. 46 Si. & Cl. 19	
			5	SS	121							
403.2 26.5	End of Borehole					400						

DEPARTMENT OF HIGHWAYS - ONTARIO

RECORD OF BOREHOLE NO. 75

FOUNDATION SECTION

MATERIALS & TESTING DIVISION

JOB 67-E-37LOCATION Hwy. 27, 186,880 N; 207,279 E.ORIGINATED BY KALW.P. 275-64-2BORING DATE May 18, 1967COMPILED BY BBGDATUM GeodeticBOREHOLE TYPE Cont. Flight AugerCHECKED BY LR

SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT — WL PLASTIC LIMIT — WP WATER CONTENT — W			BULK DENSITY P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLT	NUMBER	TYPE	BLOWS / FOOT	ELEV. SCALE	BLOWS / FOOT	WATER CONTENT % 10 20 30	WATER CONTENT % 10 20 30			
432.6	GROUND LEVEL											
0.0	Clayey silt to silt with some sand & traces of gravel.											
			1	SS	41							
	Hard		2	SS	141							
			3	SS	100/3"							
			4	SS	100/42"							
439.6												
23.0	Gravelly sand with some silt & clay.											
407.1	V. Dense		5	SS	100/31"							
25.5	End of Borehole											

435.1
May 17/67Gr. 38, Sa. 43
Si. 13, Cl. 6

FOUNDATION SECTION

DATUM Geodetic BOREHOLE TYPE Bombardier Flight Auger CHECKED BY [Signature]

SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT		LIQUID LIMIT — WL PLASTIC LIMIT — WP WATER CONTENT — W		BULK DENSITY P.C.F.	REMARKS	
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT	SHEAR STRENGTH P.S.F.	WP	WL				
417.0	GROUND LEVEL											
0.0	Clayey silt with some sand and gravel.		1	SS	51	410						
	Hard											
407.0			2	SS	122							
10.0	Sandy silt with some clay and traces of gravel		3	SS	163	400						
	Very dense											
			4	SS	151							
392.5			5	SS	172							
24.5	End of Borehole					390						

DEPARTMENT OF HIGHWAYS - ONTARIO

RECORD OF BOREHOLE NO. 81

FOUNDATION SECTION

MATERIALS & TESTING DIVISION

JOB 67-F-37 LOCATION Hwy. 27, 184, 298 N; 206, 942 E. ORIGINATED BY KAL
W.P. 275-64-2 BORING DATE May 4, 1967 COMPILED BY KAL
DATUM Geodetic BOREHOLE TYPE Continuous Flight Auger CHECKED BY KAL

SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT — WL PLASTIC LIMIT — WP WATER CONTENT — W			BULK DENSITY P.C.F.	REMARKS
ELEV DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT	ELEV. SCALE	BLOWS / FOOT	SHEAR STRENGTH P.S.F.	WATER CONTENT %	WATER CONTENT %		
419.0	GROUND LEVEL											
0.0	Clayey silt with traces of gravel. (Fill)		1	SS	5							
	Firm		2	SS	4	410						
			3	SS	4							
401.0												
18.0	Sand with some silt traces of clay. Seams of gravel. Very dense to dense.		4	SS	100/4"	400						
			5	SS	100/5 1/2"							
						390						
387.5			6	SS	21							
31.5	End of Borehole											

405.0
May 8/67

Gr.O, Sa. 74
Si. & Cl. 26

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 82

FOUNDATION SECTION

JOB 67-P-37 LOCATION Hwy. 27, 184,460 N; 206,902 E. ORIGINATED BY KAL
W.P. 275-64-2 BORING DATE May 4, 1967 COMPILED BY KAL
DATUM Geodetic BOREHOLE TYPE Continuous Flight Auger CHECKED BY SL

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT — w_L		PLASTIC LIMIT — w_p		BULK DENSITY	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT		WATER CONTENT — w		WATER CONTENT %			
420.7	GROUND LEVEL													
0.0	Clayey silt with some sand and traces of gravel.					420								
	Hard		1	SS	72/6 1/2"									
			2	SS	69	410								
			3	SS	107									
401.7														
19.0	Silty sand with traces of clay and gravel.		4	SS	100/51 1/4"	400								
			5	SS	100/4"									
			6	SS	100/5"	390								
389.8														
30.9	End of Borehole													

▽ 406.2
May 8/67

Gr. 5, Sa. 46
Si. 45, Cl. 4

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 83

FOUNDATION SECTION

JOB 67-E-37LOCATION Hwy. 27, 184,098 N; 208,760 E.ORIGINATED BY KALW.P. 275-64-2BORING DATE May 5, 1967COMPILED BY APDATUM GeodeticBOREHOLE TYPE Continuous Flight AugerCHECKED BY SK

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT — WL PLASTIC LIMIT — WP WATER CONTENT — W			BULK DENSITY P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLT	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT		WATER CONTENT %				
415.4	Ground Level												
0.0	Clayey silt with traces of sand and gravel. Slightly organic (Fill)		1	SS	6	410							
	Stiff		2	SS	9								
401.4													
14.0	Sandy silt to silty sand, trace of gravel		3	SS	108	400							
	Very dense.		4	SS	158								
			5	SS	188/92"	390							
384.2			6	SS	190/8"								
31.2	End of Borehole					380							

Gr. 4, Sa. 27
Si. 68, Cl. 1

DEPARTMENT OF HIGHWAYS - ONTARIO

RECORD OF BOREHOLE NO. 85

FOUNDATION SECTION

MATERIALS & TESTING DIVISION

JOB 67-F-37

LOCATION Hwy. 27, 183,305 N; 205,940 E.

ORIGINATED BY AMS

W.P. 275-64-2

BORING DATE May 8, 1967

COMPILED BY BRG

DATUM Geodetic

BOREHOLE TYPE Continuous Flight Auger

CHECKED BY

SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION RESISTANCE				LIQUID LIMIT — WL PLASTIC LIMIT — WP WATER CONTENT — W				BULK DENSITY P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT	SHEAR STRENGTH P.S.F.				WATER CONTENT % 10 20 30					
410.0 0.0	Gravelly Sand. Compact to loose.		1	SS	22					○				Gr. 22, Sa. 76 Sl. & Cl. 2 ▽ 397.0 May 8/67	
			2	SS	9					○					
398.0 12.0	Clayey silt becoming sandy silt with some gravel.		3	SS	28					○					
	Very stiff to hard & Very Dense.		4	SS	95					○ ———					
			5	SS	125/2"					○					
379.1 30.9	End of Borehole		6	SS	150/5"					○ N.F.					

