

DOCUMENT MICROFILMING IDENTIFICATION

GEOCRES No. 40 P1-46

DIST. 4 REGION CENTRAL

W.P. No. 340-64-02

CONT. No. 76-58

W. O. No. 70-F-015

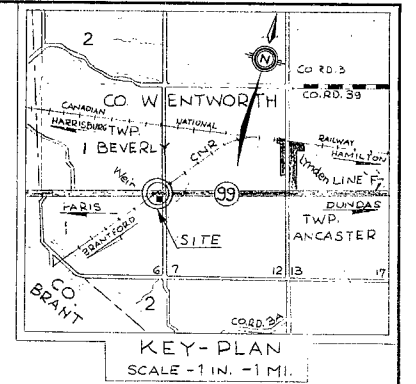
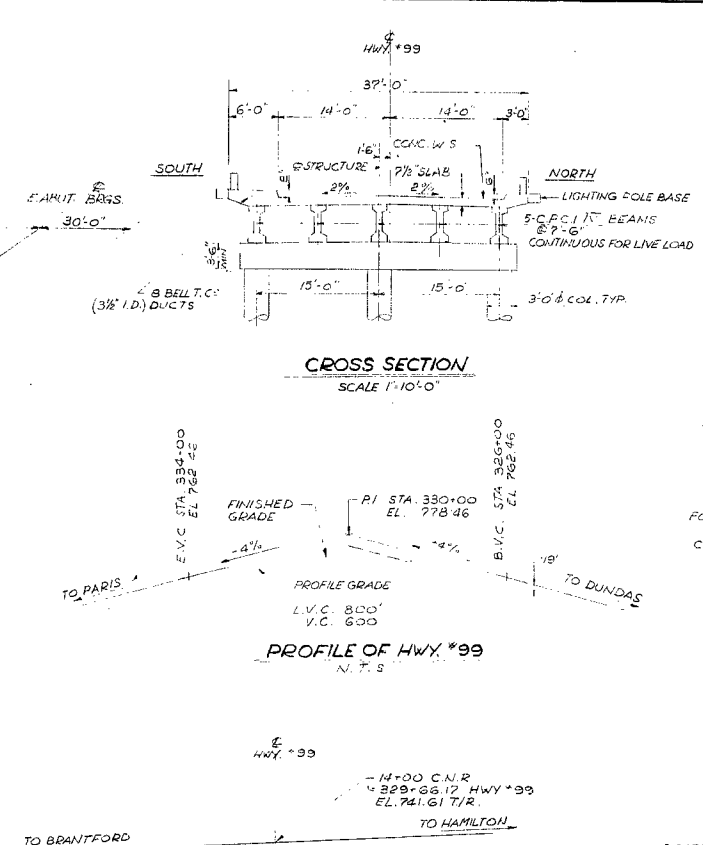
STR. SITE No. 36-234

HWY. No. 99

LOCATION C.N.R. OVERHEAD
(6.3 MI. WEST OF HWY 52 - COPE TOWNA)

OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT. _____

REMARKS: _____



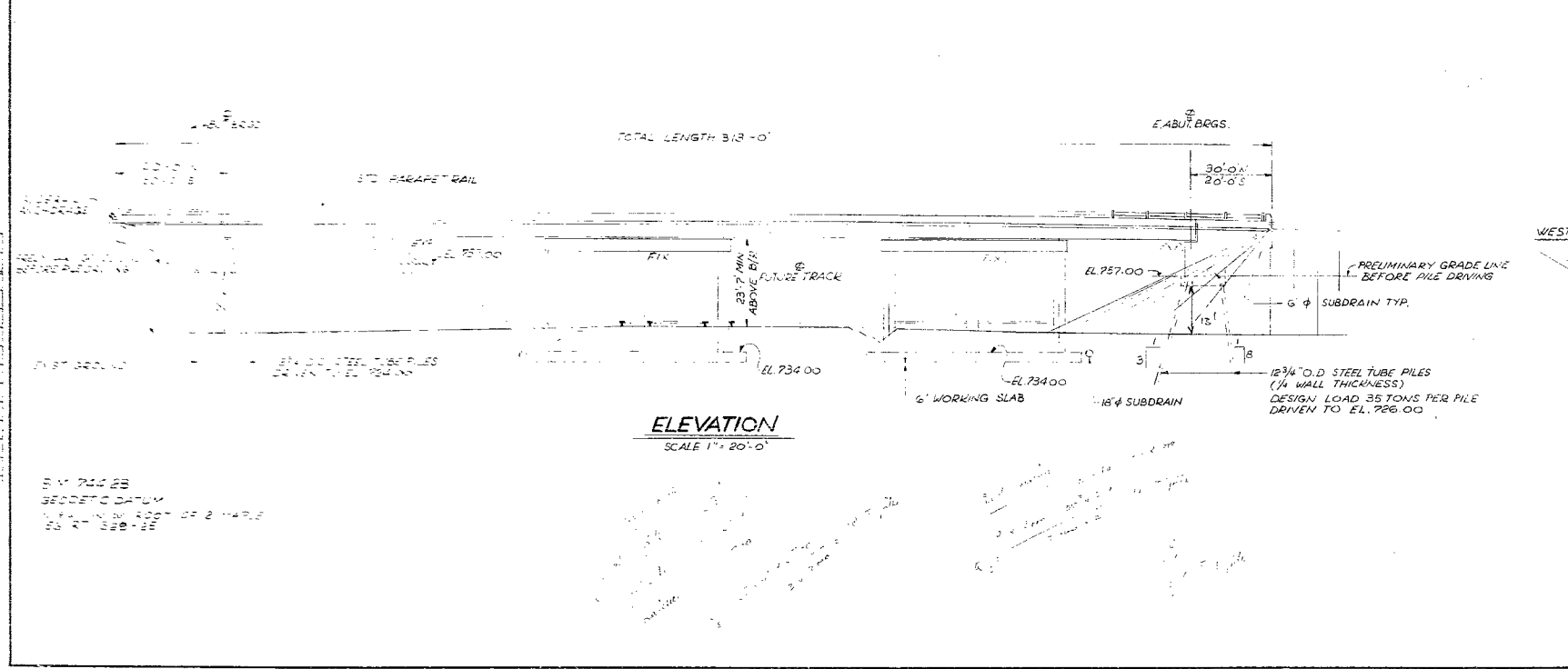
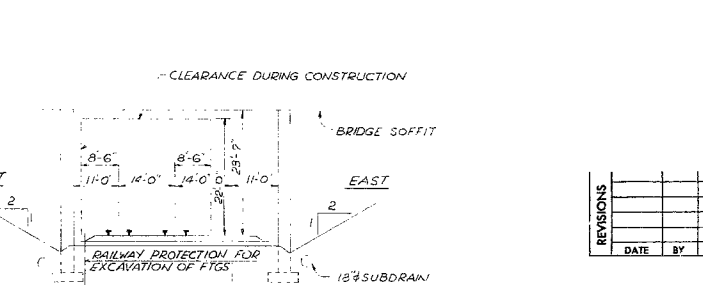
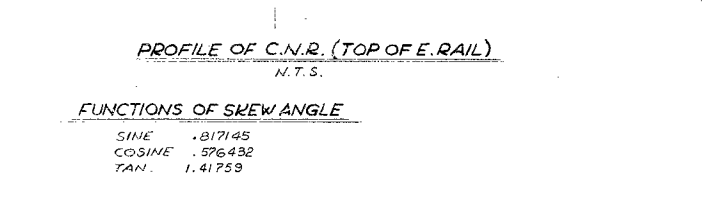
GENERAL NOTES

CLASS OF CONCRETE
 DECK, CURBS & CONC. ABOVE CURBS 4000 PSI
 PRESTRESSED BEAMS 5000 PSI
 REMAINDER 3000 PSI

CLEAR COVER ON REINFORCING STEEL

FOOTINGS ABUTMENTS PIERS DIAPHRAGMS DECK-TOP BOT 3' 3' 2' 2' 1 1/2' 1'

CURBS APPROACH SLABS PARAPET WALLS 2' 2' 1 1/2'



- LIST OF DRAWINGS**
- D-6833 -1 GENERAL DRAWING
 -2 BORE HOLE LOCATIONS & SOIL STRATA
 -3 FOOTING DETAILS
 -4 ABUTMENT & WINGWALL DETAILS
 -5 PIER DETAILS
 -6 PRESTRESSED GIRDERS & BEARINGS
 -7 DECK DETAILS & ELEVATIONS
 -8 PARAPET WALL DETAILS
 -9 STANDARD STEEL PARAPET RAIL
 -10 APPROACH SLABS
 -11 BRIDGE ELECTRICAL DETAILS TYPE "D"
 -12 STANDARD DETAILS I
 -13 STANDARD DETAILS II

REVISIONS	DATE	BY	DESCRIPTION

DEPARTMENT OF HIGHWAYS ONTARIO
 BRIDGE DIVISION

70-F-15

C.N.R. OVERHEAD
 6.3 MI. WEST OF HWY. 52 COPETOWN

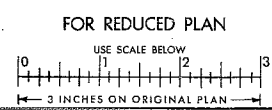
KING'S HIGHWAY No. 99 DIST. No. 4
 CO. WENTWORTH
 TWP. ANCASTER LOT 6 CON. 1

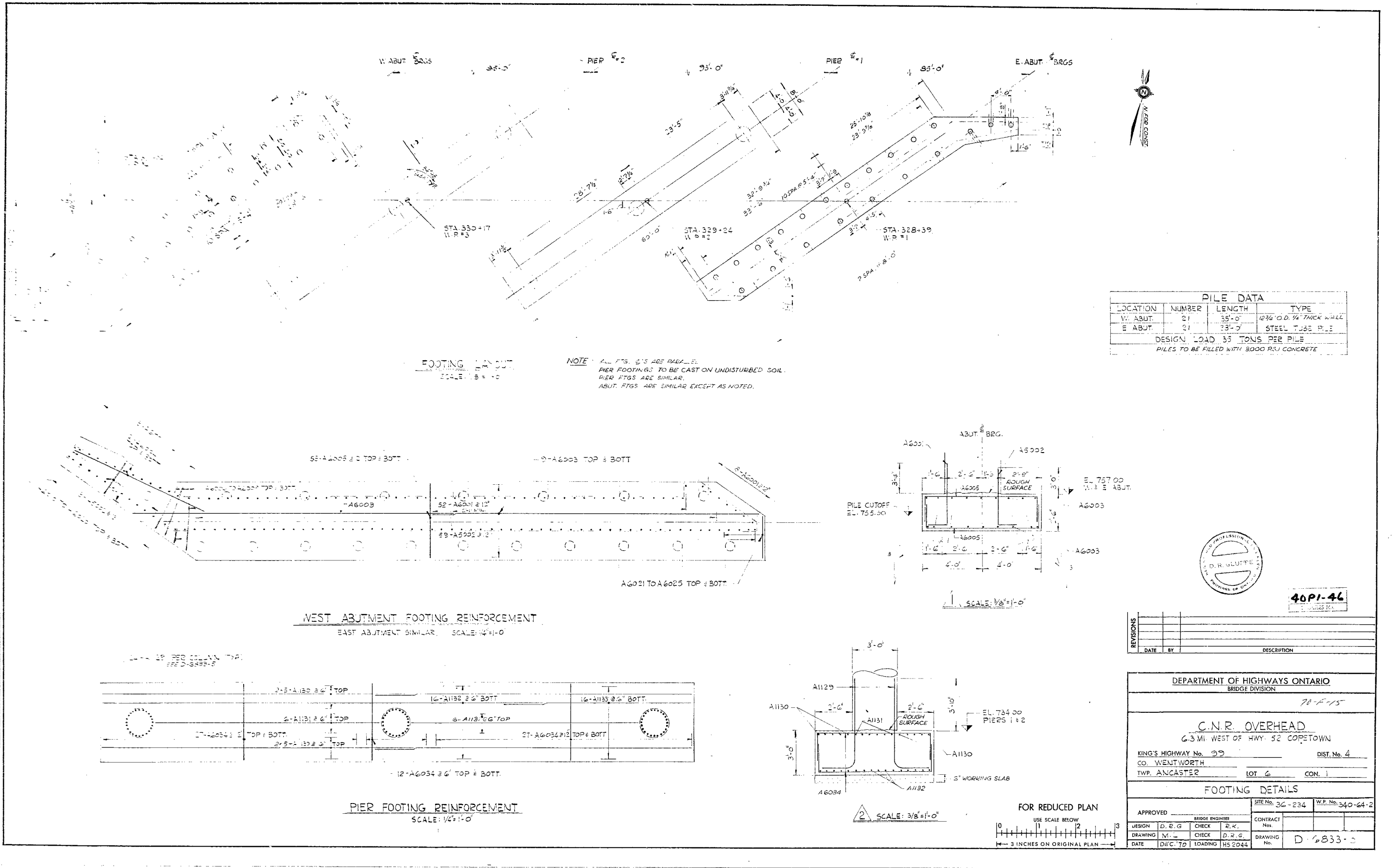
GENERAL DRAWING

APPROVED _____ SITE No. 36-234 W.P. No. 340-64-2

DESIGN D.R.G. CHECK E.L.
 DRAWING A.K. CHECK D.R.G.
 DATE DEC 27/00 LOADING 4/5/20-44

CONTRACT No. _____
 DRAWING No. D-6833-1





40PI-46
REVISED BY

REVISIONS		
DATE	BY	DESCRIPTION

DEPARTMENT OF HIGHWAYS ONTARIO
BRIDGE DIVISION

70-F-15

C.N.R. OVERHEAD
6.3 MI. WEST OF HWY. 52 COPETOWN

KING'S HIGHWAY No. 39 DIST. No. 4
CO. WENTWORTH
TWP. ANCASTER LOT 6 CON. 1

FOOTING DETAILS

APPROVED		SITE No. 36-234 W.P. No. 340-64-2	
DESIGN	D. E. G.	CHECK	R. K.
DRAWING	M. L.	CHECK	D. E. G.
DATE	DEC. 70	LOADING	HS 2044

