

70-F-054	135-67	Hwy. 27 & W. Humber River	30M12-63
W.O.	W.P.	LOCATION	GEOCRES NO.

● DATA ON FILE IN SOIL MECHANICS SECTION

REFER TO: CONTRACT FILE 72-57

REMARKS

GEOCRES INDEXING CARD FOR REPORTS NOT MICROFILMED

GI-20 AUG. 74

EXPER IMPROSED DOCUMENT MAY
APPEAR AS MULTI-FEED ON FILM.

FIELD RECONNAISSANCE REPORT
REQUIRED BY FOUNDATION SECTION
FOR

FF-69
SEPT. 1968

W.O. 70-11054

W.P. NO. 135-67-2 HIGHWAY NO. 27 DISTRICT 6 SITE PLAN NO. E4983-1 PROFILE NO. 080-13
RIVER CROSSING ☒ GRADE SEPERATION ☐ R.R.X. ☐ OTHER (SPECIFY) _____
ALTERNATE SCHEME (IF ANY) _____

EXISTING SITE CONDITIONS

DESCRIPTION:

TOPOGRAPHY: HILLY ☐ ROLLING ☐ VALLEY ☐ GULLIED ☐ FLAT ☐
VEGETATION: TREES ☐ BRUSH ☒ GRASS ☒ SWAMP ☐ FARM CROPS ☐ CLEARED ☐
SNOW COVER: 0"-6" ☐ 6"-12" ☐ >12" ☐
ROCK OUTCROP (SPECIFY LOCATIONS) _____

UNDERGROUND UTILITIES: UTILITY COMPANY _____ TELEPHONE NO. FOR DEFINITE LOCATION _____

1 Borough of Etobicoke, 36" Ø Sanitary Sewer

2 _____

3 _____

4 _____

5 _____

EXISTING STRUCTURE(S):

FOUNDATIONS: SPREAD FOUNDATIONS ☒ SIZE _____ ELEVATION(S) 485 +
PILES ☐ TYPE _____ LENGTH(S) _____
DESIGN LOAD 3.5 T.S.F. _____ TONS/PILE _____
CONDITION OF STRUCTURE _____

APPROACHES: CUT ☐ FILL ☒ SIDE SLOPES 1½:1
BERMS YES ☐ NO ☒

OTHER OBSERVATIONS (USE BACK OF SHEET TO DESCRIBE ANY FAILURES IN AREA, PAST PERFORMANCE OF EXISTING APPROACHES & STRUCTURE, ETC.)

ACCESSIBILITY

IS STRUCTURE LOCATED ON D.H.O. RIGHT OF WAY? YES ☒ NO ☐ IF NO,
HAS PERMISSION BEEN OBTAINED TO ENTER PROPERTY? YES ☐ NO ☐ IF NO,

PROPERTY OWNER(S):

NAME

ADDRESS

TELEPHONE NO.

1 _____

2 _____

3 _____

4 _____

WHO WILL OBTAIN NECESSARY PERMISSION? _____

HAS SITE BEEN SURVEYED & STAKED? YES ☒ NO ☐ IF YES, DATE OF MOST RECENT SURVEY June '70

WILL CLEARING BE NECESSARY TO ENTER SITE AREA? YES ☐ NO ☐

IS SITE ACCESSIBLE TO WHEELED VEHICLES? YES ☐ NO ☐

IF RIVER CROSSING:

WILL A RAFT BE NECESSARY? YES ☐ NO ☒ IF YES, GIVE MAX. DEPTH OF WATER _____ FT.

CURRENT: SWIFT ☐ MODERATE ☐ SLOW ☐

DRILLING OPERATIONS

NEAREST SOURCE OF WATER (GIVE HAULING DISTANCE, IF KNOWN) 200 - 500 Ft. (Humber River)

ADDITIONAL INVESTIGATION REQUIRED FOR THE FOLLOWING PURPOSES:

ALTERNATE SCHEME: YES ☐ NO ☒ IF YES, SPECIFY _____

HYDROLOGIC REASONS: YES ☒ NO ☐ IF YES, SPECIFY (SCOUR, ETC.) Stream Diversion (Short)

REMARKS

NEAREST AVAILABLE ACCOMODATION: _____

OTHER COMMENTS: Information could be obtained for the initial stream diversion scheme at the same time.

DATE June 22nd, 1970

REGIONAL BRIDGE LOCATION ENGINEER J. J. McLaughlin

DEPARTMENT OF HIGHWAYS ONTARIO
DESIGN BRANCH - ENGINEERING SURVEYS DIVISION
WORK ORDER

70-11054

28-2 E.S.

Requested By	E. J. J. J.		Order No.	W.P.135-67	
Issued By	J.D. Barclay	Date	June 22/70	Priority	June 22, 1970
Charge To	Engineering Surveys		Work Project No.	135-67	
Highway No.	27	District	6	Region	Central
Township	Borough of Woblescoke	County (Name & Number)	York	Length	N.A.
Issued To	V. G. G. G.	Riding (Name & Number)	Humber		38
Job Description	Crossing at Humber River Crossing and Hwy 27				

INSTRUCTIONS:

1. Layout bore holes as per bore holes as per attached sketch
2. Obtain chainage and offsets to bore holes from the approved centre-line
3. Take ground level elevations at each location
4. Turn over the completed survey notes to the foundation engineer on the job site.

MEMORANDUM

Telephone: 243-3097

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

FROM: W.S. Melinysbyn,
Bridge Office,
Central Region.

ATTENTION:

DATE: June 22nd, 1970.

OUR FILE REF.

IN REPLY TO

W.O. 70-11054

SUBJECT: West Humber River Bridge,
W.P. 135-67, Site 37-174,
Hwy. 27, District 6, Toronto.

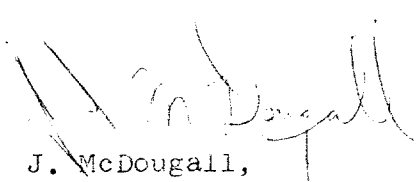
Attached please find two prints of Bridge Site Plan E-4983-1 and one print of Plan B-80-57 and a Field Reconnaissance Report for the above proposed structure.

Shown in red are probable footing locations and grade at this crossing. The Future Diversion indicated on Plan B-80-57 will be constructed by others at a later date, if warranted.

Would you kindly arrange to have a foundation investigation carried out at this site.

JMcD/cew
Attach.

cc R. Fitzgibbon


J. McDougall,
for:
W.S. Melinysbyn,
REG. BRIDGE PLANNING ENGINEER.

MEMORANDUM

100-11054

TO: Mr. V. Korlu,
Project Foundation Engineer.

FROM: K. Ingham

ATTENTION:

DATE: July 28, 1970

OUR FILE REF.

IN REPLY TO

SUBJECT: Humber River Bridge and Channel Relocation,
Highway No. 27

The bedrock outcropping at the site and that encountered in the ten boreholes is part of the Dundas formation, consisting essentially of interbedded grey shale, siltstone, silty limestone and limestone. The siltstone and limestone form beds 0.1 to 1.0 ft. in thickness and are conspicuously weathered only in the upper 0.5 to 1.0 ft. They are, however, fractured to a much greater depth. The shale is badly weathered in a zone at the top of each section, followed by a zone in which weathered layers become less frequent down to a depth at which the shale can be considered to be fresh.

A brief description of the three zones follows together with the appropriate depth in each borehole. Only in zone A can weathering be considered to be important, however, zone A is still an integral part of the bedrock. Fracturing of the harder beds is noticeable in both zones A and B.

Zone A: Broken grey shale with frequent layers weathered to clay consistency, interbedded with fractured moderately weathered beds of siltstone, silty limestone and limestone.

Zone B: Grey shale with occasional weathered layers interbedded with fractured beds of siltstone, silty limestone and limestone.

Zone C: Interbedded grey shale, siltstone, silty limestone and limestone.



K. Ingham,
Geologist.

KI:mv

<u>Borehole No.</u>	<u>Zone A Interval, feet</u>	<u>Zone B Interval, feet</u>	<u>Zone C Interval, feet</u>
1	13.0 - 15.0	15.0 - 17.5	17.5 +
2	9.5 - 14.5	14.5 - 19.0	19.0 +
3	13.0 - 15.0	15.0 - 17.5	17.5 +
4	9.5 - 13.5	13.5 - 16.0	16.0 +
5	12.0 - 13.0	13.0 - 18.0	18.0 +
6	9.0 - 17.0	17.0 - 29.0	
7	13.0 - 14.5	14.5 - 15.0	15.0 +
8	12.0 - 13.5	13.5 - 17.0	17.0 +
9	9.5 - 12.0	12.0 - 15.0	15.0 +
10	5.5 - 11.5	11.5 - 13.5	

MEMORANDUM

30M12-63

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

ATTENTION: Mr. S. McCombie

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

DATE: September 1, 1970

OUR FILE REF.

IN REPLY TO

SUBJECT:

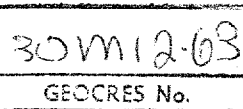
FOUNDATION INVESTIGATION REPORT

For

New Structure at the Crossing of
Hwy. 27 and Proposed West Humber
River Diversion

Borough of Etobicoke - Co. of York
District No. 6 (Toronto)

W.O. 70-11054 -- W.P. 135-67



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.

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

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

Foundations Files
Gen. Files

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FOUNDATION INVESTIGATION REPORT
For
New Structure at the Crossing of
Hwy. 27 and Proposed West Humber
River Diversion
Borough of Etobicoke--County of York
District No. 6
(Toronto)
W.O. 70-11054 -- W.P. 135-67

1. INTRODUCTION:

The Foundation Section was requested to carry out a subsurface investigation at the proposed diversion of the West Humber River and Hwy. #27. The request was contained in a memo from Mr. W. S. Melinyshyn, Toronto Regional Bridge Planning Engineer, dated June 22, 1970. An investigation was subsequently carried out by this section.

This report contains the factual results obtained from this investigation, together with the recommendations pertaining to the foundations of the proposed structure, as well as the stability and settlement of the approach embankments. Additional information pertaining to the proposed creek diversion has also been included.

2. DESCRIPTION OF THE SITE AND GEOLOGY:

The site is located on the south side of the existing crossing of the West Humber River and Hwy. #27 about 1½ miles south of Albion Road.

The surrounding area which is generally flat to very gently undulating, is dissected by the valley of the meandering West Humber River. The site is located in this valley, on the spur of one of the meanders. At this location,

2. DESCRIPTION OF THE SITE AND GEOLOGY: (cont'd.) ...

Hwy. #27 is a two-lane paved roadway, built on an embankment about 12 feet above the level of the surrounding terrain.

Physiographically, the site is situated in the "Peel Plain". The area is characterized by a stratum of gray clayey till with numerous stones of igneous and sedimentary origin. The overburden deposits are underlain by Palaeozoic shale and limestone of the Meaford-Dundas and Blue Mountain formations.

3. FIELD AND LABORATORY WORK:

Ten sampled boreholes, all of which were accompanied by dynamic cone penetration tests, were put down in the course of the field investigation. The borings were advanced by means of a conventional diamond drill rig adapted for soil sampling purposes.

Samples of the overburden deposits were obtained in a 2" O.D. split-spoon sampler, which was hammered into the subsoil in accordance with the specifications for the Standard Penetration Test. The same method was used to advance the dynamic cone penetration tests. Bedrock was proven in all the boreholes by obtaining BXL size rock core.

The locations and elevations of all the borings were surveyed in the field by personnel from the Central Region Engineering Surveys Section. They are shown on Drawing No. W.O. 70-11054A, together with the estimated stratigraphical profiles along the centre-lines of Hwy. #27 and the proposed river diversion. All elevations are referenced to a geodetic

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

datum.