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 86

FOUNDATION SECTION

JOB 67-P-37 LOCATION Hwy. 27, 185,260 N; 207,198 E. ORIGINATED BY AP
W.P. 275-64-2 BORING DATE May 16, 1967, May 18, 1967 COMPILED BY AP
DATUM Geodetic BOREHOLE TYPE Diamond Core Drill & Cont. Flight Auger CHECKED BY HL

SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT			LIQUID LIMIT — WL PLASTIC LIMIT — WP WATER CONTENT — W			BULK DENSITY P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT	ELEV. SCALE	SHEAR STRENGTH P.S.F.			WATER CONTENT % WP — W — WL			
425.7	GROUND LEVEL												
0.0	Silty sand with gravel, traces of clay/ Dense to very dense												
			1	SS	33	420							
			2	SS	155/6"								Gr. 11, Sa. 49 Si. 41, Cl. 5
			3	SS	100/6"	410							409.7 May 19/67
404.2			4	SS	156								Gr. 4, Sa. 58 Si. 4, Cl. 38
21.5	End of Borehole					400							

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 87

FOUNDATION SECTION

JOB 67-F-37 LOCATION Hwy. 27, 185,555 N; 207,125 E. ORIGINATED BY AP
W.P. 275-64-2 BORING DATE May 17, 1967 COMPILED BY AP
DATUM Geodetic BOREHOLE TYPE Diamond Core Drill CHECKED BY SK

[illegible]

FOUNDATION SECTION

CHECKED BY

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	WATER CONTENT ——— w	WATER CONTENT %		
125.7	GROUND LEVEL											
0.0												
	Sandy silt to silty sand with traces of clay and gravel		1	SS	114	420						
			2	SS	100 7/8"							
	Very dense		3	SS	50 2"	410						
			4	SS	105							
			5	SS	50 1/4"	400						
			6	SS	100 7/8"							
390.4			7	SS	100 1/4"	390						
35.3	End of Borehole											

DEPARTMENT OF HIGHWAYS - ONTARIO

RECORD OF BOREHOLE NO. 89

FOUNDATION SECTION

MATERIALS & TESTING DIVISION

JOB 57-F-37 LOCATION Hwy. 27, 181,755 N; 207,840 E. ORIGINATED BY KAL
W.P. 275-54-2 BORING DATE June 14, 1967 COMPILED BY KAL
DATUM Geodetic BOREHOLE TYPE Cont. Flight Auger CHECKED BY KL

SOIL PROFILE			SAMPLES			ELEV SCALE	DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT — WL PLASTIC LIMIT — WP WATER CONTENT — W			BULK DENSITY P.C.F.	REMARKS
ELEV DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT	SHEAR STRENGTH P.S.F.	WP	WL	W		
391.5	GROUND LEVEL												
0.0	Clayey silt with some sand & organic matter and trace of gravel.					390							
386.5			1	SS	7								
5.0	Medium to Fine Sand.												
385.0			2	SS	29								
6.5	Clayey silt with some sand and gravel and occasional boulders.												
			3	SS	103								
						380							
			4	SS	80								
			5	SS	100.4"								
372.5													
19.0	Fine silty sand and trace of gravel												
371.0			6	SS	115.4"								
20.5	End of Borehole					370							

386.5
June 14/67

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 90

FOUNDATION SECTION

JOB 67-F-37

LOCATION Co-ords. 184,673 N; 208,537 E.

ORIGINATED BY AP

W. P. 275-64-2

BORING DATE Feb. 16, 1968

COMPILED BY _____ AP

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 _L w _P ——— w _L WATER CONTENT % 20 40 60			BULK DENSITY P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F.							
416.2	Ground Level					415								Gr.Sa.Si.C.
0.0	Clayey silt, with sand and traces of gravel. Firm to hard.		1	SS	7	410								408.7 Feb.16/68 5 23 55 17
			2	SS	11									
			3	SS	43	405								
			4	SS	41									
			5	SS	16	400								
			6	SS	56									
396.7	End of Borehole					395								
19.5														

FOUNDATION SECTION

ORIGINATED BY AP

COMPILED BY _____ AP

CHECKED BY

[illegible]

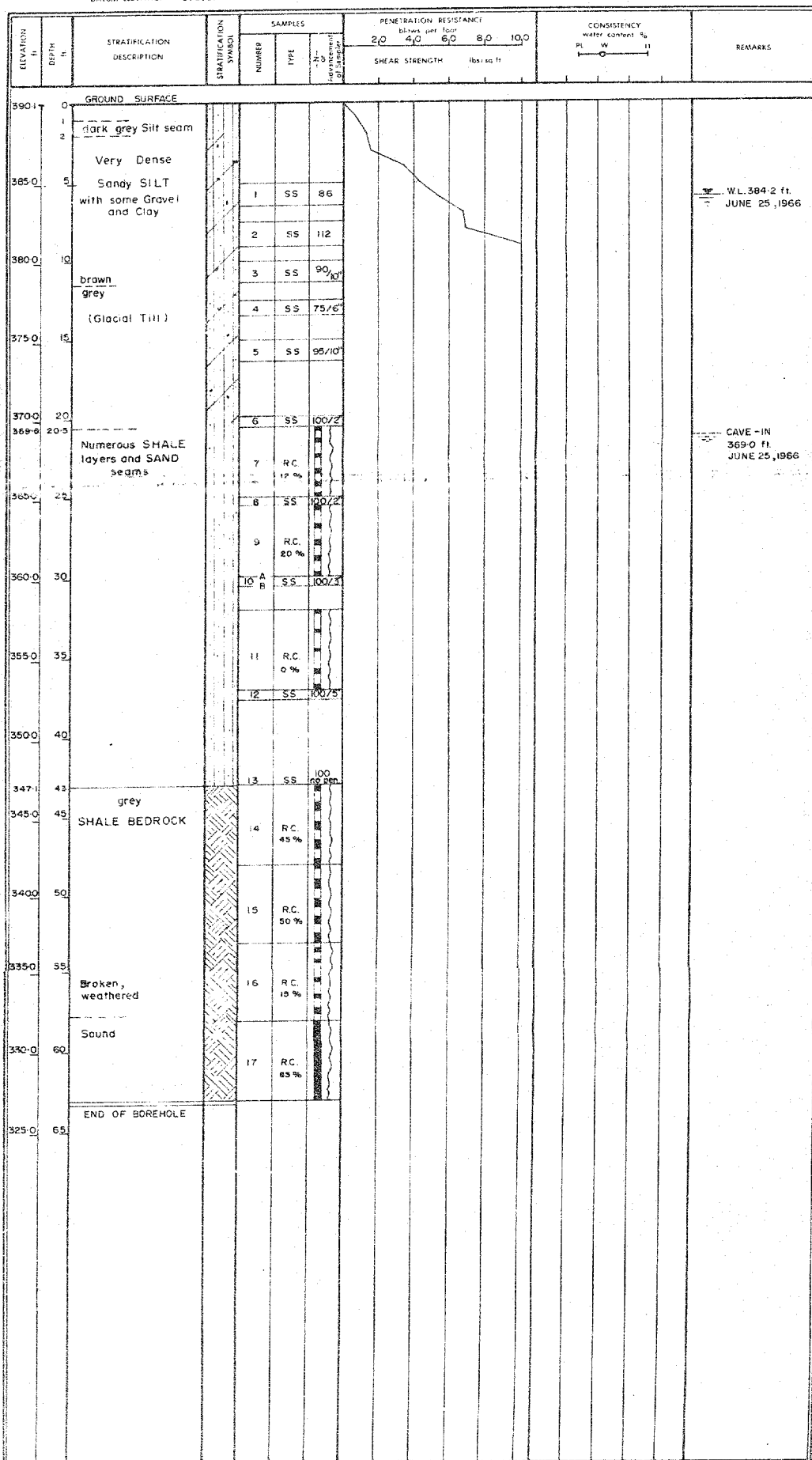
GEOTECHNICAL DATA SHEET FOR BOREHOLE . 102 .