CONTRACT No.
DRAWING No. D-6833-2

DEPARTMENT OF HIGHWAYS ONTARIO

MEMORANDUM

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

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

ATTENTION: Mr. S. McComble

DATE: April 2, 1970

Our File Ref.

IN REPLY TO

SUBJECT:

W.P. 340-64-02, Site 36-234
W.J. 70-P-15, C.N.R. Overhead
Hwy. 99 - West of Lynden
District No. 4 (Hamilton)

We have recently completed the foundation investigation field work for the above mentioned project. We understand that the Bridge Office would like to have our recommendations as soon as possible in order that work on the structural design can proceed. We therefore submit the following summary of site conditions and preliminary recommendations which, we believe, will be sufficient for your purposes.

Subsoil:

Subsoil over the site area consists of 10 to 15 ft. of very stiff clayey silt followed by 30 to 40 ft. of very dense silt to clayey silt, followed by at least 25 ft. of very dense sand. The boreholes were all terminated in this last mentioned deposit. Groundwater level at the time of the field work, was about 4 to 5 ft. below ground surface at el. 735 ±.

Recommendations:

The proposed piers may be founded on spread footings constructed within the very stiff clayey silt stratum. A net safe bearing capacity of 5 TSP may be assumed for footings placed at or below the following elevations:

East Pier	--	El. 731.0
West Pier	--	El. 732.5

Mr. B. R. Davis,
Bridge Engineer,
Bridge Office, Admin. Bldg.
Attn: Mr. S. McCombie

2

April 2, 1970

Re: W.P. 340-64-02, Site 36-234 -- W.J. 70-P-15
C.N.R. Overhead - Hwy. 99 - West of Lynden,
District No. 4 (Hamilton)

The proposed abutments may be constructed within the approach embankments and may be supported on steel tube piles driven a short distance into the original ground. For 12-3/4 O.D. steel tubes, a safe capacity of 35 tons/pile should be achieved by driving to the following elevations:

East Abutment	--	El. 726.0
West Abutment	--	El. 724.0

As an alternative, the entire structure may be supported on steel H-piles driven to approx. el. 670.0 in which case, a design load of 70 tons/pile should be achieved.

Dewatering should not present a major problem for excavations carried out within the relatively impermeable clayey silt stratum.

No stability problems are anticipated for the proposed approach embankments provided standard 2:1 slopes are constructed.

Settlements of the subsoil should occur fairly rapidly during construction and will be of a minor nature. Differential settlements will be negligible.

Our complete report will be forwarded to you in the near future.

KGS/MGP

cc: Messrs. B. R. Davis
H. A. Tregaskes
D. W. Farrer
G. K. Hunter (2)
C. B. Robertson
W. S. Molinskyshyn (2)
T. J. Kovich
B. A. Singh

Foundations Files
Gen. Files

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

(Am 110 218 Bldg)

DEPARTMENT OF HIGHWAYS ONTARIO

MEMORANDUM

40 P1-46
GECCRES No.

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: April 16, 1970

Our File Ref.

IN REPLY TO APR 20 1970

SUBJECT:

FOUNDATION INVESTIGATION REPORT
For
Proposed Crossing at C.N.R. and
Highway 29, Line 'P'
Twp. of Beverly and Ancaster
County of Wentworth
District No. 4 (Hamilton)
W.J. 70-P-15(R) -- W.P. 340-64-02
LNT 34-02

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/McP

Attach.

cc: Messrs. B. R. Davis
H. A. Tregaskes
D. W. Farrer
G. K. Hunter (2)
C. R. Robertson
W. S. Melnychyn (2)
T. J. Kovich
B. A. Singh

Foundations Files
Gen. Files

A. G. Sternes

A. G. Sternes
PRINCIPAL FOUNDATION ENGINEER

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FOUNDATION INVESTIGATION REPORT
For
Proposed Crossing at C.N.R. and
Highway 99, Line 'F'
Twp. of Beverly and Ancaster
County of Wentworth
District No. 4 (Hamilton)
W.J. 70-F-15(R) -- W.P. 340-64-02

1. INTRODUCTION:

A request for a foundation investigation at the crossing of the C.N.R. tracks and Hwy. #99, revision line 'F', was received from Mr. W. S. Melinyshyn, Regional Bridge Planning Engineer in a memo dated February 3, 1970.

A field investigation was subsequently carried out by the Foundation Section to determine the subsoil conditions existing at the site. This report contains the results of this investigation and our recommendations pertaining to the design of the proposed structure foundations.

2. DESCRIPTION OF THE SITE:

The site of the proposed crossing is situated about 1.5 miles west of Lynden on Hwy. #99. The existing crossing is a level crossing.

The surrounding area is flat and mostly cultivated farmland.

Physiographically, the site is located in the region referred to as the Norfolk Sand Plain.

3. FIELD AND LABORATORY WORK:

The field work at the proposed site consisted of

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

a total of six sampled boreholes and ten dynamic cone penetration tests. The boreholes were advanced by means of a hollow stem auger. Disturbed samples were obtained using a 2-inch O.D. split-spoon sampler driven according to the specifications for the Standard Penetration Test.

Dynamic cone penetration tests were carried out adjacent to each borehole and also at four other locations. Driving energy to advance the cone was 350 ft. lbs. per blow.

Samples were visually examined in the field and subsequently in the laboratory. Tests were carried out on selected samples to determine the following physical properties:

1. Grain-size distribution
2. Atterberg limits
3. Natural moisture content

The results of field and laboratory tests are summarized in the Record of Borehole sheets, which are contained in the Appendix to the report.

All boreholes were surveyed in the field by personnel from Toronto Region Engineering Surveys Section. The locations and elevations of the borings are shown on Drawing No. 70-P-15 (R) A which accompanies this report.

4. SUBSOIL CONDITIONS:

4.1) General:

In general, the subsoil at the site consists

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

4.1) General:

of clayey silt, underlain by a deposit of silt to clayey silt, followed by a layer of silty sand to sandy silt, which in turn is underlain by a sand and gravel deposit. All the four sampled boreholes at the four footing locations were terminated in this last mentioned deposit.

The boundaries between various soil types are shown on the Record of Borehole sheets. The estimated stratigraphical profile shown on Drawing 70-F-15 (R) A, is based upon this information.

From ground level downward, the various strata are described in some detail with regard to soil types and soil properties, as follows:

4.2) Clayey Silt (I):

This material was found in all boreholes. In boreholes 1, 3, 4 and 7, which were put down at the proposed footing locations, it extended from 11.0 to 14.0 ft. in depth and was brown in colour, while boreholes 9 and 10 were terminated in this stratum at depths of 31.5 ft. In boreholes 9 and 10 the upper 6 ft. of the soil was brown in colour and the rest was grey.

The material consists of clayey silt with traces of gravel. A plot of Plasticity Index versus liquid limit (Fig.1) shows the points to fall within the CL zone, except two points which are the CI zone. The physical properties of the material are as follows:

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

4.2) Clayey Silt (I):

		Min.	Max.	Av.
Liquid Limit	%	25	43	32
Plastic Limit	%	16	26	20
Moisture Content	%	17	27	21

The grain-size analyses indicate the following distributions; and are plotted on Fig. 2.

		Min.	Max.	Av.
Sand	%	0	1	1
Silt	%	68	95	85
Clay	%	5	31	15

The 'N' values indicate, in general a very stiff to hard consistency. The undrained shear strength is estimated to range from 2000 p.s.f. to 15,000 p.s.f. The average being about 3000 p.s.f.

4.3) Silt to Clayey Silt:

This deposit was intersected in boreholes 1, 3, 4 and 7. In boreholes 1, 3 and 4 the thickness of the deposit was 15.0, 14.0 and 13.0 ft. respectively; and it was underlain by a clayey silt layer. In borehole 7 however, the two layers could not be clearly distinguished, and the material extending down to the underlying silty sand layer is classified as silt to clayey silt. In borehole 7 the material changes irregularly from CL-ML to CL and its thickness is 39.0 ft. A plot Plasticity Index versus Liquid Limit (fig.1) of the test results from

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

4.3) Silt to Clayey Silt

boreholes 1, 3 and 4 shows that the points fall within the CL-ML zone. The material is described as silt to clayey silt, although the visual inspection and the single grain-size analysis shows it to be predominantly silt.

The physical properties of the material are as follows:

	BHS 1,3 & 4		BH 7		Av.
Liquid Limit %	22	24	20	35	24
Plastic Limit%	16	20	15	22	20
Water Content%	15	19	19	20	19

The grain-size analysis indicates 86% silt and 14% clay in that sample (Fig.3).

The Standard Penetration Tests indicate a hard consistency in boreholes 1, 3 and 4 and very stiff to hard in borehole 7.

4.4) Clayey Silt (II):

This material was encountered in boreholes 1, 3 and 4. In borehole 7, it has been merged with the overlying silt to clayey silt stratum. The thickness of the deposit in boreholes 1, 3 and 4 was 15.0, 28.0 and 30.0 ft. respectively. The colour of the soil was grey.

The material consists of clayey silt with traces of sand and occasional gravel. A plot of Plasticity Index versus Liquid Limit (Fig.1) shows the points to fall within the CL zone. The physical properties of the material

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

4.4) Clayey Silt (II):

are as follows:

	Min.	Max.	Av.
Liquid Limit	27	32	28
Plastic Limit	17	22	19
Moisture Content	16	22	21

The grain-size analyses indicate the following distributions, and are plotted on Fig. 3.

		Min.	Max.	Av.
Gravel	%	0	4	0
Sand	%	0	2	1
Silt	%	71	95	75
Clay	%	5	28	24

The 'N' values ranged from 16 to 70 blows per foot, indicating a very stiff to hard consistency. The undrained shear strength is estimated to be 2000 p.s.f. to 10,000 p.s.f. with the average being in the order of 4000 p.s.f.

4.5) Silty Sand to Sandy Silt:

This stratum was, intersected in boreholes 1, 3, 4 and 7, and its thickness in these boreholes was 7.0, 10.0, 13.0 and 17.0 ft. respectively. The colour of the soil was grey. It was underlain by a sand layer.

The composition of this material varies from silty fine sand to sandy silt with traces of clay.

The grain-size analyses indicate the following

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

4.5) Silty Sand to Sandy Silt:

distributions (Fig. 4)

Sand	(%)	12	-	66
Silt & Clay	(%)	34	-	88

The Standard Penetration Tests gave 'N' values ranging from 21 to 80 blows per foot, indicating a compact to very dense relative density, but in general the range of 'N' values was 45 to 75 blows per foot.

