

MEMORANDUM

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

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

Attention: Mr. S. McCombie

Date: January 8, 1970

Our File Ref.

In Reply To

Jan 16/70

SUBJECT:

FOUNDATION INVESTIGATION REPORT

For

STRUCTURE #5

Proposed Overhead at the Crossing of
The Realigned Q.E.W. and C.N.R.
Twp. of Etobicoke, County of York
District No. 6 (Toronto)
W.J. 69-F-76 -- W.P. 314-65-6

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/HdeF
Attach.

cc: Messrs. B. R. Davis (2)
H. A. Tregaskes
D. W. Farren
G. K. Hunter (2)
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W. S. Melinyshyn
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Foundations Office
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A. G. Sternac
A. G. Sternac
PRINCIPAL FOUNDATION ENGINEER

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FOUNDATION INVESTIGATION REPORT
For
STRUCTURE #5
Proposed Overhead at the Crossing of
The Realigned Q.E.W. and C.M.R.
Twp. of Etobicoke, County of York
District No. 6 (Toronto)
W.J. 69-F-76 -- W.P. 314-65-6

1. INTRODUCTION:

Major reconstruction is proposed for the Q.E.W. complex, about 1/4 mile east of Mimico Creek, in the south-eastern portion of the Township of Etobicoke, Metropolitan Toronto. This complex will involve the construction of 5 structures and related retaining walls. In conjunction with this project, the Foundation Section was requested, in a memo from Mr. W. S. Melnyshyn, Regional Bridge Planning Engineer, Central Region, dated September 10, 1969 to carry out subsurface investigations at the proposed sites of all the structures and their ancillary elements. An investigation was subsequently carried out by this Section to determine the subsoil, bedrock and groundwater conditions at the respective structure sites.

This report deals with the proposed overhead structure at the crossing of realigned Q.E.W. and the C.M.R., designated as Structure No. 5. The report contains all the factual data obtained at this site, together with recommendations pertaining to the foundations of the structure, as well as the stability and settlement of the approach embankments.

Foundation reports will be submitted for other structure locations, as well as for the retaining walls, within this interchange complex.

2. DESCRIPTION OF THE SITE AND GEOLOGY:

The site is situated, in the vicinity of the existing C.N.R. tracks, immediately east of Park Lawn Avenue and south of the Ontario Food Terminal, which fronts the Queensway, in the Twp. of Etobicoke. The surrounding terrain is flat to gently undulating in relief between elevations 282 and 291; the gentle topography was often obtained by placing fill. North of the railway the terrain has been stripped and is being used for car parking and loading of transports.

The C.N.R. has five main lines, as well as siding lines leading to the food terminal. The tracks are generally super-elevated on an embankment which is between 2 and 4 feet above the surrounding terrain.

The existing 760-foot long twin (E.B.L. and W.B.L.) Q.E.W. structures, which have three lanes each, cross the C.N.R. at a skew angle of approximately 30 degrees. The profile grade of the Q.E.W. varies from about elevation 310 to 314. The associated east and west approach embankments have a maximum height of about 30 and 22 feet, respectively. The embankment slopes vary from 2:1 to 2.5:1.

Physiographically the site is situated in the "Iroquois Plain", specifically in the "Toronto" sub-section. In this sub-section the predominant overburden deposit is composed of a clayey silt stratum some 20 to 30 feet thick; this deposit is of pre-Iroquoian age. The cohesive stratum is underlain by a thin basal glacial till sheet which, in turn, is followed by grey shale bedrock of the Meaford-Dundas formation, Ordovician Period.

3. FIELD AND LABORATORY WORK:

During the progress of the field investigation the Regional Bridge Planning Section advised us that major revisions for the proposed complex had been initiated by the design consultant. The borings, put down prior to this notification,

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

have been included, as well as the strategically located borings for the modified complex. In all, a total of twenty-two boreholes, 21 of which were accompanied by a dynamic cone penetration test, were put down at the proposed site. The majority of the borings were advanced by a diamond drill rig adapted for soil sampling purposes. At a few boring locations the holes were put down by a Penn-drill employing power auger techniques; at the majority of these locations bedrock was proven using the diamond drill rigs.

Samples of the fill and parent overburden were recovered, at required depths, in a 2" O.D. split-spoon sampler, which was hammered into the soil in accordance with the specifications for carrying out the Standard Penetration Test. The same method was used to advance the dynamic cone penetration tests. Wherever possible, these samples were supplemented by manually or hydraulically pushing 2" I.D. Shelby tube samples into the cohesive portion of the overburden. In addition, in situ field vane tests were carried out within the softer, more compressible portions of this stratum. Bedrock was proven in 17 of the borings, by obtaining BXL size rock core samples.

The groundwater level conditions across the site, at the time of the investigation, were determined by recording the water levels in all the open boreholes.

The location and elevation of all the borings were surveyed by personnel from the Central Region Engineering Surveys Section. The borings are shown in plan on Drawing No. 69-F-76A. Two estimated stratigraphical sections are shown on the aforementioned drawing. All elevations given in this report are referenced to a Geodetic datum.

All samples were subjected to a careful visual examination in the field and subsequently in the laboratory. Following this examination, laboratory testing was carried out

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

on selected representative samples to determine the following engineering properties of the overburden:

Bulk Densities
Natural Moisture Contents
Grain-size Distributions
Atterberg Limits
Undrained Shear Strengths
Consolidation Characteristics

The results of this testing are plotted on the Record of Borelog sheets and summarized on Figures 2 to 6, inclusive, all contained in Appendix I of this report.

4. SUBSOIL AND BEDROCK CONDITIONS:

4.1) General:

The predominant parent stratum across the site is composed of a stiff to hard clayey silt with occasional silt layers throughout; the thickness of this deposit ranges from 6 to 24 feet. The cohesive stratum is generally overlain by fill whose composition ranges from loose to compact sand and gravel to firm to very stiff clayey silt. The fill is anywhere from 3 to 15 feet in depth. At some random locations the clayey silt is underlain by a thin basal glacial till sheet, which, in turn, is followed by fractured to sound shale bedrock.

The boundaries of the various deposits, are shown on the accompanying borelog sheets. The stratigraphical sections, plotted on Drawing No. 69-F-76A, have been inferred from this data.

From ground surface downwards, the various soil types encountered are as follows:

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

4.2) Fill Material:

Fill was placed over the majority of the site as part of the grading operations carried out for the C.N.R. and the Ontario Food Terminal lot, located to the north of the tracks. The total thickness of this fill varies from about 3 feet to a maximum of 15 feet at B.H. #17, which is located in what was originally a low area in the vicinity of a drainage ditch. The majority of the fill is composed of a firm to very stiff ('N' values 4 to 39 blows/ft.) grey-brown clayey silt, with a trace of sand and organic matter throughout. Elsewhere, particularly in the northwest portion of the site, the fill is composed of loose to compact sand and gravel with cinders, bricks and other extraneous material. Grain-size curves, obtained on samples of the fill, are plotted on Figure #2.

The fill is often underlain by the parent surficial mantle, which contains organic matter. This mantle is never more than 1 foot thick.

4.3) Clayey Silt Stratum:

Directly underlying the fill, where it exists, or the surficial cover elsewhere, is the predominant stratum across the site, composed of a brown to grey clayey silt with a trace of sand. Numerous layers of silt up to 4" thick are randomly located throughout the stratum. The thickness of the clayey silt varies from 6 to 24 feet, being on the average about 20 feet thick. At two boring locations (B.H.'s #6 and 9), extensive zones of silt varying from 1 foot to 7 feet are present; these were found to be localized and were not continuous across the site. Grain-size distribution curves for samples of the clayey silt, as well as from the granular layers, are plotted on Figure #3.

The engineering properties of the stratum, as determined by field and laboratory testing, are presented in tabular form:

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

4.3) Clayey Silt Stratum: (cont'd.) ...

Identity Tests:

		<u>Range</u>	<u>Average</u>
Bulk Densities (p.c.f.)	(γ)	123 - 134	(127)
Liquid Limit (%)	(WL)	22 - 44	(32)
Plastic Limit (%)	(Wp)	16 - 26	(22)
Natural Moisture Content (%)	(W)	15 - 29	(25)
Liquidity Index	(IL)	neg. - 0.8	(0.3)

Consolidation Characteristics:

Initial Void Ratio	(e_o)	4 Tests {	.55	to	0.8
Compression Index	(C_c)		0.2	to	0.4
Degree of Preconsolidation (p.s.f.)	($P_c - P_o$)		5,000	to	10,000

Undrained Shear Strength (C_u)
(p.s.f.)

1) Field Vanes	950 to >2,000
2) Lab. Tests	800 to >2,000

Standard Penetration Tests 'N'

(Blows/ft.)	6 - 106	(30)
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The Atterberg limit tests, summarized above, are also plotted on the Plasticity Chart, Figure #5. These results indicate that the cohesive stratum is inorganic with a plasticity in the low to intermediate range. In the deposit the natural moisture content ranges from a few percent below the plastic

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

4.3) Clayey Silt Stratum: (cont'd.) ...

limit, in the upper zone, to values between the liquid and plastic limits in the lower zone (liquidity indices up to 0.8).

Based on the undrained shear strength testing carried out, it is estimated that the consistency of the cohesive stratum ranges from very stiff to hard, in the upper portion, to firm to very stiff with depth. The aforementioned pattern was corroborated by the standard penetration testing carried out within the deposit.

The consolidation characteristics of the stratum were determined by carrying out four laboratory oedometer tests, the results of which are shown as Void Ratio vs. Pressure plots, on Figure #5. The results of this testing indicate that the clayey silt subsoil, located in the relatively compressible zones, is preconsolidated by about 5,000 p.s.f. in excess of the existing overburden pressure. The remainder of the stratum is preconsolidated by a magnitude which would be in excess of the aforementioned value. The values of the initial void ratio (e_0) and the compression index (C_c) are within the normal range for cohesive deposits encountered in this area.

4.4) Clayey Silt with Sand and Gravel - (Glacial Till):

At some locations the cohesive stratum is underlain by a hard ('N' values 32 to greater than 100 blows/ft.) glacial till deposit composed of clayey silt with sand and gravel. The thickness of this deposit, where encountered, varies from 2 to 6 feet. Occasional random granular zones are present throughout the glacial till; in these areas the subsoil is composed of silt and sand binding gravel. Grain-size distribution curves, for two samples of the glacial till, obtained with 2" O.D. sampling equipment, are shown on Figure #4.

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

4.4) Clayey Silt with Sand and Gravel - (Glacial Till): -
(cont'd.) ...

The Atterberg limit tests carried out on samples of this deposit, are plotted on Figure #5. This testing indicates that the cohesive matrix has a plasticity in the low to intermediate range. The corresponding natural moisture content is consistently below the plastic limit.

4.5) Shale Bedrock:

The glacial till, where it exists, or the clayey silt stratum elsewhere, is underlain by bedrock which was proven in 17 of the borings, by obtaining from 4 to 10 feet of BXL size rock core samples. Over the area under investigation the surface of the bedrock was found to vary between elevations 358 to 265.

The bedrock is composed of a grey horizontally bedded shale, with occasional limestone interbeds. The upper 2 to 3 feet of the bedrock is generally in a fractured and jointed condition. Below this upper zone the bedrock is relatively sound.