OUR REFERENCE NO 6-6-25

CLIENT D.H.O.
PROJECT Q.E.W. & HWY. NO. 27 INTERCHANGE
LOCATION 181, 980 N ; 205,074 E
DATUM ELEVATION G.S.C.

METHOD OF BORING WASHBORING
DIAMETER OF BOREHOLE 2 3/4"
DATE JUNE 21-24, 1966
WP 278-64

ENCLOSURE NO



VERTICAL SCALE 1 IN. TO 5 FT

DOMINION SOIL INVESTIGATION LIMITED

MADE: C.K. CHD

ABBREVIATIONS USED IN THIS REPORT

PENETRATION RESISTANCE

STANDARD PENETRATION RESISTANCE 'N' - 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>'N' BLOWS / FT.</u>	<u>c LB. / SQ. FT.</u>	<u>DENSENESS</u>	<u>'N' BLOWS / FT.</u>
VERY SOFT	0 - 2	0 - 250	VERY LOOSE	0 - 4
SOFT	2 - 4	250 - 500	LOOSE	4 - 10
FIRM	4 - 8	500 - 1000	COMPACT	10 - 30
STIFF	8 - 15	1000 - 2000	DENSE	30 - 50
VERY STIFF	15 - 30	2000 - 4000	VERY DENSE	> 50
HARD	> 30	> 4000		

TYPE OF SAMPLE

S.S.	SPLIT SPOON	T.W.	THINWALL OPEN
W.S.	WASHED SAMPLE	T.P.	THINWALL PISTON
S.B.	SCRAPER BUCKET SAMPLE	O.S.	OESTERBERG SAMPLE
A.S.	AUGER SAMPLE	F.S.	FOIL SAMPLE
C.S.	CHUNK SAMPLE	R.C.	ROCK CORE
S.T.	SLOTTED TUBE SAMPLE		
	P.H.		SAMPLE ADVANCED HYDRAULICALLY
	P.M.		SAMPLE ADVANCED MANUALLY

SOIL TESTS

Q _u	UNCONFINED COMPRESSION	L.V.	LABORATORY VANE
Q	UNDRAINED TRIAXIAL	F.V.	FIELD VANE
Q _{cu}	CONSOLIDATED UNDRAINED TRIAXIAL	C	CONSOLIDATION
Q _d	DRAINED TRIAXIAL	S	SENSITIVITY

ABBREVIATIONS 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
s	SHRINKAGE LIMIT
I_L	LIQUIDITY INDEX $= \frac{w - w_p}{I_p}$
I_c	CONSISTENCY INDEX $= \frac{w_L - w_p}{I_p}$
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
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_t	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
$\bar{\sigma}$	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

66 F 102

cheaper 4 piles
adjacent

Timber

W.P. 201-62-1

Timber piles

drive - same cost

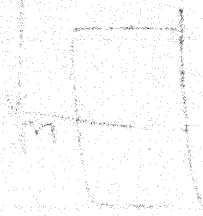
load - can carry 25^T

Supply - 150 @ 2⁰⁰/ft

steel pile 42# @ 7⁴ \$2.94/ft

∴ timber cheaper.

— why not timber?



APPENDIX I

23-67-13

MEMORANDUM

To: Mr. B. R. Davis,
Bridge Engineer,
Bridge Division,
Admin. Bldg.

FROM: Foundation Section,
Materials & Testing Div.,
Room 107, Lab. Bldg.

Attention: Mr. S. McCombie

DATE: June 23, 1967

OUR FILE REF.

IN REPLY TO

JUL 7 1967

SUBJECT:

FOUNDATION INVESTIGATION REPORT
For
Proposed Retaining Walls at the
Dundas St. and Hwy. #27 Interchange
District #6 (Toronto)

W.J. 67-F-37 -- W.J. ~~276-64-2~~

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 do not hesitate to contact our Office.

AGS/MdeF
Attach.

cc: Messrs. B. R. Davis (2)
H. A. Tregaskes
D. W. Farren
G. K. Hunter (2)
F. Allen
W. S. Melinyshyn
T. J. Kovich
B. A. Singh

Foundations Files
Gen. Files ✓

A. G. Sternac
A. G. Sternac
PRINCIPAL FOUNDATION ENGINEER

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- 4.3) Silty Sand to Sandy Silt.
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5.1) General.

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b)	"	"	#2
c)	"	"	#3
d)	"	" s	#4 and #5
e)	"	"	#6
f)	"	"	#7
g)	"	" s	#8 and #9
h)	"	"	#10
i)	"	" s	#11 and #12
j)	"	" s	#13B and #14B
k)	"	"	#15

6. SUMMARY.

7. MISCELLANEOUS.

FOUNDATION INVESTIGATION REPORT
For
Proposed Retaining Walls at the
Dundas St. and Hwy. #27 Interchange
District #6 (Toronto)
M.J. 67-F-37 -- W.P. 275-64-2

1. INTRODUCTION:

In a memo, dated April 28, 1967, a foundation investigation was requested by M. W. S. Melinyshyn, Regional Bridge Location Engineer, at the sites of some 15 retaining walls. The construction of these walls is part of the proposed new interchange of Hwy. #27 and Dundas Street.

According to the request, field and laboratory investigations were undertaken by this Section in order to determine subsoil conditions at the locations of the proposed structures. Due to the fact that quite extensive soils surveys were already carried out at this general area in connection with the proposed bridges, rather shallow boreholes only, were drilled for the present project.

In Part One of this report, general descriptions of the site, field and laboratory investigations and soil conditions are given; Part Two contains the recommendations as to the foundations of the proposed structures.

cont'd. /2 ...

PART ONE

2. DESCRIPTION OF THE SITE:

This project covers the section of the proposed improved Hwy. #27 from north of the C.P.R. overhead to north of Bloor Street. The vicinity of the existing Hwy. #27 is generally flat, highly developed urban area with commercial and residential buildings.

Geologically, the terrain belongs to the "Iroquois Plain" physiographic region, having been formed by undulating till plains above the lowland, bordering Lake Ontario. This low-lying area was inundated by a body of water known as Lake Iroquois in late Pleistocene times. At this portion of the region, some alluvial terrace lands may be found behind huge baymouth bars.

3. FIELD AND LABORATORY INVESTIGATION PROCEDURE:

Some 43 boreholes were drilled at the locations of the proposed retaining walls. The general layout of the walls, also the locations and elevations of the boreholes, are shown on Drawing #67-F-37A.

The field work was carried out by means of two Pennsylvania flight augers and one conventional diamond drill rig adapted for soil sampling purposes. Soil specimens were recovered by means of 2-in. O.D. split-spoon samplers. The number of hammer blows necessary to advance the sampler one ft. under an impact of 350 ft.-lbs., was recorded as the Standard Penetration 'N' values.

The boreholes were surveyed in the field by personnel from the construction staff of District #6.