4.6) Sand:

This deposit was found in boreholes 1, 3, 4 and 7, and all the four boreholes were terminated in this stratum. The material consists of sand, with , varying amounts of gravel and traces of silt and clay, being a mixture of red, brown and grey coloured particles.

The grain-size analyses indicate the following distributions, and are plotted on Fig. 5

		Min.	Max.	Av.
Gravel	(%)	9	40	10
Sand	(%)	43	81	75
Silt & Clay	(%)	9	35	15

The 'N' values ranged from 38 to 163 blows per foot, indicating a dense to very dense relative density, but in general the range was 50 to 100 blows per foot.

5. GROUNDWATER CONDITIONS:

The following water levels were observed on

5. GROUNDWATER CONDITIONS:(cont'd.)...

March 4, 1970 in the field

BH #	Elev.
1	729.5
3	735.0
4	735.4
7	729.6

In borcholes 9 and 10 the water levels could not be established because they were put down on the last day of the field investigation, and there was not time available for the water levels to stabilize.

The foregoing quoted figures indicate that the groundwater level would lie between elevation 730.0 and 735.0 at the time of the field investigation.

6. DISCUSSION AND RECOMMENDATIONS :

6.1) General:

It is proposed to construct a four-span overhead structure at the crossing of Hwy. #99 revision line 'F' and the C.M.R. tracks. The proposed profile grade will be Elev. 768.0. The surrounding ground level is about Elev. 738.0. Therefore, 30 ft. high embankments will be constructed for approaches.

As described earlier, the subsoil at the site consists generally of very stiff to hard clayey silt, followed by very stiff to hard silt to clayey silt, followed by dense to very dense silty sand to sandy silt underlain by very dense sand with varying amounts of gravel.

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

6.2) Foundations:

The investigation has revealed that the subsoil is capable of providing adequate bearing capacity.

Therefore it is recommended that the proposed piers be founded on spread footings constructed within the very stiff to hard clayey silt stratum. A net safe bearing capacity of 3 T.S.F. may be assumed for footings placed at or below Elev. 731.0.

It is recommended that the proposed abutments be constructed within the approach embankments and may be supported on steel tube piles driven through the fill a short distance into the original ground. In case of 12 3/4 O.D. and 1/2" thick wall steel tube piles, a safe capacity of 35 tons per pile should be achieved by driving to the following elevations.

East Abutment	-	Elev. 726.0
---------------	---	-------------

West Abutment	-	Elev. 724.0
---------------	---	-------------

As an alternative, the entire structure may be supported on steel "H" piles driven to approximate Elev. 670.0, in which case a design load of 70 tons per pile should be achieved.

Settlements of the subsoil should occur fairly rapidly during construction and will be of a minor nature. Differential settlements will be negligible.

6.3) Abutments and Decking:

Because of the relatively high shear strength

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

6.3) Embankments and Dewatering:

of the underlying subsoil, no stability problems are anticipated for the proposed approach embankments provided standard 2:1 slopes are constructed. The fill should consist of well compacted acceptable material. Care should be taken to ensure that no bouldery fill is placed within the approaches through which piles have to be driven, and it is recommended that this portion of the fill contain no larger grain sizes than 3 inches.

Dewatering should not present a major problem for excavations carried out within the relatively impermeable clayey silt stratum.

A concrete working slab should be constructed as soon as possible after exposure of the foundation soil.

All footings and pile caps should have a minimum cover of 4 ft. for frost protection.

7. MISCELLANEOUS:

The field investigation was carried out during the period February 24 - March 5, 1970, under the supervision of Mr. A. Prakash, Project Foundation Engineer, who also prepared this report.

Equipment was owned and operated by P.V.K. and Sons.

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

April 1970

APPENDIX I

RECORD OF BOREHOLE No. 1

FOUNDATION SECTION

JOB 70-F-15(R) LOCATION Hwy. 99 Sta. 328 + 14 o/s 19' Rt. ORIGINATED BY AP
W.P. 340-64-02 BORING DATE February 24 - 25, 1970 COMPILED BY AP
DATUM Geodetic BOREHOLE TYPE Hollow Stem Auger & Cone CHECKED BY LL

SOIL PROFILE		STRAT. PLOT	SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w			BULK DENSITY γ	REMARKS			
ELEV. DEPTH	DESCRIPTION		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
737.9	Ground Level																		
0.0	Clayey silt, traces of sand. Brown Very stiff to hard		1	SS	22											0 1 86 13 729.5 Mar. 4/70			
			2	SS	42														
			3	SS	52														
723.9			4	SS	63														
14.0	Silt to clayey silt Grey Hard		5	SS	87											0 1 71 28			
			6	SS	108														
			7	SS	137/9"														
708.9			8	SS	144														
29.0	Clayey silt Grey Very stiff to hard		9	SS	29											0 27 61 2			
			10	SS	32														
691.9																			
46.0	Sandy silt, traces of sand. Grey Dense		11	SS	47														
684.9																10 81 (9)			
53.0	Sand, traces of gravel, silt & clay. Brown, Red & Grey Very dense		12	SS	74														
667.9																			
70.0	End of Borehole																		

DEPARTMENT OF HIGHWAYS- ONTARIO

MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 2

FOUNDATION SECTION

JOB 70-F-15(R) LOCATION Hwy. 99 Sta. 328 + 62 o/s 21' Lt. ORIGINATED BY AP
W.P. 340-64-02 BORING DATE Feb. 25, 1970 COMPILED BY AP
DATUM Geodetic BOREHOLE TYPE Dynamic Cone Test CHECKED BY ML

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	BLOWS / FOOT	PLASTIC LIMIT ——— w_p				WATER CONTENT ——— w
									SHEAR STRENGTH P.S.F.				
738.8	Ground Level												
0.0													
728.8													
10.0	End of Cone Test												
												</	

DEPARTMENT OF HIGHWAYS- ONTARIO
 MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 3

FOUNDATION SECTION

 JOB 70-F-15(R) LOCATION Hwy. 99 Sta. 329 + 54 o/s 28' Lt. ORIGINATED BY AP
 W.P. 340-64-02 BORING DATE February 26, 1970 COMPILED BY AP
 DATUM Geodetic BOREHOLE TYPE Hollow Stem Auger & Cone CHECKED BY AP

SOIL PROFILE		STRAT. PLOT	SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT					LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w			BULK DENSITY γ	REMARKS
ELEV. DEPTH	DESCRIPTION		NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F.					WATER CONTENT %				
							20		40		60		80			
						○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE										
739.4	Ground Level															
0.0	Clayey silt, traces of sand Brown		1	SS	10											735.0 Mar. 4/70
			2	SS	21											
			3	SS	36											
728.4	Stiff to hard		4	SS	37											
11.0	Silt to clayey silt Grey Hard		5	SS	57											
			6	SS	34											
			7	SS	27											
714.4	Clayey silt, traces of sand & gravel Grey Stiff to hard		8	SS	70											4 2 72 22
25.0			9	SS	54											
			10	SS	23											
			11	SS	16											
			12	SS	13											
			13	SS	45											
686.4	Silty sand, traces of clay. Grey		14	SS	58											0 66 (34)
53.0																
			15	SS	183											
676.4	Dense to very dense. Brown, Red & Grey Dense to very dense															40 51 (9)
63.0																
			16	SS	38											
655.4	End of Borehole															
84.0																

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 4

FOUNDATION SECTION

JOB 70-F-15(R) LOCATION Hwy. 99 Sta. 329 + 98 o/s 15' Rt. ORIGINATED BY AP
 W.P. 340-64-02 BORING DATE Feb. 27 - March 2, 1970 COMPILED BY AP
 DATUM Geodetic BOREHOLE TYPE Hollow Stem Auger & Cone CHECKED BY AK

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 % 10 20 30
							20	40	60	80	100	○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE					
741.4	Ground Level																
0.0	Clayey silt to silty clay, traces of sand. Brown Firm to very stiff		1	SS	5	740									Mar. 4/70 735.4 0 1 54 45		
729.4			2	SS	24												
12.0			3	SS	19	730											
	Silt to clayey silt		4	SS	32												
			5	SS	61												
716.4	Grey Hard		6	SS	34	720											
25.0			7	SS	32												
	Clayey silt		8	SS	21	710											
			9	SS	57										0 0 95 5		
	Grey Very stiff to hard		10	SS	30	700											
			11	SS	28												
686.4			12	SS	44	690									0 12 81 7		
55.0	Sandy silt, traces of clay Grey Very dense		13	SS	75												
			14	SS	80	680											
673.4			15	SS	72	670									9 77 (14)		
68.0	Sand, traces of gravel, silt & clay Brown, Red & Grey Very dense					660											
657.4			16	SS	53												
84.0	End of Borehole					650											

FOUNDATION SECTION

ORIGINATED BY AP

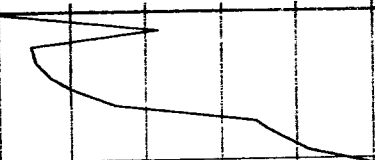
COMPILED BY AP

CHECKED BY *AK*

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	WATER CONTENT — w		
738.7	Ground Level						20 40 60 80 100 SHEAR STRENGTH P.S.F. ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE	PLASTIC LIMIT — w_p Wp — w — w_L		
0.0										
727.7						730				
11.0	End of Cone Test					720	135			

FOUNDATION SECTION

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		BLOWS / FOOT	20 40 60 80 100	SHEAR STRENGTH P.S.F.	w_p — w — w_L			
739.6	Ground Level							<div>○ UNCONFINED + FIELD VANE</div> <div>● QUICK TRIAXIAL x LAB. VANE</div>					
0.0													
729.6						730							
10.0	End of Cone Test												
						720							

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 7

FOUNDATION SECTION

JOB 70-F-15(R) LOCATION Hy. 99 Sta. 331 + 13 o/s 23' L.L. ORIGINATED BY AP
 W.P. 340-64-02 BORING DATE March 2 - 3, 1970 COMPILED BY AP
 DATUM Geodetic BOREHOLE TYPE Hollow Stem Auger & Cone CHECKED BY

SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT — W _L PLASTIC LIMIT — W _P WATER CONTENT — W			BULK DENSITY Y	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLT	NUMBER	TYPE	BLOWS/FOOT	ELEV. SCALE	20	40	60	80	100		
737.6	Ground Level												
0.0	Clayey silt, traces of sand		1	SS	20	730							
			2	SS	25								
			3	SS	30								
722.6	Very stiff to hard		4	SS	39								
14.0			5	SS	54	720							
	Silt to clayey silt		6	SS	64								
	Grey		7	SS	22	710							
	Very stiff to hard		8	SS	44								
			9	SS	31	700							
			10	SS	27	690							
684.6			11	SS	48	680							
53.0	Silty sand, traces of clay.		12	SS	21								
	Grey					670							
	Compact to very dense												
667.6			13	SS	108	660							
70.0	Sand, with gravel, some silt, traces of clay.		14	SS	-								
	Brown, Red & Grey												
655.1	Very dense												
82.5	End of Borehole					650							

FOUNDATION SECTION

CHECKED BY

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION BLOWS / FOOT 20 40 60 80 100	RESISTANCE P.S.F. ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE	LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w w_p — w — w_L WATER CONTENT %	BULK DENSITY γ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT						
739.8	Ground Level										
0.0											
728.5						730					
11.3	End of Cone Test						100/3"				
						720					

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 9

FOUNDATION SECTION

JOB 70-F-15(R)

LOCATION Hwy. 99 Sta. 332 + 02 o/s 18' Rt.