5. GROUNDWATER CONDITIONS:

Groundwater level observations have been carried out, during the period of the investigation, in the open holes. The observations are recorded on the borelog sheets and summarized on Drawing 69-F-76A.

The recorded observations indicate that the groundwater level in the overburden deposits, at the time of the investigation, varies between elevations 279 and 239, which correspond to depths ranging from ground surface to 7 feet below ground surface.

6. EXISTING STRUCTURES AND APPROACH FILLS:

The bridge drawings for the existing multi-span C.N.R. overhead structures indicate that the foundations are supported on end-bearing piles, driven to practical refusal into the lower portion of the basal glacial till sheet or, alternatively, to bedrock. As discussed in Section 2) the height of the existing spill-through type embankments (with 2:1 to 2-1/2:1 slopes) vary from 22 to 30 feet.

Visual examination, carried out at the time of the investigation, indicates that:

i) the approach embankments are inherently stable. Further, no cracking or dishing was noticed along the Q.E.W. paved lanes. This would infer that no appreciable total or differential settlements have occurred, due to the surcharge loading of the subsoil; and

ii) the existing structures appear to be in a satisfactory condition.

7. DISCUSSION AND RECOMMENDATIONS:

7.1) General:

It is proposed to construct an overhead structure at the revised Q.E.W. and C.N.R. crossing (Structure No. 5). The structure scheme proposed calls for two spans (50'-80' approx.), incorporating a centre pier and closed-type abutments. The structure, which will traverse the C.N.R. at a skew angle of approximately 25 degrees, will vary from 400 to 500 feet in width, and will carry the E.B. (3 lanes) and W.B. (4 lanes) of the Q.E.W., as well as a ramp to Lakeshore Blvd.

The profile grade of the Q.E.W., in the vicinity of the structure, will vary between elevations 322 and 324. At this grade the maximum height of the approach fills will be of the order of 36 feet above existing ground surface. The existing approach

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

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

fills shall be heightened and widened and incorporated into the proposed approaches.

Due to space restrictions between the proposed fills and existing adjacent elements, such as the C.N.R. tracks, a number of retaining structures are proposed for this area (specifically, Retaining Walls R-4 and 5). Recommendations pertaining to the retaining walls will be given in detail in our Report No. 69-F-120.

The predominant deposit across the site is a 6 to 24-foot thick stiff to hard clayey silt stratum, which is occasionally underlain by a thin hard glacial till deposit, followed by shale & rock. The overburden is generally overlain by fill, which varies from 3 to 15 feet in thickness.

The presence of the clayey silt stratum is of primary importance as far as foundation design is concerned, since it will be necessary to ensure that it is not 'overstressed' by either the structure element or approach fill surcharge loadings. These aspects will be discussed in the sub-sections to follow:

7.2) Approach Embankments:

7.2.1) Stability Considerations:

The critical condition for stability of an embankment on overconsolidated cohesive subsoils, as is the case at this site, generally occurs during or immediately after construction. This being the case, a total stress analysis ($\phi = 0$) provides a suitable means of assessing the stability of the embankment sections. In this method of analysis, stability is governed by the applied loads and by the stress-strain and undrained shear strength characteristics of the foundation and embankment soils.

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

7.2) Approach Embankments: (cont'd.) ...

7.2.1) Stability Considerations: (cont'd.) ...

Analyses have been carried out, therefore, in terms of total stresses, both manually and by the use of the electronic computer, to determine the stability of the approaches. The geometric sections at the approaches, and the soil properties for the fill and subsoil, assumed for computational purposes, are presented on Figure #1, in Appendix 1 of this report. The results of the analyses, presented on the aforementioned figure, are summarized in the following paragraphs.

Stability of the fills will be most critical at the location of the closed-type north and south abutments, since at this point the fills will have a maximum height of approximately 38 feet (refer to Section A-A, Figure #1). The compressible zone, underlying these approaches, has a minimum undrained shear strength of about 1,000 p.s.f. The computations carried out indicate that, the aforementioned sections are stable having a minimum factor of safety of 1.3.

The stability of fill sections, which are not retained but have standard 2:1 slopes, were found to be inherently stable (refer to Section B-B, Figure #1).

7.2.2) Settlement Considerations:

The underlying clayey silt stratum will undergo settlement due to consolidation, over a period of time, under the weight of the approach embankments. As a general rule, the induced stresses will be less than the degree of preconsolidation of the cohesive subsoil. This being the case, the majority of the settlement will be of a recompression nature. Settlement computations were carried out, the results of which will be discussed herein.

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

7.2) Approach Embankments: (cont'd.) ...

7.2.2) Settlement Considerations: (cont'd.) ...

The maximum amount of settlement will take place immediately behind the abutments, where the height of fill is greatest. The computations indicate that the maximum settlement at these locations could be of the order of 3 to 4 inches.

West of Station 37+00, along the west approach, and east of Station 30+00, along the east approach, the future embankments will be formed by increasing the height of and widening the existing fills. Differential settlement, between the old and new fill sections, could be of the order of 2 to 2-1/2 inches. It is anticipated that the majority of the aforementioned settlement will take place during or immediately after construction of the fill sections.

In order to have a smooth transition from the existing fill to the new fill sections, it is recommended that:

i) all topsoil be stripped from the existing fill sections prior to placing future fill; and

ii) the future fill be "keyed" into the existing approaches in accordance with current D.H.O. methods.

7.3) Structure Foundations:

7.3.1) Closed-Type Abutments:

In view of the variable thickness and random composition of the fill material, as well as the variable consistency of the underlying clayey silt stratum over the site, the abutment foundations should be supported on end-bearing piles driven to bedrock (estimated pile tip elevations between 258 and 264). The base of the pile caps should be provided with at least 4 feet of earth cover for frost protection purposes.

The piles can be designed for the maximum allowable load for the respective pile section selected (e.g., 12 BP 74 steel H-piles may be designed for 90 tons/pile).

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

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

7.3.1) Closed-Type Abutments: (cont'd.) ...

No major dewatering problems are anticipated for the construction of the pile caps, in view of the relatively impermeable nature of the subsoil. Any minor seepage or surface run-off occurring in the excavations could be handled by employing conventional techniques, such as pumping from sumps.

If the structure is designed as a rigid frame, then a coefficient of earth pressure at rest (K_0) of 0.5 should be assumed for the granular fill material behind the wall, when designing the abutments. However, if some movement of the top of the wall is permitted, then a coefficient of active earth pressure (K_a) of 0.33 can be used.

7.3.2) Centre Pier Foundation:

The centre pier can be supported on end-bearing piles driven to bedrock, as discussed in detail under Sub-section 7.3.1).

8. MISCELLANEOUS:

The field work, performed during the periods of September 13 to October 17, and November 22 to 26, 1969, was carried out under the general supervision of Mr. M. Devata, Supervising Foundation Engineer. The equipment was owned and operated by Master Soil Investigation Limited, Toronto.

This report was written by Mr. B. T. Darch, Senior Foundation Engineer, and reviewed by Mr. Devata.

January 1970

APPENDIX I

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 2

FOUNDATION SECTION

JOB 69-P-76

LOCATION Co-ords 183, 240N, 226, 69SE

ORIGINATED BY RD

W.P. 314-65-06

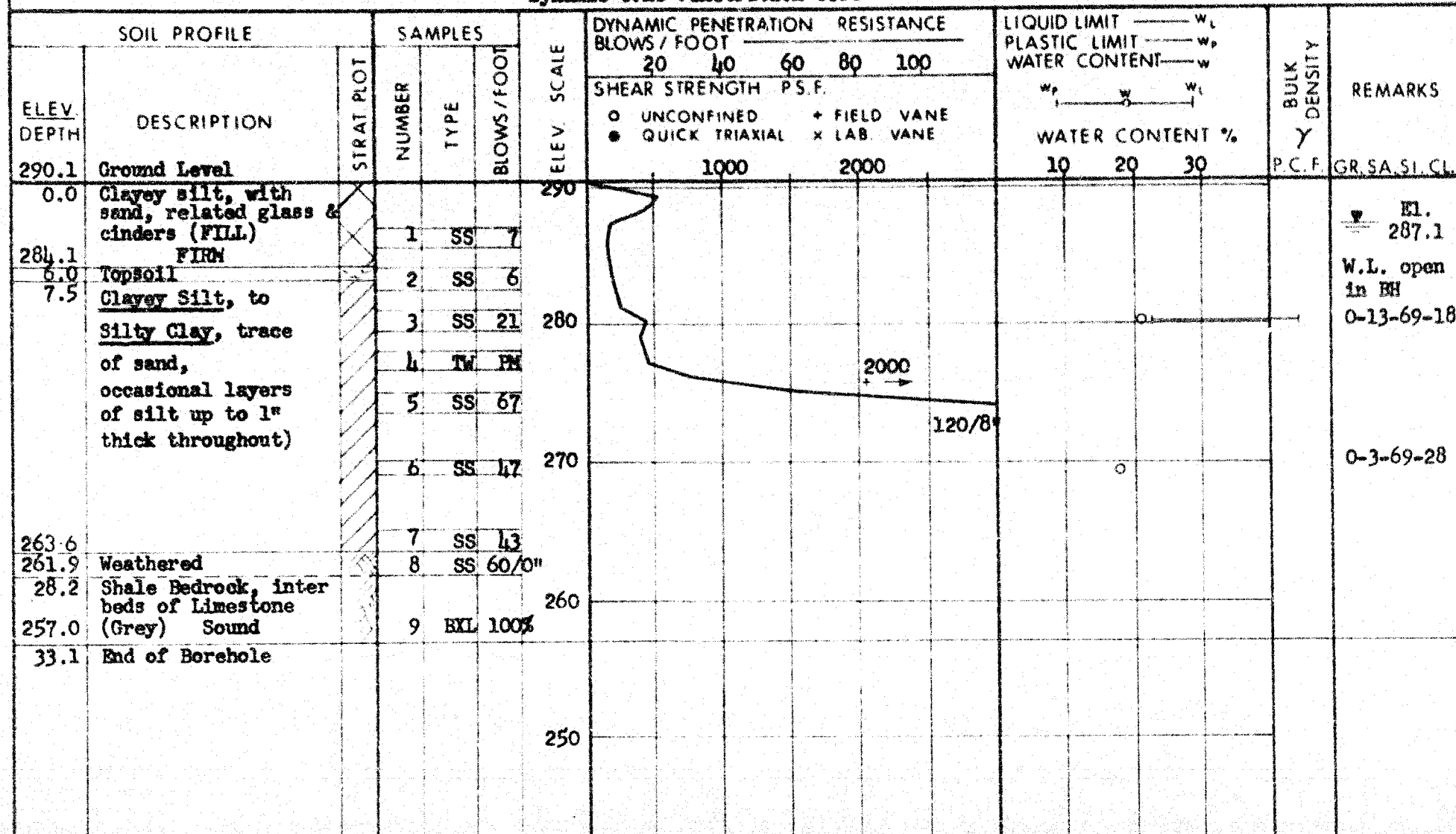
BORING DATE September 24, 25, 1969

COMPILED BY SO

DATUM Geodetic

BOREHOLE TYPE Washboring, NX Casing, BXL Rock Core
Dynamic Cone Penetration Test

CHECKED BY JR.



DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 3

FOUNDATION SECTION

JOB 69-F-76

LOCATION Co-ords 183, 30N, 226, 757

ORIGINATED BY RD

W.P. 314-65-06

BORING DATE September 25, 26, 1969

COMPILED BY SO

DATUM Geodetic

BOREHOLE TYPE Washboring, NX, BX Casing, BXL Rock Core
Dynamic Cone Penetration Test

CHECKED BY

SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT			REMARKS
ELEV. DEPTH	DESCRIPTION	NUMBER	TYPE	BOREHOLE	FIELD	LAB	WATER CONTENT	WATER CONTENT	WATER CONTENT			
					20	40	60	80	100			
					SHEAR STRENGTH (PSI)							
					○ UNCONFINED + FIELD VANE							
					● JACK TRIAXIAL * LAB VANE							
					1000 2000							
										10	20	30
289.2	Ground Level											
0.0	Sand & Gravel related cinders & bricks											
286.2	Brown (Fill) Compact											
3.0	Clayey Silt, trace of sand (occasional layers of sand & silt up to 1" thick, throughout) (Brown to Grey) Very Stiff to Hard	1	SS	41								W.L. in open BH 0-3-83-14 at 6 L on Nov 6/69
		2	SS	71								
		3	TW	FM	280				2000			
		4	TW	FM					2000			
		5	SS	38								
		6	SS	38	270							0-1-79-20
262.2		7	SS	17								
27.0	Fractured Shale Bedrock, inter- beds of Limestone (Grey) Sound	8	BXL	100%	260							
256.0		9	BXL	90%								
33.2	End of Borehole											
					250							

250

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 5

FOUNDATION SECTION

JOB 69-F-76

LOCATION Co-ords 183, 449N, 226, 895E

ORIGINATED BY RD

W.P. 311-65-06

BORING DATE September 29 & 30, 1969

COMPILED BY SO

DATUM Geodetic

BOREHOLE TYPE Washboring, NX, BX Casing, BXL Rock Core

CHECKED BY

Dynamic Cone Penetration Test

SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT			REMARKS									
ELEV DEPTH	DESCRIPTION	STRAT FOOT	NUMBER	TYPE	BLOWS/FOOT	ELEV SCALE	BLOWS/FOOT						PLASTIC LIMIT								
							20	40	60	80	100		WATER CONTENT %								
SHEAR STRENGTH, P.S.F.							UNCONFINED					FIELD VANE									
							QUICK TRIAXIAL					LAB VANE									
							1000					2000									
							10					20					30				
289.5	Ground Level																				
0.0	Top Soil																				
	Clayey Silt, trace of sand (occasional layers of silt up to 2" thick throughout)		1	SS	62																
	(Grey)		2	SS	41																
	Very Stiff		3	TW	PM	280															
			4	TW	PM																
			5	SS	20																
			6	SS	12	270															
264.5																					
263.4	Weathered		7	SS	6 1/8"																
27.1	Shale Bedrock (Grey)																				
258.4	Sound		8	BXL	100%	260															
31.1	End of Borehole																				
						250															

FOUNDATION SECTION

RD

90

Figure 1. Schematic representation of the experimental design. The subjects were divided into two groups: the control group and the experimental group. The control group was divided into two subgroups: the control group and the experimental group. The experimental group was divided into two subgroups: the control group and the experimental group.

Dynamic Cone Penetration Test

SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE		WATER CONTENT		REMARKS
ELEV DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS/FOOT	ELEV. SCALE	20 40 60 80 100	10 20 30	
288.3	Ground Level							
0.0	Top Soil							
1.0	Silt, Some clay trace of sand (Brown)	1	SS	30				
280.3	Dense to Very Dense	2	SS	66	280			
8.0	Clayey Silt, trace of sand (occasional layers of silt up to 1" thick throughout) (Brown to Grey) Very stiff to Hard	3	SS	17				
		4	SS	21				
		5	TW	PM	270			
		6	SS	22				
261.3	Clayey silt, with sand							
263.0	& Gravel, (Glacial Till)	7	SS	60/4"				
25.3	Fractured Shale Bedrock, inter- beds of Limestone (Grey Sound)	8	BXL	100%	260			
255.1		9	BXL	100%				
33.2	End of Borehole				250			

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 7

FOUNDATION SECTION

JOB 69-F-76

LOCATION Co-ords 183, 503N, 227, 035E

ORIGINATED BY RD

N.P. 31-13-96

BORING DATE October 1 & 2, 1969

COMPILED BY SO

DATUM Geodetic

BOREHOLE TYPE Washboring, NX, BX Casing, BXL Rock Core
Dynamic Cone Penetration Test

CHECKED BY

SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT			REMARKS								
ELEV. DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS/FOOT	ELEV. SCALE	BLOW COUNT					WATER CONTENT %									
						20	40	60	80	100	WATER CONTENT %		WATER CONTENT %	WATER CONTENT %						
SHEAR STRENGTH						FIELD DATA					LAB. DATA									
O UNCONSOLIDATED						FIELD DATA					LAB. DATA									
■ QUICK CLAY						LAB. DATA					LAB. DATA									
						1000					2000									
						10					20					30				
284.7	Ground Level																			
0.0	Top Soil																			
	Clayey Silt, trace of sand	1	SS	11	280										W.L. in					
	(occasional layers of silt up to 2" thick)	2	TW	FM											Open B.h.					
	(throughout)	3	SS	32											at G.L.					
	(Brown to Grey)	4	SS	40											on					
		5	SS	60	270										Nov. 6, 69					
264.7																				
20.0		6	SS	78																
	Weathered & Fractured Shale Bedrock, interbeds of Limestone	7	BXL	50%	260															
256.7	(Grey) Sound	8	BXL	80%																
28.0	End of Borehole				250															

W.L. in
Open B.h.
at G.L.
on
Nov. 6, 69

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 9

FOUNDATION SECTION

JOB 69-F-76

LOCATION

Co-ords 183, 178N, 226, 814E

ORIGINATED BY

00

W.P. 314-65-06

BORING DATE

October 8 & 9, 1969

COMPILED BY

SO

DATUM Geodetic

BOREHOLE TYPE

Washboring, NX, BX Casing, BXL Rock Core

CHECKED BY

12

Dynamic Cone Penetration Test

SOIL PROFILE		SAMPLES			ELEV SCALE	DYNAMIC PENETRATION RESISTANCE	LIQUID LIMIT ———— w_L	BULK DENSITY γ P.C.F.	REMARKS	
ELEV DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT	PLASTIC LIMIT ———— w_p			WATER CONTENT ———— w
						20 40 60 80 100	SHEAR STRENGTH PS F			WATER CONTENT %
						\circ UNCONFINED + FIELD VANE \bullet QUICK TRIAXIAL x LAB. VANE	w_p ———— w ———— w_L			
						1000 2000	10 20 30			
285.9	Ground Level									
0.0	Clayey Silt, with sand (occasional pockets of silt)								Elev. 284.5	
280.0	(Brown) Very Stiff	1	SS	39	280				W.L. in 0-2-82-16	
5.9	(Occasional layers of silt up to 1/2" thick throughout)	2	SS	60					Open B.H. on Nov 6/6	
		3	SS	46						
		4	SS	34						
	Silt Layer (Brown to Grey)	5	SS	43	270				0-6-87-7	
		6	SS	12						
259.7	Firm to Hard	7	TW	PM	260	+57 sh. 5 x 2			C 124	
26.2	Fractured Shale Bedrock, interbeds of Ltn (Grey)	8	BXL	96%						
253.9	Sound									
32.0	End of Borehole				250					

FOUNDATION SECTION

CHECKED BY *[Signature]*

[illegible]

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 12

FOUNDATION SECTION

JOB 69-F-76

LOCATION Co-ords 183, 360N, 226, 939E

ORIGINATED BY RD

W.P. 314-65-06

BORING DATE September 10, 1969

COMPILED BY SO

DATUM Geodetic

BOREHOLE TYPE Washboring, NX, BX Casing, BXL Rock Core

CHECKED BY

Dynamic Cone Penetration Test

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	20	40	60	80	100	PLASTIC LIMIT w_p	WATER CONTENT w		
287.2	Ground Level															
0.0	Clayey Silt, trace of sand & gravel, trace of organic matter (FILL Black to Brown)		1	SS	15											
273.2	Stiff to Very Stiff		2	SS	42	280										
277.2	Silt with organics Lse		3	SS	6											
10.0	Clayey Silt, trace of sand (occasional layers of silt up to 2" thick throughout) (Brown)		4	SS	32											
	Stiff		5	SS	113	270										
			6	TV	FM											
63.0			7	SS	60.5"											
24.2	Weathered & Fractured Shale Bedrock, interbeds of Limestone (Grey) Sound		8	BXL	40%	260										
256.2			9	BXL	90%											
31.0	End of Borehole					250										

x54.5
+54▼ Elev
285.9
W.L. in
open BH on
Nov. 6/69

FOUNDATION SECTION

ORIGINATED BY CG

COMPILED BY SO

CHECKED BY *[Signature]*

Dynamic Cone Penetration Test

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w		BULK DENSITY γ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		20 40 60 80 100	1000 2000	w_p — w — w_L	10 20 30		
286.3	Ground Level											
0.0	Clayey Silt, trace of sand, trace of organic matter (FILL) V.Stiff		1	SS	17							
280.8	Silt with organics		2	SS	31	280						
279.8	Clayey Silt, trace of sand (occasional layers of silt up to 4" thick throughout) (Brown to Grey) Stiff to Hard		3	TW	FM							
6.5			4	SS	57							
			5	SS	34	270						
			6	SS	9							
261.8	fractured		7	BXL	50%							
24.5	Shale Bedrock interbedded of limestone (Grey) sound		8	BXL	95%	260						
256.5												
29.7	End of Borehole					250						

FOUNDATION SECTION

ORIGINATED BY: EC

COMPILED BY SO

CHECKED BY *[Signature]*

Dynamic Cone Penetration Test

SOIL PROFILE						DYNAMIC CONE PENETRATION TEST					LIQUID LIMIT _____ w _L PLASTIC LIMIT _____ w _p WATER CONTENT _____ w			BULK DENSITY γ P.C.F.	REMARKS		
ELEV DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES		BLOWS / FOOT	ELEV SCALE	DYNAMIC PENETRATION BLOWS / FOOT		RESISTANCE	SHEAR STRENGTH PS F		WATER CONTENT %					
			NUMBER	TYPE			20	40	60	80	100						
												○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE					
													1000	2000	10	20	30
284.7	Ground Level																
0.0	Clayey Silt, trace of sand and organic matter (FILL)		1	SS	11	280											
277.2	(Grey-Brown) Stiff		2	SS	7												
7.5	Clayey Silt, trace of sand (occasional layers of silt up to 3" thick throughout)		3	TW	PM												
	Brown		4	SS	36												
	Stiff to Very Stiff		5	SS	58	270											
264.7			6	SS	11												
20.0	Clayey Silt, with sand and gravel (Glac Till)		7	TW	PM												
260.2	(Grey)		8	SS	32												
24.5	Fractured Shale Bedrock, occasional limestone inter beds (sound)		9	SS	100/1"	260											
254.7			10	BXL	90%												
30.0	End of Borehole					250											

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 16

FOUNDATION SECTION

JOB 69-F-76 LOCATION Co-ords 183, 649N 227, 267E
 W.P. 314-65-06 BORING DATE October 16, 1969
 DATUM Geodetic BOREHOLE TYPE Penn Drill, Dynamic Cone Penetration Test