Soil samples were visually examined and identified by simple tests upon recovery, and again in the laboratory. To confirm the visual examinations, further laboratory tests of

3. FIELD AND LABORATORY INVESTIGATION PROCEDURE: (cont'd.) ... natural moisture content, Atterberg limits and grain-size analyses were performed on representative specimens.

The results of these tests are compiled on the borelog sheets accompanying this report.

4. SOIL CONDITIONS:

4.1) General:

Soils covering the whole area were found to be heterogeneous, unsorted deposits, likely to be transported and dropped by the moving glacials. Because of the very high preconsolidation pressure, such deposits display very dense relative density and hard consistency; consequently, they are regarded as excellent foundation materials. Due to the unsorted nature of the soils, layers are difficult to identify. For practical purposes, however, two main strata were differentiated: one containing more than 50% fine grains, and one with more than 50% coarse-size particles.

A brief description of the soils is given as follows:

4.2) Clayey Silt:

The fine-grained or cohesive portion of the subsoils was identified to be clayey silt with a fair amount of sand-size particles and traces of gravel. This layer usually appears as the uppermost stratum, but occasionally, was observed to be overlain by granular deposits. The clayey silt exhibits slight consistency, yielding plastic limits between 12 and 16% and liquid limits between 22 and 27%. The natural moisture contents of the samples fall below or very near the plastic limits confirming the overconsolidated nature of the material. Within the upper 10 - 15 ft., firm and stiff consistencies were sometimes measured, but the majority of the Standard Penetration tests resulted in 'N' values in excess of 100 blows per ft., corresponding to hard consistency.

cont'd. /4 ...

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

4.3) Silty Sand to Sandy Silt:

The coarse or granular layers are listed on the borelogs and soil profiles as silty sands, sandy silts, sand with gravel, etc. Apart from one or two locations, this layer displays very dense relative density, corresponding to 'N' values in most cases exceeding 100 blows per ft. The natural moisture content of the layers ranges from 7% up to 15%. Due to a small percent of clay-size grains, a few samples exhibited slight plasticity, the index of plasticity being between 3 and 6%. The heterogeneous nature of the soil is well demonstrated by the scatter of the constituent particles, the gravel sizes ranging between 2 and 38%, the sand between 17 and 74%, the clay between 1 and 6%, the remainder being silt-size grains.

4.4) Groundwater Conditions:

Free water level was observed in almost all of the boreholes. The depth of water was established between 1 and 17 ft. below the prevailing ground surface - i.e., between el. 387 ft. and 427 ft. The elevations of the water table are plotted on each borelog, also on the stratigraphical profiles of Drawings #67-F-37B and C.

PART TWO

5. DISCUSSION AND RECOMMENDATIONS:

5.1) General:

a) Soil conditions within the area investigated appear to be favourable for spread footings at shallow depths.

cont'd. /5 ...

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

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

b) Recommendations for the structure foundations are given, by assuming the design ground elevations as supplied by Mr. Kolunezic of Deleuw Cather & Co. Canada Ltd., (see Drawings #67-F-16B & C). It is to be emphasized that any modification of the design or any change in the locations or elevations of the walls will likely necessitate changes in the footing recommendations.

c) Dewatering schemes for footing excavations within the granular layers below the water table, will probably be necessary, on account of the susceptibility of such soils to conditions of unbalanced hydrostatic head. In the case of using interlocking sheet piles, they should be driven to a depth below the base of the excavation equal to the height of water above it, to prevent the excavation bottom from boiling.

d) The stability of the walls supported on spread footings, should be checked against sliding along the base of the wall, caused by lateral earth pressure. The sliding force along the bottom of the wall is resisted by a horizontal force, which consists of friction, adhesion, or a combination of both.

In computing the resistance to lateral pressures for walls placed within the in-situ granular layers (sandy silt, silty sand, gravelly sand, silt with sand), a coefficient of friction $\tan \phi = 0.45$ (rough concrete slab sliding on coarse-grained soil with silt) may be used. For walls constructed within the well compacted G.B.C. Class 'A' fill material, the friction coefficient may be increased to $\tan \phi = 0.55$. For walls placed in the cohesive layers (clayey silts), the adhesion between the base and the soil is assumed to be equal to the cohesive strength of the deposit, and ϕ is assumed to be zero. The use of an adhesion value of 3000 p.s.f. is recommended for the calculations.

cont'd. /6 ...

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

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

e) For the backfill of the retaining walls, reference is made to a memo by Mr. A. Rutka, Materials and Testing Engineer, to Mr. A. M. Toye, Bridge Engineer, dated March 27, 1963. The subject of the memo: "Hwy. #401, Toronto Bypass Retaining Wall Backfill."

f) In a few locations, piled foundations are recommended. The working load on the piles should be checked during pile driving by means of the Hiley Formula (D.H.O. Standards DD 1218 and 1219).

5.2) Recommendations for the Individual Walls:

(Soil profiles at the individual walls may be seen on Drawings #67-F-37B and C.)

a) Retaining Wall #1 -

Due to the generally poor compaction of old fills, it appears undesirable to support the wall within the existing approach fill of the Bloor Street structure. Piled foundations are, therefore, recommended. It may be assumed that 12 BP at 53 steel H-piles, driven to approx. el. 410 - 420 ft., will carry safe loads of 70 T/pile. The bottom of the pile cap should be placed some four ft. below design ground line at the low side of the wall.

The easterly approx. 100-ft. length of the wall may also be placed on spread footings at or below el. 425 ft. with a design load of 2.5 t.s.f. A vertical expansion joint should be employed between the section founded on piles and on spread footings.

b) Retaining Wall #2 -

The northerly approx. 75-ft. length of this wall will be placed on new fill, while the remaining portion will be located in a cut. The wall within the cut section, may be supported on spread footings at some four ft. below finished grade, using a design

cont'd. /7 ...

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

5.2) Recommendations for the Individual Walls: (cont'd.) ...

b) Retaining Wall #2 - (cont'd.) ...

pressure of 4 t.s.f. The portion of the wall placed on fill may be founded on footings within well compacted G.B.C. Class 'A' granular fill. The method of construction of the granular fill is shown on Fig. #1, together with the recommended sequence of operations. This sequence should be strictly adhered to, in order to achieve the desired bearing capacity. A safe design load of 2 t.s.f. may be assumed for footings within the fill, constructed according to the specified method. A vertical expansion joint is recommended between the part on natural ground and on compacted fill.

