

MEMORANDUM

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

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

ATTENTION: S. McCombie

DATE: September 29, 1969

OUR FILE REF.

IN REPLY TO

OCT - 3 1969

SUBJECT:

FOUNDATION INVESTIGATION REPORT
For

Proposed Crossings -- Reconstructed
Hwy. 401 Hwy. 2 and New Hwy. 2-A
Twp. of ... rborough -- Co. of York
District No. 6 (Toronto)
W.J. 69-F-48 -- W.P. 28-67-02 & 03

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/EdEP
Attach.

cc: Messrs. B. R. Davis (2)
H. A. Tregaskes
D. W. Farran
G. K. Hunter (2)
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W. S. Melnyshyn
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PRINCIPAL FOUNDATION ENGINEER

Foundations Files ✓
Gen. Files

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FOUNDATION INVESTIGATION REPORT
For
Proposed Crossings -- Reconstructed
Hwy. 401 - Hwy. 2 and New Hwy. 2-A
Twp. of Scarborough -- Co. of York
District No. 6 (Toronto)
W.J. 69-P-48 -- W.P. 28-67-02 & 03

1. INTRODUCTION:

It is proposed to reconstruct Hwy. 401 easterly from Warden Avenue (Metropolitan Toronto) towards Oshawa. In connection with this reconstruction programme, the Foundation Section was requested to carry out a subsurface investigation for the proposed structures which will carry Hwy. 401 Revision over reconstructed Hwy. 2 and the Westbound lanes of new Hwy. 2A. The request was contained in a memo from the Bridge Office - (Mr. W. S. Melinyshyn, Regional Bridge Location Engineer) dated May 29, 1969. The same memo also contained requests for foundation investigations at other proposed crossings in the area.

Subsequently, an investigation was carried out by this Section in order to determine the subsoil conditions at the locations of these proposed crossings. The results of this investigation are contained in this report, together with our recommendations pertaining to structure foundations and stability of the approaches.

2. DESCRIPTION OF THE SITE AND GEOLOGY:

The site is located at the east limits of Metropolitan Toronto, and is residentially developed. The proposed structures will be located in an area bounded on the west by the existing Hwy. 401 - Hwy. 2 overpass, on the east by the Hwy. 2 - Sheppard Avenue crossing, and on the north and south by Hwy. 2 and Hwy. 401, respectively. The terrain at the site is gently undulating.

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

According to the available geologic information, the general area is situated in the physiographic region known as the "South Slope". The soils in this physiographic region are mainly glacial tills.

3. FIELD AND LABORATORY WORK:

A total of 11 boreholes, each accompanied by a dynamic cone penetration test, was carried out at the site by means of two standard diamond drill rigs adapted for soil sampling purposes. In addition, 3 separate dynamic cone penetration tests were carried out to practical refusal in order to substantiate the information from the boreholes.

Soil samples were obtained at various depths in a 2-inch O.D. split-spoon sampler which was hammered into the subsoil in accordance with the specifications for the Standard Penetration Test. The same procedure was used to carry out the dynamic cone penetration tests. Due to the very dense or hard nature of the subsoil at the site, the boreholes had to be advanced, on occasion, by drilling with a bicone bit.

Surveying of the borehole locations and elevations at the site was carried out by personnel from the Central Region Engineering Surveys Section. The elevations given in this report are referenced to geodetic datum. The locations of the boreholes were initially surveyed by using existing Hwy. 2 and assumed Ellsmere Road chainages; these locations were later referred to a coordinate system.

The locations and elevations of all the borings are given on Drawings 69-F-48A and 69-F-48B which show estimated stratigraphical profiles and sections across the site.

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

All samples were subjected to a careful visual examination in the field and subsequently in the laboratory, following which, tests were carried out on selected samples to determine the various physical properties of the subsoil, namely:

Natural Moisture Contents

Atterberg Limits

Grain-Size Distributions

The results of these tests are plotted on the individual Borelog sheets, and are shown on Figure 1 in the Appendix.

4. SUBSOIL CONDITIONS:

4.1) Heterogeneous Mixture of Silt, Sand and Occasional Gravel (Glacial Till):

Underlying a surficial cover of up to 2 ft. of topsoil, or up to 4 ft. of fill material (granular base course) is a glacial till deposit consisting of a heterogeneous mixture of silt, sand and occasional gravel. Random zones of a cohesive mixture of clayey silt, sand and occasional gravel are present within this deposit. The upper 7 to 18 ft. of the glacial till has a mottled brown to grey colour, whereas the remainder of the deposit is generally grey. The total thickness of the deposit across the site was not established, but it is known to be at least 35 ft. thick.

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

4.1) Heterogeneous Mixture of Silt, Sand and Occasional Gravel (Glacial Till): (cont'd.) ...

The results of laboratory tests carried out on representative samples from the deposit, are tabulated below:

		<u>Range</u>
Natural Moisture Content - % (overall deposit)	--	6 - 12
Liquid Limit - (cohesive zones only) - %	--	11 - 20
Plastic Limit - (cohesive zones only) - %	--	10 - 13
Grain-Size Distributions:		
- % Gravel	--	1 - 22
- % Sand	--	30 - 56
- % Silt and Clay	--	30 - 64
Standard Penetration Resistance 'N' Values (overall deposit) - Blows/ft.	--	20 -->100

The grain-size distribution curves for typical samples from the deposit, are given on Figure 1 in the Appendix.

The Standard Penetration Resistance 'N' values in the deposit generally increased with depth, indicating a very dense relative density for the non-cohesive portions of the deposit and a hard consistency for the cohesive zones. However, at the locations of Boreholes 8 and 10, 'N' values as low as 13 and 10 blows/ft., respectively, were obtained in this deposit between elevations 375 and 368.

According to available information, water mains and similar utilities are situated in proximity to Boreholes 8 and 10. The precise locations and invert elevations of these utilities

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

4.1) Heterogeneous Mixture of Silt, Sand and Occasional Gravel (Glacial Till): (cont'd.) ...

are not known. Since the glacial till deposit is generally susceptible to "softening" when exposed to water, it is possible that the zones with low 'N' values at Boreholes 8 and 10, may be due to leakage of water from such buried utilities.

5. GROUNDWATER CONDITIONS:

Water level observations were carried out in the open boreholes during the period of this investigation. These observations are summarized on Drawings 69-P-48A and 69-P-48B, and are also shown on the individual Borelog sheets.

These observations indicate that the groundwater level across the site, is situated at depths ranging from 2.5 ft. (B.H. 3) to 9 ft. (B.H. 9) below the ground surface, and generally, tends to follow the ground profile.

6. DISCUSSION AND RECOMMENDATIONS:

6.1) General:

It is proposed to construct two new structures near the east limits of Metropolitan Toronto in order to carry the revised Hwy. 401 over the reconstructed Hwy. 2 and the Westbound lanes of the new Hwy. 2A. The pertinent details for these proposed structures together with our recommendations for the design of foundations and approaches, are as follows:

6.2) Structure Foundations:

6.2.1) Structure at Crossing of Hwy. 401 Revision and Reconstructed Hwy. 2 -

This structure will be located some 300 ft. east of the existing Hwy. 401 - Hwy. 2 overpass. At this location, no revision

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

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

6.2.1) Structure at Crossing of Hwy. 401 Revision and
Reconstructed Hwy. 2 - (cont'd.) ...

of the existing Hwy. 2 alignment is contemplated. The new overpass will be a single-span (160') skew structure with a total width of about 215 ft. The profile grades of the revised Hwy. 401 and the reconstructed Hwy. 2 will be respectively at about elevations 403 and 377. Such grades will require approach fills up to 15 ft. in height above the existing ground surface, and approach cuts of up to 13 ft. in depth.

The investigation revealed the subsoil to be a very dense granular glacial till containing occasional cohesive zones and extending to a depth of at least 35 ft. below the ground surface. In view of the competent nature of this subsoil, the proposed closed-type abutments may be supported on spread footings located within the glacial till deposit at a minimum depth of 4 ft. below the finished grade of the reconstructed Hwy. 2 - i.e., at or below elevation 373 in order to satisfy the frost protection requirements. Such footings may be designed for a safe allowable bearing pressure of 2.5 TSF.

The resistance to sliding may be computed by using a value of $\phi = 25^\circ$ for the angle of shearing resistance between the base of the footing and the glacial till.

Since the glacial till can deteriorate when exposed to water, the excavations should be kept dry at all times. It is recommended that a thin mat of lean concrete be poured as soon as the base level of the excavation is reached in order to prevent deterioration of the glacial till stratum at the footing formation level.

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

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

6.2.2) Structure at Crossing of Hwy. 401 Revision and Westbound Lanes of New Hwy. 2A -

This structure will be located some 600 ft. southeast of the proposed Hwy. 401 Rev'n. - Reconstructed Hwy. 2 crossing, and will be a three-span (105'-130'-90') Overpass, with a width of about 215 ft. The profile grades of the revised Hwy. 401 and the new Westbound Hwy. 2A will be at about elevations 392 and 365, respectively. Such grades will require approach fills up to 20 ft. in height above the ground surface, and approach cuts of up to 18 ft. in depth.

The subsoil at this site is a glacial till consisting predominantly of a granular type of material with random cohesive zones and extending to a depth of at least 30 ft. below the ground surface. In view of the competent nature of the subsoil, the structure may be supported on spread footing type foundations.

The proposed piers may be supported on spread footings located within the glacial till deposit at a minimum depth of 4 ft. below the finished grade of the Westbound Hwy. 2A - i.e., at or below elevation 361, in order to satisfy the frost protection requirements. Such footings may be designed for a safe allowable bearing pressure of 5 TSF. It is recommended that a working slab of lean concrete be poured when the excavation base levels are reached in order to prevent deterioration of the glacial till stratum at the footing formation level.

The proposed abutments will be 'perched' within the approach fills. These may be supported on spread footings founded within a zone of well-compacted granular fill using a safe bearing pressure of 2 TSF. The fill material below the tops of the footings should consist of well-compacted G.B.C. Class 'A' material and should extend for a horizontal distance of at least 10 ft. from the footing edges in the plane of the footing tops. This portion of the

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

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

6.2.2) Structure at Crossing of Hwy. 401 Revision and Westbound Lanes of New Hwy. 2A - (cont'd.) ...

fill should be built with side slopes of 2:1. The remainder of the fill should be completed to about profile grade for a distance of about 50 ft. behind the abutments before re-excavating for the abutment footings.

Alternatively, the abutments may be supported on end-bearing steel H-piles driven to practical refusal within the glacial till stratum to an estimated pile tip elevation of 365. It should be noted that the piles for the northern portion of the west abutment may encounter practical refusal at a higher elevation (estimated tip elevation of 375). The maximum allowable load for the particular steel H-pile section chosen may be used for design purposes. Care should be taken to ensure that rock or bouldery fill is not placed within the plan limits of the piles.