ORIGINATED BY BC
 COMPILED BY SO
 CHECKED BY ✓

SOIL PROFILE		SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT			BULK DENSITY	REMARKS
ELEV. DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT					PLASTIC LIMIT				
						20	40	60	80	100	W _L				
SHEAR STRENGTH P.S.F.						+ FIELD VANE					W _p				
						x LAB VANE					W ₁				
						1000					2000				
						10					20				
						30									
</															

xsl.5 ●
+sl.5

W.L. in open Bh at G.L. Nov 6/69

124.5

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 17

FOUNDATION SECTION

JOB 69-F-76

LOCATION

Co-ords 183, 722N, 227, 337E

ORIGINATED BY

BC

W.P. 314-65-06

BORING DATE

October 16 & 17, 1969

COMPILED BY

SO

DATUM Geodetic

BOREHOLE TYPE

Penn Drill, Washboring, BX Casing BXL Rock Core

CHECKED BY

JL

SOIL PROFILE		SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT		LIQUID LIMIT — % PLASTIC LIMIT — % WATER CONTENT — %			BULK DENSITY Y P C F	REMARKS
ELEV. DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P S F ○ UNCONFINED * FIELD VANE ● QUICK TRIAXIAL x LAB VANE		WATER CONTENT % 10 20 30				
283.3	Ground Level											
0.0	Clayey silt, to silt, trace of sand (occasional pockets of silty sand (FILL) (Grey-Brown) Stiff or compact	1	SS	18	280							W.L. in Open BH, 0-4-86-10 at G.L. on Nov. 6/69
		2	SS	22								
		3	SS	13								
		4	TM	PM								
268.3					270							
15.0	Organic clay Firm	5	SS	7								
266.8												
16.5	Clayey silt, trace of sand, (occasional layers of silt up to 1" thick throughout)	6	SS	17	260							
257.8	Very Stiff											
25.5	Weathered & Fractured Shale Bedrock, interbeds of limestone (Grey) Sound	7	BXL	60%								
251.8		8	BXL	95%								
31.5	End of Borehole				250							

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 27

FOUNDATION SECTION

JOB 69-F-76 LOCATION Co-ords 183, 740N, 227, 174E
W.P. 314-65-06 BORING DATE October 6 & 7, 1969
DATUM Geodetic BOREHOLE TYPE Washboring, NX, BX Casing-BXL Rock Core
Dynamic Cone Penetration Test

ORIGINATED BY RD

COMPILED BY SO

CHECKED BY

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT — W _L PLASTIC LIMIT — W _P WATER CONTENT — W			BULK DENSITY Y P.C.F.	REMARKS	
ELEV. DEPTH	DESCRIPTION	STRAIT PILOT	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT					SHEAR STRENGTH PSF					WATER CONTENT %
							20	40	60	80	100	○ UNCONFINED ● QUICK TRIAXIAL	+ FIELD VANE x LAB. VANE	10			
286.3	Ground Level																
0.0	Clayey Silt, trace of sand with related cinder, concrete fragments etc. (FILL) Stiff		1	SS	16										GR SA SI CL		
280.8	5.5 Clayey Silt, trace of sand (occasional layers of silt up to 3" thick throughout) (Brown) Firm to Very Stiff		2	SS	9	280									Elev. 279.4		
			3	TW	IM										W.L. in Open BH		
			4	SS	6										Nov 28/69		
268.3			5	SS	90	270									0-2-81-17		
18.0	Clayey Silt, with sand and gravel (Glac. Till) (Grey) Hard		6	SS	61												
263.5	22.8 Weathered & Fractured Shale Bedrock, occasional interbeds of Limestone (Grey)		7	BXL	50%	260											
254.2	Sound		8	BXL	95%												
32.1	End of Borehole					250											

Elev. 279.4
W.L. in Open BH Nov 28/69
0-2-81-17

FOUNDATION SECTION

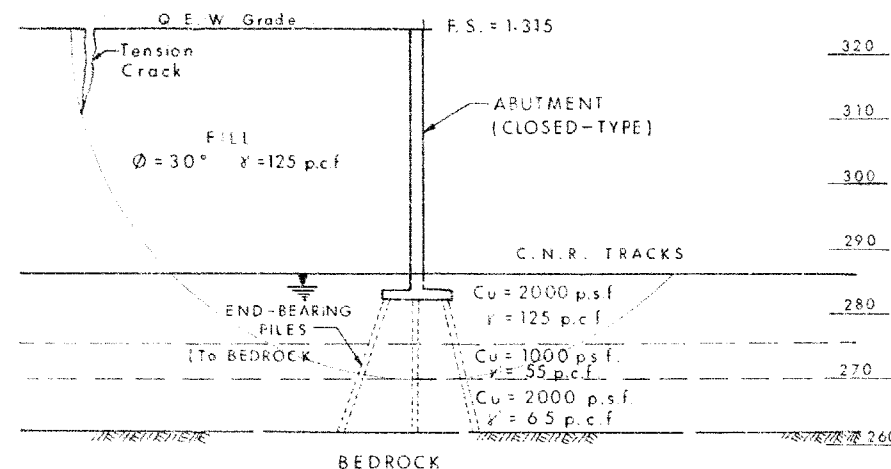
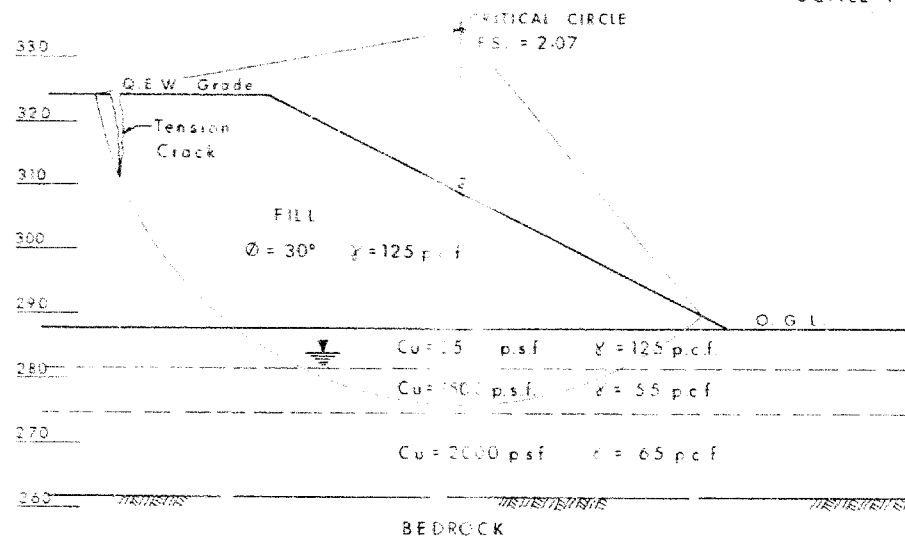
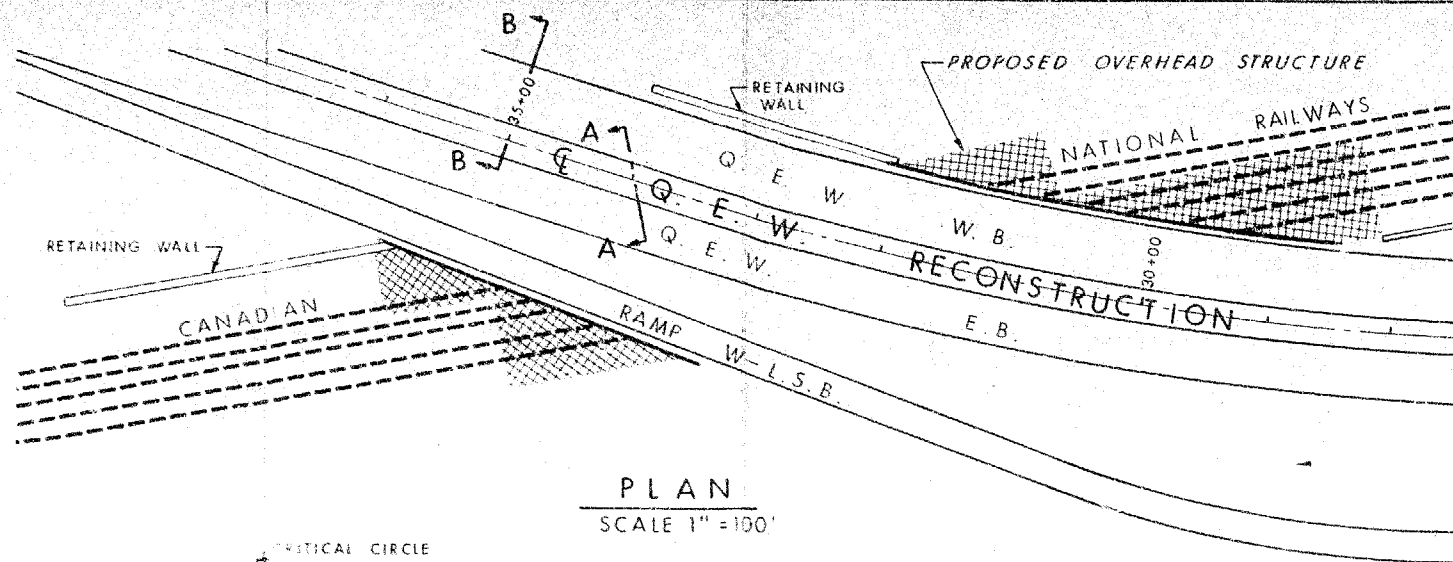
ORIGINATED BY RD

COMPILED BY

ENCLOSURE 2

Dynamic Cone Penetration Test

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DEPARTMENT OF HIGHWAYS
MATERIALS and
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DIVISION