c) Retaining Wall #3 -

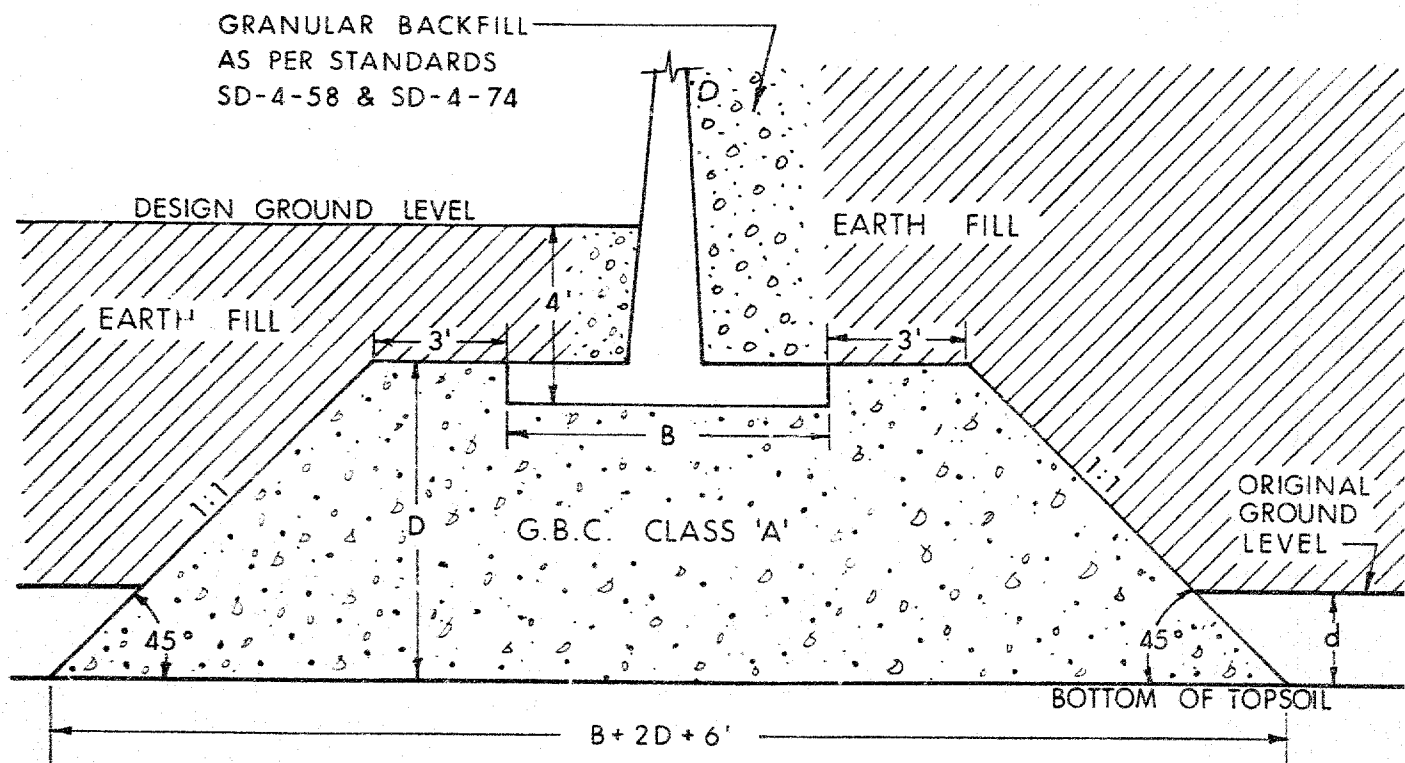
The geometry of this wall is similar to Wall #1. Here, the south portion of the wall will be placed on new fill, the remainder being founded within the natural ground. Spread footings, some four ft. below finished ground level, are recommended. Footings placed on natural soil below el. 424 ft., will safely support loads of 4 t.s.f. For footings placed above el. 424 ft., also for footings within the G.B.C. Class 'A' granular fill, 2 t.s.f. design pressures may be assumed. For the construction of the fill below the footings, reference is again made to Fig. #1. Vertical expansion joints should be employed between the sections founded on original soil and for those founded within granular fill.

d) Retaining Walls #4 and #5 -

Both walls will be placed partly in a cut, partly on new fill. The walls can be built with spread footings, the base being four ft. below finished ground. In this case, the footings will lie either within the natural soil, or the fill. The fill below the footings should be constructed of well compacted granular G.B.C. Class 'A' material as specified on Fig. #1. Footings placed

cont'd. /8 ...

FIGURE 1



LEGEND

- B = BREADTH OF FOOTINGS
- D = DEPTH OF G.B.C. CLASS 'A' BACKFILL
- d = DEPTH OF TOPSOIL

SEQUENCE OF OPERATION

- 1 - STRIP TOPSOIL
- 2 - CONSTRUCT G.B.C. CLASS 'A' TO FULL HEIGHT AS SHOWN
- 3 - CONSTRUCT REMAINDER OF FILL TO CONVENIENT HEIGHT
- 4 - RE-EXCAVATE FOR RETAINING WALL FOOTING

TYPICAL SECTION OF A RETAINING WALL SUPPORTED ON SPREAD FOOTINGS WITHIN THE FILL MATERIAL

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

5.2) Recommendations for the Individual Walls: (cont'd.) ...

d) Retaining Walls #4 and #5 - (cont'd.) ...

not higher than three ft. below the existing ground level will support loads of 4 t.s.f. For footings above this depth, or within the granular fill, 2 t.s.f. safe pressure may be assumed. As an alternative, sections of the walls within the proposed fill may also be supported on piles. No granular fill would be necessary for the piled foundation. It is believed that either 12-3/4" O.D. steel tubes or 12 BP at 53 steel H-piles will develop safe bearing capacities of 70 T/pile, when driven to approx. el. 415 - 420 ft. at the location of Wall #4, and to approx. el. 405 - 410 ft. at Wall #5.

Expansion joints should be installed between the sections supported on natural ground and those supported on piles or on fill material.

e) Retaining Wall #6 -

The design ground level at this wall closely follows the existing ground line. Spread footings, placed not higher than four ft. below the average ground level, appear to be feasible. Up to 4 t.s.f. design load may be used on the footings at or below the suggested depth. Some dewatering problems may be encountered below the south portion of the wall, due to the sandy silt subsoil.

f) Retaining Wall #7 -

Since the proposed grade at the low side of the wall is well below the existing ground surface, a spread footing foundation is the obvious answer. Footings placed four ft. below finished grade may be designed for 4 t.s.f. safe loads. The location of the larger part of the wall coincides with the existing pavement of the Municipal Road (See Drawing #67-F-37A); consequently, borings had

cont'd. /9 ...

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

5.2) Recommendations for the Individual Walls: (cont'd.) ...

f) Retaining Wall #7 - (cont'd.) ...

to be offset from the exact location. It is suggested that the footing excavation be inspected and approved by the Foundation Section, prior to commencing the pouring of concrete. Dewatering schemes may be necessary within the sandy silt to silty sand stratum.

g) Retaining Walls #8 and #9 -

In view of the much lower design grades than the existing ones, spread footings are the most economical for both walls. At Wall #8, 4 t.s.f. safe pressure may be used at or below el. 413 ft., and 2 t.s.f. between el. 413 ft. and the existing ground level.

The footings of Wall #9 will carry loads of up to 4 t.s.f. at or below el. 412 ft., and 1.5 t.s.f. between el. 412 ft. and the existing ground. Dewatering of the excavations might become problematic due to the presence of the susceptible, granular material. In such a case, a dewatering scheme should be provided as described under Section (5.1), para. (c).

h) Retaining Wall #10 -

Spread footings may be employed for this wall, at four ft. below finished grade with design pressures of up to 4 t.s.f. The elevation of the footing base should, however, not be higher than el. 393 ft. at the west end of the wall, and el. 397 ft. at the east end. The bottom of the excavation will likely lie within the clayey silt stratum; hence, no major dewatering problems are foreseen.

cont'd. /10 ...