6.2.3) Dewatering of Footing Excavations -

As discussed previously, the glacial till at this site is predominantly granular in nature, consisting of a heterogeneous mixture of silt, sand and occasional gravel with random zones of a cohesive mixture of clayey silt, sand and occasional gravel. Excavations carried out within this granular type of deposit below the prevailing groundwater level, may be susceptible to "boiling" and a dewatering scheme may be required. Boiling of the excavations may be prevented by temporarily lowering the prevailing groundwater level to below the base level of the footings by the use of vacuum wellpoints, or by any other suitable dewatering scheme.

6.3) Approaches:

As mentioned earlier, the approach cuts for the reconstructed Hwy. 2 and the new Westbound lanes of Hwy. 2A, will be about 13 to 18 ft. in depth at the respective structure locations. The approach

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

6.3) Approaches: (cont'd.) ...

fills for the revised Hwy. 401 will vary in height between 15 and 20 ft.

The approach cuts will be made through the predominantly granular type of glacial till deposit, which is particularly susceptible to erosion. Cuts through this material should, therefore, be constructed with standard 2:1 slopes and covered with an adequate cover of topsoil and either seeded or sodded. The approach fills should also be constructed with standard 2:1 slopes.

The existing groundwater level is situated some 3 to 9 ft. above the base of the proposed approach cuts; seepage through, and surficial sloughing of the glacial till material can, therefore, be expected when the excavation bottom is taken below the prevailing groundwater level. However, this problem will be of a temporary nature, since the overall excavation will result in a general lowering of the groundwater level across the site.

7. MISCELLANEOUS:

The field work for this project was carried out during the period of June 5 - July 30, 1969, by Messrs. V. Korlu, Project Foundation Engineer, R. Szymanski, and H. Delamarre (student).

The equipment used was owned and operated by Dominion Soil Investigation Ltd.

This report was prepared by Mr. C. Mirza, Project Foundation Engineer.

The entire project was under the general supervision of Mr. M. Devata, Supervising Foundation Engineer, who also reviewed the report.

September 1969

APPENDIX I.

FOUNDATION SECTION

ORIGINATED BY HS

COMPILED BY CM

CHECKED BY

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT					LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w			BULK DENSITY γ P.C.F.	REMARKS		
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F.					WATER CONTENT %						
							<div><div>○ UNCONFINED</div><div>● QUICK TRIAXIAL</div><div>+ FIELD VANE</div><div>x LAB. VANE</div></div>					<div><div>w_p</div><div>w</div><div>w_L</div></div>						
							20	40	60	80	100	10	20	30	GR.	SA.	SI.	CL.
376.1	Ground Level																	
374.1	Topsoil & Fill Material	X																
2.0	Compact - Very Dense or V.Stiff - Hard Mottled Brown		1	SS	21"													10 33 42 15
368.1			2	SS	11"	370												2370.1
8.0	Glacial Till Het.mix.of silt,sand & occ. gravel.		3	SS	100 1/2"													7 39 47 7
			4	SS	100 1/4"													
	Very dense with zones of cohesive mixture of clayey silt,sand & occ.gravel.		5	SS	100 1/2"	360												1 40 49 10
			6	SS	100 1/2"													
	Hard		7	SS	65 7 10"	350												3 45 43 9
345.8	Gray		8	SS	100 1/4"													
30.3	End of Borehole																	
						340												


SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION	RESISTANCE	LIQUID LIMIT ——— w _L	BULK DENSITY Y P.C.F.	REMARKS	
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT		PLASTIC LIMIT ——— w _p			WATER CONTENT ——— w
							20	40	60			80
371.3	Ground Level											
369.3	Topsoil	~				370						
2.0	Compact-Very Dense or Very stiff - Hard	/	1	SS	20							
364.0	Mottled Brown	/	2	SS	100/5"							
7.3	Glacial Till	/	3	SS	100/5"						22 48 28 2	
	Het.mix.of silt,sand & occasional gravel	/	4	SS	100/4"	360					<u>2</u>	
	Very dense	/	5	SS	100/6"							
	with zones of cohesive mixture of clayey silt, sand & occ. gravel	/	6	SS	100/5"	350					11 37 38 12	
	Hard	/	7	SS	100/5"							
340.6	Grey	/	8	SS	100/2"							
30.7	End of Borehole					340						

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 3

FOUNDATION SECTION

JOB 69-F-48 LOCATION Co-ords. 15,913,542 N; E 1,092,300 ORIGINATED BY VK
 W.P. 28-67-03 BORING DATE June 9, 1969 COMPILED BY CM
 DATUM Geodetic BOREHOLE TYPE Washboring-NX Casing; Cone CHECKED BY Q/R

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w			BULK DENSITY γ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FOOT		SHEAR STRENGTH P.S.F.		WATER CONTENT % 10 20 30				
							○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE						
384.1	Ground Level												
382.1	Topsoil	22											
2.0	Very dense or Hard		1	SS	60	380							381.6
	Mottled Grey-Brown		2	SS	175								
374.6			3	SS	100/6"								
9.5	Glacial Till		4	SS	160/10"								6 38 49 7
	Det. mix. of silt, sand & occasional gravel		5	SS	100/4"	370							
	Very dense		6	SS	100/5"								22 56 19 3
	with zones of cohesive mixture of clayey silt, sand & occ. gravel		7	SS	100/5"	360							
	Hard		8	SS	100/2"								
353.8	Grey												
30.3	End of Borehole					350							

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 6

FOUNDATION SECTION

JOB 69-F-48 LOCATION Co-ords. 15,913,592 N; E 1,092,612 ORIGINATED BY HD
W.P. 28-67-03 BORING DATE July 29-30, 1969 COMPILED BY CM
DATUM Geodetic BOREHOLE TYPE Washboring-NX & BX Casing; Cone CHECKED BY W.R.

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					WATER CONTENT %				
							20	40	60	80	100	w_p	w	w_L		
							SHEAR STRENGTH P.S.F.									

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 9

FOUNDATION SECTION

JOB 69-F-48

LOCATION Co-ords. 15,913,625 N; 1,091,930 E.

ORIGINATED BY HD

W.P. 28-67-02

BORING DATE July 24, 1969

COMPILED BY CN

DATUM Geodetic

BOREHOLE TYPE Washboring-NX & BX Casing; Cone

CHECKED BY 9/2

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT — w_L		BULK DENSITY γ	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT	WATER CONTENT — w	WATER CONTENT — w	WATER CONTENT — w		
390.8	Ground Level											
389.3	Topsoil					390						
1.9												
	Mottled Brown		1	SS	58							
381.8			2	SS	85							
9.0	Glacial Till		3	SS	45	380						
	Het. mix. of silt, sand & occ. gravel		4	SS	24							
	Compact - Very dense		5	SS	82							
	with zones of cohesive		6	SS	100/3"	370						
	mix. of clayey silt, sand and occasional gravel		7	SS	100/3"							
	Very stiff - Hard		8	SS	100/3"							
360.0	Grey		9	SS	100/3"	360						
30.8	End of Borehole											
						350						

FOUNDATION SECTION

ORIGINATED BY ED

COMPILED BY CN

CHECKED BY *[Signature]*

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE	Liquid Limit — w_L	BULK DENSITY	REMARKS	
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT	PLASTIC LIMIT — w_p			P.C.F.
							20 40 60 80 100	WATER CONTENT — w			
							SHEAR STRENGTH P.S.F.	w_p — w_L	WATER CONTENT %		
							○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE		10 20 30		
389.6	Ground Level										
0.0	Fill Material	X									
386.6											
3.0	Mottled Brown	Hatched	1	SS	7 1/4"			○	I		
382.1			2	SS	100 1/4"					No recovery	
7.5	Glacial Till	Hatched	2	SS	1 1/4"	380		○	I	9 45 35 11	
	Fat. mix. silt, sand & occ. gravel	Hatched	3	SS	70"						
	Dense - Very dense	Hatched	4	SS	33"			○	I	10 34 42 14	
	with zones of cohesive	Hatched				370					
	mix. of clayey silt, sand	Hatched	5	SS	10"						
	and occasional gravel	Hatched	6	TN	1 1/4"						
	Stiff - Hard	Hatched	7	SS	176 1/2"	360				No recovery	
		Hatched	8	SS	100 1/2"						
		Hatched	9	SS	100 7/8"					No recovery	
354.1	Grey										
35.5	End of Borehole										
						350					

FOUNDATION SECTION

JOB	65-F-48	LOCATION	Co-ords. N 15,913,685; E 1,092,145	ORIGINATED BY	VK
W.P.	28-67-02	BORING DATE	June 5, 1969	COMPILED BY	CM
DATUM	Geodetic	BOREHOLE TYPE	Washboring-NX Casing; Cone	CHECKED BY	<i>[Signature]</i>

SOIL PROFILE		STRAT. PLOT	SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE - BLOWS / FOOT 20 40 60 80 100	LIQUID LIMIT ——— w _L PLASTIC LIMIT ——— w _p WATER CONTENT ——— w	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		
397.3	Ground Level									
0.0	Fill Material	[Cross-hatched]								
383.3			1	SS	57					
4.0	Very dense or Hard	[Diagonal lines \]	2	SS	65	380				
	Mottled Brown	[Diagonal lines /]	3	SS	100/6"					
375.3			4	SS	100/6"					
12.0	Glacial Till	[Diagonal lines \]	5	SS	100/6"	370				
	Het. mix. of silt, sand & occ. gravel with zones of cohesive mix of clayey silt, sand & occasional gravel	[Diagonal lines /]	6	SS	150					
			7	SS	100/6"	360				
356.8	Grey	[Diagonal lines \]	8	SS	100/6"					
30.5	End of Borehole					350				

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 1

FOUNDATION SECTION

JOB 69-F-18 LOCATION Co-ords. 15,913,552 N; 1,091,855 E. ORIGINATED BY HD
 W.P. 28-67-02 BORING DATE July 29, 1969 COMPILED BY HD
 DATUM Geodetic BOREHOLE TYPE Dynamic Cone Penetration CHECKED BY HL

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT — w_L		BULK DENSITY	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLT	NUMBER	TYPE	BLOWS/FOOT		BLOWS / FOOT	20	40	60	80	100	PLASTIC LIMIT — w_p		
389.0	Ground Level						SHEAR STRENGTH P.S.F.					WATER CONTENT — w			
0.0							○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE					w_p — w — w_L WATER CONTENT %		Y	
383.2														P.C.F.	GR. SA. SI. CL.
5.8	End of Cone Test					380									Practical refusal