ORIGINATED BY AP

W.P. 340-64-02

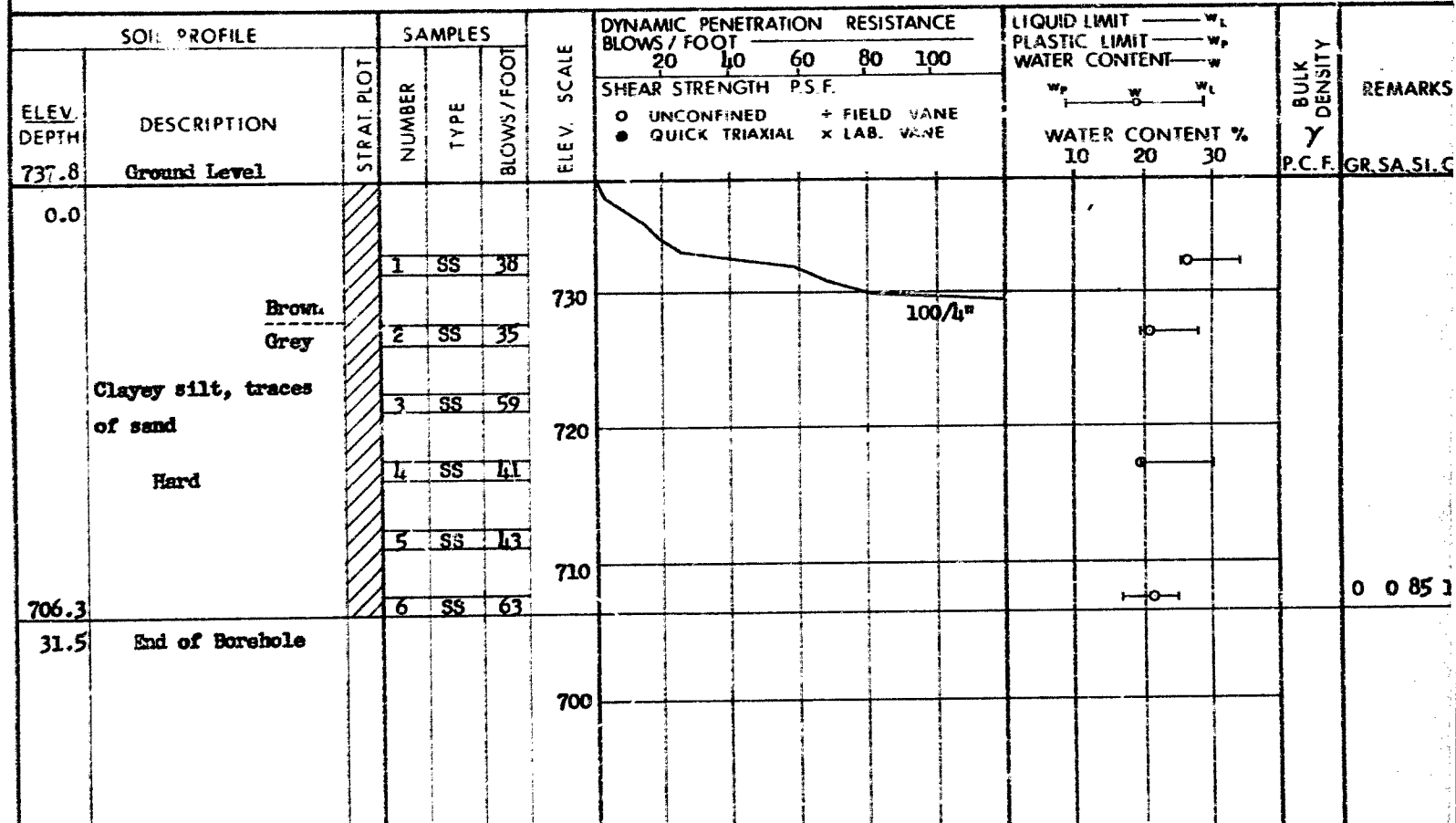
BORING DATE March 4 - 5, 1970

COMPILED BY AP

DATUM Geodetic

BOREHOLE TYPE Hollow Stem Auger & Cone

CHECKED BY



DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 10

FOUNDATION SECTION

JOB 70-F-15(R)

LOCATION Hwy. 99 Sta. 327 + 03 o/s 19' Lt.

ORIGINATED BY AP

W.P. 340-64-02

BORING DATE March 5, 1970

COMPILED BY AP

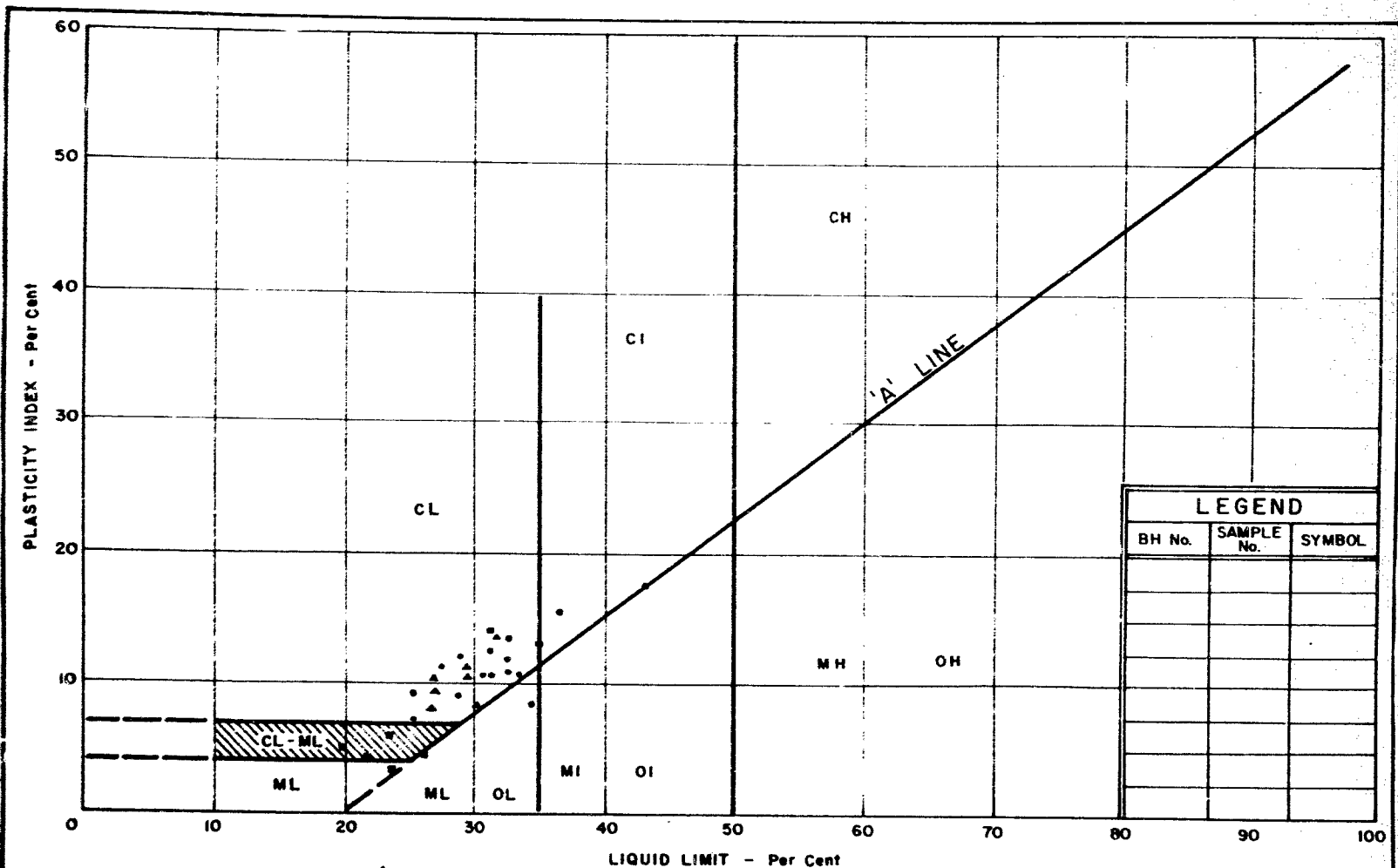
DATUM Geodetic

BOREHOLE TYPE Hollow Stem Auger & Cone

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	NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F. ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE		WATER CONTENT % 10 20 30			
738.7	Ground Level										
0.0	Brown Grey Clayey silt, traces of sand Very stiff to hard										
		1	SS	20							
		2	SS	96	730		100/4"				
		3	SS	45							
		4	SS	29	720						
		5	SS	30							
707.2		6	SS	73	710						
31.5	End of Borehole				700						

0 1 68 31



LEGEND		
BH No.	SAMPLE No.	SYMBOL



DEPARTMENT OF HIGHWAYS
MATERIALS and
TESTING
DIVISION

PLASTICITY CHART

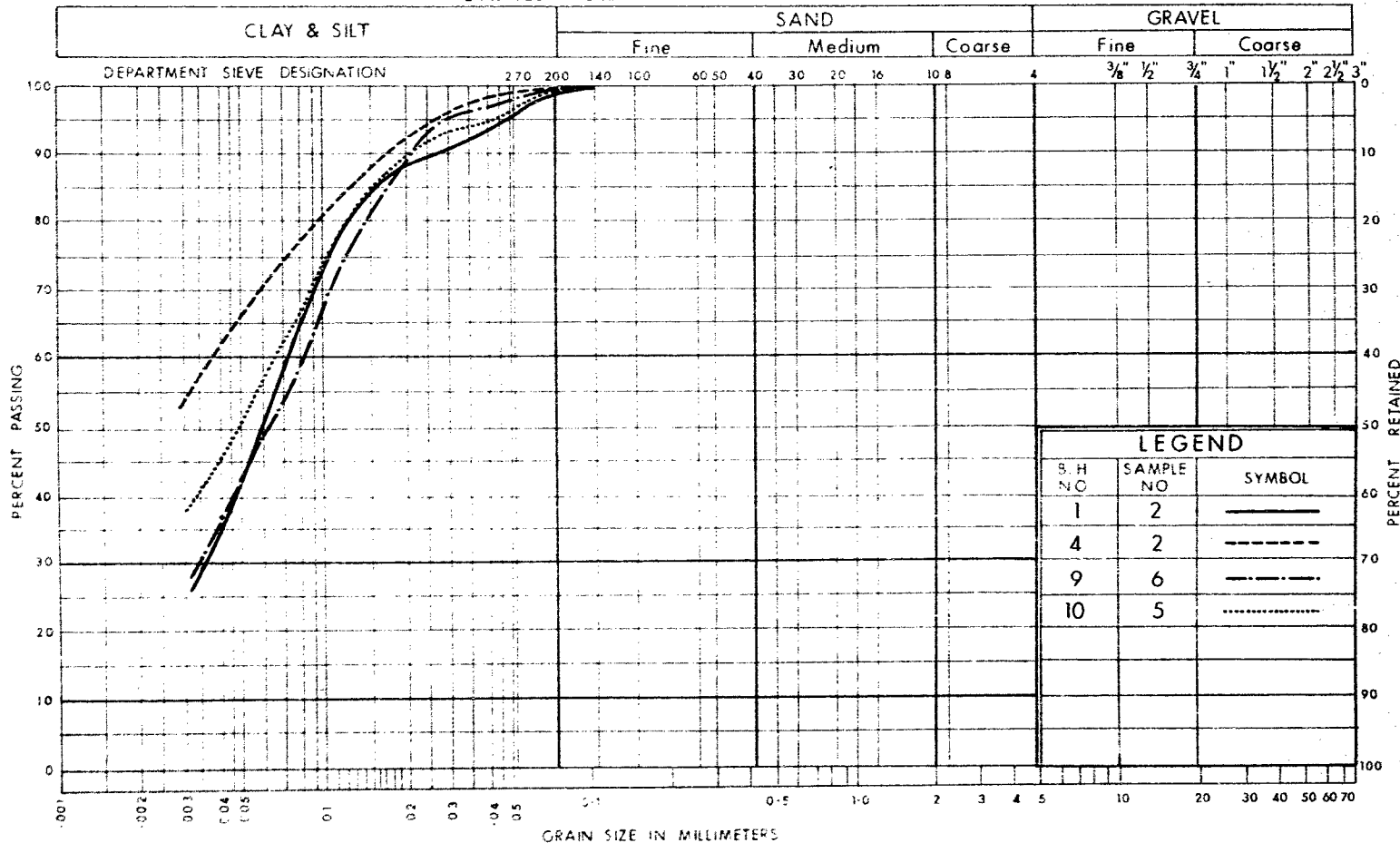
● CLAYEY SILT (I) ▲ CLAYEY SILT (II)
■ SILT TO CLAYEY SILT

WP No. 340 - 64 - 02

JOB No. 70 - F - 15 (R)