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

5.2) Recommendations for the Individual Walls: (cont'd.) ...

i) Retaining Walls #11 and #12 -

A stiff to hard clayey silt fill material forms the uppermost layer at the location of both walls. The consistency of this fill varies considerably: the material contains pockets of organic matter. According to the information supplied by Deleuw Cather & Co., however, the design ground at both walls lies below this fill; consequently, spread footings may be constructed with the provision of four-ft. cover. Footings will support up to 4 t.s.f. design load, but it is essential that the base of the footings be below el. 405 ft. The sandy silt layer is susceptible to conditions of unbalanced hydrostatic head; a dewatering scheme, therefore, might be necessary.

j) Retaining Walls #13B and #14B -

The design ground line at both of these long retaining walls will closely follow the existing ground level. Soil conditions appear to be favourable for spread footings. The depth of the base of the footings should be some four ft. below existing ground level along the length of both walls, except around the south end of Wall #13B. At this location (B.H. #89), some soft to firm clayey silt was found which was observed to be contaminated with organic matter. The depth of this material is believed to be not greater than 4 - 6 ft.; nevertheless, complete excavation of this layer is essential. Footings should be constructed - after the excavation of the contaminated layer - on the inorganic subsoil. Safe pressures of 4 t.s.f. may be assumed on the footing bases for design purposes.

No major dewatering problems are anticipated.

cont'd. /11 ...

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

5.2) Recommendations for the Individual Walls: (cont'd.) ...

k) Retaining Wall #15 -

The proposed design grade at the low side of this wall varies between el. 415 ft. at the south end, and el. 418 ft. at the north. At or below these elevations, the subsoil has sufficient strength to support the structure on spread footings, placed four ft. below finished grade. A design load of 4 t.s.f. may be employed on the footings. Boiling of the excavation bottom may not occur - regardless of the presence of the granular material - since the water level was found to be at a somewhat low elevation.

6. SUMMARY:

The results of the foundation investigation at the site of some 15 retaining walls at the proposed Hwy. #27 and Dundas St. interchange are reported.

The report is divided into two parts. Part One deals with the description of the site, together with the procedure of the investigation and the soils description. In Part Two, general and detailed recommendations are presented pertaining to the foundations.

Special attention should be given to Section (5.1), where general remarks and recommendations are made concerning all the footings. These recommendations are not repeated again in the sections for the individual walls; nevertheless, they should be considered and incorporated into the design of the walls, if applicable.

cont'd. /12 ...

7. MISCELLANEOUS:

The field work was carried out during the period May 2 - 3, 1967, by Messrs. A. M. Seppala and A. Prakash, Project Foundation Engineers, under the supervision of Mr. A. K. Barsvary, Senior Foundation Engineer, who also prepared this report.

Equipment used was owned and operated by Canadian Longyear Ltd., and Dominion Soil Investigation Ltd., Toronto.

The report was reviewed by Mr. K. G. Selby, Supervising Foundation Engineer.

June 1967

APPENDIX I

MEMORANDUM

To: Mr. B. R. Davis,
Bridge Engineer,
Bridge Division,
Admin. Bldg.

FROM: Foundation Section,
Materials & Testing Div.,
Room 107, Lab. Bldg.

Attention: Mr. S. McCombie

DATE: March 4, 1968

OUR FILE REF.

IN REPLY TO

MAR 12 1968

SUBJECT:

SUPPLEMENTARY

FOUNDATION INVESTIGATION REPORT

For

Proposed Retaining Walls at the
Dundas St. and Hwy. #27 Interchange
District #6 (Toronto)

W.J. 67-F-37 -- W.P. 275-64-2

Enclosed, please find our Foundation Investigation Report for Retaining Wall #16, Hwy. #27 and Dundas Street Interchange.

The investigation was requested by Mr. W. S. Melinyshyn, in a memo dated January 26, 1968. The report is supplementary to Report #67-F-37, and includes Record of Borelog sheets #90, 91, 92 and 34, together with revised Drawings #67-F-37A - (March 1, 1968) and #67-F-37C (March 1, 1968). You should attach all of the above to your present copy(s) of Report #67-F-37 and destroy the old copies of Drawings #67-F-37A and C.

We believe you will find the report sufficient for your design purposes. Should any points require clarification, however, please contact this Office.

KGS/MdeF
Attach.

cc: Messrs. B. R. Davis (2)
L. A. Tregaskes
D. W. Farren
G. K. Hunter (2)
F. Allen
W. S. Melinyshyn
T. J. Kovich
B. A. Singh

Foundations Files
Gen. Files

K. G. Selby
K. G. Selby,
SUPERVISING FOUNDATION ENGR.
For:
A. G. Sternac,
PRINCIPAL FOUNDATION ENGR.

SUPPLEMENTARY
FOUNDATION INVESTIGATION REPORT
For

Proposed Retaining Walls at the
Dundas St. and Hwy. #27 Interchange
District #6 (Toronto)
W.J. 67-F-37 -- W.P. 275-64-2

RETAINING WALL #16 - (East Mall -

Subsoil Conditions:

Three boreholes, No's 90, 91 and 92, were drilled at the site. One borehole, No. 34 from Report 66-F-103, put down by Dominion Soil Investigation Ltd. in December 1966 - January 1967, was also used to arrive at the soil stratigraphy.

The subsoil consists of a layer of firm to hard clayey silt with sand and traces of gravel underlain by a stratum of very dense silty sand to sandy silt with some gravel and traces of clay. The boundary between the two layers dips from el. 409 in borehole 34 to el. 395 in borehole 91. Borehole 90 was terminated in the clayey silt stratum.

Groundwater elevations were as follows:

B.H. 34	.....	399.4
B.H. 90	.....	408.7
B.H. 91	.....	406.9

The locations and elevations of the boreholes and the estimated soil profile are plotted on revised Drawings 67-F-37A and 67-F-37C, respectively.

cont'd. /2 ...

RETAINING WALL #16 - (East Mall) - (cont'd.) ...

Recommendations:

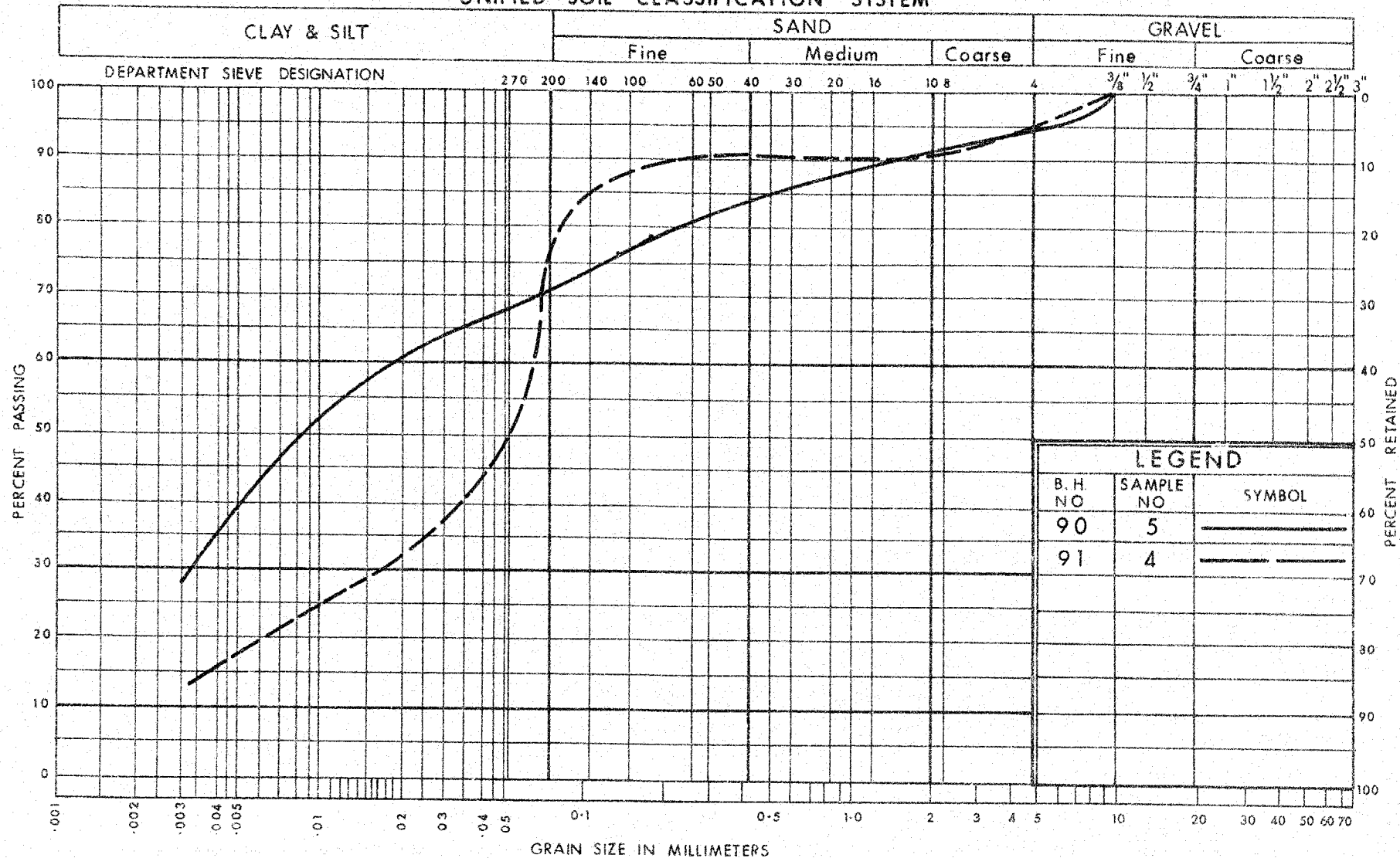
It is recommended that the retaining wall be supported on spread footings, placed 5 ft. or more below the boulevard design ground level, as shown on Drawing No. 7723 (DeLeuw, Cather & Co. of Canada Ltd.).

A safe bearing pressure of 2.0 tons/sq.ft. may be assumed for design purposes.

The silty sand to sandy silt layer is likely to be susceptible to unbalanced hydrostatic conditions; consequently, a dewatering scheme might be necessary.

For the computations of resistance of the wall against lateral thrust along the base, a friction coefficient of 0.45 in the silty sand layers, and an adhesion value of 2000 p.s.f. in the clayey silt layers, may be assumed.

UNIFIED SOIL CLASSIFICATION SYSTEM



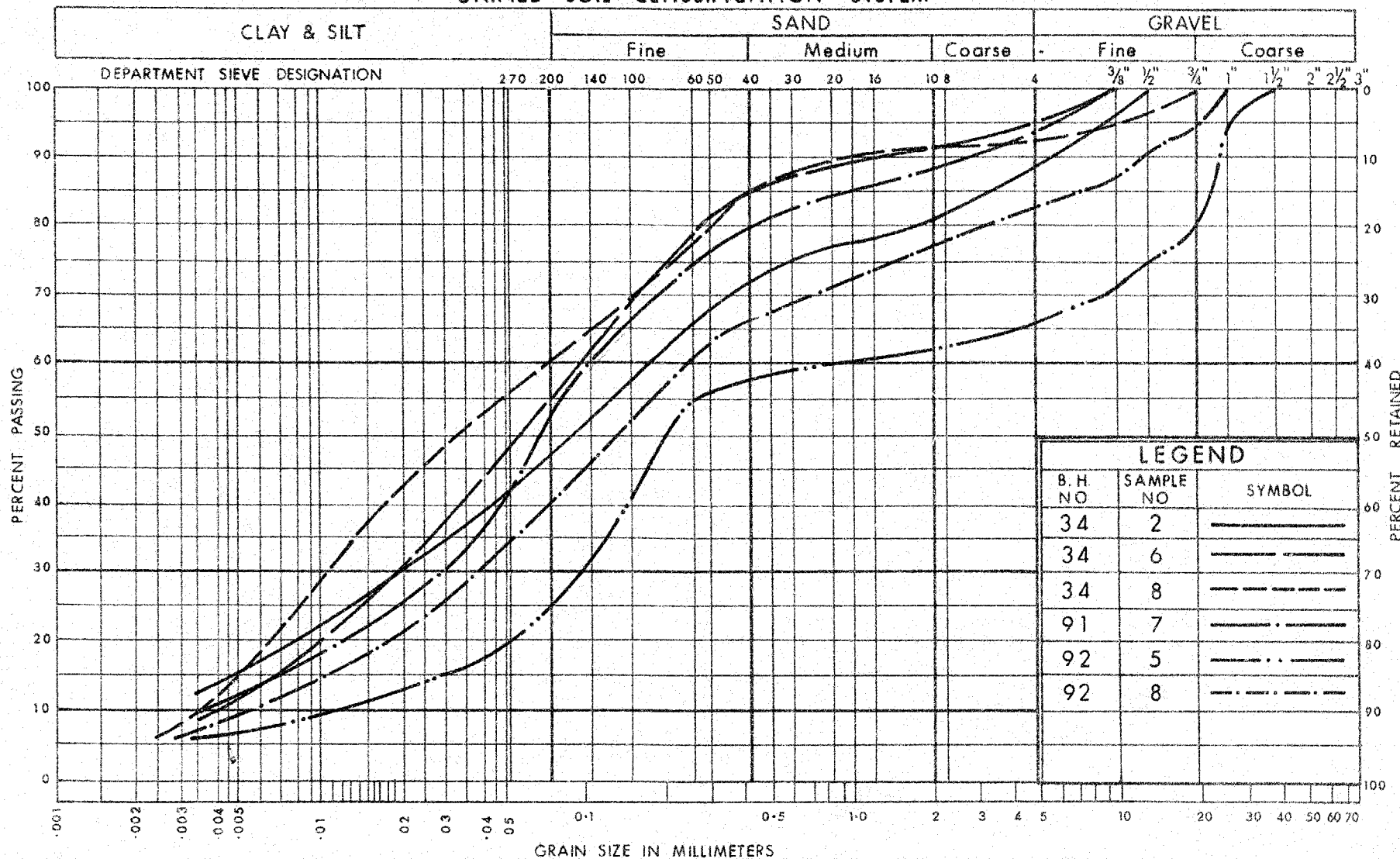
DEPARTMENT OF HIGHWAYS
MATERIALS and
TESTING
DIVISION

GRAIN SIZE DISTRIBUTION
CLAYEY SILT

W.P. No. 275-64-2

JOB No. 67-F-37

UNIFIED SOIL CLASSIFICATION SYSTEM



DEPARTMENT OF HIGHWAYS
MATERIALS and
TESTING
DIVISION

GRAIN SIZE DISTRIBUTION SANDY SILT

W.P. No. 275-64-2

JOB No. 67-F-37

401 & Aeele St.
Downsview, Ontario

June 20, 1967

Canadian Longyear Limited
35 Brydon Drive
Rexdale, Ontario

Dear Sirs:

This is to confirm our request of May 1, 1967 for the supply of a Penn Drill and Bombadier together with all necessary equipment, as specified under the terms of our Contract Agreement, at Dundas St. and Hwy. 27, Toronto, Ontario.