FOUNDATION SECTION

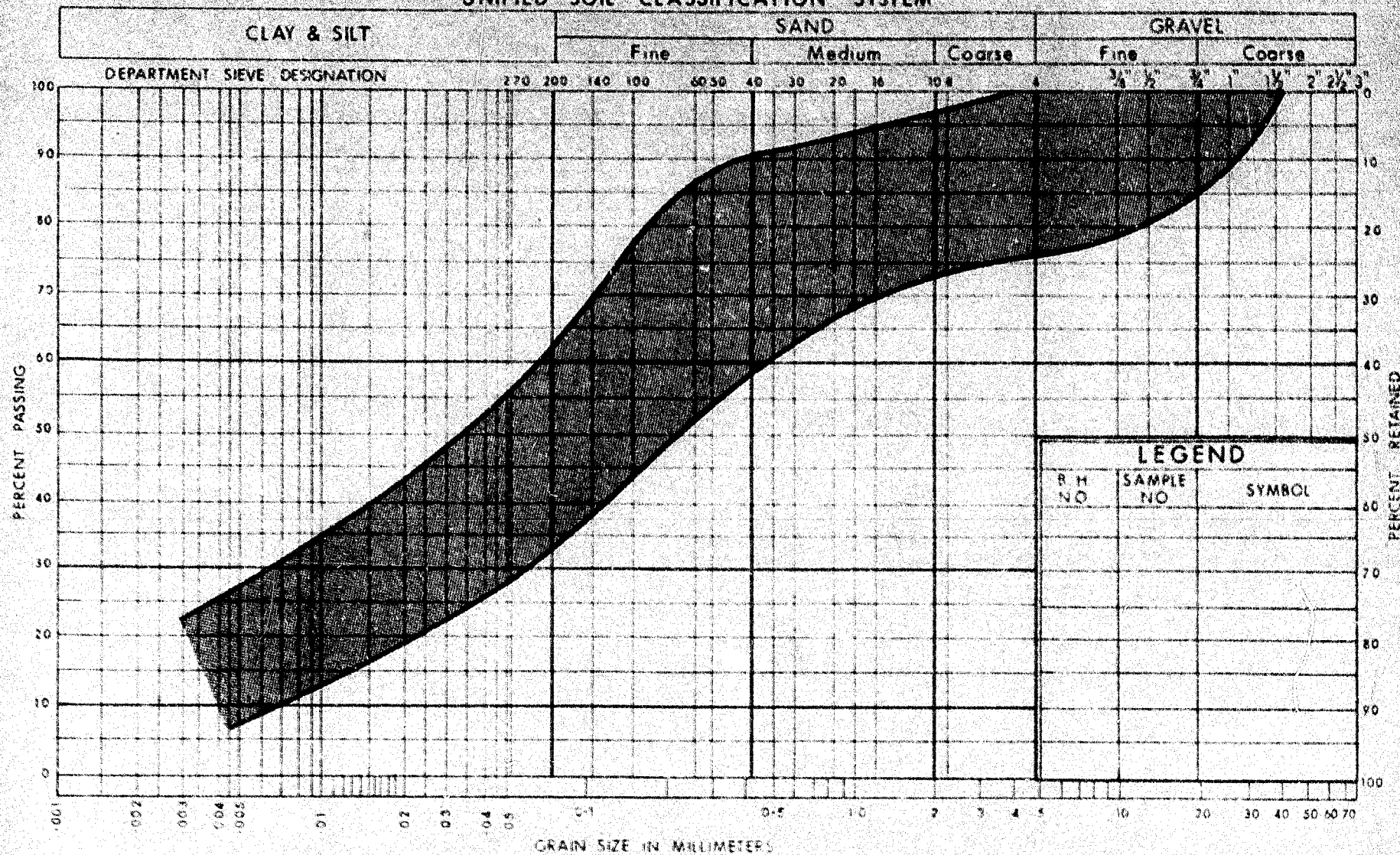
ORIGINATED BY HD

COMPILED BY HD

CHECKED BY

SOIL PROFILE			SAMPLES			DYNAMIC PENETRATION BLOWS / FOOT	RESISTANCE	LIQUID LIMIT ——— w_L	PLASTIC LIMIT ——— w_p	WATER CONTENT ——— w	BULK DENSITY γ	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT	ELEV. SCALE	SHEAR STRENGTH P.S.F.	w_p	w	w_L	P.C.F.	GR, SA, SI, CL
							O UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE					
387.0	Ground Level											
0.0												
382.2												
4.8	End of Cone Test					380						Practical refusal

UNIFIED SOIL CLASSIFICATION SYSTEM



LEGEND

B. H. NO.	SAMPLE NO.	SYMBOL



DEPARTMENT OF HIGHWAYS
MATERIALS and
TESTING
DIVISION

GRAIN SIZE DISTRIBUTION GLACIAL TILL

W.P. No. 28-67 02&03

JOB No. 69-F-48

FIGURE 1

ABBREVIATIONS USED IN THIS REPORT

PENETRATION RESISTANCE

STANDARD PENETRATION RESISTANCE 'N' :- THE NUMBER OF BLOWS REQUIRED TO ADVANCE A STANDARD SPLIT SPOON SAMPLER 12 INCHES INTO THE SUBSOIL, DRIVEN BY MEANS OF A 140 POUND HAMMER FALLING FREELY A DISTANCE OF 30 INCHES.

DYNAMIC PENETRATION RESISTANCE :- THE NUMBER OF BLOWS REQUIRED TO ADVANCE A 2 INCH, 60 DEGREE CONE, FITTED TO THE END OF DRILL RODS, 12 INCHES INTO THE SUBSOIL. THE DRIVING ENERGY BEING 350 FOOT POUNDS PER BLOW.

DESCRIPTION OF SOIL

THE CONSISTENCY OF COHESIVE SOILS AND THE RELATIVE DENSITY OR DENSENESS OF COHESIONLESS SOILS ARE DESCRIBED IN THE FOLLOWING TERMS :-

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

TYPE OF SAMPLE

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

SOIL TESTS

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

ABBREVIATIONS USED IN THIS REPORT

SOIL PROPERTIES

γ	UNIT WEIGHT OF SOIL (BULK DENSITY)
γ_s	UNIT WEIGHT OF SOLID PARTICLES
γ_w	UNIT WEIGHT OF WATER
γ_d	UNIT DRY WEIGHT OF SOIL (DRY DENSITY)
γ'	UNIT WEIGHT OF SUBMERGED SOIL
G	SPECIFIC GRAVITY OF SOLID PARTICLES $G = \frac{\gamma_s}{\gamma_w}$
e	VOID RATIO
n	POROSITY
w	WATER CONTENT
S_r	DEGREE OF SATURATION
w_L	LIQUID LIMIT
w_p	PLASTIC LIMIT
I_p	PLASTICITY INDEX
s	SHRINKAGE LIMIT
I_L	LIQUIDITY INDEX = $\frac{w - w_p}{I_p}$
I_c	CONSISTENCY INDEX = $\frac{w_L - w}{I_p}$
e_{max}	VOID RATIO IN LOOSEST STATE
e_{min}	VOID RATIO IN densest STATE
I_D	DENSITY INDEX = $\frac{e_{max} - e}{e_{max} - e_{min}}$
	RELATIVE DENSITY D_r IS ALSO USED
h	HYDRAULIC HEAD OR POTENTIAL
q	RATE OF DISCHARGE
v	VELOCITY OF FLOW
i	HYDRAULIC GRADIENT
k	COEFFICIENT OF PERMEABILITY
j	SEEPAGE FORCE PER UNIT VOLUME
m_v	COEFFICIENT OF VOLUME CHANGE = $\frac{-\Delta e}{(1+e)\Delta\sigma}$
c_v	COEFFICIENT OF CONSOLIDATION
C_c	COMPRESSION INDEX = $\frac{\Delta e}{\Delta \log_{10} \sigma}$
T_v	TIME FACTOR = $\frac{c_v t}{d^2}$ (d, DRAINAGE PATH)
U	DEGREE OF CONSOLIDATION
τ_f	SHEAR STRENGTH
c'	EFFECTIVE COHESION INTERCEPT
ϕ'	EFFECTIVE ANGLE OF SHEARING RESISTANCE, OR FRICTION
c_u	APPARENT COHESION
ϕ_u	APPARENT ANGLE OF SHEARING RESISTANCE, OR FRICTION
μ	COEFFICIENT OF FRICTION
S_t	SENSITIVITY

GENERAL

π	3.1416
e	BASE OF NATURAL LOGARITHMS 2.7183
$\log_e \sigma$ 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
$\bar{\sigma}$	NORMAL EFFECTIVE STRESS ($\bar{\sigma}$ IS ALSO USED)
τ	SHEAR STRESS
ϵ	LINEAR STRAIN
γ	SHEAR STRAIN
ν	POISSON'S RATIO (μ IS ALSO USED)
E	MODULUS OF LINEAR DEFORMATION (YOUNG'S MODULUS)
G	MODULUS OF SHEAR DEFORMATION
K	MODULUS OF COMPRESSIBILITY
η	COEFFICIENT OF VISCOSITY