All the samples were subjected to a careful visual examination in the field and subsequently in the laboratory. In addition, certain selected samples were subjected to the following laboratory tests:

Natural Moisture Content
Bulk Density
Grain Size Distribution
Atterberg Limits

The results of the laboratory testing are plotted on the Record of Borelog sheets and Figures 1 and 2, all of which are contained in the appendix of this report.

4. SUBSOIL AND BEDROCK CONDITIONS:

4.1) General:

The predominant stratum across the site is composed of a cohesive glacial till stratum; in some places, this stratum is replaced by a silty sand deposit. The overburden deposits are underlain by shale bedrock, encountered at 5 to 13 feet below ground surface.

In some locations the overburden deposits are overlain by fill material of the existing Hwy. #27.

The boundaries of the various deposits, as determined in the boreholes, are shown on the accompanying borehole sheets. The stratigraphical profile, shown on Drawing No. W.O. 70-11054 is inferred from this boring data.

From ground surface downwards, the various soil

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

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

types are as follows:

4.2) Fill Material:

The roadway fill material, which has a maximum thickness of about 15 feet at the highway centre-line, was encountered in all the boreholes, except B.H.'s 9 and 10.

The fill material is cohesive in nature, consisting of a clayey silt to silty clay with some sand and gravel, and a trace of organics. However, in the vicinity of B.H. 6 the fill which is more granular in nature, consists of brown sandy silt to silty sand with a trace of clay and gravel.

The Standard Penetration Tests, carried out within the fill material gave 'N' values ranging from 8 to 29 blows per foot. These values indicate that the fill material is generally well compacted. The laboratory results of the fill material, are shown on the Record of Borelog sheets in the appendix of this report.

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

A deposit of glacial till was observed in all the borings carried out on the western side of the existing Hwy. #27 and also in B.H.'s 7 and 9 on the eastern side of the highway. In general, the glacial till deposit is overlain by fill material except in B.H. 9. The deposit where it was encountered varies from 1 to 6 feet in thickness.

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

4.3) Heterogeneous Mixture of Clayey Silt, Sand & Gravel:
(cont'd.)... (Glacial Till):

The glacial till is predominantly cohesive in nature, and is composed of a heterogeneous mixture of clayey silt, sand and gravel. The Atterberg limit tests, performed in this material, indicate that the deposit is inorganic with a low plasticity. Grain size distribution curves for samples of this deposit, obtained with 2" O.D. sampling equipment, are illustrated, in envelope form, on Figure #1.

The Standard Penetration Tests, carried out within this deposit, are plotted on the Record of Borelog sheets. This testing gave 'N' values which vary from 11 to 72 blows/ft. Based on these values, the consistency of the glacial till ranges from stiff to hard.

4.4) Silty Sand:

A stratum of silty sand with some gravel was encountered in B.H.'s 1, 3 and 5, immediately below the roadway fill material, and also in B.H. 9, below the ground surface. This granular deposit is, in general, underlain by shale bedrock except in B.H. 9, where a thin layer of glacial till was encountered. The overall thickness of the stratum varies from 5 to 8 feet. As the site is located within the flood plain of the river, it is believed that this is a fluvial deposit. Grain size distribution curves for samples of this deposit are illustrated, in envelope form, on Figure #2.

The Standard Penetration Tests, carried out within this deposit, gave 'N' values which vary from 12 to 67 blows/

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

4.4) Silty Sand: (cont'd.)...

ft., generally increasing with depth. However, in B.H. 9, an 'N' value of 3 blows/ft. was observed at a depth of 4 feet below the existing ground surface.

Based on these values, the relative density of the silty sand ranges generally from compact to very dense.

4.5) Shale Bedrock:

The overburden deposits are directly underlain by bedrock, which was proven in all the boreholes, by obtaining from 8 to 20 feet of BXL size rock core samples. Over the site, the bedrock surface was found to vary between elevations 289 and 296 (5 to 13 feet below ground surface).

The bedrock at this site is described in the following report by Mr. K. Ingham, D.H.O. Geologist:

"The bedrock outcropping at the site and that encountered in the ten boreholes is part of the Dundas formation, consisting essentially of interbedded grey shale, siltstone, silty limestone and limestone. The siltstone and limestone form beds 0.1 to 1.0 ft. in thickness and are conspicuously weathered only in the upper 0.5 to 1.0 ft. They are, however, fractured to a much greater depth. The shale is badly weathered in a zone at the top of each section, followed by a zone in which weathered layers become less frequent down to a depth at which the shale can be considered to be fresh.

A brief description of the three zones follows together with the appropriate depth in each borehole. Only in

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

4.5) Shale Bedrock: (cont'd.)...

zone A can weathering be considered to be important, however zone A is still an integral part of the bedrock. Fracturing of the harder beds is noticeable in both zones A and B.

Zone A: Broken grey shale with frequent layers weathered to clay consistency, interbedded with fractured moderately weathered beds of siltstone, silty limestone and limestone.

Zone B: Grey shale with occasional weathered layers interbedded with fractured beds of siltstone, silty limestone and limestone.

Zone C: Interbedded grey shale, siltstone, silty limestone and limestone."

The zones of the bedrock, as described above, are shown on Drawing No. W.O. 70-11054A, and on the Record of Borelog Sheets which are contained in the appendix of this report.

5. GROUNDWATER CONDITIONS:

During the period of the investigation, groundwater level observations were carried out in the open boreholes. The groundwater level was at a depth of 5 to 10 feet below the existing ground surface. These depths correspond to elevations between 492 and 497.

6. DISCUSSION AND RECOMMENDATIONS:

6.1) General:

It is proposed to widen the existing Hwy. #27 to a six-lane roadway in the vicinity of the West Humber River crossing. In conjunction with this project, it is also proposed to relocate the river and to construct a new three-span bridge immediately south of the existing structure. The new structure will be 90 feet wide and approximately 130 feet long, with span lengths of 52, 76 and 52 feet. At the structure, Hwy. #27 will have a profile grade between elevations 517 and 519. The associated approach fills will, therefore, have a height varying between 8 and 20 feet.

The predominant stratum across the site is composed of a cohesive glacial till stratum; in some places, on the east side of the structure, this stratum is replaced by a silty sand deposit. The overburden deposits are underlain by shale bedrock, encountered at 5 to 13 feet below ground surface.

6.2) Structure Foundations:

6.2.1) Pier Foundations (Refer to B.H.'s 3, 4, 5 and 6)

The two centre piers will be located within the channel of the proposed diverted river. The invert elevation of the proposed channel is 491, which approximately coincides with the top of the bedrock. Therefore, the piers may be founded on spread footings located within the bedrock.

In view of the weathered condition of Zone A, it is recommended that the pier footings be located within either Zone B or Zone C of the bedrock (the bedrock zones are described

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

6.2) Structure Foundations: (cont'd.) ...

6.2.1) Pier Foundations (Refer to B.H.'s 3, 4, 5 and 6) (cont'd.) ..

and illustrated on Drawing No. W.O. 70-11054A and the Record of Borelog Sheets). If the footings are located within Zone B, i.e., at or below elevations 488 (South pier) and 487 (North pier), an allowable bearing value of 5 t.s.f. may be used in the footing design. If a higher bearing value is required, the footings should be located within Zone C, at or below elevations 485 (South pier) and 480 (North pier). In this case, an allowable bearing value of 10 t.s.f. may be used.

It should be noted that the fractured shale bedrock (Zone B) may be susceptible to frost action. For this reason, it is recommended that at least a 4-foot cover be provided from the base of the footing.

No major dewatering problems are anticipated for the construction of the pier foundations; however, any seepage into the excavation could be handled by normal pumping methods.

6.2.2) Abutment Foundations (Refer to B.H.'s 1, 2, 7 and

The proposed perched abutments for the structure may be supported on end-bearing piles driven to bedrock. As the surface of the bedrock is badly weathered, it is anticipated that the piles may penetrate up to one foot into the bedrock. The approximate tip elevations would range from 488 to 493 at the South abutment and from 490 to 491 at the North abutment. The allowable loads

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

6.2) Structure Foundations: (cont'd.) ...

6.2.2) Abutment Foundations (Refer to B.H.'s 1, 2, 7 and 8
(cont'd.) ...

would depend on the pile section chosen (e.g., 12 BP 74 steel H-piles may be designed for 95 tons/pile).

No boulder or rock fill material should be used in areas through which piles are to be driven.

6.3) Settlement and Stability Considerations:

The maximum differential settlement would take place between the piers founded on spread footings and the abutments founded on piles; however, this settlement would be negligible.

The approach fills will vary between 8 and 20 feet, in height. No stability problems are anticipated for embankments of these heights, if constructed of properly compacted fill with standard 2:1 slopes.

The settlement induced in the foundation subsoil by the approach fill surcharge loading is expected to be negligible.

6.4) River Diversion:

It is proposed to relocate the West Humber River to a location south of the existing river where the new structure will be constructed. The invert elevation of the proposed channel will be 491, which is generally at the surface of the shale bedrock.

In view of the competent subsoil conditions at this site, no stability problems are anticipated if the channel is constructed with standard 2:1 slopes.

7. MISCELLANEOUS:

The field work, performed during the period of June 24 to July 10, 1970, was supervised by Mr. V. Korlu, Project Foundation Engineer, and Mr. F. A. Patterson, Student Technician (Field). The equipment used was owned and operated by F. E. Johnston Drilling Co. Ltd.

The preparation of this report was undertaken by Mr. Korlu and Mr. Patterson.