DATE Dec 30, 1969

W.P. 314-65-06

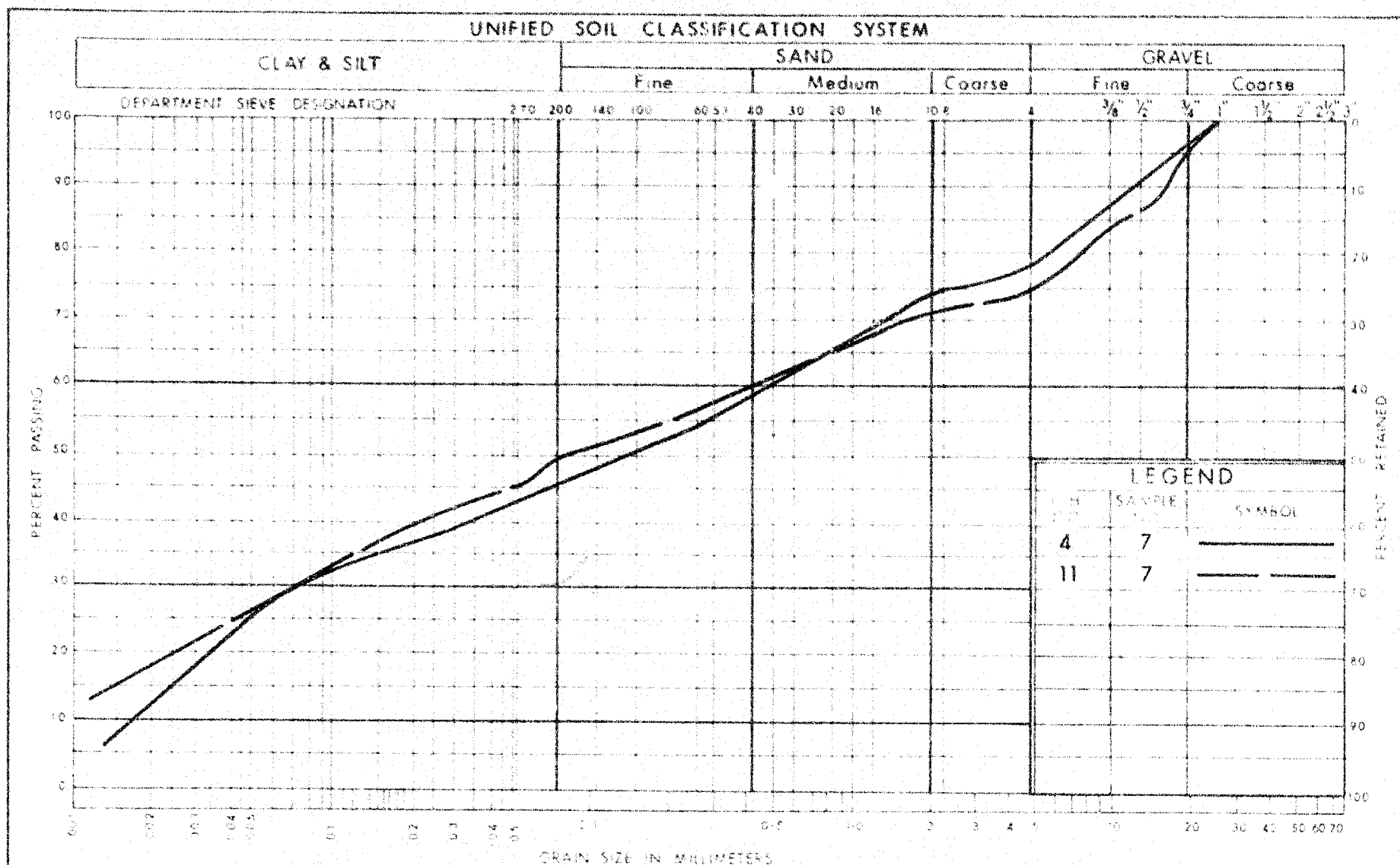
APPROVED

SUMMARIZED RESULTS OF
STABILITY ANALYSES

DIST. 4

JOB 69-F-76

Fig. NO. 1



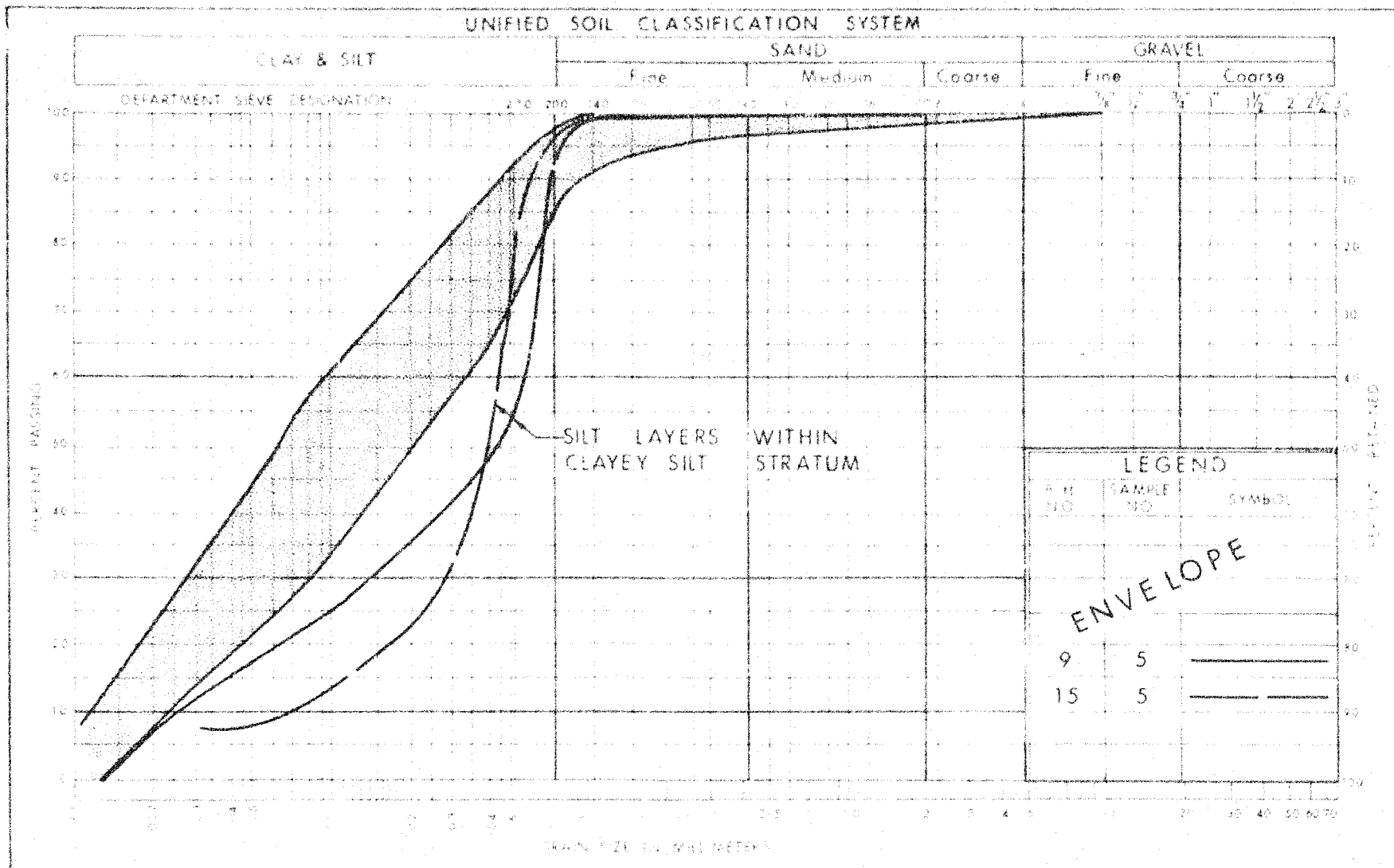
DEPARTMENT OF HIGHWAY
MATERIALS and
TESTING
DIVISION