EARTH PRESSURE

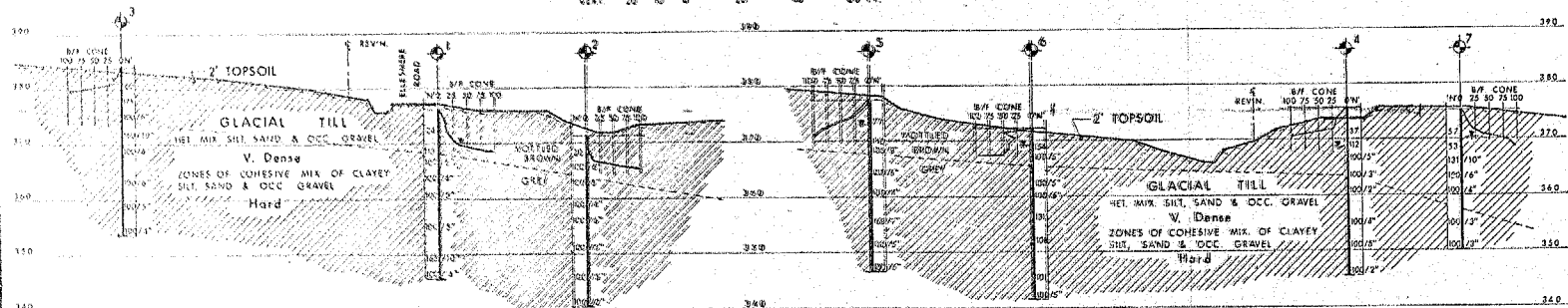
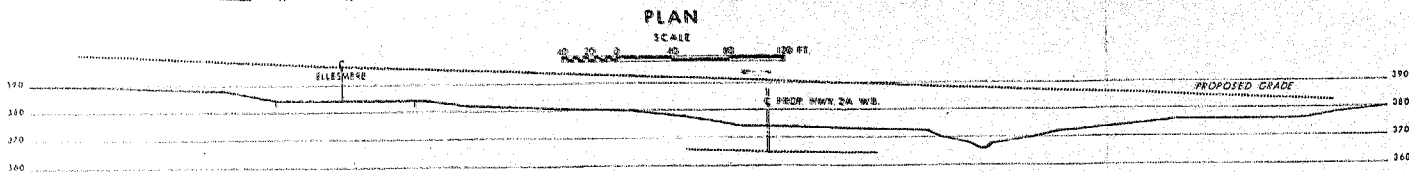
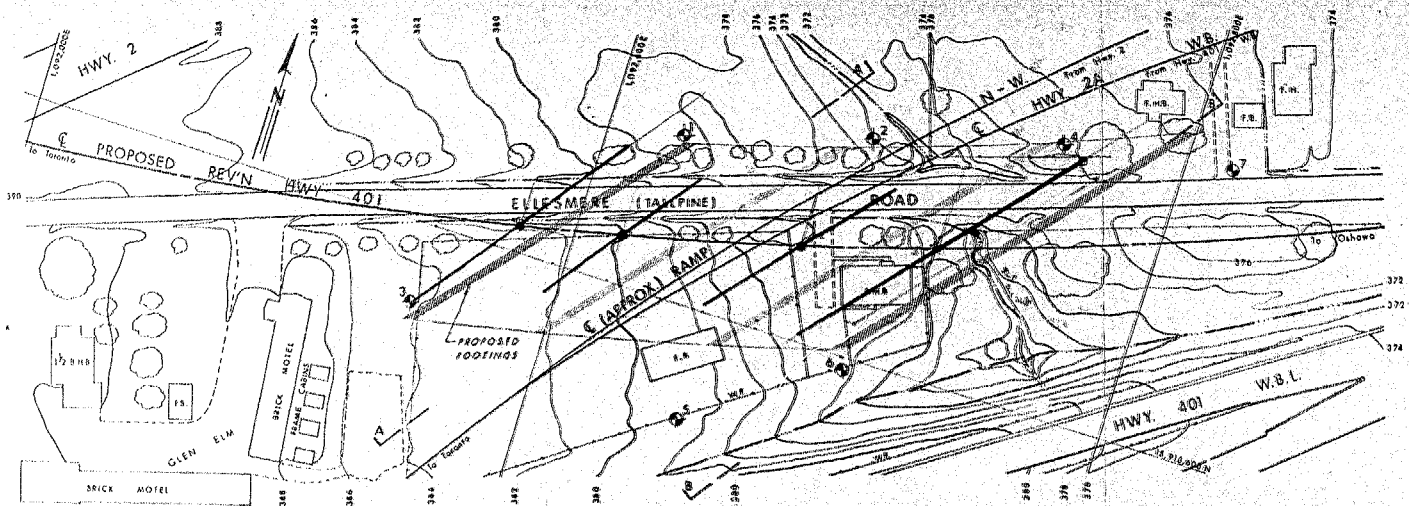
d	DISTANCE FROM TOP OF WALL TO POINT OF APPLICATION OF PRESSURE
δ	ANGLE OF WALL FRICTION
K	DIMENSIONLESS COEFFICIENT TO BE USED WITH VARIOUS SUFFIXES IN EXPRESSIONS REFERRING TO NORMAL STRESS ON WALLS
K_0	COEFFICIENT OF EARTH PRESSURE AT REST

FOUNDATIONS

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

SLOPES

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



LEGEND

- Bore Hole
- Cone Penetration Hole
- Dare & Cone Penetration Hole
- Water Levels established at time of field investigation, JULY 1969

NO.	ELEVATION	EASTING	NORTHING
1	376.1	15,913.718	1,092.454
2	371.3	" 757	" 583
3	384.1	" 542	" 300
4	375.9	" 766	" 713
5	377.2	" 520	" 510
6	372.4	" 592	" 612
7	375.2	" 614	" 833

- 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.

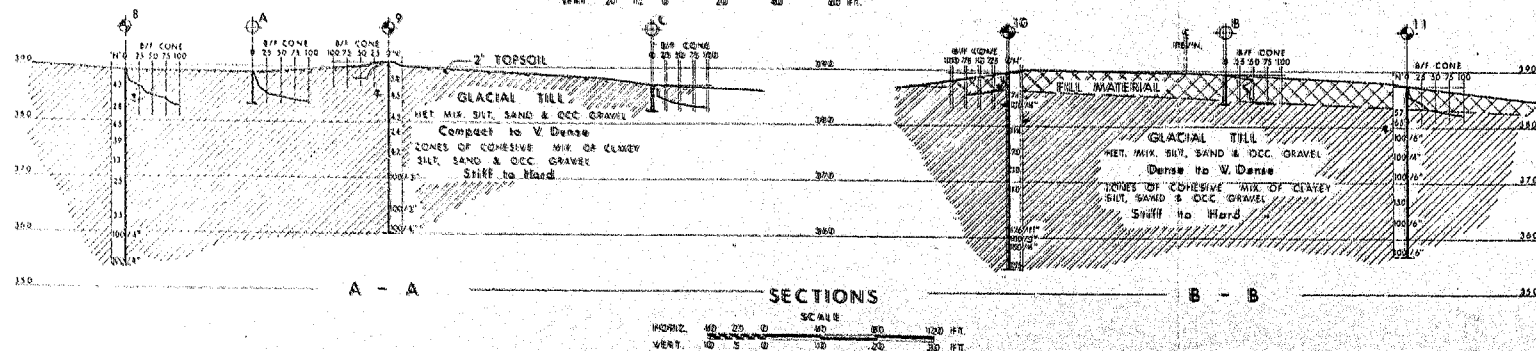
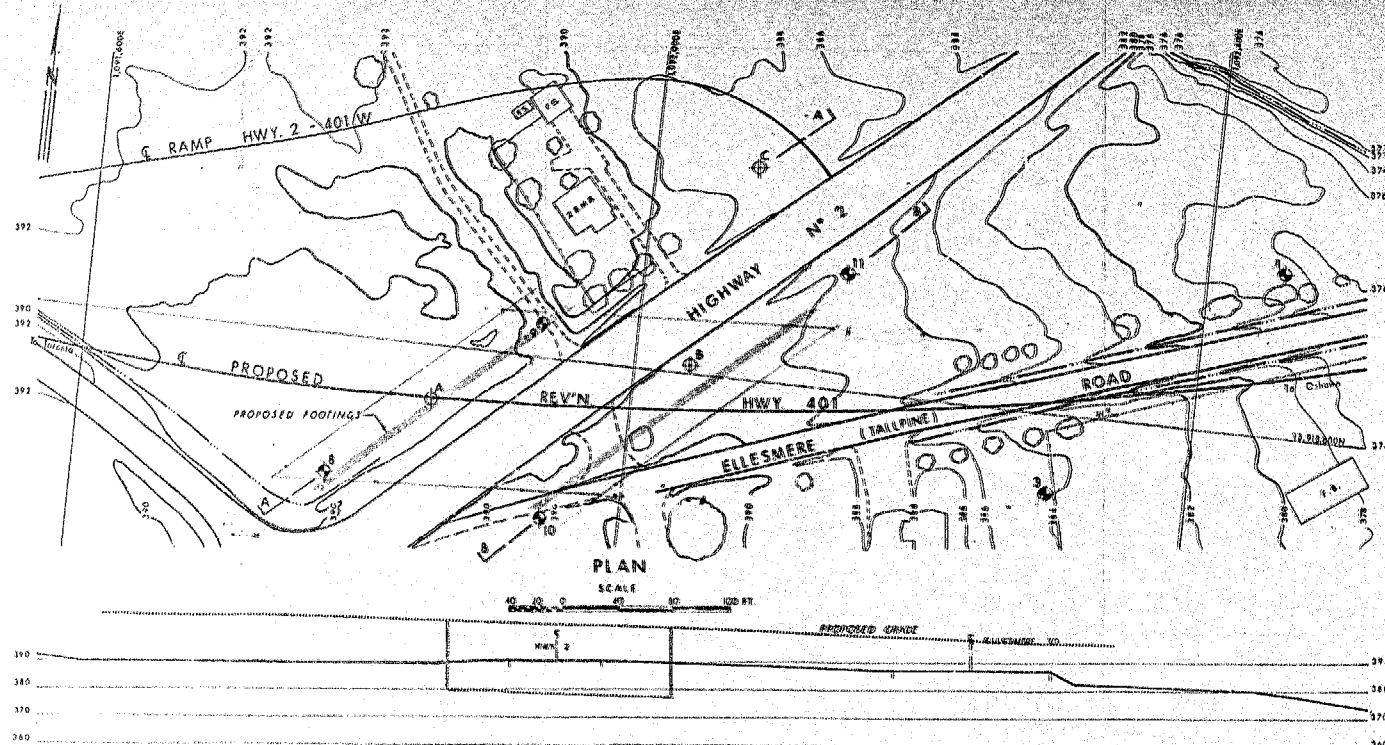
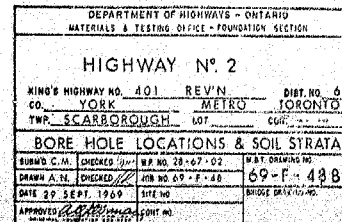
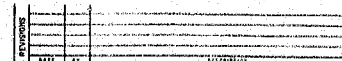
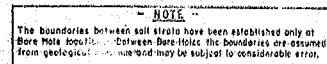
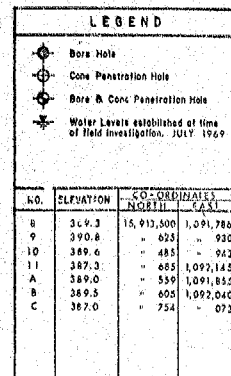
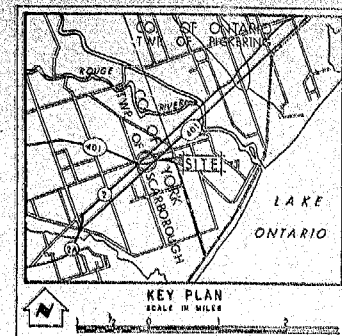
EXTENDING	DATE	BY	DESCRIPTION

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

HIGHWAY No. 2A W.B.

KING'S HIGHWAY No. 401 REV'N DIST. No. 6
CO. YCRK METRO TORONTO
TWP. SCARBOROUGH LOT CON.

BORE HOLE LOCATIONS & SOIL STRATA
SHOWN C.M. CHECKED W.P. No. 28-A7-03 W.B. DRAWING NO.
DRAWN A.M. CHECKED JOR No. 69-F-48 69-F-48A
DATE SEPT. 25, 1969 SITE NO. BRIDGE DRAWING NO.
APPROVED [Signature] ENGINEER, FORT NO.