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

August, 1970

APPENDIX I

OVERSIZES DRAWINGS

RECORD OF BOREHOLE #

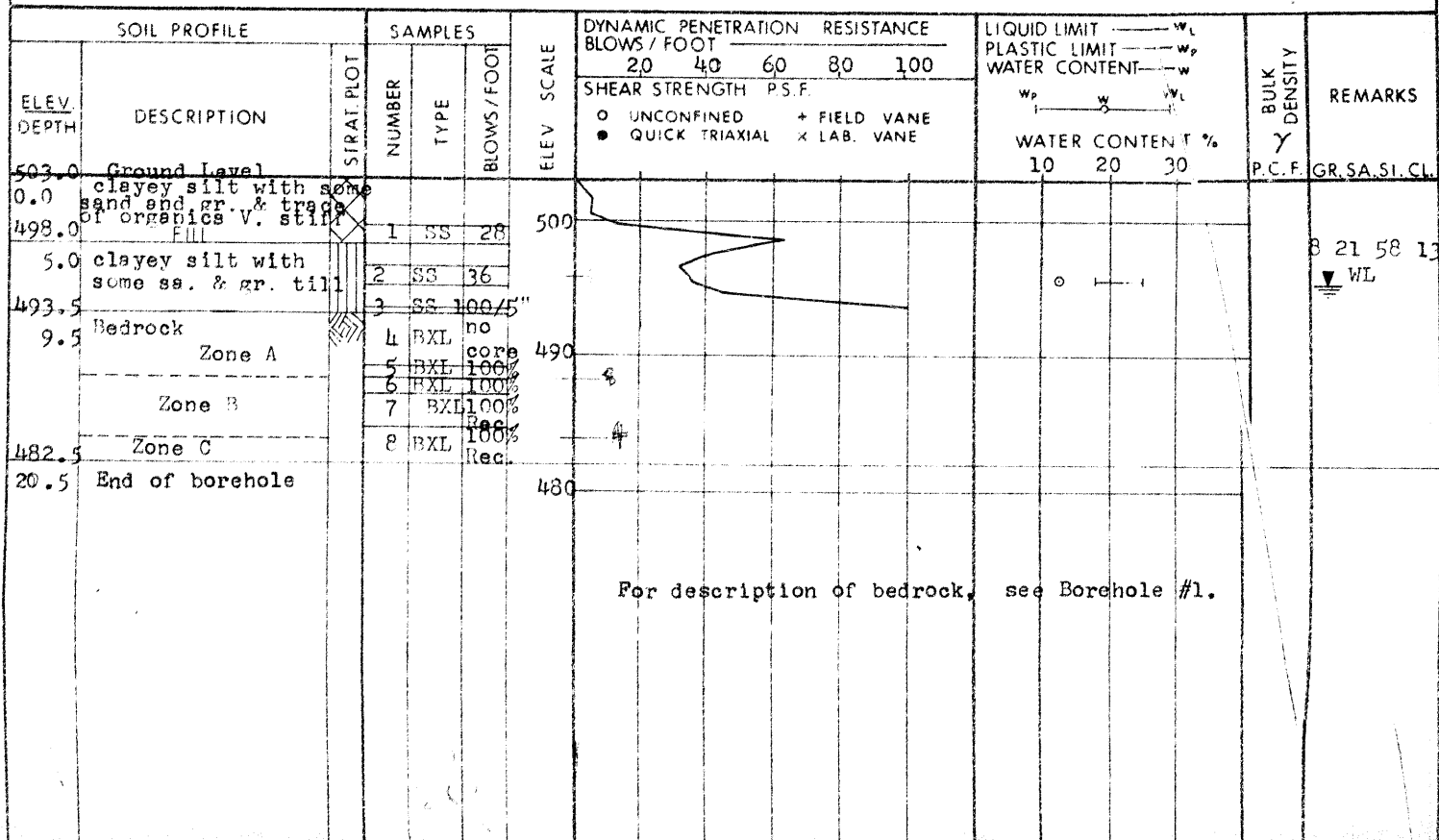
1

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 2

FOUNDATION SECTION

JOB 70-11054 LOCATION Humber River Diversion STA 451 +10 45' RT. ORIGINATED BY VK
 W.P. 135-67 BORING DATE June 24, 1970 COMPILED BY VK
 DATUM Geodetic BOREHOLE TYPE Washboring with NX casing BXL core CHECKED BY 74



DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No.3

FOUNDATION SECTION

JOB 70-11054 LOCATION Humber River Diversion, STA 451 + 62 45' Rt. ORIGINATED BY VK
W.P. 135-67 BORING DATE June 29, 1970 COMPILED BY VK
DATUM Geodetic BOREHOLE TYPE Washboring with NX casing; BXL core CHECKED BY SL

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT					LIQUID LIMIT ——— w_L PLASTIC LIMIT ——— w_p WATER CONTENT ——— w			BULK DENSITY γ	REMARKS			
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		20	40	60	80	100	SHEAR STRENGTH P.S.F.					WATER CONTENT %		
							w_p	w	w_L	○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE	10	20	30						
502.7	Ground Level															P.C.F. GR. SA. SI. CL.			
0.0	clayey silt with some sa. & gr. and trace of organics Fill		1	SS	13	500										40 33 20			
494.7	stiff to V. stiff		2	SS	29												WL		
8.0	silty sand with tr. of gr. and clay (V. dense)		3	SS	67												6 45 43 6		
489.7	Zone A		4	SS	100	490													
13.0	Zone B		5	BXL	50% Reg.														
	Zone C		6	BXL	100% Reg.														
			7	BXL	100% Reg.														
			8	BXL	100% Reg.	480													
			9	BXL	100% Reg.														
472.5																			
30.2	End of borehole					470													
For description of bedrock, see Borehole #1.																			

For description of bedrock, see Borehole #1.

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 4

FOUNDATION SECTION

JOB 70-11054 LOCATION Humber River Diversion, STA 451 + 62 45' Bt. ORIGINATED BY VK
W.P. 135-67 BORING DATE July 9, 1970 COMPILED BY VK
DATUM Geodetic BOREHOLE TYPE Wash & Boring with NX casing; BXL core CHECKED BY

SOIL PROFILE		STRAT. PLOT	SAMPLES		BLOWS/FOOT	ELEV SCALE	DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT — w_L			BULK DENSITY	REMARKS	
ELEV. DEPTH	DESCRIPTION		NUMBER	TYPE			BLOWS/FOOT	BLOWS / FOOT					PLASTIC LIMIT — w_p				
								20	40	60	80	100	WATER CONTENT — w				
													w_p	w			w_L
SHEAR STRENGTH P.S.F.						UNCONFINED + FIELD VANE					WATER CONTENT %			P.C.F.	GR. SA. SI. CL.		
● QUICK TRIAXIAL x LAB. VANE																	
502.5	Ground Level																
0.0	clayey silt with some sand and gr. and thin of organics fill																
497.5	stiff		1	SS	11		500										
5.0	clayey silt with some sa. & gr. till hard		2	SS	52										WL 496.0		
493.0			3	SS	63 1/2"										9 10 62 19		
9.5	Zone A		4	PXL	Rec.		490										
	Zone B		5	BXL	100% Rec.												
			6	PXL	60%												
	Zone C		7	PXL	100%												
			8	BXL	100% Rec.												
477.6			9	BXL	100% Rec.		480										
24.9	End of borehole																
For description of bedrock, see borehole #1																	

107 10
494 10
13 10

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No.5

FOUNDATION SECTION

JOB 70-11054 LOCATION Humber River Diversion, STA 452 + 38 45' Rt ORIGINATED BY VK
W.P. 135-67 BORING DATE June 30, 1970 COMPILED BY VK
DATUM Geodetic BOREHOLE TYPE Wash & Boring with NX casing; BXL core CHECKED BY

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT					LIQUID LIMIT ——— w_L PLASTIC LIMIT ——— w_p WATER CONTENT ——— w			BULK DENSITY γ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F.					WATER CONTENT %				
												w_p ——— w ——— w_L				
							20	40	60	80	100					
							○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE									
502.2	Ground Level															
0.0	Clayey silt with some sa. & traces of gr. organics, fill (Vstiff)		1	SS	26	500										20 62 18
497.2			2	SS	26											W.L.
5.0	Silty sand with tr. of gravel (compact)		3	SS	101											46 49 2
492.7	Zone A		4	BXL	100% Rec.	490										
9.5	Zone B		5	BXL	100% Rec.											
	Zone C		6	BXL	100% Rec.											
			7	BXL	100% Rec.	480										
475.2			8	BXL	100% Rec.											
27.0	End of borehole					470										
For description of bedrock, see borehole #1																

For description of bedrock, see borehole #1

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 6

FOUNDATION SECTION

JOB 70-11054 LOCATION Humber River Diversion, STA 452 + 38 45' Lt. ORIGINATED BY VK
W.P. 135-67 BORING DATE June 25, 1970 COMPILED BY VK
DATUM Geodetic BOREHOLE TYPE Wash & Boring with NX casing; BXL core 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					
							20	40	60	80	100	WATER CONTENT ——— w					
							SHEAR STRENGTH P.S.F.					w_p ——— w ——— w_L			WATER CONTENT %		
							○ UNCONFINED + FIELD VANE								P.C.F. GR. SA. SI. CL.		
							● QUICK TRIAXIAL x LAB. VANE										
502.5	Ground Level																
0.0	Brown sandy silt to silty sand with tr of clay & organics & gr. Fill		1	SS	16										5 40 45 10		
494.5	compact to V. dense		2	SS	100/2"												
8.0	Grey clayey silt hard		3	SS	72												
9.0	Zone A		3A	BXL	14"												
			4	SS	100/6"												
			5	BXL	100%												
	Zone B		6	BXL	100%												
			7	BXL	100%												
			8	BXL	100%												
			9	BXL	100%												
473.3	Zone C																
29.2	End of borehole																

For description of bedrock, see Borehole

For description of bedrock, see Borehole

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 7

FOUNDATION SECTION

JOB 70-11054 LOCATION Humber River Diversion STA 452 + 90 45' Rt. ORIGINATED BY VK
W.P. 135-67 BORING DATE July 2, 1970 COMPILED BY VK
DATUM Geodetic BOREHOLE TYPE Wash & Boring with NX casing; BXL core CHECKED BY JK

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 x LAB. VANE					w_p — w — w_L		
503.4	Ground Level																		
0.0	clayey silt with some sand & trace of organics (fill) stiff		1	SS	11	500										0 29 59 12			
495.9			2	SS	9														
7.5	clayey silt with some sand & trace of organics (fill) v. stiff to hard		3	SS	22														
491.4			4	SS	100 75"	490										14 24 47 15			
12.0	Zone A	5	BXL	90%															
	Zone B	6	BXL	100% Rec.															
			7	BXL	80% Rec.														
	Zone C		8	BXL	100% Rec.	480													
			9	BXL	100% Rec.														
475.4																			
28.0	End of borehole					470													
For description of bedrock, see borehole #1																			

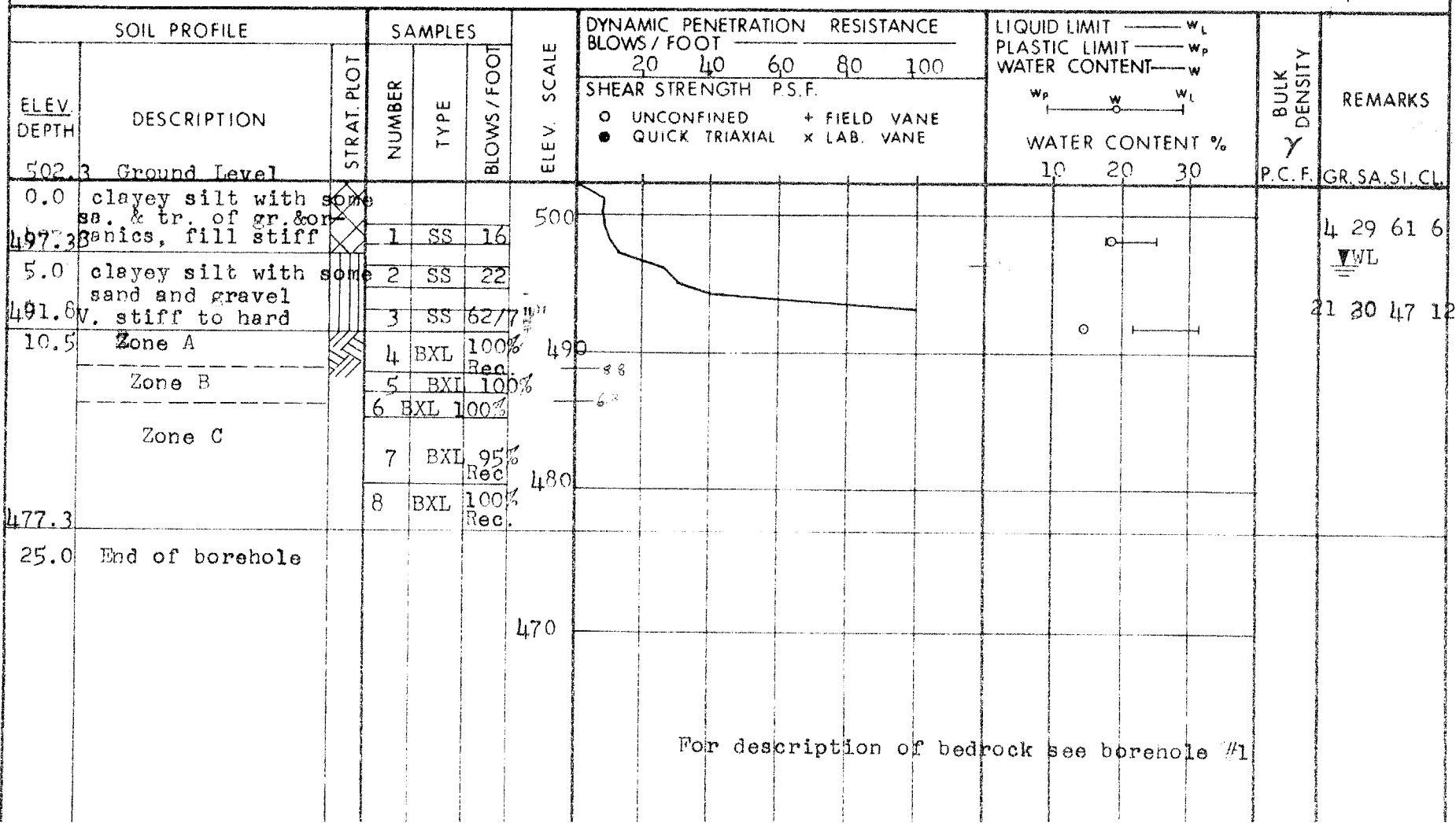
For description of bedrock, see borehole #1

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 8

FOUNDATION SECTION

JOB 70-11054 LOCATION Humber River Diversion, STA 452 + 90 45' Lt. ORIGINATED BY VK
W.P. 135-67 BORING DATE July 8, 1970 COMPILED BY VK
DATUM Geodetic/ BOREHOLE TYPE Wash & Boring with NX casing; BXL core CHECKED BY EL



FOUNDATION SECTION

CHECKED BY _____

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT		LIQUID LIMIT ——— w_L PLASTIC LIMIT ——— w_p WATER CONTENT ——— w		BULK DENSITY γ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		20	40	60	80		
498.0	Ground Level											
490.0	silty sand with traces of clay, gravel & organics.		1	SS	3							0 53 37 1
488.5	V. loose to compact grey clayey silt hard		2	SS	12							▼ WL
9.5	Zone A		3	SS	60/5"							9 68 21 2
	Zone B		4	BXL	90%							
	Zone C		5	BXL	90%							
17.2	End of borehole		6	BXL	90%							

For description of bedrock see borehole #1.