FIG No 1

UNIFIED SOIL CLASSIFICATION SYSTEM



LEGEND		
S. H. NO.	SAMPLE NO.	SYMBOL
1	2	—————
4	2	-----
9	6	- . - . - .
10	5

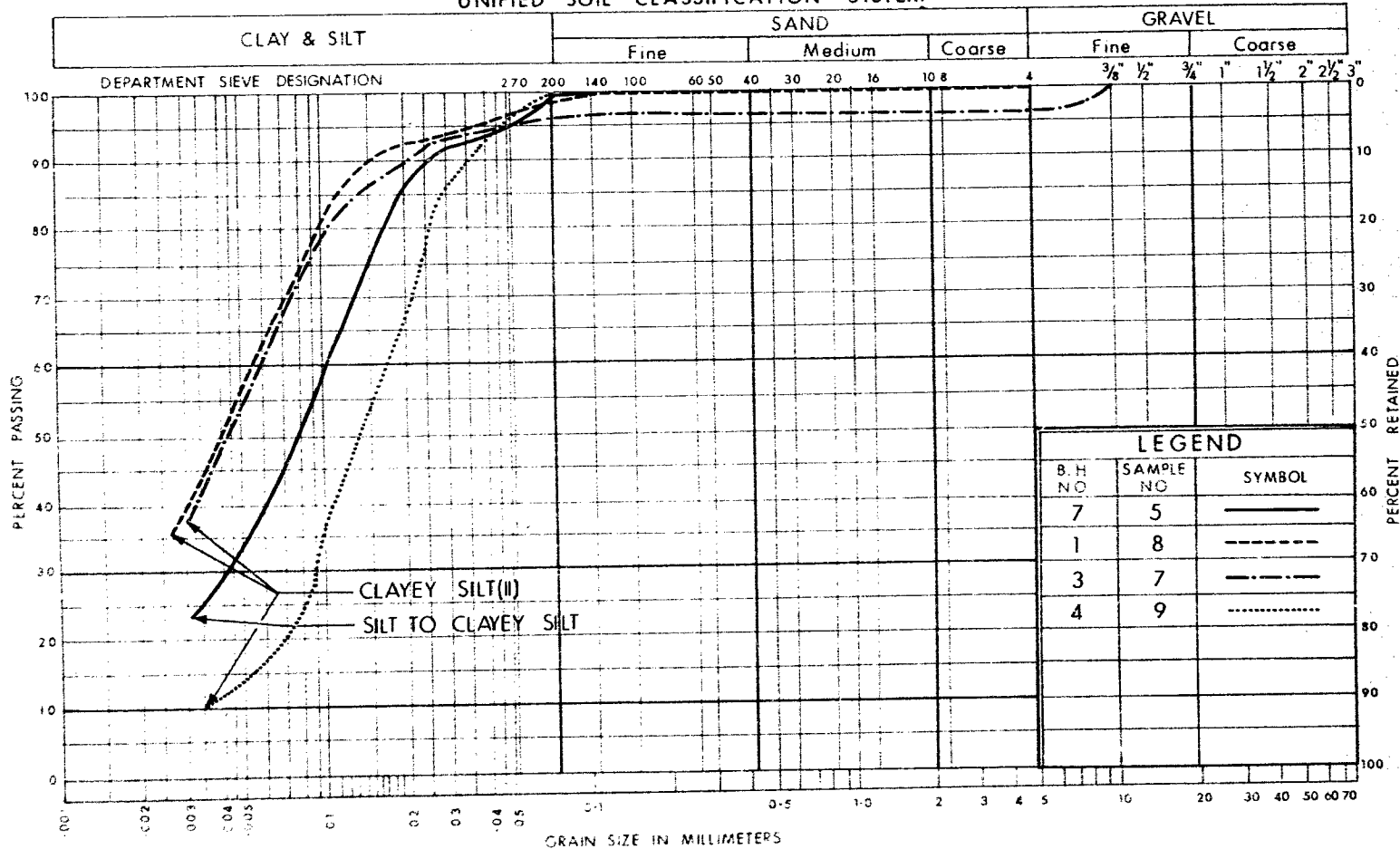


DEPARTMENT OF HIGHWAYS
MATERIALS and
TESTING
DIVISION

GRAIN SIZE DISTRIBUTION
CLAYEY SILT (I)

W.P. No. 340 - 64 - 02
JOB No. 70 - F - 15 (R)
FIG. No. 2

UNIFIED SOIL CLASSIFICATION SYSTEM



DEPARTMENT OF HIGHWAYS
MATERIALS and
TESTING
DIVISION

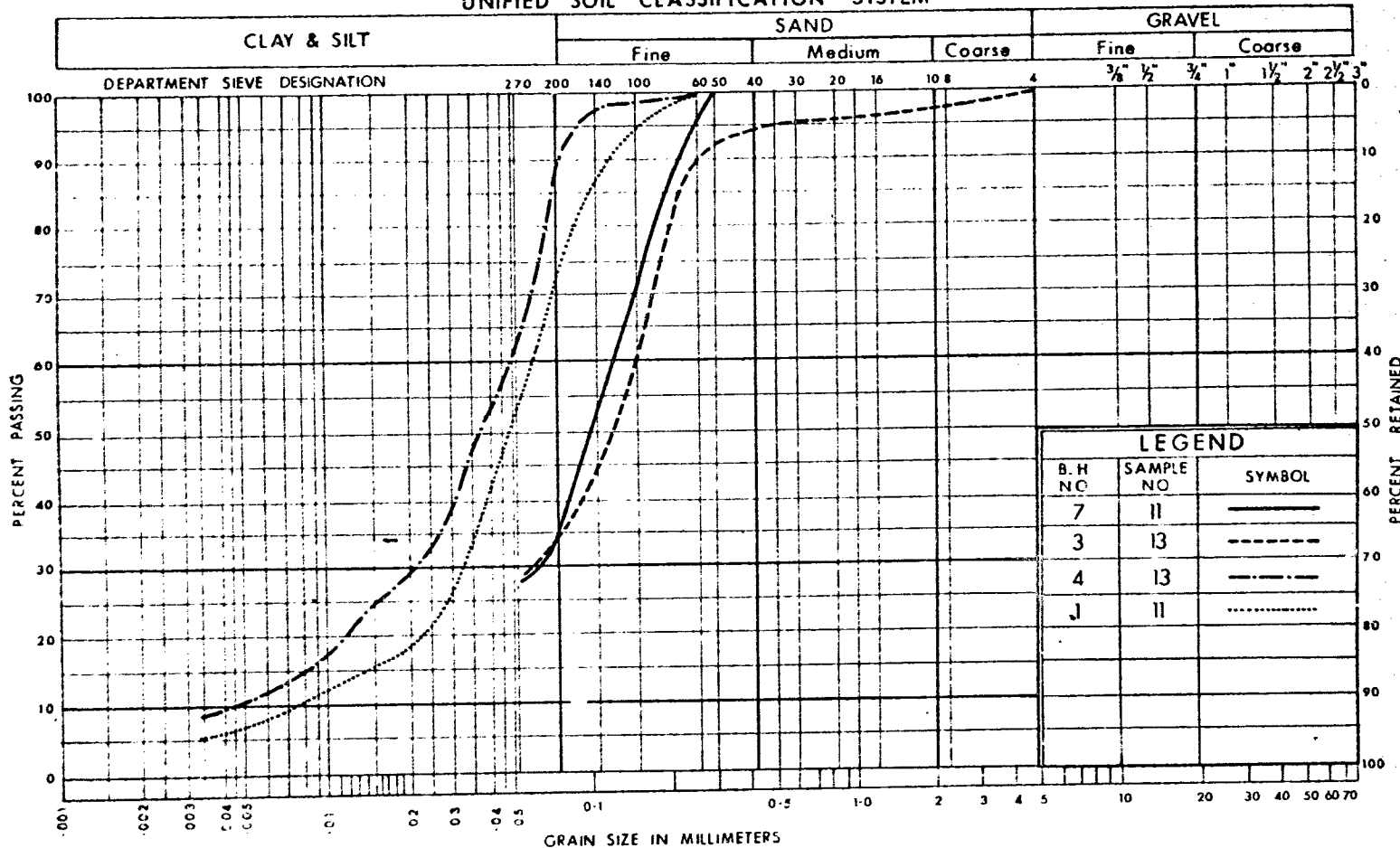
GRAIN SIZE DISTRIBUTION SILT TO CLAYEY SILT & CLAYEY SILT(II)

W.P. No. 340 - 64 - 02

JOB No. 70 - F - 15(R)

FIG. No. 3

UNIFIED SOIL CLASSIFICATION SYSTEM



DEPARTMENT OF HIGHWAYS
MATERIALS and
TESTING
DIVISION

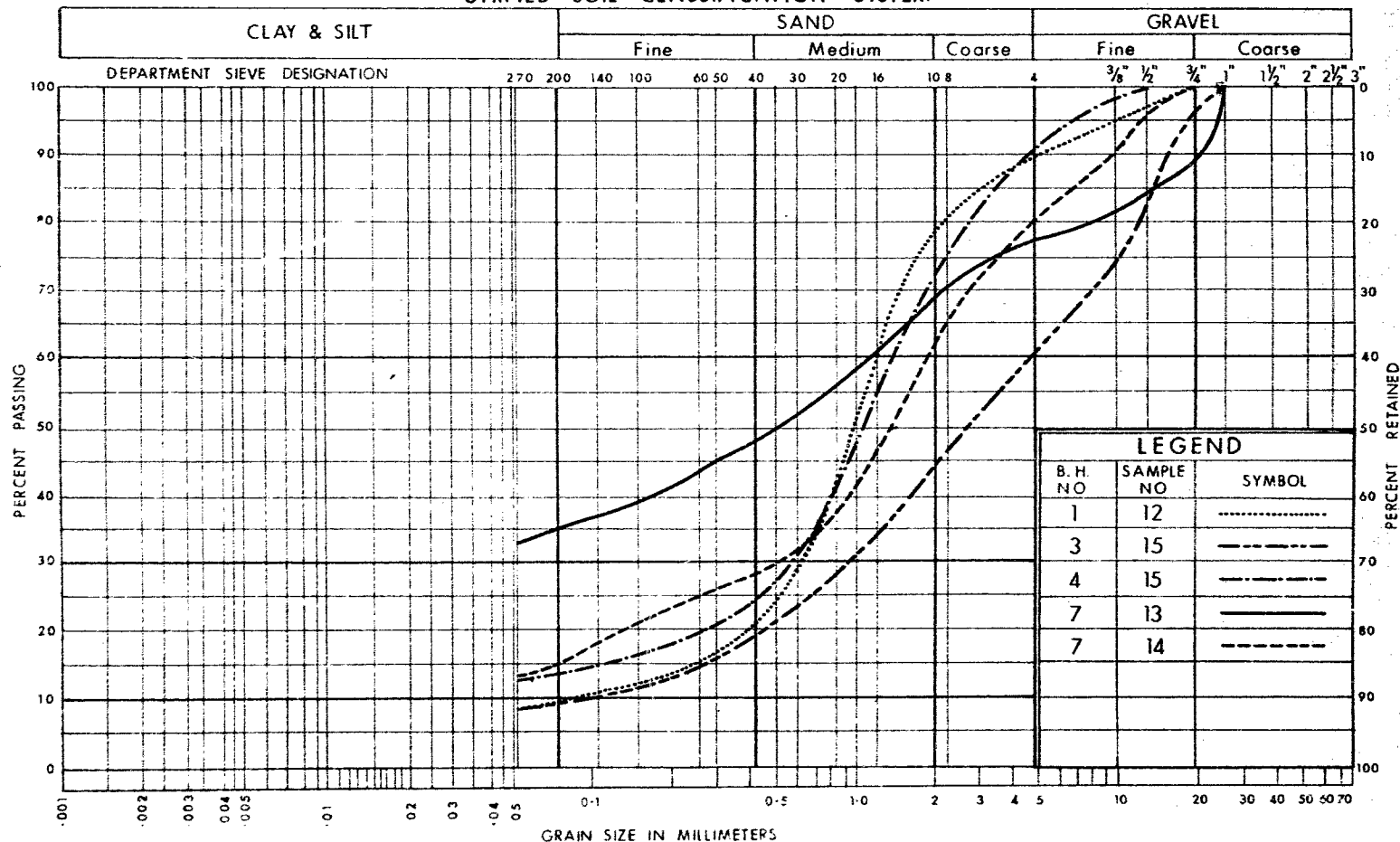
GRAIN SIZE DISTRIBUTION
SILTY SAND TO SANDY SILT

W.P. No. 340 - 64 - 02

JOB No. 70 - F - 15(R)