MEMORANDUM

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

FROM: C.S. Grebski,
Bridge Office

ATTENTION:

DATE: October 9, 1970

OUR FILE REF.

IN REPLY TO

SUBJECT:

Bridge No. 5
Rouge River Bridge
W.P. 28-67-7, Site 22-161
Highway 401, District 6

69-1050-1

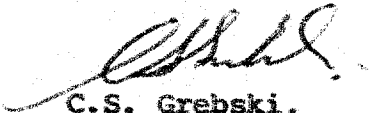
Attached herewith we are submitting the final bridge drawings which show the foundation design for this structure.


Kindly give us your comments at your earliest convenience.

CSG:rd

Attach.

c.c. Foundation Office


C.S. Grebski,
Bridge Design Engineer


Comments
made
Oct 27/70

Department of Highways Ontario

Copy for the information of

Foundation Office

~~Mr. A. Stenno,~~

Principal Foundation Engineer,
Room 107, Lab. Bldg.

C.S. Grebski,
Bridge Office

October 28, 1970

Bridge #3
Hwy. 401/Hwy. 2A Interchange
W.P. 28-67-3, Site No. 37-903
District No. 6

69-F-48A

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

Kindly give us your comments at your earliest
convenience.

CSG:rd

C.S. Grebski,
Bridge Design Engineer

Attach.

c.c. Foundation Office

HL
Dwg.
69-F-48A

MEMORANDUM

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

FROM: C.S. Grebski,
Bridge Office

ATTENTION:

DATE: October 27, 1970

OUR FILE REF.

IN REPLY TO

SUBJECT: Retaining Wall Nos. 2,3,4 and 5
Hwy. 401 & Hwy. 2 Interchange
W.P. 28-67-6, Site No. 37
District No. 6

69-F-48B
28-67-6
69-F-48B

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

Comments made Oct 28/70
MR.

no drawings done to cover Retaining Walls.
Refer to Log. 69-F-48B Bridge No. 2.
MR.

MEMORANDUM

TO: Mr. M. Devata,
Supervising Foundation Engineer,
Foundation Section,
Lab. Building

FROM: H.S. Bawcutt,
Bridge Office

ATTENTION:

DATE: November 6, 1970

OUR FILE REF.

IN REPLY TO

65-F-48

SUBJECT: Retaining Walls @ 401 & 2 Interchange
W.P. 28-67-6, Site 37, District 6

Further to your letter dated November 3, 1970, concerning the above retaining walls, we have lowered the footing of Wall #3 to elev. 381.00 as requested.

We confirm that all the timber piles supporting the north and south perched parapet walls have been lengthened by 5'-0" to ensure that they extend below the existing ground level.

Thank you for drawing these points to our attention.

H.S. Bawcutt

H.S. Bawcutt,
Regional Bridge Project Technologist

HSB:rd

DEPARTMENT OF HIGHWAYS ONTARIO

MEMORANDUM

To: Mr. C. S. Grebski,
Bridge Design Engineer,
Bridge Office,
Admin. Bldg.

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

ATTENTION

DATE: November 5, 1970

OUR FILE REF.

IN REPLY TO

SUBJECT:

Bridge #3 --
Hwy. 401/Hwy. 2A Interchange
W.P. 28-67-3, Site 37-903, W.J. 69-F-48,
District No. 6 (Toronto) --

We have reviewed the Final Bridge Drawings D-6811-1 & 2 for the above mentioned structure and submit the following comments:

It appears from the drawings, the East abutment footing base in the central portion, will be located above the existing ground surface and elsewhere within the competent glacial till stratum.

In view of this, it is recommended that the topsoil in the central portion of the abutment footing be excavated to its full depth, and the low-lying area should be brought up to the footing formation level with lean concrete.

MD/MdeP

M. Devata
M. Devata,
SUPERVISING FOUNDATION ENGR.
For:
A. G. Sternac,
PRINCIPAL FOUNDATION ENGR.

cc: Messrs. S. McComble
G. C. E. Burkhardt
Foundations Files
Gen. Files

MEMORANDUM

Mr. C. S. Grebski,
Bridge Design Engineer,
Bridge Office,
Admin. Bldg.

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

ATTENTION:

DATE: November 3, 1970

OUR FILE REF.

IN REPLY TO

SUBJECT:

Retaining Wall Nos. 2, 3, 4, & 5
Hwy. #401 & Hwy. #2 Interchange
W.P. 28-67-6 -- Site No. 37
District No. 6 (Toronto)
-- W.O. 69-11048 --

We have reviewed the Final Bridge Drawings D-6918-1, 2, & 4 for the above mentioned structures, and submit the following comments:

1) Retaining Wall #3 -

It is recommended that the footing at the east end of the retaining wall should be lowered at least to elev. 381, in order to locate the entire foundation on, or within the competent glacial till stratum.

11) North Perched Parapet Wall (Panels N2, N3, N4, & N5)
and South Perched Parapet Wall (All panels) -

According to the design Drawing D-6918-4, it appears that the piles at the above mentioned locations will terminate within fill material. Since there will be some settlements within the fill material, these short piles will also move accordingly. Therefore, it is our recommendation that these piles should extend at least 5 ft. below the existing ground surface.

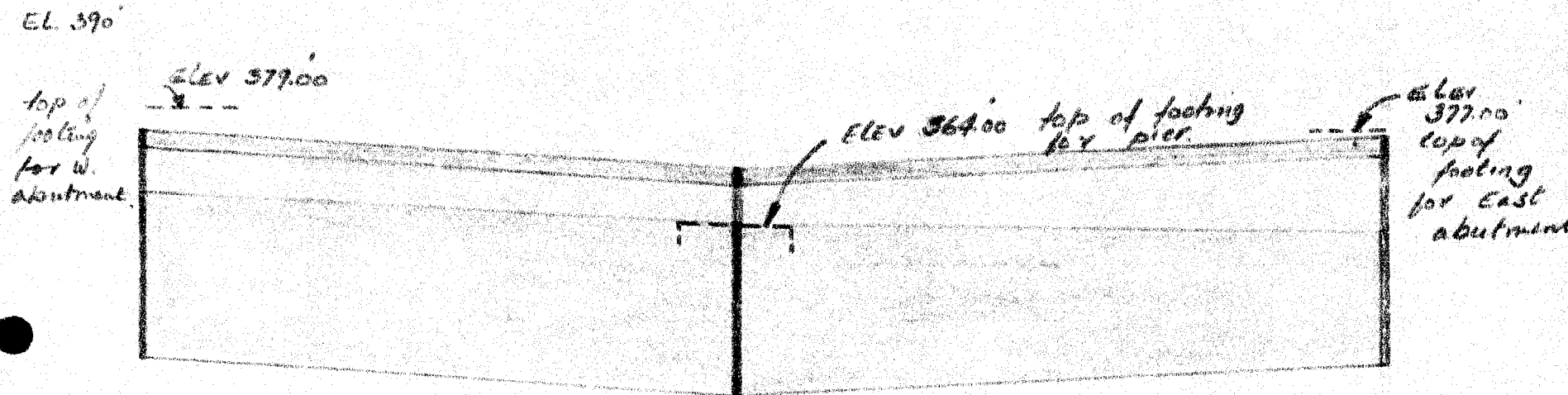
MD/MdeP

cc: Messrs. S. McCombie
G. C. E. Burkhardt
Foundations Files
Gen. Files

M. Devata
M. Devata,
SUPERVISING FOUNDATION ENGR.
For:
A. G. Stermac,
PRINCIPAL FOUNDATION ENGR.

CHECKING DESIGN

ON 69-F-48
HWY 401 & HWY 2A INTERCHANGE



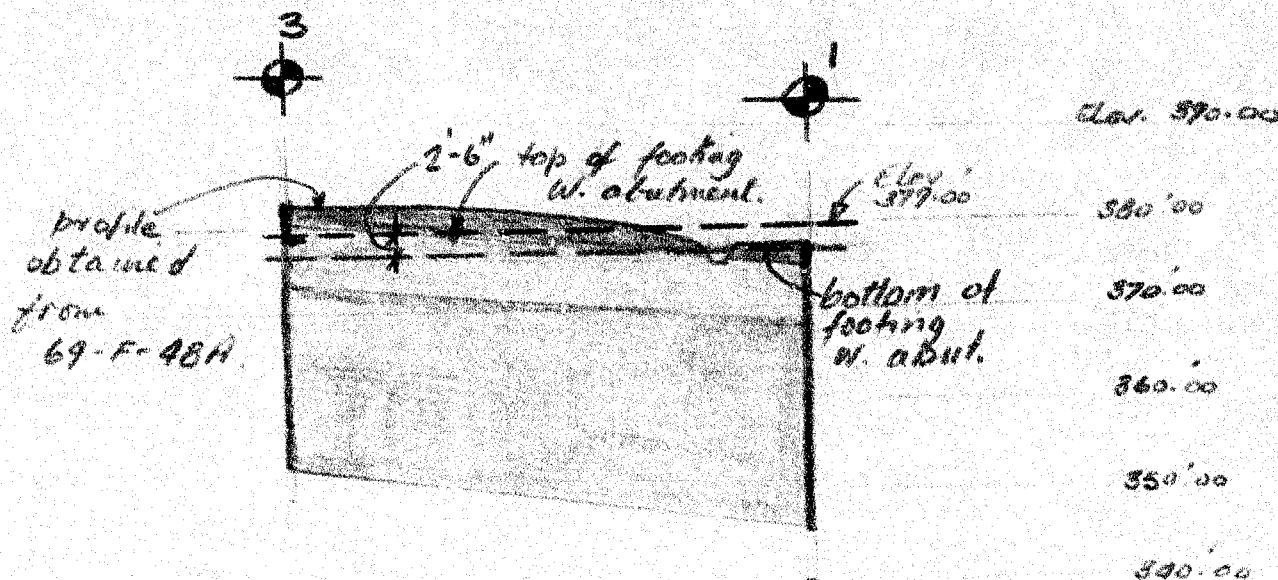
Date: May 26, 1970

CHECKING DESIGN

ON 69-F-48

HWY 401 & HWY 2A INTERCHANGE

Date: May 26, 1970



	FILL
	TOPSOIL
	DENSE - VERY STIFF - HARD - MOTTLED BROWN
	GLACIAL TILL COMPACT - VERY DENSE WITH ZONES OF COARSE MIXTURE OF CLAYEY SILT SAND & OR GRAVEL STIFF HARD, GREY.