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

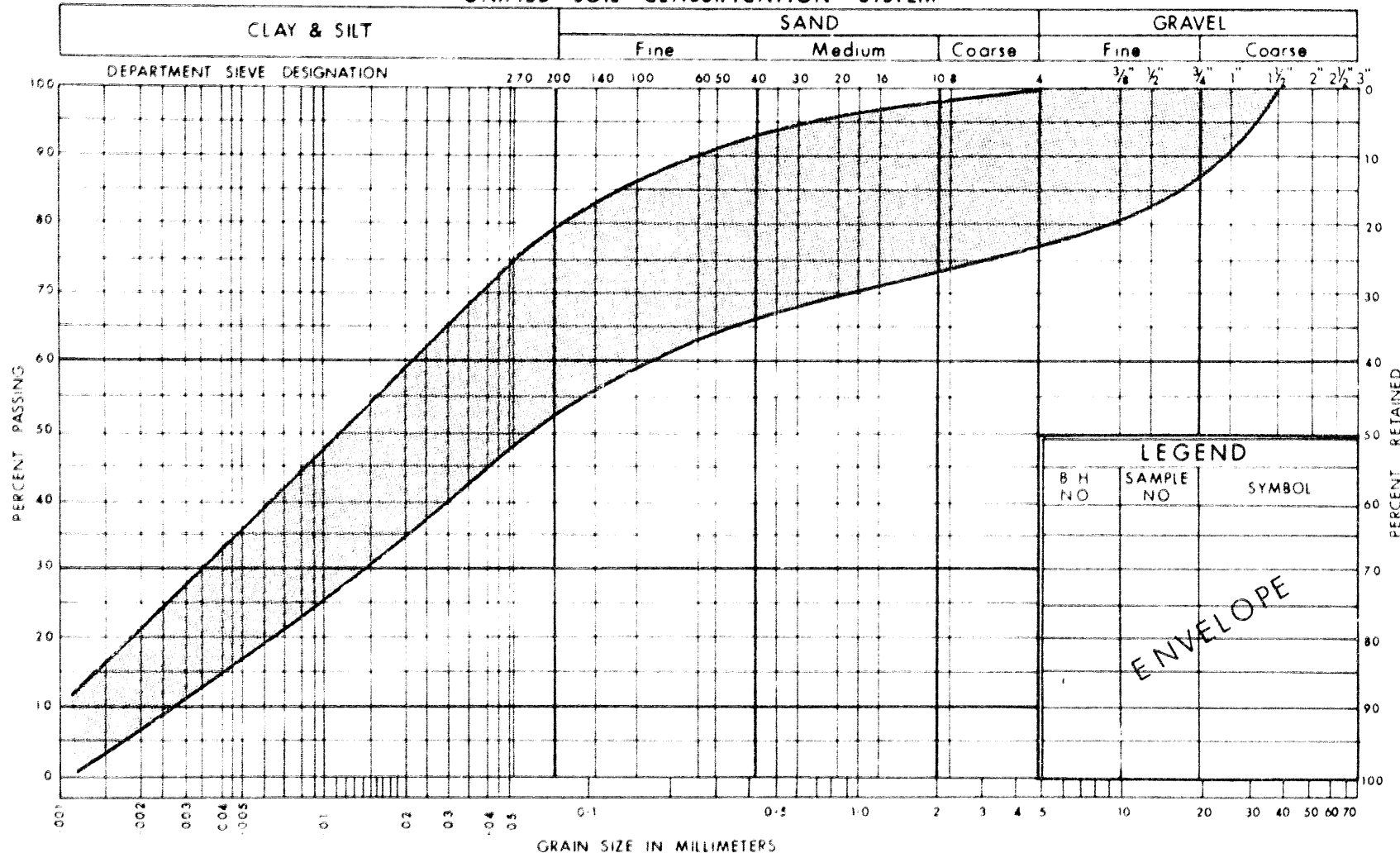
RECORD OF BOREHOLE No. 10

FOUNDATION SECTION

JOB 70-11054 LOCATION Humber River Diversion STA 451 + 82 126' Lt. ORIGINATED BY VK
 W.P. 135-67 BORING DATE July 8, 1970 COMPILED BY VK
 DATUM Geodetic BOREHOLE TYPE Wash & Boring with NX casing; BXL core 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 % 10 20 30			
501.5	Ground Level										
0.0	clayey silt with some sand & gr. (Hard)				500						
496.0			1	SS	33						
5.5	Zone A		2	BXL	100%						
			3	BXL	95%						
			4	BXL	95%						
			5	BXL	95%						
487.8	Zone B		6	BXL	100%	490					
			7	BXL	100%						
13.7	End of borehole										
					480						
For description of bedrock, see borehole #1.											

UNIFIED SOIL CLASSIFICATION SYSTEM



DEPARTMENT OF HIGHWAYS
**MATERIALS and
TESTING
DIVISION**

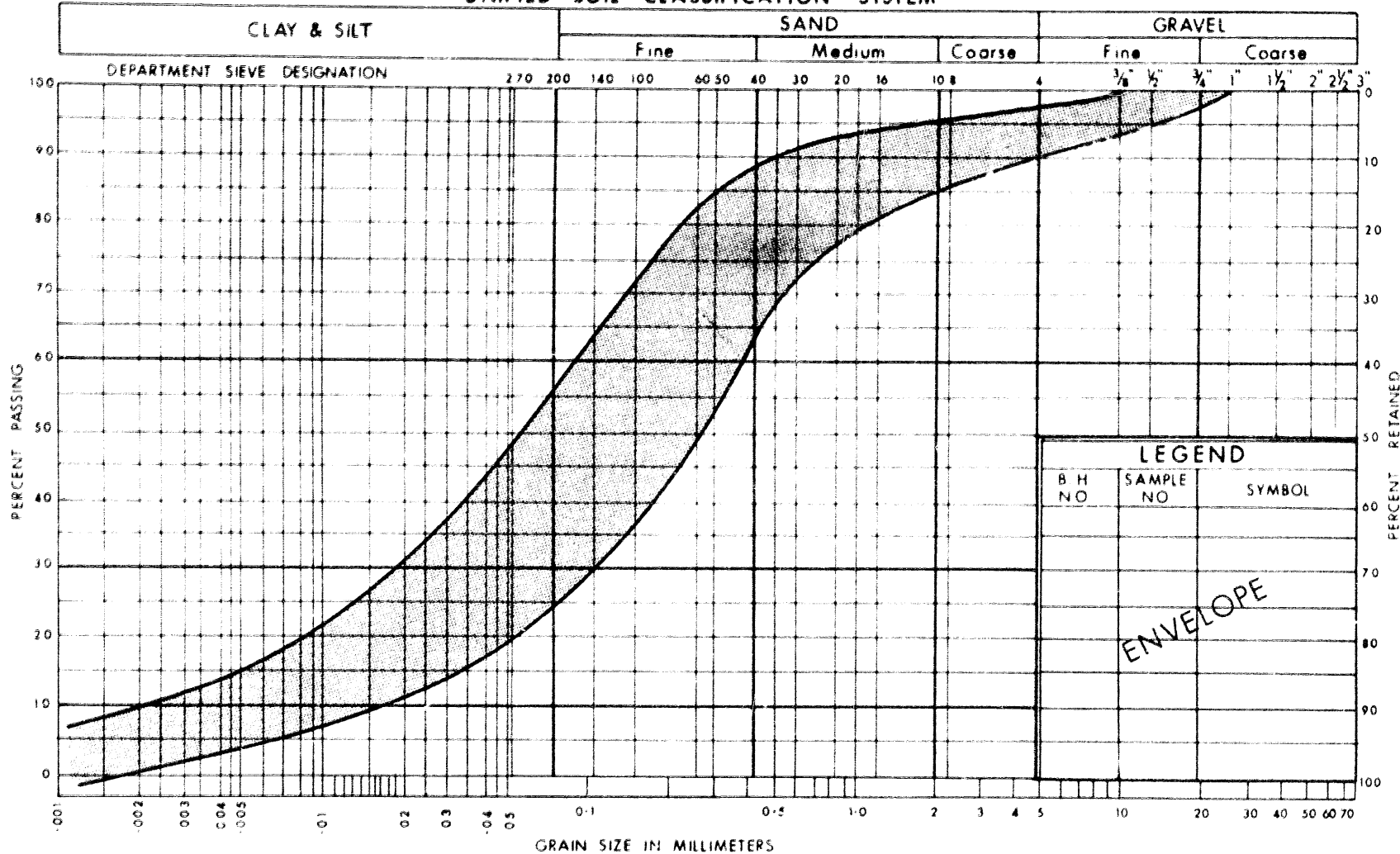
GRAIN SIZE DISTRIBUTION
GLACIAL TILL
HET. MIXTURE OF CLAYEY SILT, SAND & GRAVEL

WP No. 135-67

JOB No. 70-11054

Fig. No. 1

UNIFIED SOIL CLASSIFICATION SYSTEM



DEPARTMENT OF HIGHWAYS
MATERIALS and
TESTING
DIVISION

GRAIN SIZE DISTRIBUTION
SILTY SAND

WP No. 135--67

JOB No: 70-11054

Fig. No 2

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

Qu	UNCONFINED COMPRESSION	L.V.	LABORATORY VANE
Q	UNDRAINED TRIAXIAL	F.V.	FIELD VANE
Qcu	CONSOLIDATED UNDRAINED TRIAXIAL	C	CONSOLIDATION
Qd	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 $= \frac{w_L - w}{I_P}$
e_{max}	VOID RATIO IN LOOSEST STATE
e_{min}	VOID RATIO IN DENSEST STATE
I_D	DENSITY INDEX $= \frac{e_{max} - e}{e_{max} - e_{min}}$
	RELATIVE DENSITY D_r IS ALSO USED
h	HYDRAULIC HEAD OR POTENTIAL
q	RATE OF DISCHARGE
v	VELOCITY OF FLOW
i	HYDRAULIC GRADIENT
k	COEFFICIENT OF PERMEABILITY
j	SEEPAGE FORCE PER UNIT VOLUME
m_v	COEFFICIENT OF VOLUME CHANGE $= \frac{-\Delta e}{(1+e)\Delta\sigma}$
c_v	COEFFICIENT OF CONSOLIDATION
C_c	COMPRESSION INDEX $= \frac{\Delta e}{\Delta \log_{10} \sigma}$
T_v	TIME FACTOR $= \frac{c_v t}{d^2}$ (d, DRAINAGE PATH)
U	DEGREE OF CONSOLIDATION
τ_f	SHEAR STRENGTH
c'	EFFECTIVE COHESION INTERCEPT
ϕ'	EFFECTIVE ANGLE OF SHEARING RESISTANCE, OR FRICTION
c_u	APPARENT COHESION
ϕ_u	APPARENT ANGLE OF SHEARING RESISTANCE, OR FRICTION
μ	COEFFICIENT OF FRICTION
S_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