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

WP No. 314-65-06

JOB No. 69-F-76

FIG. NO. 4



DEPARTMENT OF HIGHWAYS
MATERIALS and
TESTING
DIVISION

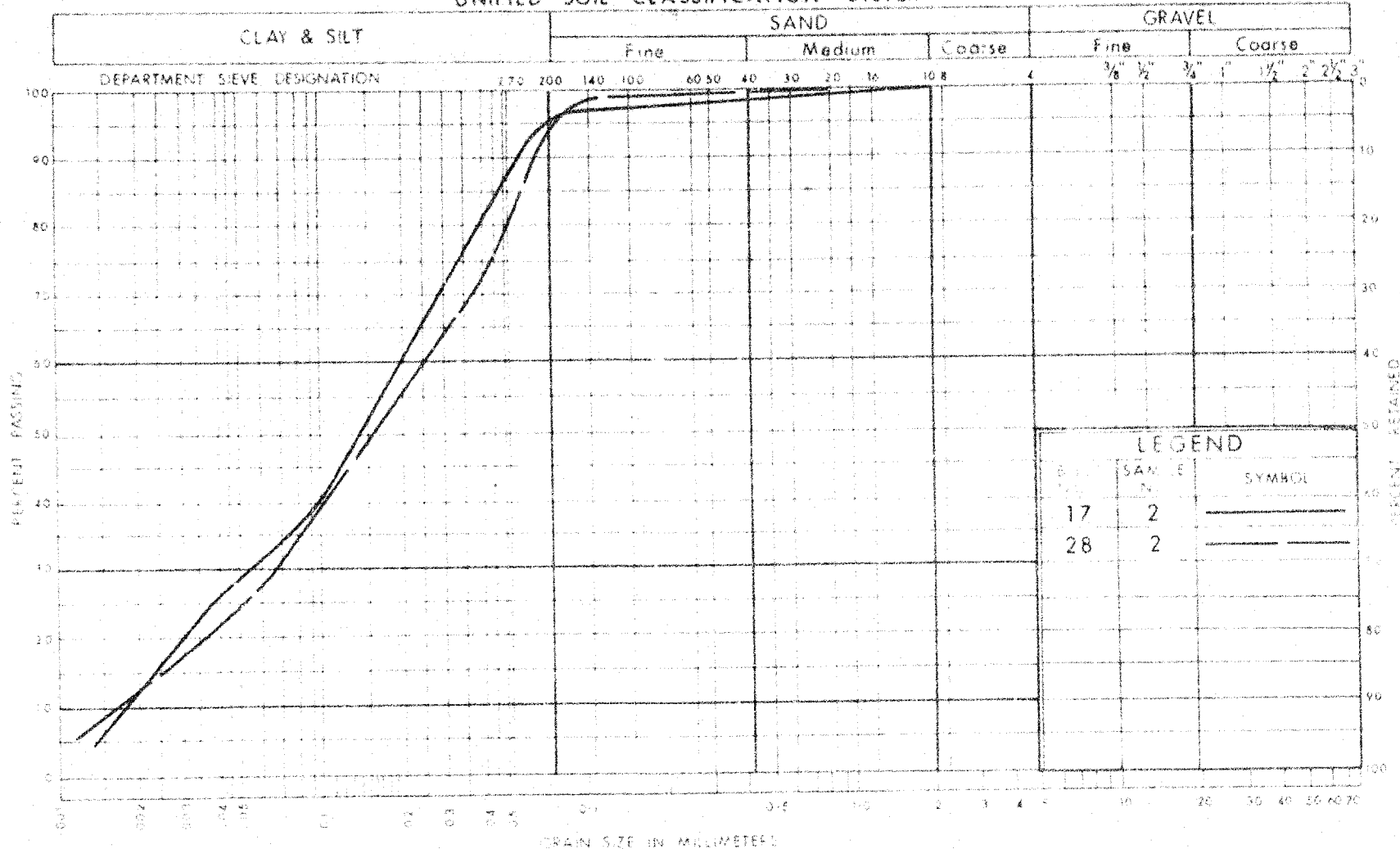
GRAIN SIZE DISTRIBUTION
CLAYEY SILT
TRACE OF SAND

WT. N. 314-65-06

JOB NO. 69-F-76

FIG. NO. 3

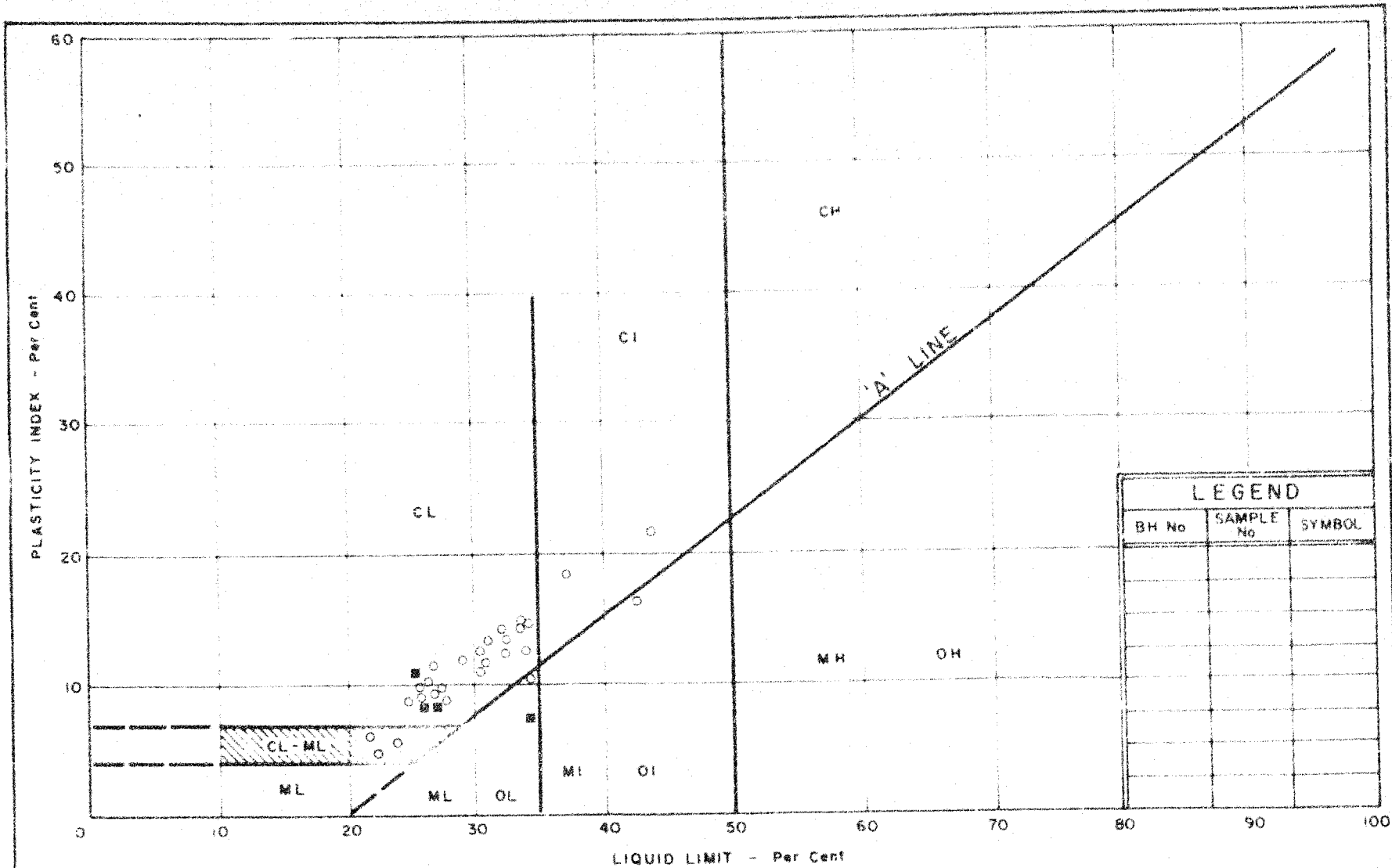
UNIFIED SOIL CLASSIFICATION SYSTEM



DEPARTMENT OF HIGHWAY
MATERIALS and
TESTING
DIVISION

GRAIN SIZE DISTRIBUTION
FILL MATERIAL
CLAYEY SILT TO SILT

W.P. No. 314-65-06
JOB No. 69-F-76
FIG. NO. 2



LEGEND		
BH No	SAMPLE No	SYMBOL



DEPARTMENT OF HIGHWAYS
MATERIALS and
TESTING
DIVISION

PLASTICITY CHART

- - CLAYEY SILT Stratum
- - GLACIAL TILL Deposit

WP No. 314-65-06

JOB No. 69-F-76

Fig No. 5

VOID RATIO - PRESSURE CURVES

JOB NO. 69-F-76

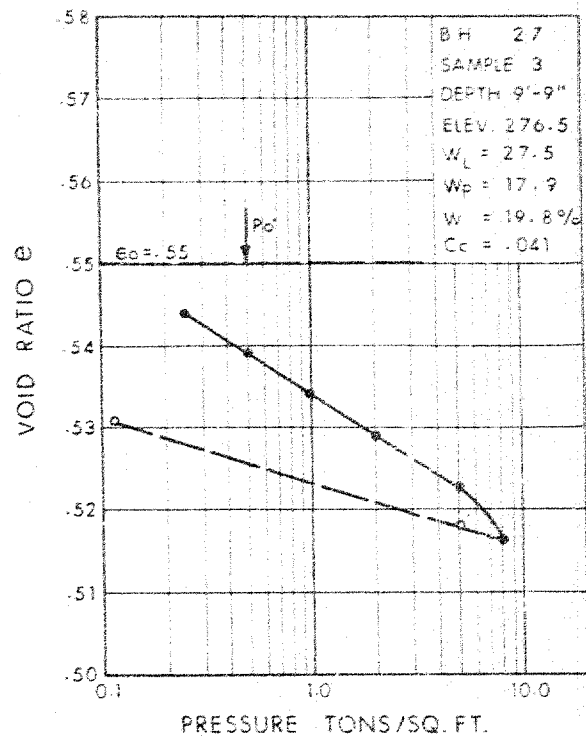
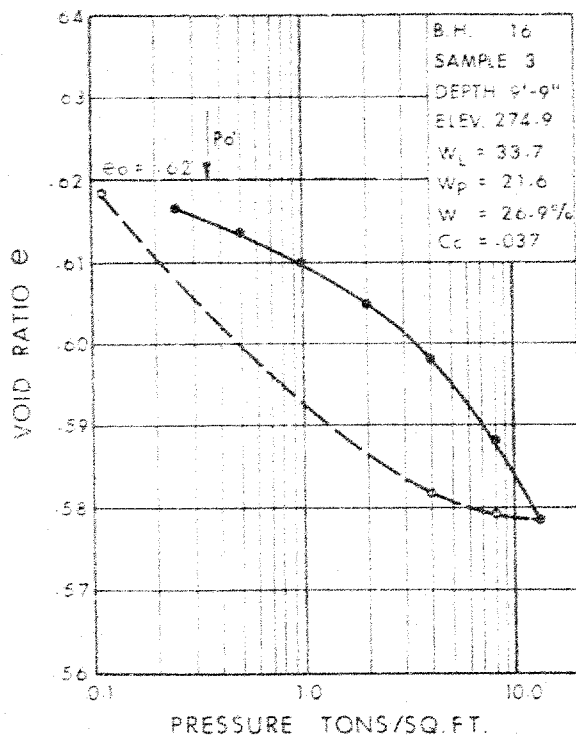
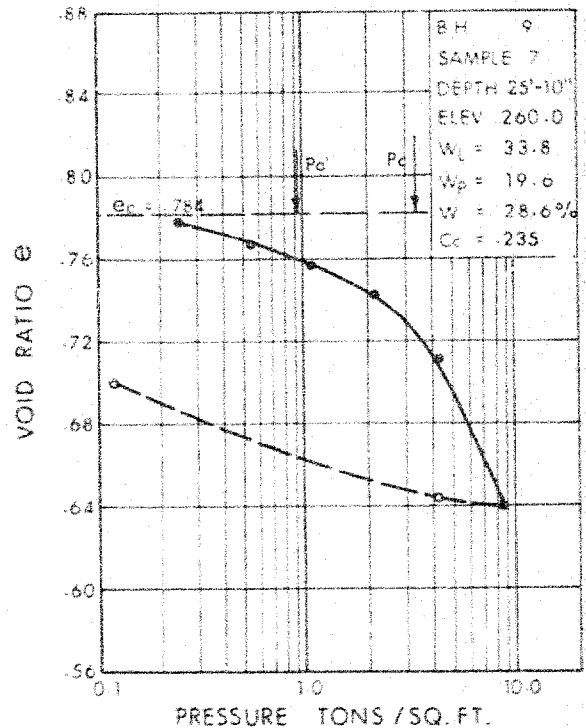
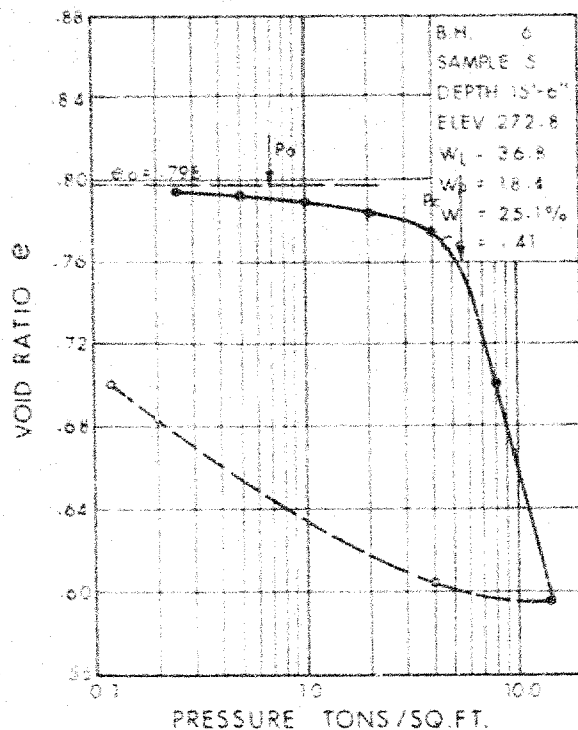


FIG. 6

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 $= \frac{w - w_p}{I_p}$
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	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
$\log_e \sigma$ OR $\ln \sigma$	NATURAL LOGARITHM OF σ
$\log_{10} \sigma$ OR $\log \sigma$	LOGARITHM OF σ TO BASE 10
t	TIME
g	ACCELERATION DUE TO GRAVITY
V	VOLUME
W	WEIGHT
M	MOMENT
F	FACTOR OF SAFETY