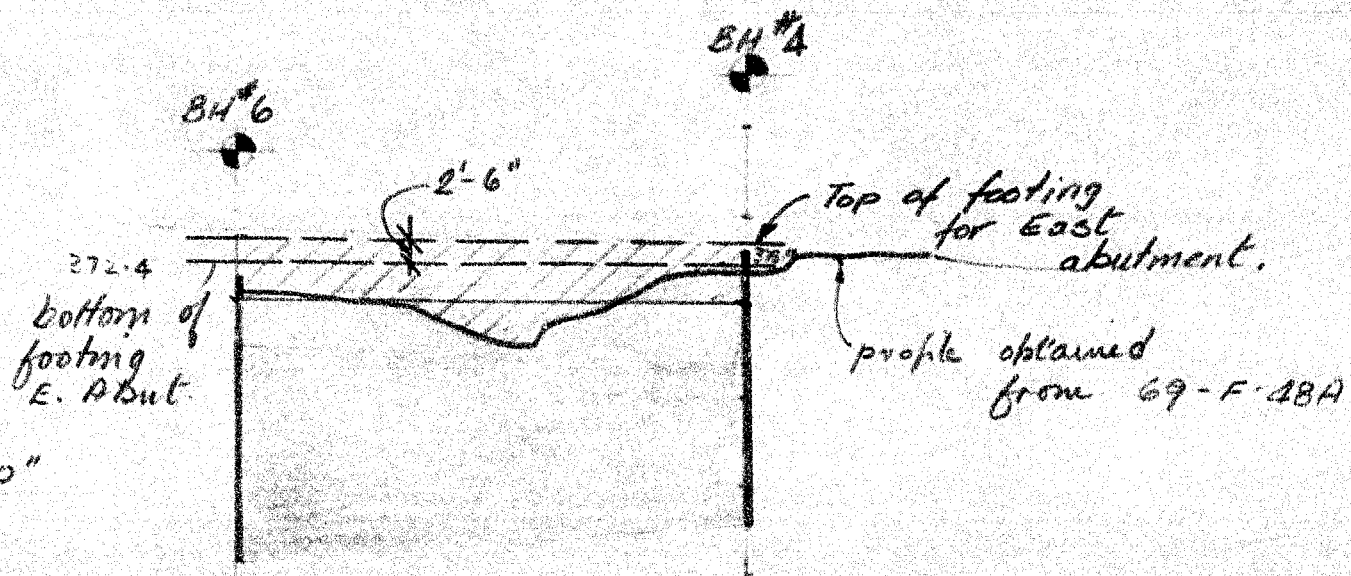
CHECKING DESIGN

ON 69-F-48

HWY 401 / HWY 2A INTERCHANGE.

DATE: May 25, 1970

70.0



SCALE 1" = 20'-0"

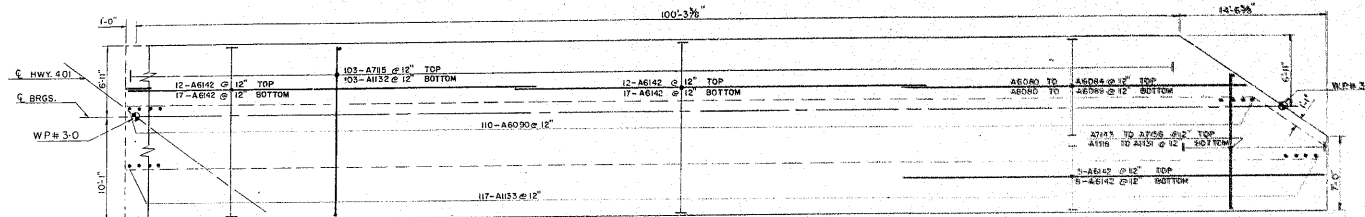
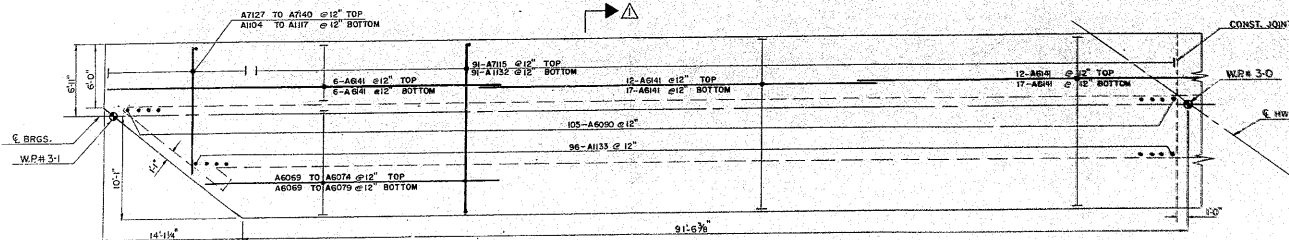
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W.P. 28-67-02-03 AND 06

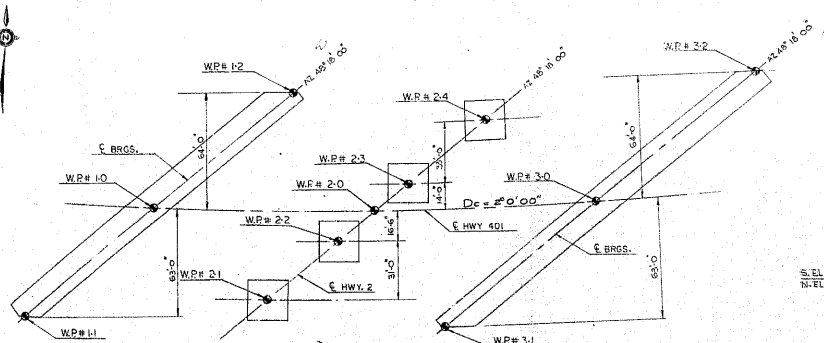
RECONSTRUCTED

H.W.Y. [#]401 - H.W.Y. [#]2 AND

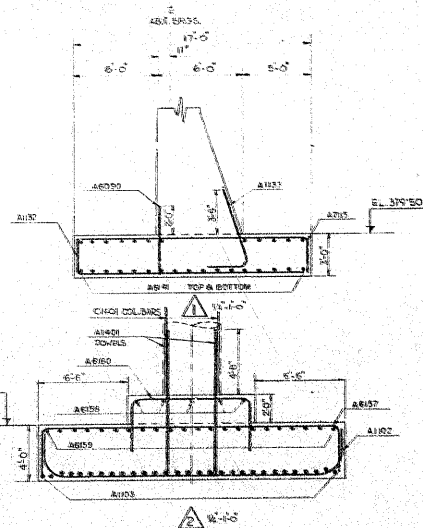
NEW H.W.Y. [#]2-A.



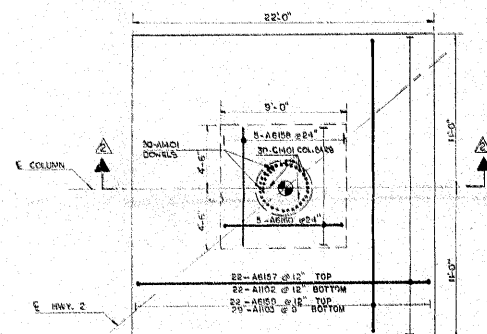
EAST ABUTMENT FOOTING
SCALE 3/16" = 1'-0"



LAYOUT OF W.P.S.
N.T.S.



W.R.#	STATION ON HWY 401	LOCATION OF W.R.S	
		CO-ORDINATES	
		N.	E.
1.0	719 + 25.58	913565.32	91829.77
2.0	720 + 46.58	913569.07	91849.70
3.0	721 + 66.58	913577.84	92065.37
1.1	718 + 56.90	913502.45	91759.21
1.2	720 + 52.77	913531.07	91903.57
2.1	719 + 59.99	913519.17	91893.69
2.2	720 + 26.20	913551.59	91930.08
2.3	720 + 64.20	913584.02	91956.48
2.4	721 + 07.00	913619.73	92006.56
3.1	720 + 54.28	913508.42	91891.46
3.2	722 + 57.65	913651.33	92181.86



COLUMN FOOTING
SCALE 3/4" = 1'-0"

REVISIONS	DATE	BY	DESCRIPTION

DEPARTMENT OF HIGHWAYS ONTARIO
BRIDGE DIVISION

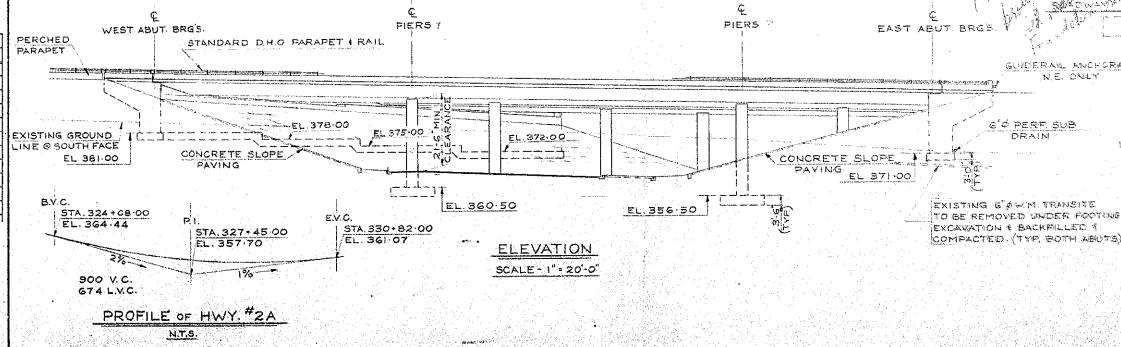
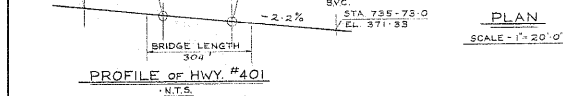
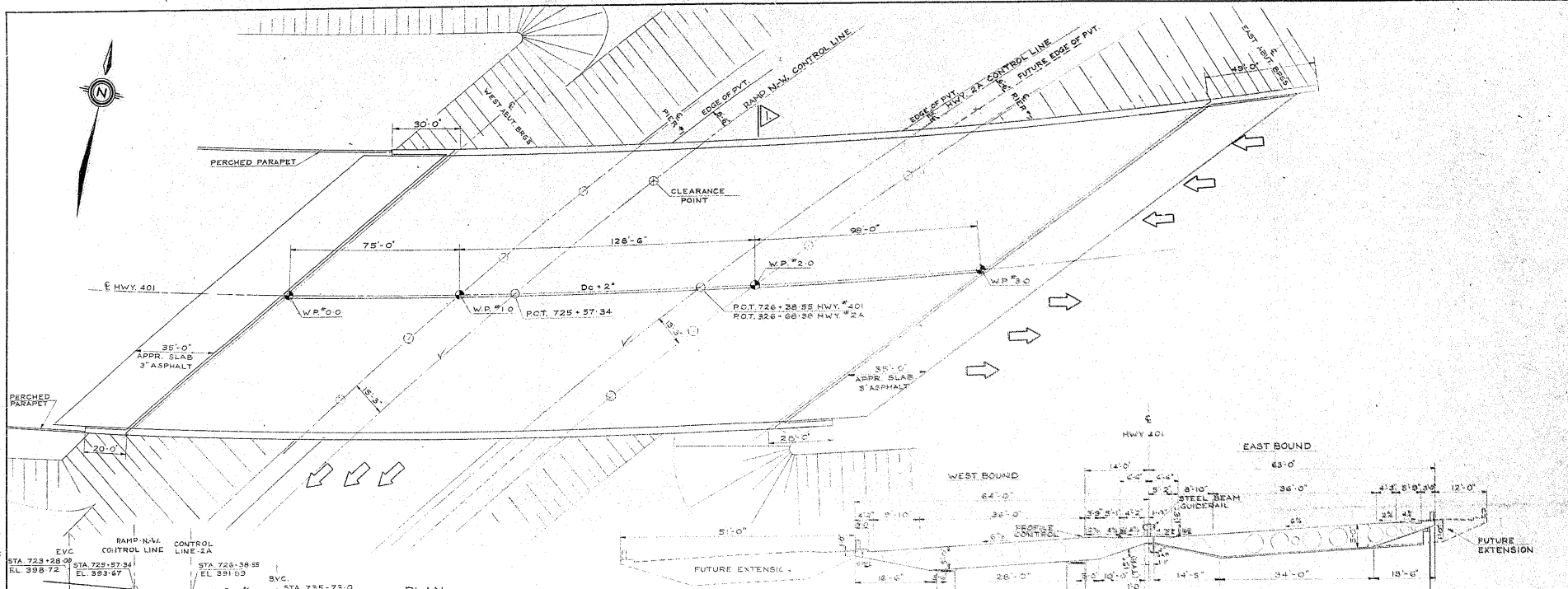
BRIDGE #2
HWY 401 HWY 2 INTERCH. "E"