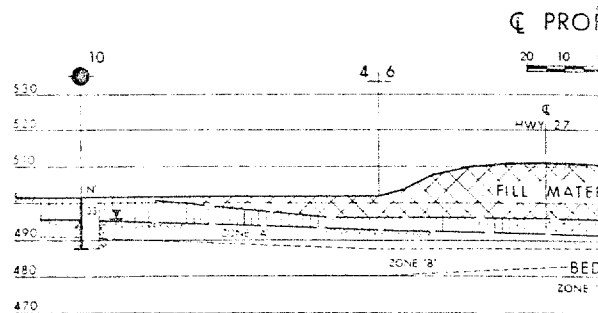
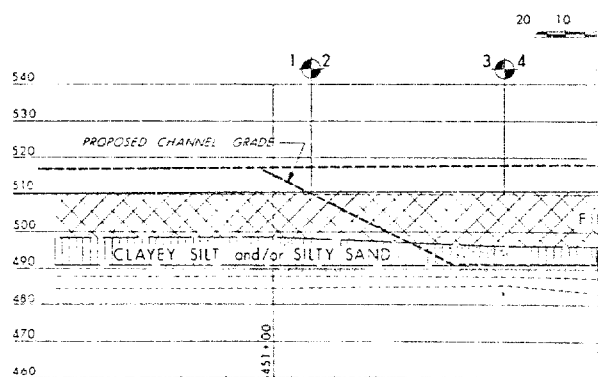
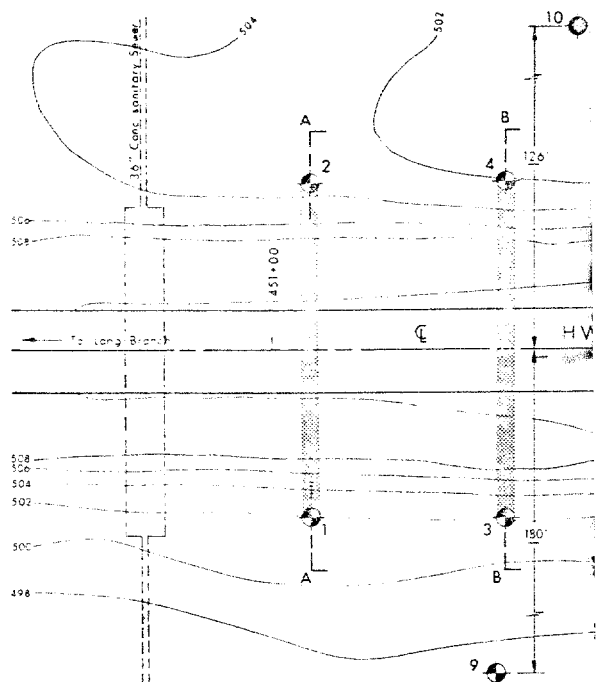
SLOPES

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

B - B

C - C

D - D



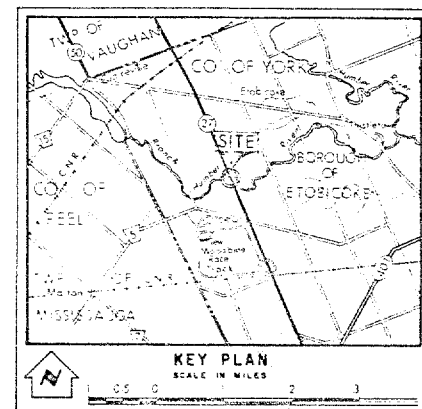
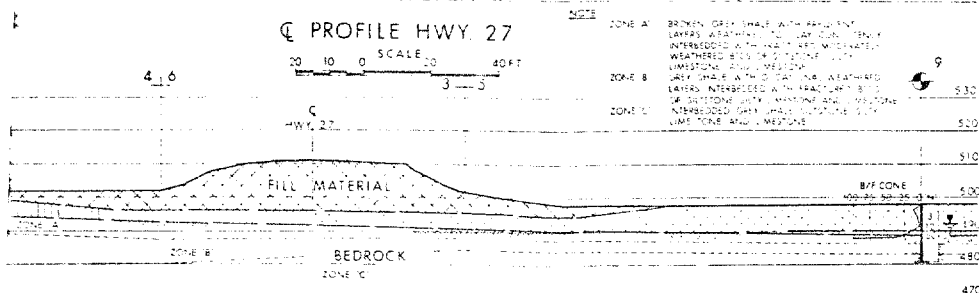
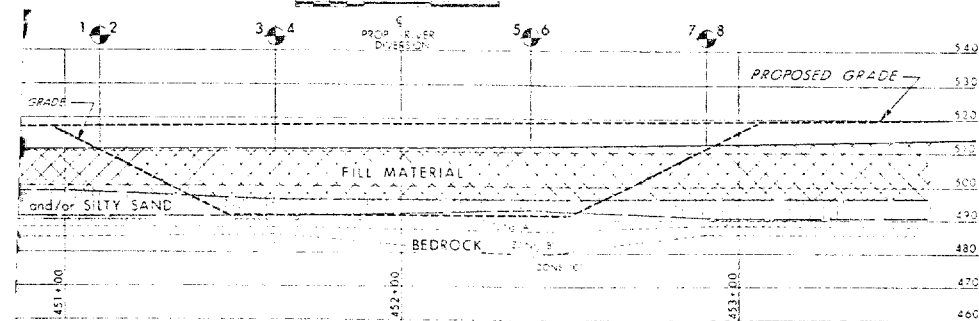
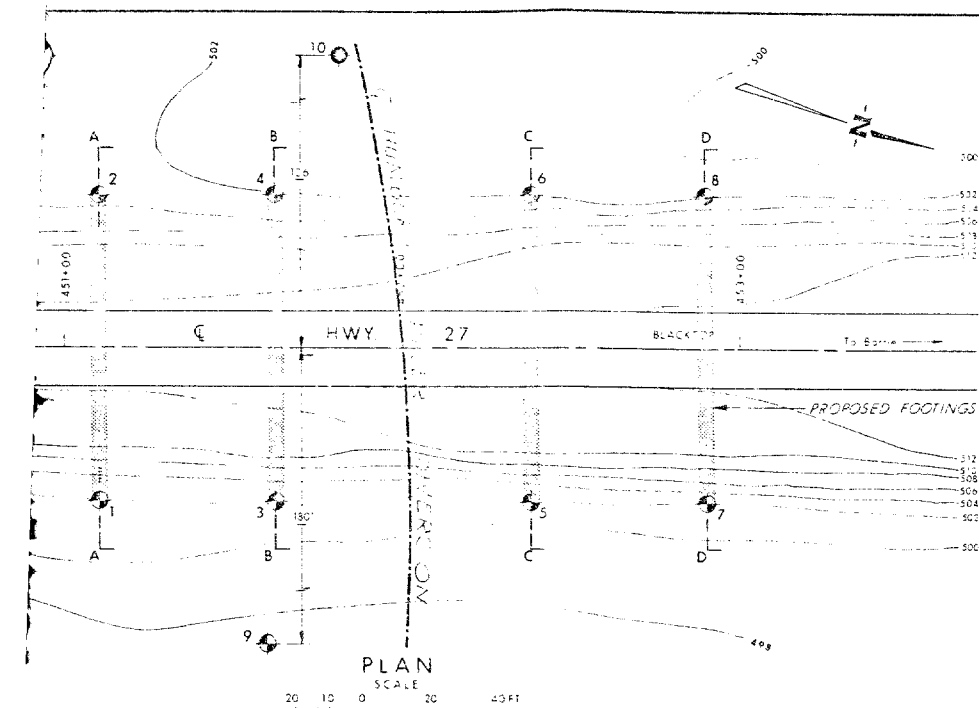
SECTIONS

20 10 0 SCALE 20 40 FT

④ PROFILE AL

20 10

PRINT RECORD		
NO	FOR	DATE



LEGEND			
	Bore Hole		
	Cone Penetration Hole		
	Bore & Cone Penetration Hole		
	Water Levels established at time of field investigation, June & July 1970		

NO.	ELEVATION	STATION	OFFSET
1	502.0	451+10	45' RT
2	503.0	451+10	45' LT
3	502.7	451+02	45' RT
4	502.5	451+02	45' LT
5	502.2	452+38	45' RT
6	502.5	452+38	45' LT
7	503.4	452+90	45' RT
8	502.3	452+90	45' LT
9	498.0	451+00	180' RT
10	501.5	451+82	126' LT

- NOTE -

The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence and may be subject to considerable error.

REVISIONS	DATE	BY	DESCRIPTION

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING OFFICE - FOUNDATION SECTION

HUMBER RIVER DIVERSION

KING'S HIGHWAY NO. 27 DIST. NO. 6
CO. YORK

BOROUGH ETOBICOKE LOT 33 CON. III FH

BORE HOLE LOCATIONS & SOIL STRATA

SUBM'D V.K.	CHECKED G.	W.P. NO. 135-67	M.B.T. DRAWING NO.
DRAWN E.C.	CHECKED H.	JOB NO. 70-11054	70-11054A
DATE JULY 29 1970	SITE NO.		BRIDGE DRAWING NO.
APPROVED <i>[Signature]</i>	PROJECT NO.		

MEMORANDUM

To: A. G. Stermac
Principal Foundation Engineer
Central
Building

ATTENTION:

OUR FILE REF.

FROM: R. G. Burnfield
Regional Highway Design Engineer
Regional Systems Design Office

DATE: January 17, 1972

IN REPLY TO

SUBJECT: W.P. 135-67, Highway 27 Including
Humber River Bridge

70-11-054

We wish to advise that plans and documents for the above-noted project have been submitted to Mr. C. Grebski's office. The review will be held on January 25, 1972, at 9:00 a.m. in the district boardroom.

As discussed with Mr. Selby, we attach herewith a copy of the Bridge Special Provisions.

Please contact Mr. Grebski or this office for any other information.



A. Sulavella

RGB/AS/ss
c. c.
R. L. Illingworth

FOR: R. G. Burnfield
Regional Highway Design Engineer

157-37-34-004
(Hwy. Dept. Road, State T.)

19. SUPPLY AND PLACE GRANULAR 'C' (SAND CUSHION) AS GRANULAR BACKFILL TO BRIDGE

Section 9.02 of D.H.O. Form 9 shall apply to this work, with the following provisions:

The extent of the lump sum item for supplying and placing granular backfill to bridges shall be as shown on the drawings. Where, however, the Contractor has excavated beyond these limits, or has failed to place earth fill up to the lower limits, he shall supply, place and compact, to the satisfaction of the Engineer, either earth or granular material, whichever the Engineer shall direct, as required to fill the resulting excess volume. All costs of supplying and placing such additional material shall be deemed to be included in the lump sum price bid.

The Contractor shall advise the Engineer, not less than 3 weeks before starting any granular backfill to bridges, of the equipment, and all details of the operation which he proposes to use, and the Engineer may make such changes as he may deem necessary, both at this time and during the progress of the work.