FIG No 4

UNIFIED SOIL CLASSIFICATION SYSTEM



DEPARTMENT OF HIGHWAYS
MATERIALS and
TESTING
DIVISION

GRAIN SIZE DISTRIBUTION SAND AND/SOME GRAVEL

W.P. No. 340 - 64 - 02
JOB No. 70 - F - 15(R)
FIG.No. 5

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
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

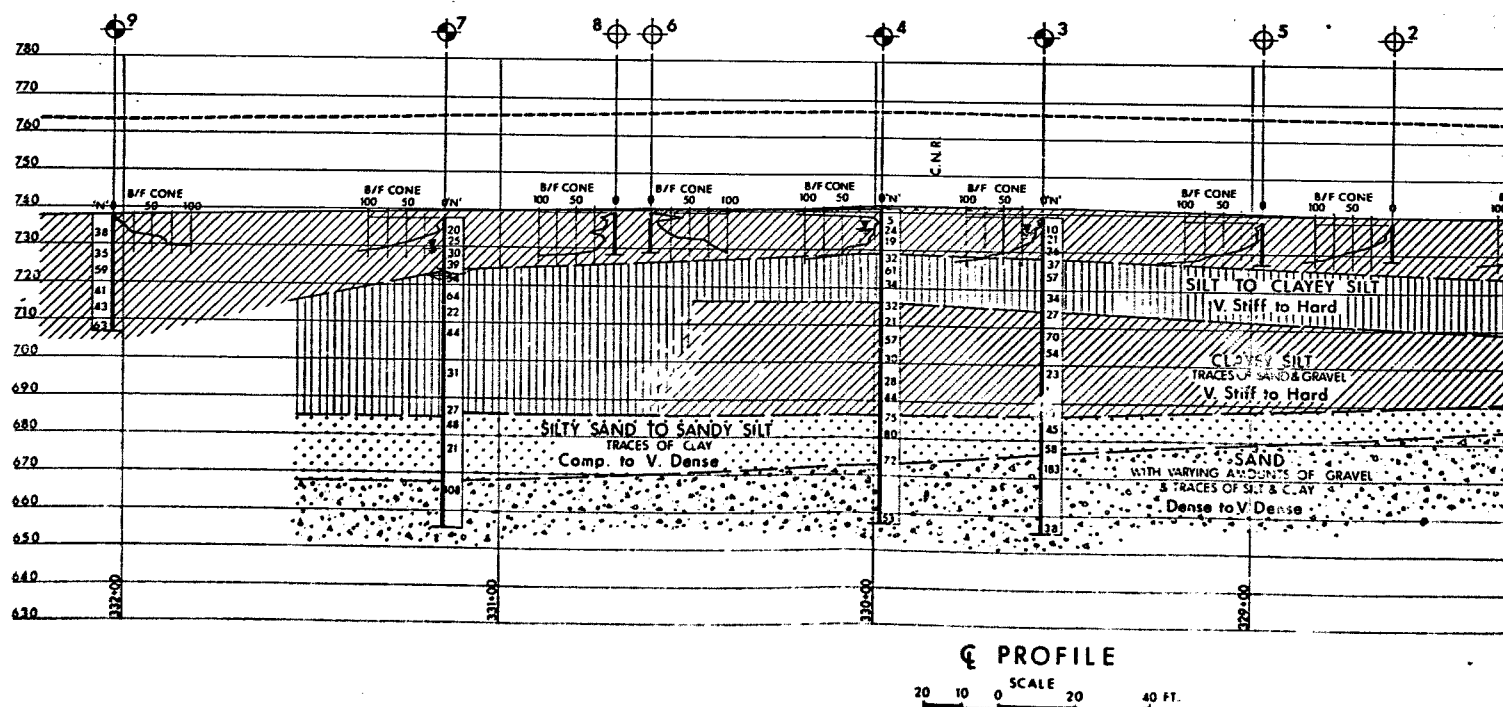
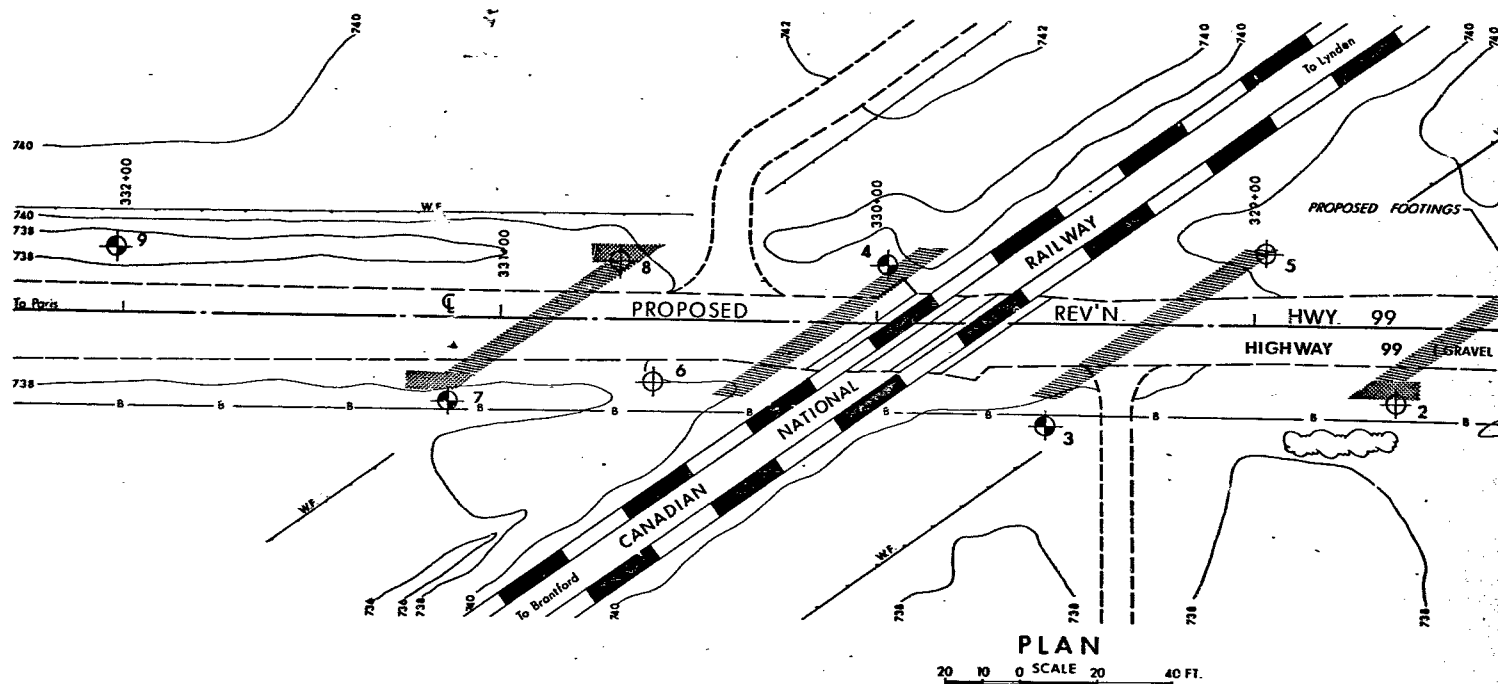
d	DISTANCE FROM TOP OF WALL TO POINT OF APPLICATION OF PRESSURE
δ	ANGLE OF WALL FRICTION
K	DIMENSIONLESS COEFFICIENT TO BE USED WITH VARIOUS SUFFIXES IN EXPRESSIONS REFERRING TO NORMAL STRESS ON WALLS
K_0	COEFFICIENT OF EARTH PRESSURE AT REST

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

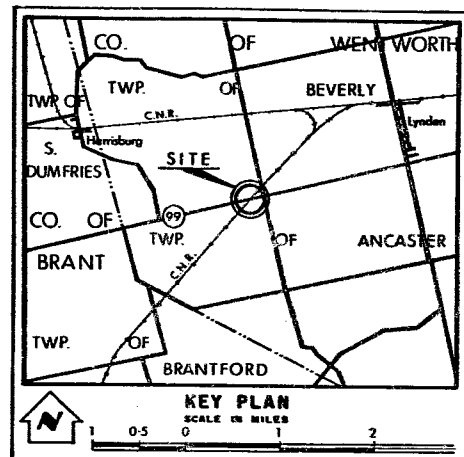
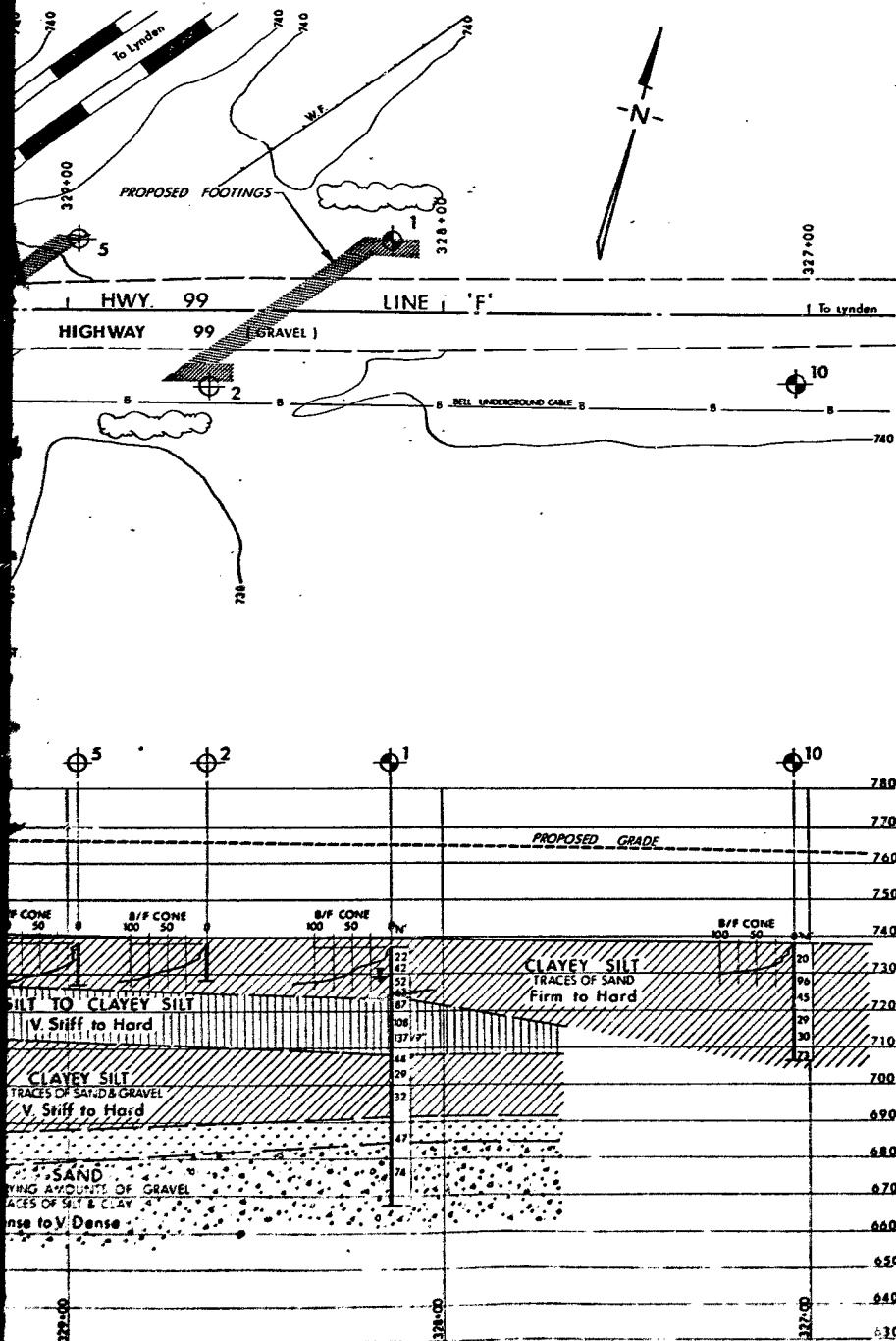
SLOPES

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



PRINT RECORD

NO. FOR DATE



LEGEND

- Bore Hole
- ⊙ Cone Penetration Hole
- ⊙ Bore & Cone Penetration Hole
- ⊙ Water Levels established at time of field investigation. MAR 1970

NOTE - Water Levels in Bore Holes 9 & 10 not established at time of field investigation.