STRESS AND STRAIN

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

EARTH PRESSURE

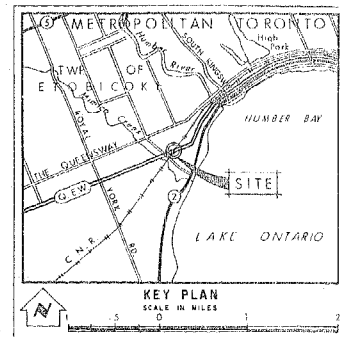
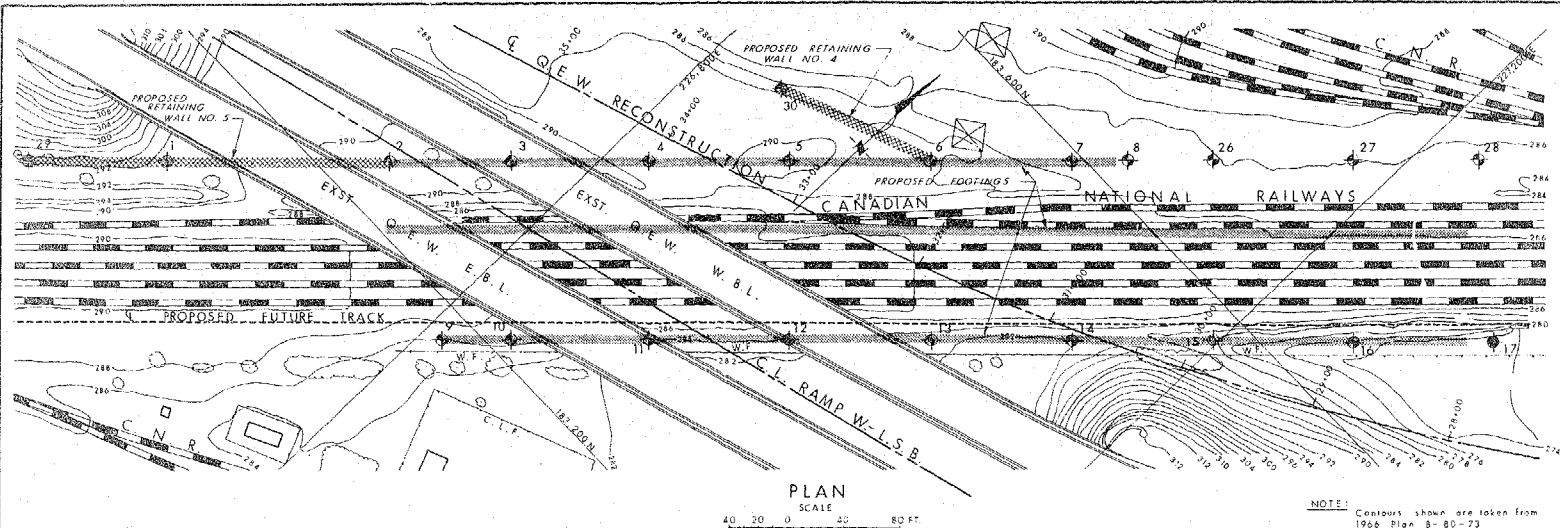
d	DISTANCE FROM TOP OF WALL TO POINT OF APPLICATION OF PRESSURE
δ	ANGLE OF WALL FRICTION
K	DIMENSIONLESS COEFFICIENT TO BE USED WITH VARIOUS SUFFIXES IN EXPRESSIONS REFERRING TO NORMAL STRESS ON WALLS
K_0	COEFFICIENT OF EARTH PRESSURE AT REST

FOUNDATIONS

B	BREADTH OF FOUNDATION
L	LENGTH OF FOUNDATION
D	DEPTH OF FOUNDATION BENEATH GROUND
N	DIMENSIONLESS COEFFICIENT USED WITH A SUFFIX APPLYING TO SPECIFIC GRAVITY, DEPTH AND COHESION ETC. IN THE FORMULA FOR BEARING CAPACITY
k_s	MODULUS OF SUBGRADE REACTION

SLOPES

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

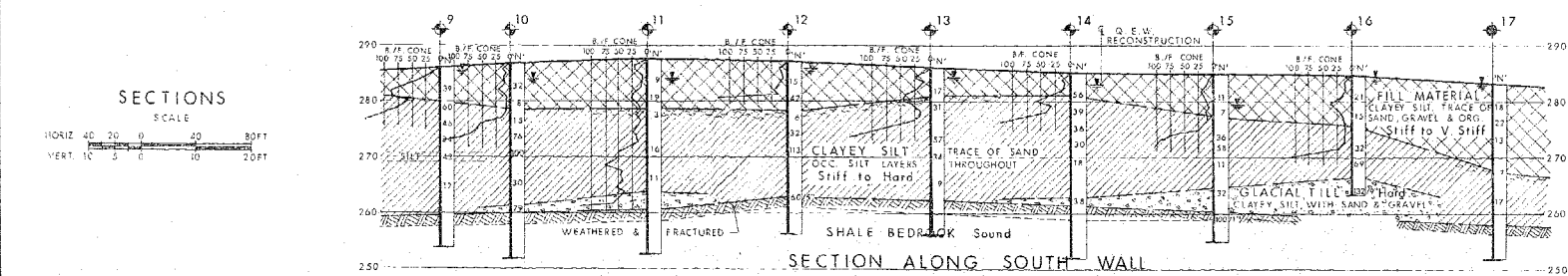
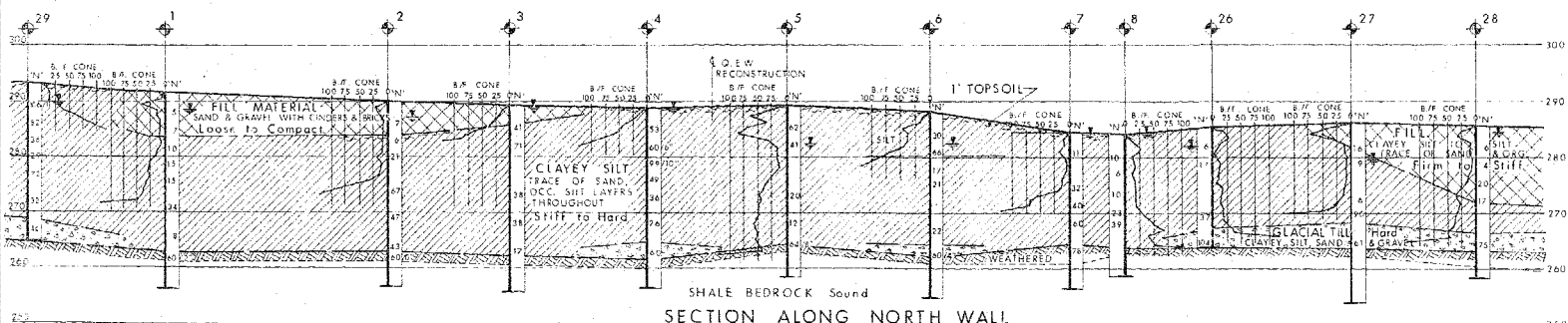


LEGEND

- Bore Hole
- Cone Penetration Hole
- Bore & Cone Penetration Hole
- Water Levels established at time of field investigation. Nov. 1969

NO	ELEV.	CO-ORDINATES	
		NORTH	EAST
1	291.9	185,173	278,583
2	290.1	183,240	276,695
3	289.2	183,304	276,757
4	288.9	181,376	276,825
5	288.5	183,440	276,895
6	288.3	183,521	276,965
7	284.7	185,593	277,035
8	283.6	183,622	277,062
9	285.9	183,178	276,814
10	280.7	183,215	276,849
11	287.9	183,287	276,919
12	287.2	183,360	276,980
13	286.5	183,437	277,058
14	285.0	183,504	277,127
15	284.7	183,577	277,176
16	284.7	183,649	277,197
17	283.3	185,729	277,337
26	285.4	183,667	277,114
27	286.3	185,760	277,174
28	285.5	183,605	277,235
29	279.3	183,650	276,317
30	286.0	183,481	276,854

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.



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.

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

BRIDGE NO. 5
(C.N.R. OVERHEAD)

KING'S HIGHWAY NO. Q.E.W. (RECONSTR. N.) DIST. NO. 6
CO. YORK METRO. TORONTO
TWP. ETOBICOKE LOT CON.

BORE HOLE LOCATIONS & SOIL STRATA

SURVEYED BY: C. J. CHEWCH W.P. NO. 318-65-70 H.S.T. DRAWING NO. 69-F-76A
DRAWN BY: C. J. CHEWCH JOB NO. 69-F-76
DATE: Dec. 11, 1969 SITE NO. BRIDGE DRAWING NO.

Department of Highways Ontario

Copy for the information of

Foundation Office

Mr. A. Stermac,

Principal Foundation Engineer,
Room 107, Lab. Bldg.

C.S. Grebski,
Bridge Office

December 23, 1970

Bridge No. 5 (C.N.P. Overhead)
W.P. 314-65-06, Site No. 37-243
Q.E.W., District No. 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:rd

Attach.

c.c. Foundation Office

No comments

PTD Jan 8/71

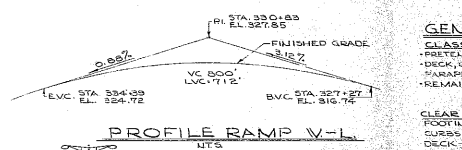
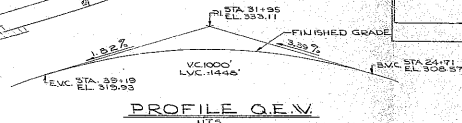
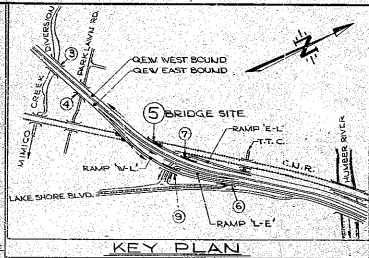
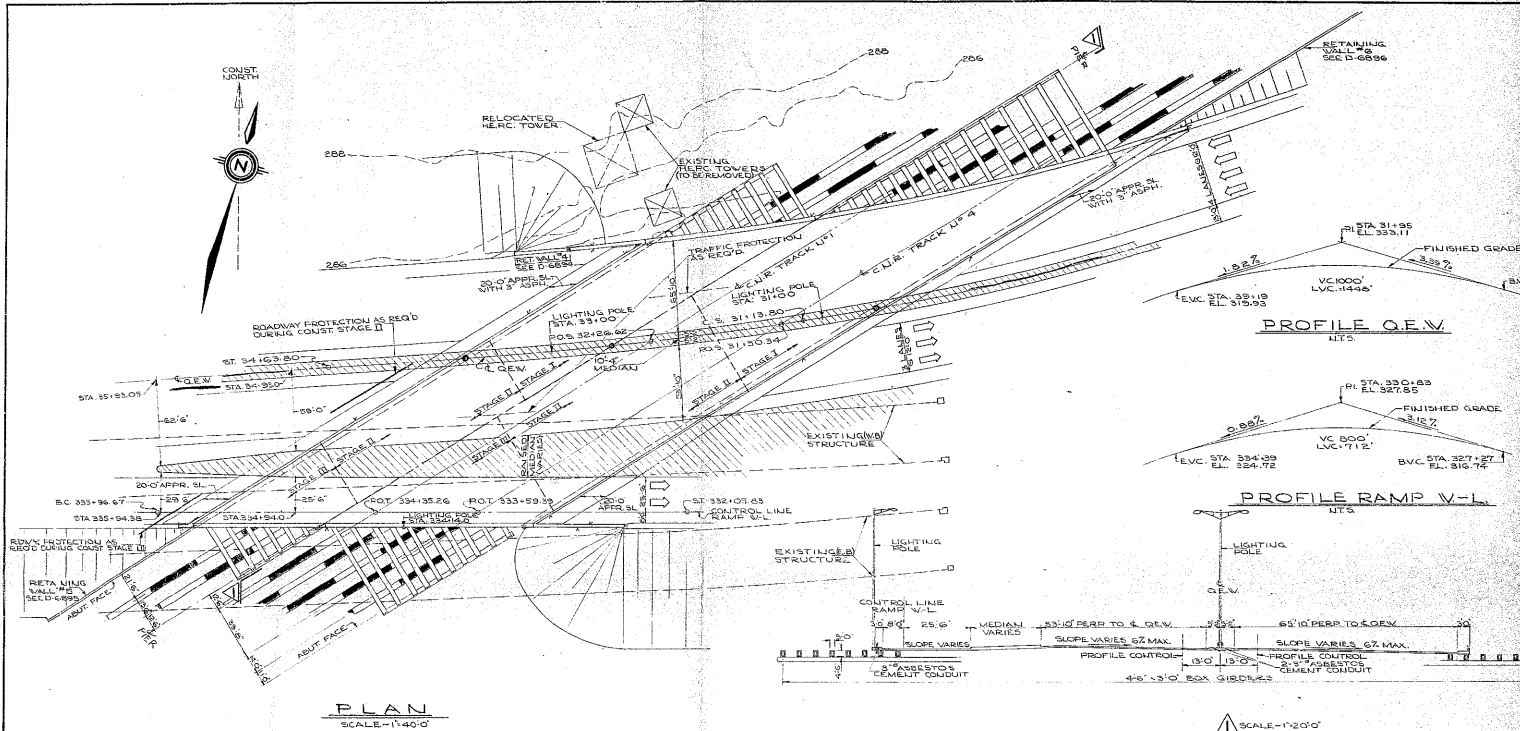
29 Jan 71

#69-F-76

W.P. #314-65-6

HWY. Q.E.W. &

C.N.R. OVERHEAD
STRUCTURE #5



GENERAL NOTES

CLASS OF CONCRETE:

- RETAINING WALLS - 5000 P.S.I.
- DECK, DECK CURBS, DIAPHRAGMS, PIERS & PARAPET WALLS - 4000 P.S.I.
- REMAINDER - 3000 P.S.I.