The placing and compaction operations shall proceed in strict accordance with the method approved by the Engineer. The material shall be compacted throughout to a minimum dry density of 100% of the maximum dry density as determined by the current Department procedure, or to such greater density as may be required by the Engineer.

The Contractor shall supply and use such hand-operated mechanical tamping equipment, or towed or self-propelled roller, or combination thereof as will economically compact the material throughout. The type and quantity of compacting equipment, and all details of the placing and compaction operation, including the rate, method and sequence, and the lift thickness, shall be subject to the approval of the Engineer.

Water shall be applied to the material to assist compaction, as directed by the Engineer, and shall be measured in units of one thousand gallons. Payment for Water for Compaction shall be made at the contract unit price per thousand gallons.

16. SUPPLY AND PLACE CUTWATERS

Under this item and for the lump sum bid the Contractor shall supply and place the cutwaters as shown on the drawings.

17. EMBEDDED WORK IN STRUCTURE (BELL TELEPHONE)

The Bell Telephone Company will supply material as noted on the drawings.

The Contractor shall notify the Bell Telephone Company in writing at least one month prior to when the material will be required.

18. EMBEDDED WORK IN STRUCTURE (HYDRO)

Under this item and for the lump sum bid the Contractor shall supply and place the ducts for the Etobicoke Hydro-Electric Commission as shown on the drawings and as specified herein.

Ducts shall be 5" I.D. P.V.C. type I complete with standard couplings, expansion couplings separation and No. 10A. W.G. bare copper fish wire or 3/16" polypropylene rope.

Ducts shall be set to provide a minimum concrete cover of 3" and a minimum separation between ducts of 1 1/2" of concrete. Joints shall be staggered and all ducts shall extend beyond the concrete at each end, a distance between 6" minimum and 24" maximum. All ducts shall be cleaned out and their entire length freed of all obstructions, and the ends capped.

15. MECHANICAL FINISHING OF BRIDGE DECKS

Bridge deck surfaces shall be formed by means of a mechanical self-propelled bridge deck finishing machine, capable of producing the required surface on concrete deposited at a minimum rate of 45 cubic yards per hour or alternatively which will produce the required surface while the screed is maintaining a rate of forward progress of 30 linear feet per hour. Longitudinal construction joints will be permitted only where shown on the plans.

FOR STRUCTURES OTHER THAN BRIDGES AND CULVERTS

Although the requirements for concrete in structures such as sidewalks, curb and gutter, catchbasins, retaining walls and the like may be designated by reference to this specification, the measurement and payment for the concrete in such structures and for the protection thereof shall be as provided in the Department specification for the type of structure built.

Where the constituent materials of the concrete for bridge and culvert construction are heated as herein required, for Cold Weather Concreting, payment will, unless otherwise specified in the contract, be made as follows:

- (a) for concrete made using heated mix water at 75¢ per cubic yard of concrete,

OR

- (b) for concrete made using both heated mix water and heated fine and/or coarse aggregates at \$1.50 per cubic yard of concrete.

Protective measures provided as herein required for Cold Weather Concreting and approved by the Engineer will be classified by the Engineer as Class "A", "B" or "C" protection, and for such protection payment, if any, unless otherwise specified in the contract and with the exception of concrete in footings, will be made as follows:

- (a) For Class "A" Protection, payment at the Contract Unit price per cubic yard for the class of concrete specified shall be compensation in full and no additional payment will be made for such protection.
- (b) For Class "B" Protection, a payment of \$3.00 per cubic yard of concrete so protected will be made.
- (c) For Class "C" Protection, a payment of \$6.50 per cubic yard of concrete so protected will be made.

Payment as herein provided shall be compensation in full for all Cold Weather Concreting protective measures required to provide the designated curing conditions and to consistently maintain these conditions for the specified curing period to allow strength development.

When concrete footings are poured in cold weather payment for heating the mix water or heating the mix water and the concrete aggregates will be made as set out above.

The contract price for placing the concrete in the footings will be full compensation for any additional protection which may be required.

When it is specified on the plans that concrete in footings is to be placed against undisturbed soil or set in rock, and where the excavation is made wider than the neat lines of the footings, the Contractor shall supply and place the excess yardage of concrete at his own expense.

14. AMENDMENT TO SECTION 9.04 OF D.H.O. FORM 9 -

Section 9.04 of D.H.O. Form 9 is hereby amended as follows:

- (a) Wherever reference is made to "unit price" it shall be considered as "unit or lump sum price".
- (b) Sub-section 9.04.18 "Measurement and Payment" is to be deleted in its entirety and replaced with Sub-section 9.04.18 revised April 1968.

MEASUREMENT AND PAYMENT (9.04.18 Rev. April 1968)

Payment for the various concrete items will be made either by lump sum or by the cubic yard, whichever is called for in the tender.

When measurement for payment is to be made in cubic yards it will be based on the neat lines called for in the plans or provided by authorization. The volume of concrete displaced from within the neat lines of the structure by,

drainage openings, load lightening devices, utility and prestressing steel ducts, each of less than 1 square foot in cross-sectional area;

timber, steel, concrete and concrete filled tubular piles; and,

reinforcing and structural steel;

will not be deducted in calculating the quantity of concrete to be paid for.

Unless otherwise provided for in the contract, payment whether by lump sum or by the cubic yard will be compensation in full for furnishing all materials, except those supplied by the Department, for all labour and equipment necessary to complete the structure component as shown on the plans and described in the specifications, and for providing shipping containers for concrete test cylinders.

The Contractor may apply in writing for an advance payment for not more than 40% of the work to be carried out under concrete tender item, after the applicable forms, false-work, reinforcing steel and all other operations prerequisite to the placing of the concrete have been completed to the satisfaction of the Engineer.

13. FALSEWORK -

The Contractor shall prepare and submit drawings of all falsework to the Department for approval.

All falsework drawings shall bear the seal or signature of a Professional Engineer who is a member of or is licensed by, The Association of Professional Engineers of Ontario, who shall be responsible for the entire falsework design and drawings of a structure. The falsework shall be constructed in accordance with the approved drawings and at least one approved copy of all falsework drawings shall be kept at the site at all times while the falsework is being constructed or used.

The grades of materials and unit stresses used for falsework shall be in accordance with the applicable Canadian Standards Association standards. Patented accessories, fabricated shoring or scaffolding units may be used provided the manufacturer's recommendations as to load-carrying capacities and bracing are followed. These recommended capacities must be supported by test reports from qualified and recognized testing laboratories.

The falsework drawings shall show the values of longitudinal and vertical live and impact loads used in the design. Sequence, method and rate of concrete placement, type and weight of moving equipment which will be supported on the falsework shall also be shown. Foundation bearing pressures, maximum column loads and camber diagrams shall be given where applicable. They shall also show the type, size, grade and spacing of all members, details of load bearing connections and splices and locations of supports for moving equipment.

Drawings not meeting these requirements will be returned marked "Not Approved".

12. LUMP SUM CONCRETE ITEMS

Should the estimated quantities of concrete or reinforcing steel as shown in the tendering information for any specific lump sum concrete item differ by more than 5 percent from the theoretical quantities as determined from the design dimensions of the structure component and the nominal weight of steel actually placed, then either party to the contract, upon the written request of the other, shall as soon as reasonably possible, negotiate upward or downward, the compensation for that portion of the work to be done which is in excess of or less than the estimated quantity, plus or minus the 5 percent increase or decrease as the case may be.

11. CONCRETE QUANTITIES

The following approximate quantities for the concrete tender items listed below are for the Contractor's information only.

- | | |
|---|-----------------|
| (a) Place concrete in piers, abutments and wingwalls. | 583
585 C.Y. |
| (b) Place concrete in deck and diaphragms. | 481 C.Y. |
| (c) Place concrete in parapet walls. | 25 C.Y. |
| (d) Place concrete in approach slabs. | 108 C.Y. |

7. PLACE CONCRETE IN PARAPET WALLS

ITEM 83

Payment of this item at the lump sum bid will include placing the anchors for the steel parapet rails and for the guiderails as shown on the drawings. The anchors will be supplied by the Department.

8. PLACE CONCRETE IN APPROACH SLABS

ITEM 84

The lump sum bid for this item will include the curb on the approach slabs and supplying and applying asphalt paint between the approach slabs and the wingwalls. This shall be done in accordance with the requirements of C.G.S.B. specification 37 GP-2 at the rate of 100 sq. ft. per gallon.

9. ERECT AND CLEAN STEEL PARAPET RAIL INCLUDING STEEL POSTS

ITEM 85

Payment for the erection of the steel parapet rail will be made at the lump sum bid and shall be compensation in full for all work required to erect the steel rail and posts; to clean the rail and posts, or to repair the damaged spelter coatings as required in Section 9.08 of D.H.O. Form 9.

10. REINFORCING STEEL

Sub-Section 9.05.07 of Section 9.05 of D.H.O. Form 9 shall be deleted in its entirety and replaced by the following:

Measurement and Payment

Payment for placing reinforcing steel shall be included in the Contract price bid for the class of concrete specified, which price will be payment in full for furnishing ties and supports, necessary for placing the reinforcing steel in the finished work, and for storing, protecting, placing, field bending and cutting when called for in the plans.

The approximate breakdown of reinforcing steel quantities for the various concrete items in the tender are as listed below:

(a) Place concrete in structure foundations.	29.1 tons
(b) Place concrete in piers, abutments and wingwalls.	40.2 tons
(c) Place concrete in deck and diaphragms.	75.0 tons
(d) Place concrete in parapet walls.	1.9 tons
(e) Place concrete in approach slabs.	9.7 tons

The Contractor is advised that the reinforcing steel schedule is available for examination at the Contract Control Office, Downsview, and at the District Office.

TRANSPORTING

The Contractor's attention is drawn to the provisions of the Highway Traffic Act regarding dimensions and weights of vehicles.

If the Contractor plans to make delivery by Highway Transport, he shall contact the Department of Transport prior to submitting his bid, to ensure that the hauling operation will comply with the regulations.

If delivery cannot be made by highway transport, then some other means of transportation must be arranged and no additional payment will be made for such arrangements.

GROUT

Grout shall consist of high early strength cement, water and admixtures. The cement shall conform with the requirements of D.H.O. Form 1301, the water shall conform with the requirements of D.H.O. Form 504 and the admixtures shall conform with the requirements of D.H.O. Form 1303. The admixtures to be used shall be a type III admixture together with an expanding agent. These admixtures may be supplied separately or they may be combined in one product.

The compressive strength of the grout shall be not less than 3000 p.s.i. at 7 days and 5000 p.s.i. at 28 days, determined on 2" cubes, stored and tested in accordance with A.S.T.M. Specification C-109.

All materials shall be supplied by the Contractor. Representative samples of the cement and admixtures shall be submitted to the Department, for approval, at least 14 days prior to their anticipated use.

The maximum water cement ratio of the grout shall be 0.55, and the required amount of admixtures will be determined by the Engineer.

6. PLACE CONCRETE IN DECK AND DIAPHRAGMS

ITEM 82

Payment of this item at the lump sum bid will include the sidewalk on the deck, and supplying and placing the deck expansion joint assemblies including the clamping devices, as shown on the drawings.

Part (c) of Sub-Section 9.04.15 is amended in that where concrete is to form the finished riding surface of the deck, the surface shall receive a transverse wire brooming immediately following the final finishing and before the specified curing and protection of the concrete is applied. The brooming may be done by hand or by machine to produce a skid resistant texture with an average depth of indentation or height of ridge of 1/16 inches above or below the average surface and each spaced 1/4 inches apart in an even and uniform manner.

3. PILING

ITEM 75

The following steel H piling has been advance ordered by the Department, and it will be stockpiled, prior to the award of the Contract, by the Department, at the point designated in the material list in the tender.