NO.	ELEVATION	STATION	OFFSET
1	737.9	328+14	19' RT.
2	738.8	328+62	21' LT.
3	739.4	329+54	28' LT.
4	741.4	329+98	15' RT.
5	738.7	328+97	18' RT.
6	739.6	330+60	17' LT.
7	737.6	331+13	23' LT.
8	739.8	330+69	15' RT.
9	737.8	332+02	18' RT.
10	736.7	327+03	19' 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.

REVISION	DATE	BY	DESCRIPTION

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

CANADIAN NATIONAL RAILWAY

KING'S HIGHWAY NO. 99 LINE 'F' DIST. NO. 4
CO. WENTWORTH
TWP. BEVERLY & ANCASTER LOT 6 CON. 1

BORE HOLE LOCATIONS & SOIL STRATA

SUB'D. A. P.	CHECKED	BY NO. 340-64-02	S.T. DRAWING NO.
DRAWN S. O.	CHECKED	JOB NO. 70-F-15	70-F-15(R) A
DATE 8 APRIL 1970	SITE NO.	BRIDGE DRAWING NO.	
APPROVED	DATE	CON. NO.	

Department of Highways Ontario

Copy for the information of

Mr. A. Stermac

Mr. W. Melnyshyn,
Reg. Bridge Planning Engineer,
Central Region, Central Bldg.

C.S. Grebaki,
Bridge Office

June 26, 1970

C.N.R. Overhead
6.3 Miles West of Hwy. 52, Copetown
W.P. 340-64-2, Site 36-234
Highway 99, District No. 4

70-F-15

Attached herewith are print. of the Preliminary Bridge Plan
Drawing D-6833-P1 for the above-mentioned structure.

The estimated cost of the proposed structure is \$190,000.
This cost includes tender, materials, engineering and sundry
construction.

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

CSG:rd

C.S. Grebaki,
Bridge Design Engineer

Attach.

c.c. S. McCombie
A. Stermac (2)
J. Anderson

As noted above, the drawing has
been reviewed and approved.

29/6/70

[Signature]

MEMORANDUM

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

FROM: C.S. Grebski,
Bridge Office

ATTENTION:

DATE: January 13, 1971

OUR FILE REF.


IN REPLY TO

SUBJECT: C.N.R. Overhead
6.3 Mi. West of Hwy. 52 Copestown
W.P. 340-64-2, Site No. 36-234
Highway 99, District No. 4

70-F-15

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

13 Jan 71

NO COMMENTS

13 Jan 71

13 Jan 71

Date May 12, 1974

APPROVED SCHEDULE FOR 1974 - 75

Page 11 of 13

PROGRAM OF CONSTRUCTION

DISTRICT No. 4, HAMILTON

W.P. No.	HWY. No.	Type of work	LOCATION	Date of		Tend. open.	CONT. No.
				Advert.	Award.		
341-64 207-59-02	52 & 99	G. D. GB. B. C. Pav. & Str.	0.3 Mi. South of Hwy. 99 N'ly 0.5 Mi. Incl. C.N.R. O'head; Hwy. 99, from 0.2 Mi. East of Hwy. 52 W'ly 0.3 Mi.	May 1/74	June 5/74	10	74-05

ENGINEERING SERVICES BRANCH
SOIL MECHANICS SECTION

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 4 CONTRACT NO. 74-05 STRUCTURE C.N.R. OVERHEAD
CONTRACTOR BIRMINGHAM Co DESIGN LOAD OF PILE 60 TON
HAMMER DETAILS: TYPE B225 WEIGHT 1.38 HEIGHT OF FALL OR ENERGY 25.000 FT/LBS
TYPE OF ANVIL OR CAP B225 WEIGHT OF ANVIL OR CAP 1100 LBS
PILE DETAILS 12" TUBE PILE - SHOE PLATE - 33 LBS TO THE FOOT - 1-6 BATTER
PILE NO. 57 LOCATION PIER 'C' DATE DRIVEN SEPT 23/74

TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS/FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS/FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS/FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS/FT.
74	1	6	49	26	11	24	51	67		76	
73	2	4	48	27	10	23	52	58		77	
72	3	5	47	28	11	22	53	54		78	
71	4	4	46	29	11	21	54	45		79	
70	5	5	45	30	11	20	55	46		80	
69	6	3	44	31	11	19	56	47		81	
68	7	2	43	32	12	18	57	51		82	
67	8	3	42	33	11	17	58	65		83	
66	9	3	41	34	13	16	59	60		84	
65	10	4	40	35	23	15	60	29		85	
64	11	4	39	36	29	14	61	31		86	
63	12	2	38	37	24	13	62	28		87	
62	13	2	37	38	23	12	63	28		88	
61	14	2	36	39	29	11	64	33		89	
60	15	1	35	40	38	10	65	54		90	
59	16	1	34	41	44	9	66	30		91	
58	17	2	33	42	41	8	67	32		92	
57	18	2	32	43	40	7	68	21		93	
56	19	3	31	44	44	6	69	26		94	
55	20	5	30	45	45	5	70	28		95	
54	21	6	29	46	44	4	71	29		96	
53	22	6	28	47	45	3	72	42		97	
52	23	7	27	48	45	2	73	61		98	
51	24	8	26	49	101	1	74	105		99	
50	25	10	25	50	96	0	75	146		100	

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH	8	8	10	12	12	3
MEASURED REBOUND IN INCHES						
FINAL LENGTH OF PILE	FINAL CUT OFF ELEVATION					

REPORT TO BE SENT TO: - HEAD, SOIL MECHANICS SECTION
ENGINEERING SERVICES BRANCH
MINISTRY OF
TRANSPORTATION AND
COMMUNICATIONS
DOWNSVIEW, ONTARIO

SIGNED _____
NAME (PRINT) _____
DATE _____

ATTACH SKETCH OF PILE NUMBERING SYSTEM

Notes:-

In general this form should be completed for every tenth pile in a group, but at least one is required for every pier and abutment.

Piles driven vertically should be selected where possible.

File Details must include type, dimensions and weight per foot, details of shoe, and slope of batter: e.g. 12 $\frac{1}{2}$ " O.D. steel tube x 0.251" @ 33 lbs. per ft. Vertical. 12 $\frac{1}{2}$ " x $\frac{1}{2}$ " steel plate shoe.

Details for the final six inches of penetration must be completed for all piles except in the case of an end bearing pile driven to bedrock. Final length of pile, and final cut off elevation must always be given.

The total length being driven is the full length of the pile and remains unchanged until a length is cut off or spliced on.

The penetration in blows per foot must be recorded for every foot of penetration of the pile.

Measured rebounds recorded on this form must be the average for each individual inch for the final six inches of penetration.



ENGINEERING SERVICES BRANCH
 SOIL MECHANICS SECTION

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 4 CONTRACT NO. 74-05 STRUCTURE C.N.R. OVERHEAD
 CONTRACTOR BIRMINGHAM DESIGN LOAD OF PILE 60 TON
 HAMMER DETAILS: TYPE B 400 WEIGHT 5.5 HEIGHT OF FALL OR ENERGY 46000
 TYPE OF ANVIL OR CAP B 400 WEIGHT OF ANVIL OR CAP 1400 LBS.
 PILE DETAILS 12" TUBE PILE - SHOE PLATE - 33 LBS./FT. - 1-6 BATTER
 PILE NO. 35 LOCATION PIER "B" DATE DRIVEN OCT 3/74

TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS/FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS/FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS/FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS/FT.
99	1	0	74	26	1	49	51	17	24	76	18
98	2	1/2	73	27	2	48	52	17	23	77	18
97	3	1/2	72	28	4	47	53	19	22	78	26
96	4	1/2	71	29	5	46	54	20	21	79	28
95	5	1/2	70	30	6	45	55	19	20	80	31
94	6	1/2	69	31	6	44	56	16	19	81	36
93	7	1/2	68	32	7	43	57	14	18	82	38
92	8	1/2	67	33	8	42	58	14	17	83	40
91	9	1/2	66	34	8	41	59	15		84	
90	10	1/2	65	35	9	40	60	31		85	
89	11	1/2	64	36	9	39	61	37		86	
88	12	1/2	63	37	7	38	62	30		87	
87	13	1/2	62	38	10	37	63	23		88	
86	14	1	61	39	12	36	64	26		89	
85	15	1	60	40	13	35	65	30		90	
84	16	1	59	41	13	34	66	31		91	
83	17	1	58	42	14	33	67	26		92	
82	18	1	57	43	14	32	68	24		93	
81	19	1	56	44	15	31	69	23		94	
80	20	1	55	45	14	30	70	21		95	
79	21	1	54	46	16	29	71	26		96	
78	22	1	53	47	17	28	72	20		97	
77	23	1	52	48	17	27	73	20		98	
76	24	1	51	49	17	26	74	20		99	
75	25	1	50	50	18	25	75	17		100	

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH	4	4	4	4	5	5
MEASURED REBOUND IN INCHES	1"	1"	1"	1 1/4"	1 1/2"	1 1/2"
FINAL LENGTH OF PILE	FINAL CUT OFF ELEVATION					

REPORT TO BE SENT TO: - HEAD, SOIL MECHANICS SECTION
 ENGINEERING SERVICES BRANCH
 MINISTRY OF
 TRANSPORTATION AND
 COMMUNICATIONS
 DOWNSVIEW, ONTARIO

SIGNED [Signature]
 NAME (PRINT) P. H. HARRISON
 DATE OCT 3/74

ATTACH SKETCH OF PILE NUMBERING SYSTEM

ENGINEERING SERVICES BRANCH
 SOIL MECHANICS SECTION

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 4 CONTRACT NO. 74-05 STRUCTURE C.N.R. OVERHEAD
 CONTRACTOR BIRMINGHAM Co. DESIGN LOAD OF PILE 60 TON
 HAMMER DETAILS: TYPE B400 WEIGHT 5.5 HEIGHT OF FALL OR ENERGY 46,000 FT/LB
 TYPE OF ANVIL OR CAP B400 WEIGHT OF ANVIL OR CAP 1400 LBS
 PILE DETAILS 12" TUBE PILE - SHELL PLATE - 33 LBS/FT. 1-6 MATTE
 PILE NO. 69 LOCATION PIER D DATE DRIVEN SEPT 26/74

TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS/FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS/FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS/FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS/FT.
100	1		74	26	2	49	51	16	24	76	22
99	2	1	73	27	4	48	52	18	23	77	26
98	3	1	72	28	2	47	53	23	22	78	25
97	4	1	71	29	3	46	54	20	21	79	20
96	5	1	70	30	2	45	55	23	20	80	25
95	6	1	69	31	2	44	56	25	19	81	23
94	7	1	68	32	3	43	57	25	18	82	24
93	8	1	67	33	4	42	58	20	17	83	26
92	9	1	66	34	4	41	59	19	16	84	23
90	10	1	65	35	3	40	60	27	15	85	27
89	11	1	64	36	8	39	61	35	14	86	24
88	12	1	63	37	9	38	62	34	13	87	27
87	13	1	62	38	10	37	63	27	12	88	30
86	14	2	61	39	11	36	64	28	11	89	32
85	15	5	60	40	13	35	65	30	10	90	37
84	16	5	59	41	14	34	66	26	9	91	33
83	17	5	58	42	14	33	67	26	8	92	34
82	18	6	57	43	13	32	68	32	7	93	35
81	19	2	56	44	13	31	69	25	6	94	41
80	20	2	55	45	16	30	70	26	5	95	40
79	21	4	54	46	19	29	71	25	4	96	
78	22	3	53	47	17	28	72	24	3	97	
77	23	3	52	48	16	27	73	24	2	98	
76	24	3	51	49	18	26	74	28	1	99	
75	25	3	50	50	14	25	75	30		100	