CLEAR COVER ON REINFORCING STEEL

FOOTINGS, ABUTMENTS & PIERS - 3"

CURBS & DIAPHRAGMS - 2"

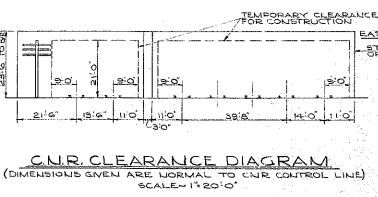
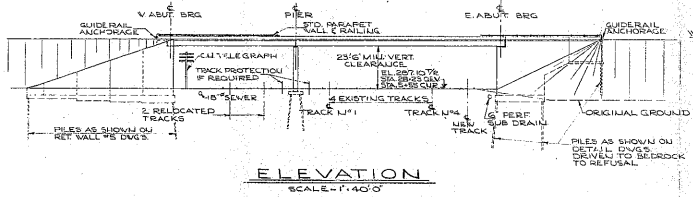
DECK - TOP 1/2" BOTTL 1"

PARAPET WALLS - 12"

CONSTRUCTION NOTES

THE CONTRACTOR IS RESPONSIBLE FOR FURNISHING THE NEARBY STAKES DEAD LEVEL TO THE SPECIFIED ELEVATIONS WITH A TOLERANCE OF 1/8".

ABUTMENT BEARING SEATS UNTIL THE CONCRETE IN THE DECK HAS BEEN PLACED.



- LIST OF DRAWINGS**
- D-6763-1 GENERAL DRAWING
 - 2 BORE HOLE LOCATIONS & SOIL STRATA
 - 3 FOOTING DETAILS
 - 4 EAST ABUTMENT DETAILS
 - 5 WEST ABUTMENT DETAILS
 - 6 PIER DETAILS
 - 7 BOX GIRDER DETAILS 1
 - 8 BOX GIRDER DETAILS 2
 - 9 DECK DETAILS 1
 - 10 DECK DETAILS 2
 - 11 PARAPET WALL DETAILS
 - 12 STANDARD STEEL PARAPET RAIL
 - 13 APPROACH SLABS
 - 14 STANDARD DETAILS 1
 - 15 STANDARD DETAILS 2

GEODETIC BENCH MARK T-220

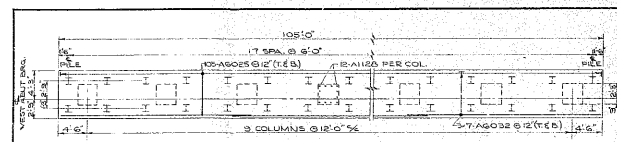
Q.E.V. BRIDGE FOR WEST BOUND TRAFFIC OVER C.N.R. 0.5 MILE NORTH OF MINICO CREEK, TABLET IN NORTHEAST (END) FACE OF CONCRETE FOOTING FOR STRUCTURAL STEEL AT NORTH WEST SIDE OF BRIDGE AND ON SOUTHEAST SIDE OF TRACKS, 6 INCHES BELOW TOP OF PIER AND IN CENTRE. N.T. T-220 ELEVATION 231.252



FOR REDUCED PLAN



DEPARTMENT OF HIGHWAYS ONTARIO		
BRIDGE DIVISION		
67-176		
BRIDGE N° 5		
(CNR OVERHEAD)		
KING'S HIGHWAY No. Q.E.V.		DIST. No. G
CO. YORK		
TWP.	LOT	CON.
GENERAL DRAWING		
APPROVED	DESIGN	DRAWING
DATE	NO. 7/75	LOADING 15000-144



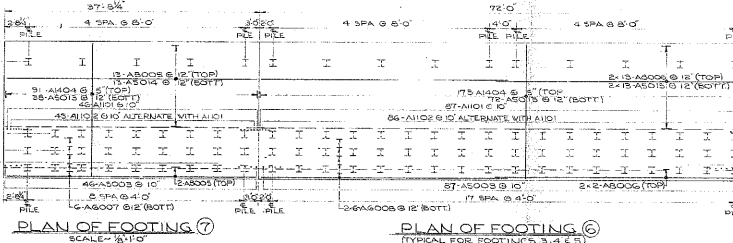
PLAN OF FOOTING ①
SCALE=1/8"=1'-0"

VP	STATION	COORDINATES
1	31+62.50 QEV	183410.52 EAST 258058.98 NORTH
2	32+59.42 QEV	183426.95 EAST 258059.69 NORTH
3	33+04.76 QEV	183420.72 EAST 257136.63 NORTH
4	33+55.19 QEV	183255.24 EAST 257110.76 NORTH
5	34+00.00 QEV	183278.06 EAST 256799.99 NORTH
6	35+10.11 QEV	183136.96 EAST 256344.10 NORTH

PIER & ABUTMENT C'S ARE PARALLEL

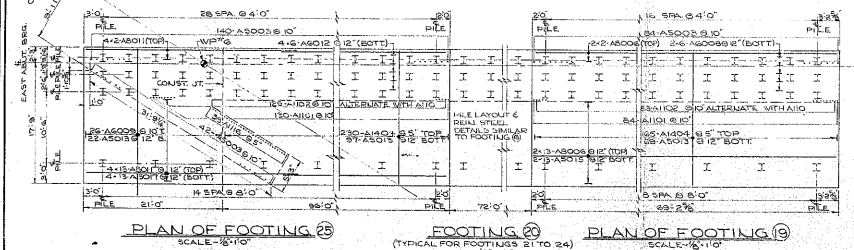
FOOTING LAYOUT
SCALE=1/4"=1'-0"

PLAN OF FOOTING ⑩
SCALE=1/8"=1'-0"



PLAN OF FOOTING ⑦
SCALE=1/8"=1'-0"

PLAN OF FOOTING ⑧
SCALE=1/8"=1'-0"

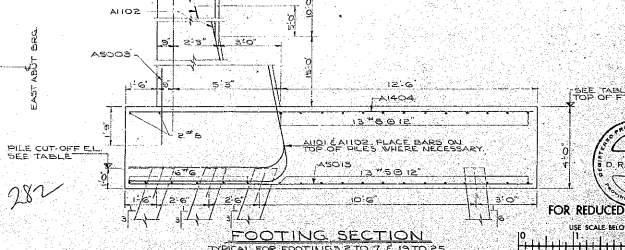


PLAN OF FOOTING ⑨
SCALE=1/8"=1'-0"

FOOTING ⑩
(TYPICAL FOR FOOTINGS 21 TO 24)
SCALE=1/8"=1'-0"

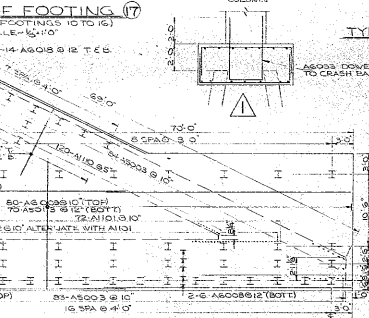
PLAN OF FOOTING ⑩
SCALE=1/8"=1'-0"

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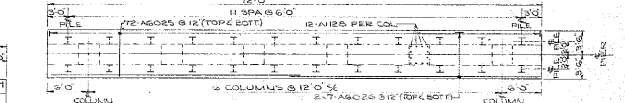


FOOTING SECTION
TYPICAL FOR FOOTINGS 2 TO 7 & 19 TO 25
SCALE=1/8"=1'-0"

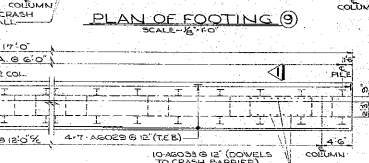
PLAN OF FOOTING ②
SCALE=1/8"=1'-0"



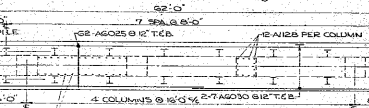
PLAN OF FOOTING ③
SCALE=1/8"=1'-0"



PLAN OF FOOTING ④
SCALE=1/8"=1'-0"



PLAN OF FOOTING ⑤
SCALE=1/8"=1'-0"

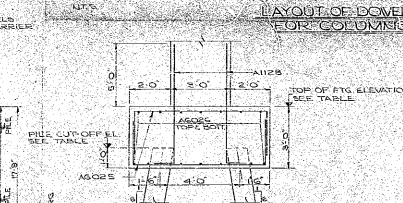


PLAN OF FOOTING ⑥
SCALE=1/8"=1'-0"

NOTE:
STAGING SHOWN APPLIES ONLY TO FOOTINGS, PIERS AND ABUTMENTS.
FOR UNDER STAGING SEE D-5763-8
FOR DECK STAGING SEE D-5763-10



TYP EXPANSION JOINT
(TYP BETWEEN PANELS)



FOOTING SECTION
TYPICAL FOR FOOTINGS 1, 9 TO 14 & 26
SCALE=1/8"=1'-0"

FOOTING	TOP OF PILE CUT-OFF ELEVATION	NO. OF PILES	LENGTH OF PILES	PILE SIZE
VERTICAL	254.00	255.00	34	25"Ø
1	255.50	255.50	58	
2	256.00	256.00	64	
3	256.50	256.50	64	
4	257.00	257.00	64	
5	257.50	257.50	64	
6	258.00	258.00	64	
PIER	259.00	259.00	12	
7	260.00	260.00	16	
8	260.50	260.50	24	
9	261.00	261.00	24	
10	261.50	261.50	24	
11	262.00	262.00	24	
12	262.50	262.50	24	
13	263.00	263.00	24	
14	263.50	263.50	24	
15	264.00	264.00	24	
16	264.50	264.50	24	
17	265.00	265.00	24	
18	265.50	265.50	24	
19	266.00	266.00	24	
20	266.50	266.50	24	
21	267.00	267.00	24	
22	267.50	267.50	24	
23	268.00	268.00	24	
24	268.50	268.50	24	
25	269.00	269.00	24	
26	269.50	269.50	24	
27	270.00	270.00	24	
28	270.50	270.50	24	
29	271.00	271.00	24	
30	271.50	271.50	24	
31	272.00	272.00	24	
32	272.50	272.50	24	
33	273.00	273.00	24	
34	273.50	273.50	24	
35	274.00	274.00	24	
36	274.50	274.50	24	
37	275.00	275.00	24	
38	275.50	275.50	24	
39	276.00	276.00	24	
40	276.50	276.50	24	
41	277.00	277.00	24	
42	277.50	277.50	24	
43	278.00	278.00	24	
44	278.50	278.50	24	
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