KING'S HIGHWAY No. 401 DIST. No. 6
CO. YORK
TWP. SCARBOROUGH LOT CON.

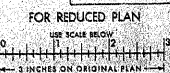
FOOTINGS-DIMENSIONS & REINFORCING (EAST SIDE)

APPROVED: [Signature] DATE: 10/27/70
DESIGNED: W.K.A. CHECKED: [Signature]
DRAWING: [Signature] NO. 06810-2

FOR REDUCED PLAN
USE SCALE BELOW
1" = 10' ON ORIGINAL PLAN

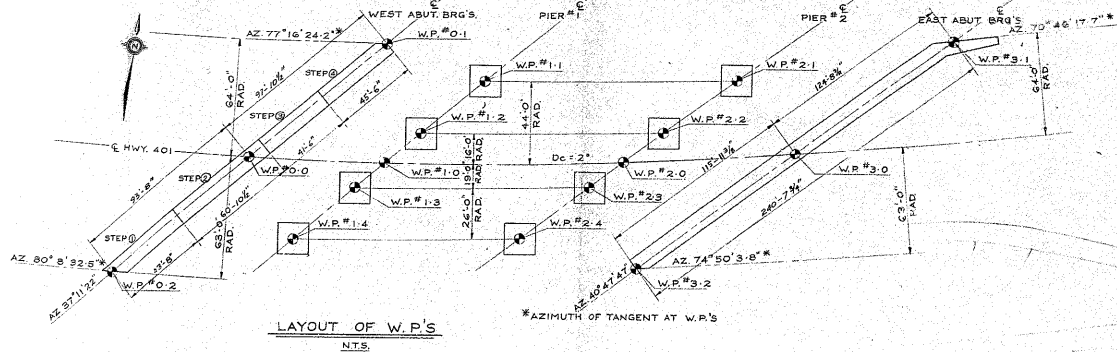


- LIST OF DRAWINGS**
- 1. GENERAL PLAN
 - 2. FOOTINGS - DIM. & REINFORCING
 - 3. EAST ABUTMENT - N. BRIDGE - DIM. & REINFORCING
 - 4. DO DO - S. BRIDGE - DO DO
 - 5. WEST ABUTMENT - N. BRIDGE - DO DO
 - 6. DO DO - S. BRIDGE - DO DO
 - 7. PIER DETAILS
 - 8. DECK DIMENSIONS & SLOPED ELEVATIONS
 - 9. CABLE DETAILS
 - 10. DECK TRANSVERSE STRESSING & REINFORCING - N. BRIDGE
 - 11. DO DO - S. BRIDGE
 - 12. PROPOSED WALL DETAILS
 - 13. SINKHOLE STEEL PARAPET RAIL
 - 14. 25 FOOT APPROACH SLAB
 - 15. DETAILS OF CONC. SLOPE PAVING
 - 16. STANDARD DETAILS

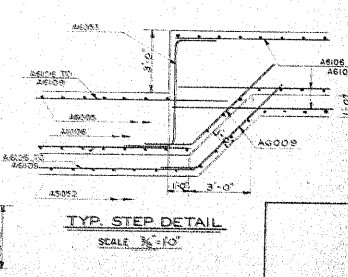
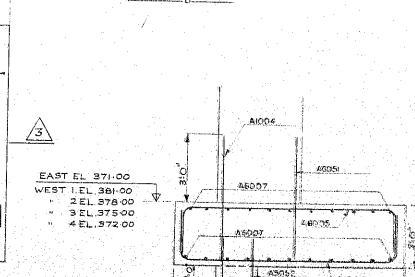
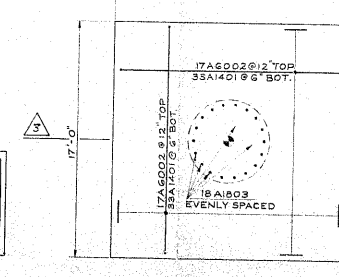
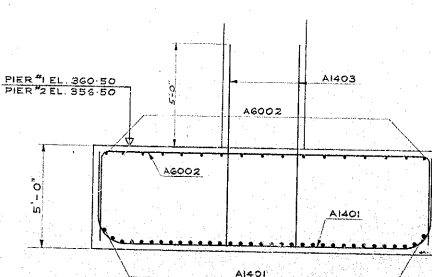
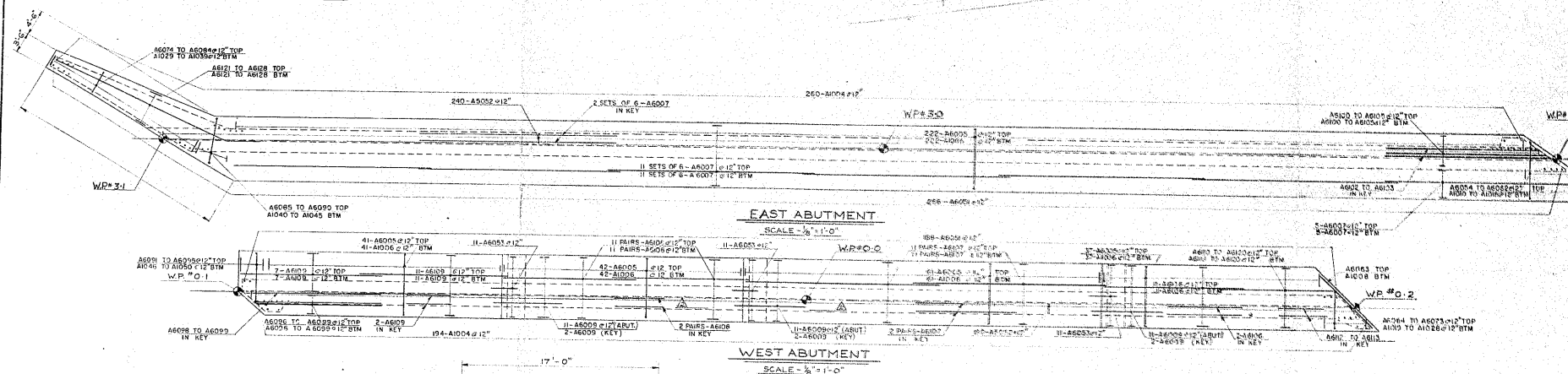


REVISIONS	
NO.	DATE

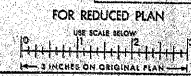
DEPARTMENT OF HIGHWAYS ONTARIO	
BRIDGE DIVISION	
BRIDGE #3	
HWY. 401/HWY. 2A INTERCHANGE	
KING'S HIGHWAY No. 401	DIST. No. 6
CO. YORK	TWP. SCARBOROUGH
LOT	CON.
GENERAL PLAN	
APPROVED	DESIGN
CHECKED	DATE
DATE	LOADING

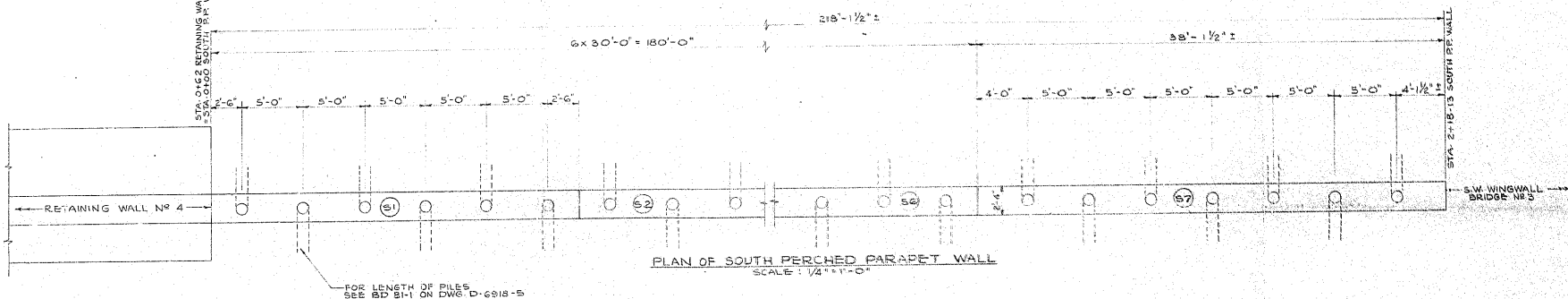
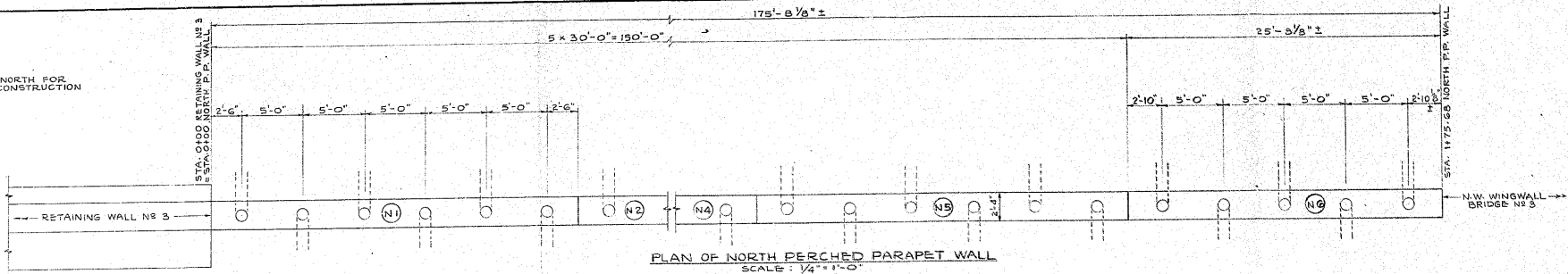
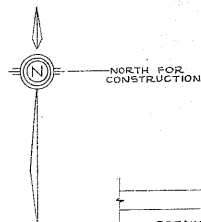