Steel H Piles

12 BP 74 Section

24 pieces, each 34 feet long

The Contractor shall take delivery of the steel H piling at the stockpile, and shall be responsible for checking it, and reporting any shortages, errors, or damage, and for transferring this piling from the stockpile to the work, including handling, storing, and care of the piling until it is placed in the work.

Payment for this work shall be included in the lump sum bid for the tender item "Supply All Equipment for Driving Piles".

4. PLACE CONCRETE IN PIER, ABUTMENTS AND WINGWALLS

ITEM 79

Payment for this item at the lump sum bid will include the curb over the wingwalls, the treatment of the bearing seats as specified on the drawings and the placing of the Date and Site Number figures as shown on the drawings. The Department will supply the figures.

5. PRESTRESSED BEAMS

ITEM 80

PRESTRESSING STEEL

Prestressing steel shall be Extra High Strength strand and shall be fabricated and tested in accordance with the requirements of A.S.T.M. Specification A 416 with the following exceptions:

Minimum Breaking Strength of Strand	-41,300 lb.
Nominal Steel Area of Strand	- 0.153 sq. in.
Nominal Weight of Strand	- 525 lb. per 1000 feet
Yield Strength Requirement, Initial Load	- 4,130 lb.
Minimum Load at 1% Extension	-35,100 lb.

2. EARTH EXCAVATION FOR STRUCTURE FOUNDATIONS

Sub-Section 9.02.13 of D.H.O. Form 9 shall be amended by deleting the first paragraph and substituting the following:

Unless otherwise authorized by the Engineer, measurement for excavation for structure foundations will include only those quantities as measured within the theoretical lines of the foundations below the tops of the footings as shown on the plans. Subject to the contract requirements for excavation necessary to place granular backfill to structures, the contract price for the applicable structure items will be full compensation for all other excavation which may be required for the structure. However, when such excavation overlaps excavation required for other work, then payment will be made for such other work, as though no excavation were required for the structure.

1. REMOVAL OF STRUCTURE

Item 72

Under this item and for the lump sum bid the Contractor shall remove:

- (a) the handrail and posts,
- (b) the deck, including asphalt and sidewalks,
- (c) the crossbeams and arches,
- (d) the abutments and wingwalls down to 6 feet below top of deck,
- (e) the south pier to existing groundline,
- (f) the north pier to top of footing,
- (g) the approach slabs.

Such drawings of the existing structure as may be provided by the Department show approximate dimensions.

Department of Highways Ontario

Copy for the information of

Mr. A. Stermac
Mr. G. Burkhardt,
Reg. Bridge Planning Engineer,
Central Building

C.S. Grebski,
Bridge Office

December 7, 1970

West Rumber River Bridge on Hwy. #27
W.P. 135-67, Site No. 37-174
Highway 27, District No. 6

70-11054

Attached herewith are prints of the Preliminary Bridge Plan Drawing D-6924-P1 for the above-mentioned structure.

The estimated cost of the proposed structure is \$220,000. This cost includes tender, materials, engineering and sundry construction.

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

C.S. Grebski,
Bridge Design Engineer

CSG:rd

Attach.

c.c. B. Davis
A. Stermac (2)
J. Anderson

no comments

BTD. Dec 15/70

M. Levata
Dec 15th 1970

MEMORANDUM

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

FROM: C. S. Grebski,
Bridge Office.

ATTENTION:

DATE: April 30, 1971.


OUR FILE REF.

IN REPLY TO

SUBJECT: West Humber River Bridge
Approx. 3.8 Mi. North of Hwy. #401.
W.P. #135-67, Site #37-174
Highway #27, District #6.

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.


C. S. Grebski,
Bridge Design Engineer.

CSG/mh
ATTACH*
cc: Foundation Office.

all.

Piles for the south abutment
shall be as follows:

16 nos.	16' long
12 nos.	18' long

and 17' long.
The total length of the piles
shall be as follows:
The total length of the piles
shall be as follows:
The total length of the piles
shall be as follows:

*M. Devada
May 3rd 1971*

Arr May 3/71

DEPARTMENT OF HIGHWAYS — ONTARIO
MATERIALS AND TESTING OFFICE
VISUAL CLASSIFICATION SHEET

PROJECT <u>70-11054</u>		SITE <u>Humber Rd. Driveway</u>		BOREHOLE No. <u>1</u>		GROUND ELEVATION _____										
SAMPLE No.	DEPTH	GRAIN SIZE DISTRIBUTION					DRY STRENGTH	SHINE	DILATANCY	TOUGHNESS	ODOR	COLOUR	ACID TEST	CONSISTENCY OR UNDRAINED SHEAR STRENGTH	CLASSIFICATION WITH DESCRIPTION	SYMBOL
		LARGEST GRAIN SIZE	SHAPE	PERCENTAGE												
				GRAVEL	SAND	SILT & CLAY										
1	3-4"	1"		30	30	40	Med. & Hard	none	slight	red	earthy	Brown	strong		clayey silt with some gravel & sand grains	
2	6-7.5"	1"		70	60	10	—	—	—	—	"	"	"		silty sand with gravel	
3	9-10"	1"		10	75	15	—	—	—	—	"	"	"		silty sand & some gravel	
4	12-13"	1"		10	10	80	Med. & Hard	—	slight	Med.	"	gray	strong		gray clayey silt with some sand & gravel & shale fragments	

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

REMARKS:—

DEPARTMENT OF HIGHWAYS — ONTARIO
MATERIALS AND TESTING OFFICE
VISUAL CLASSIFICATION SHEET

PROJECT <u>10-11054</u>		SITE <u>Humber Rv. Dissection</u>		BOREHOLE No. <u>2</u>		GROUND ELEVATION _____										
SAMPLE No	DEPTH	GRAIN SIZE DISTRIBUTION					DRY STRENGTH	SHINE	DIALATANCY	TOUGHNESS	ODOR	COLOUR	ACID TEST	CONSISTENCY OR UNDRAINED SHEAR STRENGTH	CLASSIFICATION WITH DESCRIPTION	SYMBOL
		LARGEST GRAIN SIZE	SHAPE	PERCENTAGE												
				GRAVEL	SAND	SILT & CLAY										
1	3-4.5	2"		10	35	55	Med	none	Med	Med	sooty	Brown	strong		clayey silt with gravel and sand (fine)	
2	6-7.5	1/4"		10	10	80	Med	slight	Hard			gray	"		clayey silt with traces of gravel and sand	
3	9-9.5	1/8"		5	5	90	"	"	"	"	"	"	"		clayey silt with shale	
4	14-15			20	5	75	"	"	"	"	"	"	"		clayey silt with shale fragments	

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

REMARKS:—

DEPARTMENT OF HIGHWAYS — ONTARIO
MATERIALS AND TESTING OFFICE
VISUAL CLASSIFICATION SHEET

PROJECT 70-11054 SITE Humber Rv. Diversion BOREHOLE No. 3 GROUND ELEVATION _____

SAMPLE No.	DEPTH	GRAIN SIZE DISTRIBUTION			DRY STRENGTH	SHINE	DIALATANCY	TOUGHNESS	ODOR	COLOUR	ACID TEST	CONSISTENCY OR UNDRAINED SHEAR STRENGTH	CLASSIFICATION WITH DESCRIPTION	SYMBOL
		LARGEST GRAIN SIZE	SHAPE	PERCENTAGE										
				GRAVEL SAND SILT & CLAY										
1	3-4.5	1/4"		15 50 65	Med to Hard	None	slight	Med	earthy	Brown	Strong		Clayey silt with some sand & gravel to trace of gravel (fill)	CL
2	6-7.5	1"		10 30 60	Med	"	slight	Med	"	"	"		Clayey silt with some fine gravel	CL
3	9-10.5	1/2"		10 40 50	"	"	Med to Hard	light	"	"	"		Silt sand with trace of clay and gravel	
4	12-13.5	1/2"		10 40 50	"	"	"	"	"	"	"		" " " "	

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

REMARKS:—

DEPARTMENT OF HIGHWAYS — ONTARIO
MATERIALS AND TESTING OFFICE
VISUAL CLASSIFICATION SHEET

PROJECT 10-11054 SITE Humber R. Diversion BOREHOLE No. 4 GROUND ELEVATION _____

SAMPLE No.	DEPTH	GRAIN SIZE DISTRIBUTION					DRY STRENGTH	SHINE	DIALATANCY	TOUGHNESS	ODOR	COLOUR	ACID TEST	CONSISTENCY OR UNDRAINED SHEAR STRENGTH	CLASSIFICATION WITH DESCRIPTION	SYMBOL
		LARGEST GRAIN SIZE	SHAPE	PERCENTAGE												
				GRAVEL	SAND	SILT & CLAY										
1	3-6"	1/4"		15	15	70	Med	None	Slight	Med	Earth	Brown	Fin		Med. fine sand (75/10)	(S)
2	6-7"	1/2"		15	10	75	Med	None	Slight	Med					Med. silt with traces of sand & gravel	(S)
3	7-8"	1/2"		15	10	75	Med					Brown				(S)

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

REMARKS:—

DEPARTMENT OF HIGHWAYS — ONTARIO
MATERIALS AND TESTING OFFICE
VISUAL CLASSIFICATION SHEET

PROJECT <u>70-113 S-1</u>		SITE <u>Humber R. Diversion</u>		BOREHOLE No. <u>5</u>		GROUND ELEVATION _____										
SAMPLE No.	DEPTH	GRAIN SIZE DISTRIBUTION					DRY STRENGTH	SHINE	DILATANCY	TOUGHNESS	ODOR	COLOUR	ACID TEST	CONSISTENCY OR UNDRAINED SHEAR STRENGTH	CLASSIFICATION WITH DESCRIPTION	SYMBOL
		LARGEST GRAIN SIZE	SHAPE	PERCENTAGE												
				GRAVEL	SAND	SILT & CLAY										
1	2-4 ft	1/4"		10	10	80	Soft	None	Slight	Hard	earthy	Brown	Strong		clayey silt with trace of gravel & sand	
2	6-7 ft	1/4"		10	80	10	—	—	—	—	earthy	—	—		silty sand & fine gravel	
3	7-10 ft	1/4"		25	5	70	Medium	None	Slight	Hard	earthy	—	—		clayey silt with fine gravel or shale fragments	

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

REMARKS:—

DEPARTMENT OF HIGHWAYS — ONTARIO
MATERIALS AND TESTING OFFICE
VISUAL CLASSIFICATION SHEET

PROJECT <u>70-11054</u>		SITE <u>Franklin Rd. Deviation</u>		BOREHOLE No. <u>6</u>		GROUND ELEVATION _____								
SAMPLE No.	DEPTH	GRAIN SIZE DISTRIBUTION			DRY STRENGTH	SHINE	DIALATANCY	TOUGHNESS	ODOR	COLOUR	ACID TEST	CONSISTENCY OR UNDRAINED SHEAR STRENGTH	CLASSIFICATION WITH DESCRIPTION	SYMBOL
		LARGEST GRAIN SIZE	SHAPE	PERCENTAGE										
				GRAVEL	SAND	SILT & CLAY								
1	3-4 1/2"	1/2"		20	45	55	Slight	None	Quick	Slight	earthy	Brown		Si. Silt. Sandy Silt - some gravel and trace of or 4 mm (silt)
2	5-11 1/2"	1/2"		10	15	65	"	"	"	"	"	"		Sandy silt with some sand and gravel
3	12-14 1/2"	1/2"		20	10	70	"	"	"	"	Grey	"		Clayey silt with some sand and gravel or gravel
4	16-18 1/2"	1/2"		10	10	60	"	"	"	"	"	"		Clayey silt with some sand and gravel or gravel fragments