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH	4	5	7	7	8	10
MEASURED REBOUND IN INCHES	1 1/4	1 1/4	1"	3/8	1	1 1/2
FINAL LENGTH OF PILE	95					FINAL CUT OFF ELEVATION

REPORT TO BE SENT TO: - HEAD, SOIL MECHANICS SECTION
 ENGINEERING SERVICES BRANCH
 MINISTRY OF
 TRANSPORTATION AND
 COMMUNICATIONS
 DOWNSVIEW, ONTARIO

SIGNED P. Hryhoruk
 NAME (PRINT) P. HRYHORUKO
 DATE SEPT 26/74

ATTACH SKETCH OF PILE NUMBERING SYSTEM

ENGINEERING SERVICES BRANCH
SOIL MECHANICS SECTION

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 4 CONTRACT NO. 74-05 STRUCTURE C.N.R. OVERHEAD

CONTRACTOR BIRMINGHAM CO DESIGN LOAD OF PILE 60 TON

HAMMER DETAILS: TYPE B400 WEIGHT 55 HEIGHT OF FALL OR ENERGY 4600

TYPE OF ANVIL OR CAP B400 WEIGHT OF ANVIL OR CAP 1400 LBS

PILE DETAILS 12" TUBE PILE - SHEL PILE - 32 LBS/FT. N.BATTER - 1.5 S.BATTER

PILE NO. 86 LOCATION NORTH ABUT. FOOTING DATE DRIVEN OCT 1/74

TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS/FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS/FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS/FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS/FT.
99	1	2	74	26	7	49	51	24	24	76	33
98	2	2	73	27	7	48	52	24	23	77	31
97	3	2	72	28	6	47	53	27	22	78	32
96	4	2	71	29	7	46	54	25	21	79	34
95	5	2	70	30	8	45	55	26	20	80	37
94	6	2	69	31	7	44	56	24	19	81	33
93	7	6	68	32	8	43	57	25	18	82	30
92	8	8	67	33	7	42	58	27	17	83	26
91	9	9	66	34	6	41	59	26	16	84	23
90	10	7	65	35	7	40	60	25	15	85	25
89	11	8	64	36	6	39	61	24	14	86	26
88	12	6	63	37	4	38	62	28	13	87	23
87	13	5	62	38	6	37	63	28	12	88	22
86	14	5	61	39	7	36	64	29	11	89	19
85	15	4	60	40	7	35	65	28	10	90	19
84	16	5	59	41	7	34	66	28	9	91	21
83	17	5	58	42	10	33	67	28	8	92	28
82	18	4	57	43	13	32	68	27	7	93	26
81	19	5	56	44	15	31	69	30	6	94	29
80	20	7	55	45	15	30	70	30	5	95	28
79	21	8	54	46	17	29	71	34	4	96	29
78	22	7	53	47	19	28	72	33	3	97	35
77	23	7	52	48	20	27	73	37	2	98	42
76	24	8	51	49	21	26	74	32		99	
75	25	8	50	50	24	25	75	34		100	

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH	4	5	5	5	6	7
MEASURED REBOUND IN INCHES	1"	1 1/4"	1 1/4"	1"	1"	1 1/2"
FINAL LENGTH OF PILE	FINAL CUT OFF ELEVATION					

REPORT TO BE SENT TO: - HEAD, SOIL MECHANICS SECTION
ENGINEERING SERVICES BRANCH
MINISTRY OF
TRANSPORTATION AND
COMMUNICATIONS
DOWNSVIEW, ONTARIO

SIGNED P. Hrybowski
NAME (PRINT) P. HRYBOWSKI
DATE OCT 1/74

ATTACH SKETCH OF PILE NUMBERING SYSTEM

ENGINEERING SERVICES BRANCH
SOIL MECHANICS SECTION

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 4 CONTRACT NO. 74-05 STRUCTURE C.W.R. OVERHEAD
CONTRACTOR BIRNINGHAM DESIGN LOAD OF PILE 60 TON
HAMMER DETAILS: TYPE B 400 WEIGHT 5.5 HEIGHT OF FALL OR ENERGY 46,000 ft/lb
TYPE OF ANVIL OR CAP B 400 WEIGHT OF ANVIL OR CAP 1400 lbs
PILE DETAILS 12" TUBE, SHOE PLATE - 33 LBS/FT. - 1-6 BATTER
PILE NO. 24 LOCATION PIER A DATE DRIVEN OCT 11/74

TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS/FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS/FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS/FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS/FT.
96	1	0	71	26	6	46	51	14	21	76	30
95	2	1	70	27	6	45	52	14	20	77	31
94	3	1	69	28	6	44	53	15	19	78	31
93	4	1	68	29	6	43	54	15	18	79	31
92	5	1	67	30	6	42	55	15	17	80	32
91	6	1	66	31	6	41	56	16	16	81	28
90	7	1	65	32	7	40	57	16	15	82	27
89	8	1	64	33	8	39	58	17	14	83	25
88	9	1	63	34	8	38	59	17	13	84	25
87	10	1	62	35	8	37	60	17	12	85	25
86	11	1	61	36	9	36	61	19	11	86	25
85	12	1	60	37	9	35	62	19	10	87	26
84	13	2	59	38	9	34	63	19	9	88	26
83	14	2	58	39	10	33	64	18	8	89	26
82	15	2	57	40	10	32	65	18	7	90	27
81	16	2	56	41	11	31	66	20	6	91	27
80	17	3	55	42	12	30	67	20	5	92	27
79	18	3	54	43	13	29	68	21	4	93	
78	19	4	53	44	13	28	69	22	3	94	
77	20	4	52	45	13	27	70	22	2	95	
76	21	4	51	46	13	26	71	25	1	96	
75	22	5	50	47	13	25	72	27		97	
74	23	5	49	48	13	24	73	28		98	
73	24	6	48	49	13	23	74	29		99	
72	25	6	47	50	13	22	75	29		100	

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH	4	5	7	7	7	7
MEASURED REBOUND IN INCHES	7/8	1 1/4"	1 1/2"	1 1/2"	1 1/2"	1 1/2"
FINAL LENGTH OF PILE	97					
FINAL CUT OFF ELEVATION						

REPORT TO BE SENT TO: - HEAD, SOIL MECHANICS SECTION
ENGINEERING SERVICES BRANCH
MINISTRY OF
TRANSPORTATION AND
COMMUNICATIONS
DOWNSVIEW, ONTARIO

SIGNED R. Mathew
NAME (PRINT) R. MATHEW
DATE OCT 11/74
ATTACH SKETCH OF PILE NUMBERING SYSTEM

ENGINEERING SERVICES BRANCH
SOIL MECHANICS SECTION

BRIDGE CONSTRUCTION - PILE DRIVING RECORD

DISTRICT NO. 4 CONTRACT NO. 74-05 STRUCTURE C.N.R. OVERHEAD

CONTRACTOR BIRMINGHAM CONST. DESIGN LOAD OF PILE 60 TON

HAMMER DETAILS: TYPE B-400 WEIGHT 550 HEIGHT OF FALL OR ENERGY 46000

TYPE OF ANVIL OR CAP B-400 WEIGHT OF ANVIL OR CAP 1400 LBS

PILE DETAILS 12" TUBE PILE - SMOO PLATE - 33 LB/FT - 1-10 BATTER

PILE NO. 12 LOCATION SOUTH ABUTMENT P.F.G. DATE DRIVEN OCT 16/74

TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS/FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS/FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS/FT.	TOTAL LENGTH BEING DRIVEN	LENGTH IN GROUND	PENETRATION BLOWS/FT.
99	1	1	74	26	9	49	51	10	24	76	27
98	2	1	73	27	9	48	52	10	23	77	28
97	3	1	72	28	10	47	53	10	22	78	32
96	4	1	71	29	10	46	54	11	21	79	36
95	5	1	70	30	10	45	55	12	20	80	36
94	6	1	69	31	10	44	56	12	19	81	31
93	7	1	68	32	10	43	57	12	18	82	29
92	8	1	67	33	9	42	58	12	17	83	29
91	9	1	66	34	8	41	59	15	16	84	28
90	10	2	65	35	7	40	60	16	15	85	26
89	11	2	64	36	7	39	61	17	14	86	28
88	12	2	63	37	7	38	62	18	13	87	30
87	13	2	62	38	7	37	63	18	12	88	25
86	14	2	61	39	6	36	64	19	11	89	24
85	15	2	60	40	6	35	65	19	10	90	24
84	16	2	59	41	5	34	66	19	9	91	25
83	17	2	58	42	4	33	67	21	8	92	24
82	18	2	57	43	5	32	68	21	7	93	26
81	19	5	56	44	7	31	69	21	6	94	26
80	20	7	55	45	9	30	70	22	5	95	29
79	21	9	54	46	9	29	71	24	4	96	32
78	22	8	53	47	9	28	72	25	3	97	33
77	23	8	52	48	9	27	73	25	2	98	32
76	24	8	51	49	9	26	74	26	1	99	37
75	25	1	50	50	9	25	75	26	0	100	

DETAILS FOR FINAL SIX INCHES OF PENETRATION	1	2	3	4	5	6
BLOWS PER INCH	4	5	6	8	8	8
MEASURED REBOUND IN INCHES	1 1/2	1 1/2	1 1/2	1 3/4	1 3/4	1 3/4
FINAL LENGTH OF PILE	FINAL CUT OFF ELEVATION					

REPORT TO BE SENT TO: - HEAD, SOIL MECHANICS SECTION
ENGINEERING SERVICES BRANCH
MINISTRY OF
TRANSPORTATION AND
COMMUNICATIONS
DOWNSVIEW, ONTARIO

SIGNED _____

NAME (PRINT) _____

DATE _____

ATTACH SKETCH OF PILE NUMBERING SYSTEM



Ministry of
Transportation and
Communications

Memorandum

To: Mr. M.R. Ernesaks,
Regional Manager,
Reg. Planning and Design Office,
Central Region, Toronto.

Attention: Mr. A. Sulavella

From: Structural Office,
West Building,
Downsview, Ontario.

Date: February 16, 1976.

Our File Ref.

In Reply to

Subject: W.P. 340-64-2, Site 36-234
CNR Overhead (2nd Updated Copy)
Highway 99, District 4

As this project has been stockpiled for some time, we wish to submit an updated D4 and Special Provisions for the Structure which will supersede all the contract documents previously sent to you.

Enclosed is two copies of the D4 and Special Provisions for your use.

One copy of the D4 and Special Provisions is also being forwarded to the following:

District Office
Systems Design Project Review Section
Structural Material Section
Structural Design Office
Estimating Office
Assistant Construction Engineer (Structures)
Regional Structural Planning Engineer.
Structural Maintenance Engineer
Soil Mechanics Section

Prints of the plan will follow.

NZ/ac
Encl.

c.c. W. Lin
W. McFarlane
J. Wear
C.R. Robertson
K.C. Howe
B. Giroux
A.E. McKim
G. Burkhardt
W. Birch
C. Mirza ✓
R. Fitzgibbon
J. Anderson

N. Zoltay
N. Zoltay,
Structural Contract
Specifications Engineer.





Ministry of
Transportation and
Communications

Memorandum

To: Mr. M.R. Ernesaks,
Regional Manager,
Reg. Planning and Design Office,
3501 Dufferin Street, Toronto.

From: Structural Office,
West Building,
Downsview, Ontario.

Attention:

Date: February 23, 1976.

Our File Ref.

In Reply to

Subject:

W.P. 340-64-2, Site 36-234
CNR Overhead (2nd Updated Copy)
Highway 99, District 4

As this project has been stockpiled for some time, the design drawings have recently been updated.

Enclosed are four sets of the latest prints of the design drawings D6833-1 to-14 inclusive which will supersede all drawings previously sent to you.

One print of drawing D-6833-1 is being forwarded to the Systems Design Project Review Section.

One set of prints is also being forwarded to the following:

Estimating Section
Regional Structural Planning Engineer
Assistant Construction Engineer (Structures)
District Office
Structural Maintenance Engineer
Soil Mechanics Section

The updated D4 and Special Provisions were mailed to you previously.

NZ/ac
Encl.

c.c. J. Wear
B. Giroux
G. Burkhardt
A.E. McKim
C.R. Robertson
W. Birch
C. Mirza
R. Fitzgibbon
J. Anderson

N. Zoltay
N. Zoltay,
Structural Contract
Specifications Engineer.