LOCATION OF W.P.'S			
W.P. STATION ON HWY. 401	CO-ORDINATES		
	N.	E.	
0-0	724+56.44	913620.00	92358.04
0-1	725+33.33	913697.97	92417.20
0-2	723+89.88	913545.39	92301.43
1-0	725+33.44	913635.57	92431.41
1-1	725+17.14	913630.62	92473.18
1-2	725+52.64	913535.44	92446.40
1-3	725+11.11	913512.17	92413.65
1-4	724+51.35	913590.49	92389.61
2-0	726+61.93	913666.68	92556.06
2-1	727+29.61	913727.46	92608.52
2-2	726+96.02	913688.53	92574.92
2-3	726+34.05	913641.08	92533.97
2-4	725+97.10	913606.62	92504.23
3-0	727+59.93	913694.15	92620.13
3-1	728+68.22	913788.58	92731.63
3-2	726+63.64	913606.38	92574.37



REVISIONS	
DATE	DESCRIPTION
DEPARTMENT OF HIGHWAYS ONTARIO BRIDGE DIVISION	
BRIDGE # 3	
HWY 401/HWY 2A INTERCHANGE	
ENR3 HIGHWAY No. 401	DIST. No. 6
CO. YORK	TWP. SCARBOROUGH
LOT	CON.
FOOTINGS-DIMENSIONS & REINFORCEMENT	
APPROVED	DIST. No. 37-903
DESIGN	CONTRACT No.
DRAWING	DATE
DATE	2-27-78
D-6811-2	





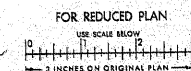
NOTE: FOR ALIGNMENT OF PERCHED PARAPET WALL SEE ROAD DESIGN DRAWINGS. FOR DETAIL OF PERCHED PARAPET WALL SEE BD 81-1 ON DWG. D-6918-5.

CONSTRUCTION TABLE						
NORTH PERCHED PARAPET WALL						
STATION	PANEL NO.	LENGTH	E 6001	E 5002	E 5003	E 5004
0+00	(N1)	30'-0"	10' G 2 PER LINE	31' 5" @ 12"	31' 5" @ 12"	20' 5" 2 PER LINE
0+30	(N2)	30'-0"	10' G 2 PER LINE	31' 5" @ 12"	31' 5" @ 12"	20' 5" 2 PER LINE
0+60	(N3)	30'-0"	10' G 2 PER LINE	31' 5" @ 12"	31' 5" @ 12"	20' 5" 2 PER LINE
0+90	(N4)	30'-0"	10' G 2 PER LINE	31' 5" @ 12"	31' 5" @ 12"	20' 5" 2 PER LINE
1+20	(N5)	30'-0"	10' G 2 PER LINE	31' 5" @ 12"	31' 5" @ 12"	20' 5" 2 PER LINE
1+50	(N6)	25'-8 1/8"	10' G 2 PER LINE	31' 5" @ 12"	31' 5" @ 12"	20' 5" 2 PER LINE
1+75.68						
SOUTH PERCHED PARAPET WALL						
0+20	(S1)	30'-0"	10' G 2 PER LINE	31' 5" @ 12"	31' 5" @ 12"	20' 5" 2 PER LINE
0+30	(S2)	30'-0"	10' G 2 PER LINE	31' 5" @ 12"	31' 5" @ 12"	20' 5" 2 PER LINE
0+60	(S3)	30'-0"	10' G 2 PER LINE	31' 5" @ 12"	31' 5" @ 12"	20' 5" 2 PER LINE
0+90	(S4)	30'-0"	10' G 2 PER LINE	31' 5" @ 12"	31' 5" @ 12"	20' 5" 2 PER LINE
1+20	(S5)	30'-0"	10' G 2 PER LINE	31' 5" @ 12"	31' 5" @ 12"	20' 5" 2 PER LINE
1+50	(S6)	30'-0"	10' G 2 PER LINE	31' 5" @ 12"	31' 5" @ 12"	20' 5" 2 PER LINE
1+80	(S7)	38'-1 1/2"	10' G 2 PER LINE	31' 5" @ 12"	31' 5" @ 12"	20' 5" 2 PER LINE
2+18.13						

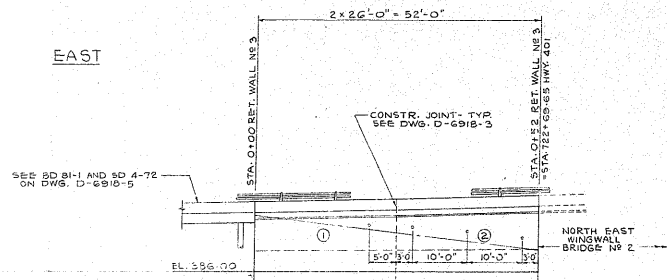
PILE DATA			
NORTH PERCHED PARAPET WALL			
PANEL NO.	TOTAL NO. OF PILES	LENGTH	TOTAL LENGTH
(N1)	6	15'	90'
(N2)	6	10'	60'
(N3)	6	10'	60'
(N4)	6	10'	60'
(N5)	6	10'	60'
(N6)	5	15'	75'
TOTAL			900 L.F.
SOUTH PERCHED PARAPET WALL			
(S1)	6	15'	90'
(S2)	6	10'	60'
(S3)	6	10'	60'
(S4)	6	10'	60'
(S5)	6	10'	60'
(S6)	6	10'	60'
(S7)	7	15'	105'
TOTAL			900 L.F.

REVISIONS	DATE	BY	DESCRIPTION

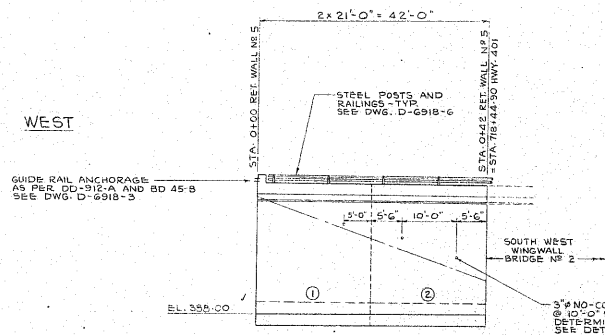
DEPARTMENT OF HIGHWAYS ONTARIO		BRIDGE DIVISION	
KING'S HIGHWAY No. 401		DIST. No. 6	
CO. YORK		CONTRACT No.	
TWP. SCARBOROUGH		LOT	
PLAN & CONSTRUCTION TABLE		DATE No. 37	
APPROVED	DESIGNER	CHECK	CONTRACT
DRAWING	D. G. CHECK	APP	NO.
DATE	GCT. 1970	LOADING	NO.
D-6918-4		D-6918-4	



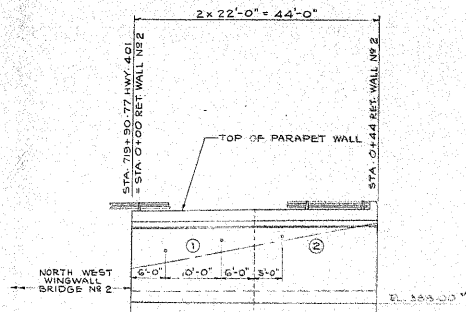
EAST

NORTH ELEVATION
RETAINING WALL NO 3

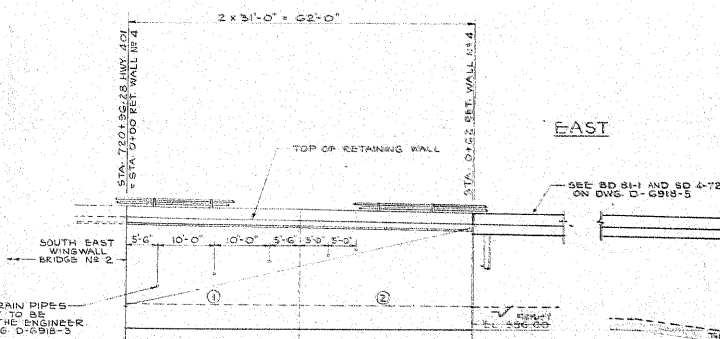
WEST

SOUTH ELEVATION
RETAINING WALL NO 3

WEST

NORTH ELEVATION
RETAINING WALL NO 2

EAST

SOUTH ELEVATION
RETAINING WALL NO 4

NOTES

CLASS OF CONCRETE

3000 P.S.I.

CLEAR COVER ON REINFORCING STEEL

3' IN FOOTINGS AND WALL
2' IN CURB
1 1/2' IN PARAPET WALL

CONSTRUCTION NOTES

FOR CONSTRUCTION DETAILS SEE CONSTRUCTION
TABLE D-6918-2
FOR ALIGNMENT OF RETAINING WALLS SEE
ROAD DESIGN DRAWINGS.

SCALE: 1" = 10'-0"

PRINT RECORD
No. FOR DATE

LEGEND

EXISTING GROUND LINE -----
FINISHED GROUND LINE -----

LIST OF DRAWINGS

- D-6918-1 ELEVATION
- 2 CONSTRUCTION TABLE
- 3 TYPICAL MISCELLANEOUS DETAILS
- 4 PLAN & CONSTRUCTION TABLE
- 5 TYPICAL MISCELLANEOUS DETAILS FOR PERCHED PARAPET WALLS
- 6 STANDARD STEEL PARAPET RAIL

REVISION	DATE	BY	DESCRIPTION

DEPARTMENT OF HIGHWAYS ONTARIO

BRIDGE DIVISION

67-F-486 70-11057

RETAINING WALL NOS 2,3,4&5

HWY. 401 & HWY. 2 INTERCHANGE

KING'S HIGHWAY No. 401 DIST. No. G
 CO. YORK
 TWP. SCARBOROUGH LOT CON.

ELEVATION

APPROVED	DESIGNED	37	W.D. No. 28-57-G
DESIGNED	ADAPTED	CHECK	CONTRACT
DRAWN	D.G.	1	NO. 100
DATE	OCT. 1970	LOADING	HS 27-24

FOR REDUCED PLAN