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

REMARKS:-

DEPARTMENT OF HIGHWAYS — ONTARIO
MATERIALS AND TESTING OFFICE
VISUAL CLASSIFICATION SHEET

PROJECT 70-1834 SITE London Rd. Disposal BOREHOLE No. 7 GROUND ELEVATION _____

SAMPLE No.	DEPTH	GRAIN SIZE DISTRIBUTION			DRY STRENGTH	SHINE	DILATANCY	TOUGHNESS	ODOR	COLOUR	ACID TEST	CONSISTENCY OR UNDRAINED SHEAR STRENGTH	CLASSIFICATION WITH DESCRIPTION	SYMBOL
		LARGEST GRAIN SIZE	SHAPE	PERCENTAGE										
				GRAVEL	SAND	SILT & CLAY								
1	3-4	1/4"		15	10	75			partly	light	strong		clayey silt with sand & gravel traces of 3/4" max	
2	6-7.5	1/4"		10	15	75	"	"	"	light	"		"	
3	9-10	1"		20	5	75							gravel	
4	12-13	1"		20	10	70	"	"	"	light	"		clayey silt with sand & gravel	

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

REMARKS:-

DEPARTMENT OF HIGHWAYS — ONTARIO
MATERIALS AND TESTING OFFICE
VISUAL CLASSIFICATION SHEET

PROJECT <u>10-11059</u>		SITE <u>Humber R. Division</u>		BOREHOLE No. <u>8</u>		GROUND ELEVATION _____											
SAMPLE No.	DEPTH	GRAIN SIZE DISTRIBUTION					DRY STRENGTH	SHINE	DIALATANCY	TOUGHNESS	ODOR	COLOUR	ACID TEST	CONSISTENCY OR UNDRAINED SHEAR STRENGTH	CLASSIFICATION WITH DESCRIPTION	SYMBOL	
		LARGEST GRAIN SIZE	SHAPE	PERCENTAGE													
				GRAVEL	SAND	SILT & CLAY											
1	3-4.5'	1/2"		20	75	65	Med		Light	Med		Light				Clayey silt with some sand & gravel & trace of organic (2.5%)	
2	5-7.5'	1/2"		20	75	45	Med		Light	Med		Light				Clayey silt with sand & gravel	
3	9-10'	1/2"		20	75	20	Med		Light	Med						Clayey silt with sand & gravel	

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

REMARKS:-

DEPARTMENT OF HIGHWAYS — ONTARIO
MATERIALS AND TESTING OFFICE
VISUAL CLASSIFICATION SHEET

PROJECT 70-140-54 SITE Humber R. Disposal BOREHOLE No. 9 GROUND ELEVATION _____

SAMPLE No.	DEPTH	GRAIN SIZE DISTRIBUTION					DRY STRENGTH	SHINE	DIALATANCY	TOUGHNESS	ODOR	COLOUR	ACID TEST	CONSISTENCY OR UNDRAINED SHEAR STRENGTH	CLASSIFICATION WITH DESCRIPTION	SYMBOL
		LARGEST GRAIN SIZE	SHAPE	PERCENTAGE												
				GRAVEL	SAND	SILT & CLAY										
1	0-4.5	1/2"		5	75	20				earthy brown	strong			silty sand & trace of gravel & organic		
2	4.5-7.5	1/2"		5	70	25	Med. weak	light	Med	"	"	"		clayey silt with lenses of sand & traces of gravel & organic	(C)	
3	7.5-15	1/2"		15	10	65	"	light	"	"	Brown grey	strong		greyish clayey silt with gravel & small fragments of gravel	(C)	

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

REMARKS:-

DEPARTMENT OF HIGHWAYS — ONTARIO
MATERIALS AND TESTING OFFICE
VISUAL CLASSIFICATION SHEET

PROJECT <u>70-1/054</u> SITE <u>Humber River Division</u> BOREHOLE No <u>10</u> GROUND ELEVATION _____														
SAMPLE No.	DEPTH	GRAIN SIZE DISTRIBUTION			DRY STRENGTH	SHINE	DILATANCY	TOUGHNESS	ODOR	COLOUR	ACID TEST	CONSISTENCY OR UNDRAINED SHEAR STRENGTH	CLASSIFICATION WITH DESCRIPTION	SYMBOL
		LARGEST GRAIN SIZE	SHAPE	PERCENTAGE										
				GRAVEL										
	3 1/2	1 1/4		10	15	75	Med none	slight	Med	slightly brown	slimy		clayey silt with some sand & gravel	

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

REMARKS:—

General Plan
Testing Layout.

DOCUMENT MICROFILMING IDENTIFICATION

GEOCRES No. 30m12-63

DIST. 6 REGION CENTRAL

W.P. No. B5-67

CONT. No. 72-57

W. O. No. 75F.054

STR. SITE No. 27-174

HWY. No. 27

LOCATION HWY. 27 AND WEST

HUMBER RIVER

OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT 83

REMARKS: DOCUMENTS TO BE UNFOLDED BEFORE
MICROFILMING

808-63

RECORD OF BOREHOLE No. 1

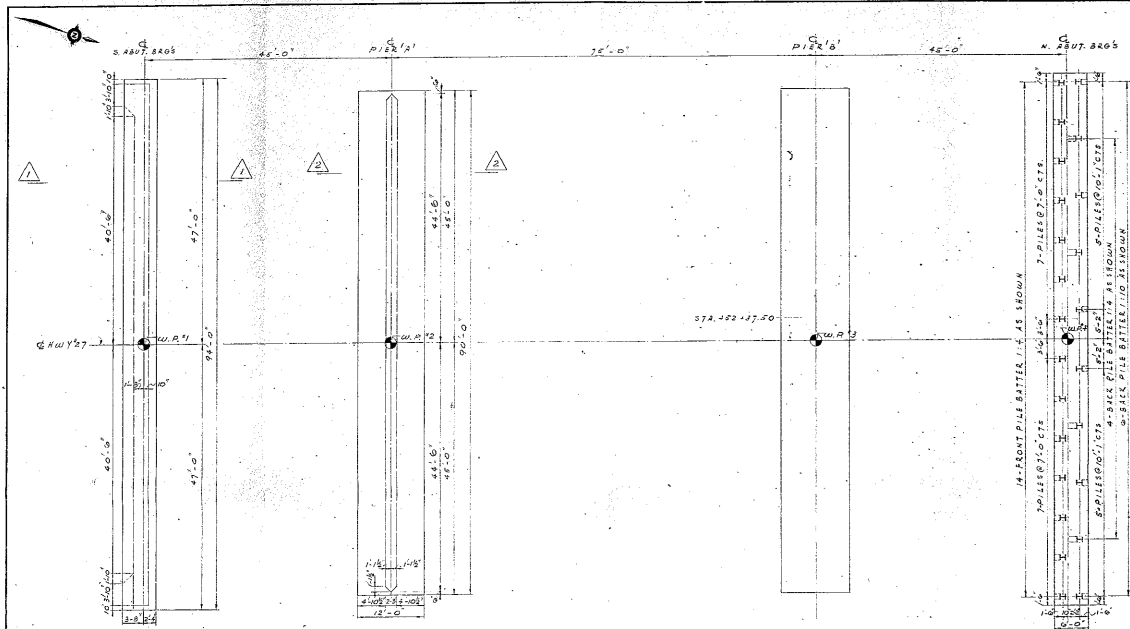
DEPARTMENT OF HIGHWAYS, ONTARIO
 MATERIALS & TESTING OFFICE

LOCATION: Bathur River, Riverdale AREA: A-11 + 12.45' B. ORIGINATED BY: W.E.
 JOB: 22-1105A BORING DATE: July 6, 1979 COMPILED BY: W.E.
 W.P. 135-62 BOREHOLE TYPE: Weathering with NX sampler. BIL. COR. CHECKED BY: W.E.
 DATUM: Geodetic

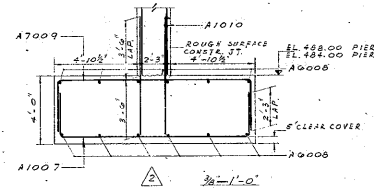
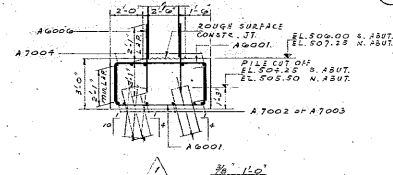
SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT - %		REMARKS
DEPTH	DESCRIPTION	NUMBER	SOIL TYPE	BLOWS/FOOT	FIELD VALUE	WATER CONTENT, %	PLASTICITY INDEX	
0.0	Ground Level							
0.0	Weathered shale with frequent layers weathered to clay sandstone, underlain by fractured sandstone and limestone.	1	SH	1				6 10 51 5
5.0	silty sand with some gravel (compact to v. dense)	2	SH	15				21 49 17 3
10.0	Zone A	3	SH	25				
13.0	Zone B	4	SH	25				
16.0	Zone C	5	SH	25				
22.0	End of borehole	10	SH	25				

NOTE:
 Zone A: Broken grey shale with frequent layers weathered to clay sandstone, underlain by fractured sandstone and limestone.
 Zone B: Grey shale with occasional weathered layers interbedded with fractured beds of siltstone, silty limestone and limestone.
 Zone C: Interbedded grey shale, siltstone, silty limestone and limestone.

10
 100 % STRAIN AT FAILURE

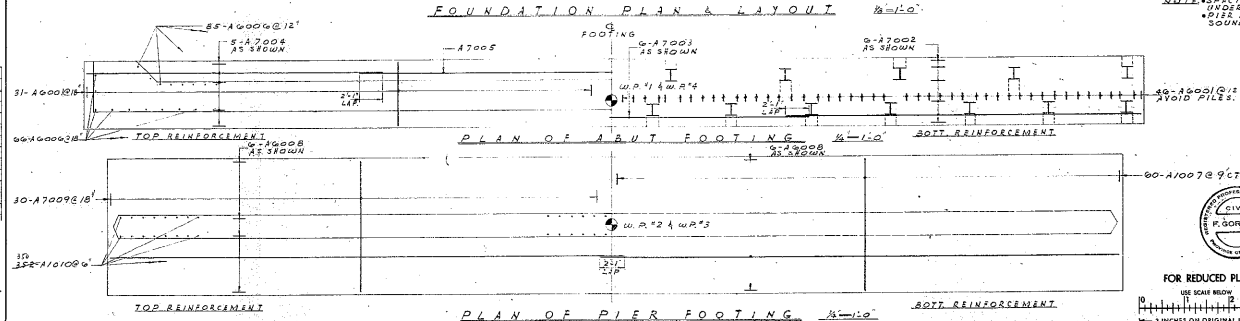


FOUNDATION PLAN & LAYOUT



LOCATION	N. ABUTMENT	S. ABUTMENT
NO.	24	12
LENGTH	17'	16'
TYPE	12 BPT4 (DESIGN LOAD 95 TONS)	12 BPT4 (DESIGN LOAD 95 TONS)
BATTER	1:4	1:10

NOTE: SPACING OF PILES ARE MEASURED AT
UNDER SIDE OF FOOTING
*PILES FOOTINGS ARE PLACED ON
SOUND BEDROCK



PLAN OF PIER FOOTING

REVISION	DATE	BY	DESCRIPTION

DEPARTMENT OF HIGHWAYS ONTARIO
BRIDGE OFFICE

WEST Humber River Bridge on Hwy #27
APPROX. 38 MI NORTH OF HWY #27

BRIDGE NO. 27
CO. Y04X
TWP. 6T081C0KE

BRIDGE NO. 27
CO. Y04X
TWP. 6T081C0KE

FOOTING LAYOUT

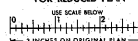
APPROVED: 37-174
DATE: 10/77

DESIGNED: 37-174
DATE: 10/77

CONTRACT NO. 37-174
DRAWING NO. D-6924-3



FOR REDUCED PLAN



PRINT RECORD	NO.	FOR	DATE