This job bears the number 67-P-37.

Yours truly,

K. L. Selby

KS:mr

K. Selby
Supervising Foundation Engineer
for A. G. Sternac
Principal Foundation Engineer

401 & Keele St.
Downsview, Ontario

June 20, 1967

Dominion Soil Investigation Ltd.
77 Crockford Blvd.
Scarborough, Ontario

Dear Sirs:

This is to confirm our request of May 1, 1967 for the supply of Penn Drill, ~~WINDMILL~~, & Core Drill together with all necessary equipment, as specified under the terms of our Contract Agreement, at Dundas St. & Hwy. 27, Toronto, Ontario.

This project bears Job Number 67-F-37

Yours truly,

A. Selby

KS:mt

A. Selby
Supervising Foundation Engineer
for A. G. Stermac
Principal Foundation Engineer

MEMORANDUM

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

FROM: Bridge Division,
Downsview, Ontario.

DATE: April 25th, 1967.

OUR FILE REF.

IN REPLY TO

SUBJECT: W.P. 275-64-2, Dundas Interchange,
Highway No. 27, District No. 6.

67-637

Since receiving your report WJ. 66-F-103 dated 21st February 1967 the design of the above interchange has been changed by Functional Planning. The attached two prints of the 100' scale plan are different in the following areas:-

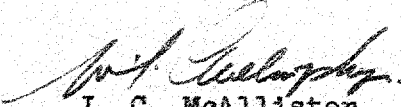
- a) The original overpass at Dundas Street has now been split into two bridges with the North Bound Collector being called Bridge No. 2 with W.P. 279-64-4.
- b) The location of the W.B. Basketweave (W.P. 266-66) has been moved southwards. The grades have also been reversed with the N.B. Collector going over the two-lane transfer road.
- c) A temporary grade separation Bridge No. 9, W.P. 279-64-6 will be located approximately as shown on the plan.
- d) The proposed location of retaining walls No. 1 to No. 12, 13B and 14B are also shown on the plan with the approximate height of ret. wall above ground also shown.

Also attached are two prints of preliminary profiles of Highway No. 27 S.B. and N.B. Basketweaves, and Dundas St.

It is expected that all the bridges in this interchange will be under design within a month. We therefore should have foundation reports by 31st May 1967.

JCMca/aw
Attach.

c.c. A. Crowley
R. Forrest


J. C. McAllister,
for W. S. Melinyshyn,
Regional Bridge Location Engineer.

MEMORANDUM

From: Office of the
Director, Bureau of
Plant Industry

To: Mr. A. C. ...
Mr. ...
Mr. ...

Date: April 25, 1967

Subject: ...
Reference: ...

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APR 26 1967
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OVER

DEPARTMENT OF HIGHWAYS ONTARIO

MEMORANDUM

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

FROM: Bridge Division,
Downsview, Ontario.

DATE: April 28, 1967.

OUR FILE REF.

IN REPLY TO

SUBJECT: W.P. 275-64-2 Retaining Walls,
Dundas Interchange,
District #6.

67 F 37

It has been pointed out to us that our memo of 25th. April 1967 requesting foundation information in the above interchange is ambiguous; in that it implies structure and retaining wall reports should be ready in a month.

This memo is to correct the situation and inform you that completed retaining wall reports are not expected at that time and that the sketchy information given you was to let you get a head start on the field work.

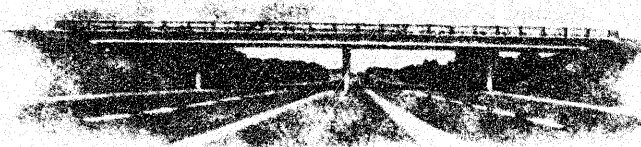
As near as can be estimated at the moment retaining walls will not be in for design for about two months.

J. C. McAllister

JCMCA/ss

cc. R. Strain
A. Crowley
R. Forrest

J. C. McAllister,
for W. S. Melnyshyn,
Regional Bridge Location Engineer.



401 & Keele Street
Downsview, Ontario

DEPARTMENT OF HIGHWAYS

March 5, 1968

Dominion Soil Investigation
77 Crockford Blvd.
Scarborough, Ontario

Dear Sirs:

This is to confirm our request of January 31, 1968 for the supply of a Diamond Drill and a Pennsylvania Auger, together with all necessary equipment, as specified under the terms of our Contract Agreement, at Hwy. #401 and #27, on February 1, 1968.

These projects bear Job Numbers 68-F-10; 67-F-37; 66-F-102.

Yours truly,

K. G. Selby
Supervising Foundation Engineer
for: A. G. Stermac
Principal Foundation Engineer

KGS:mt

cc: H. Konings
Foundation Files (2) 119
General File

MEMORANDUM

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

FROM: Bridge Division,
Downsview, Ontario.

DATE: April 25th, 1967.

OUR FILE REF.

IN REPLY TO

SUBJECT: W.P. 275-64-2, Dundas Interchange,
Highway No. 27, District No. 6.

Since receiving your report WJ. 66-F-103 dated 21st February 1967 the design of the above interchange has been changed by Functional Planning. The attached two prints of the 100' scale plan are different in the following areas:-

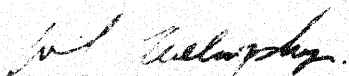
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- b) The location of the W.B. Basketweave (W.P. 266-66) has been moved southwards. The grades have also been reversed with the N.B. Collector going over the two-lane transfer road.
- c) A temporary grade separation Bridge No. 9, W.P. 279-64-6 will be located approximately as shown on the plan.
- d) The proposed location of retaining walls No. 1 to No. 12, 13B and 14B are also shown on the plan with the approximate height of ret. wall above ground also shown.

Also attached are two prints of preliminary profiles of Highway No. 27 S.B. and N.B. Basketweaves, and Dundas St.

It is expected that all the bridges in this interchange will be under design within a month. We therefore should have foundation reports by 31st May 1967.

JCMCA/aw
Attach.

c.c. A. Crowley
R. Forrest


J. C. McAllister,
for W. S. Melinyshyn,
Regional Bridge Location Engineer.

#67-F-37

W. P. #275-64-2

HWY. #27 AND

DUNDAS ST.

INTERCHANGE

