

DOCUMENT INFORMATION IDENTIFICATION

GEOCRES No. 4057-8

DIST. 1 REGION SOUTHWESTERN

W.P. No. 257-66-07

CONT. No. 77-43

W. O. No. _____

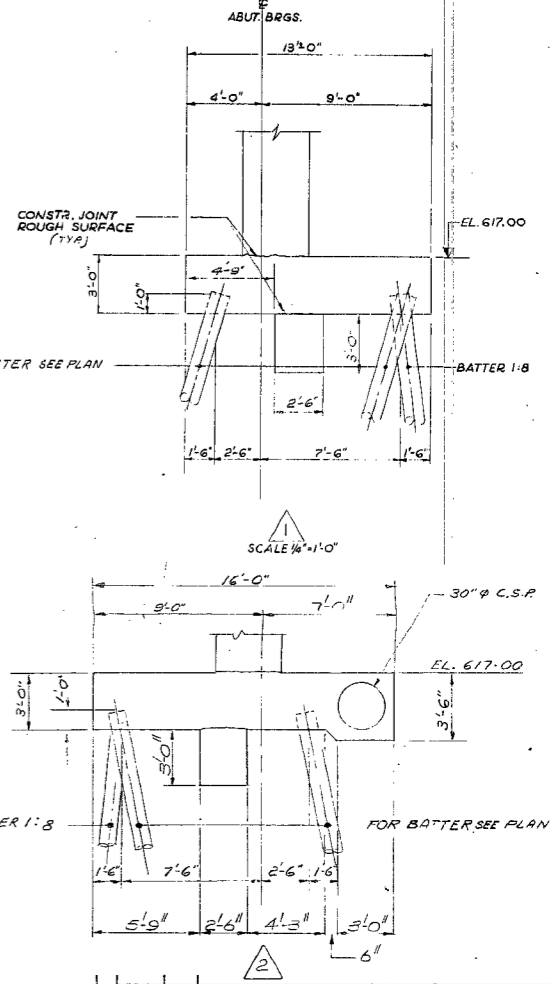
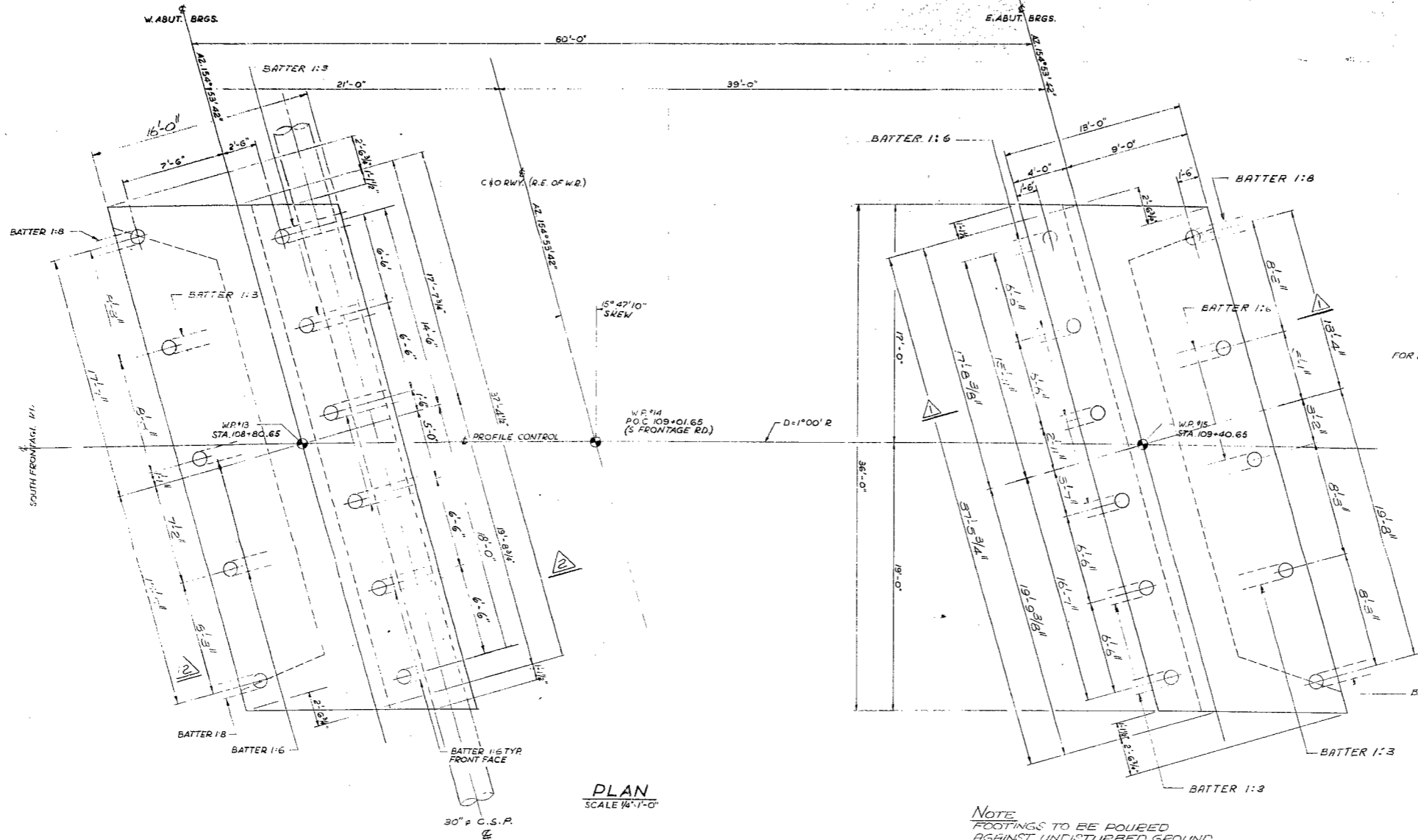
STR. SITE No. 6-293

HWY. No. _____

LOCATION C to Railway X-ING
(SOUTH SERVICE RD.)

OVERSIZE DRILLINGS TO BE INCLUDED WITH THIS REPORT. 4

REMARKS: _____



NOTE
FOOTINGS TO BE POURED
AGAINST UNDISTURBED GROUND

PLAN
SCALE 1/4" = 1'-0"

LIST OF 12" x 12" C.C. STEEL TIE PILES (WALL THICKNESS 1/4")

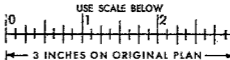
LOCATION	NO. PILES	LENGTH	DESIGN LOAD
WEST ABUT.	11	138'-0"	120 T/P/PILE
EAST ABUT.	11	138'-0"	120 T/P/PILE

NOTE: - DRIVING ENERGY MUST NOT EXCEED 30,000 FT. LBS./BLOW WHEN PILES ARE PENETRATING THE ZONE BELOW EL. 495.00.

W.P.	STATIONS	CO-ORDINATES	
		NORTH	EAST
13	108 + 80.65	36 27 52.38	87 04 18.93
14	109 + 01.65	36 27 55.84	87 04 39.65
15	109 + 40.65	36 27 62.00	87 04 78.15

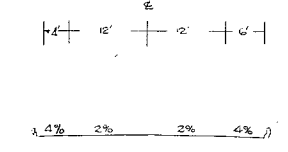
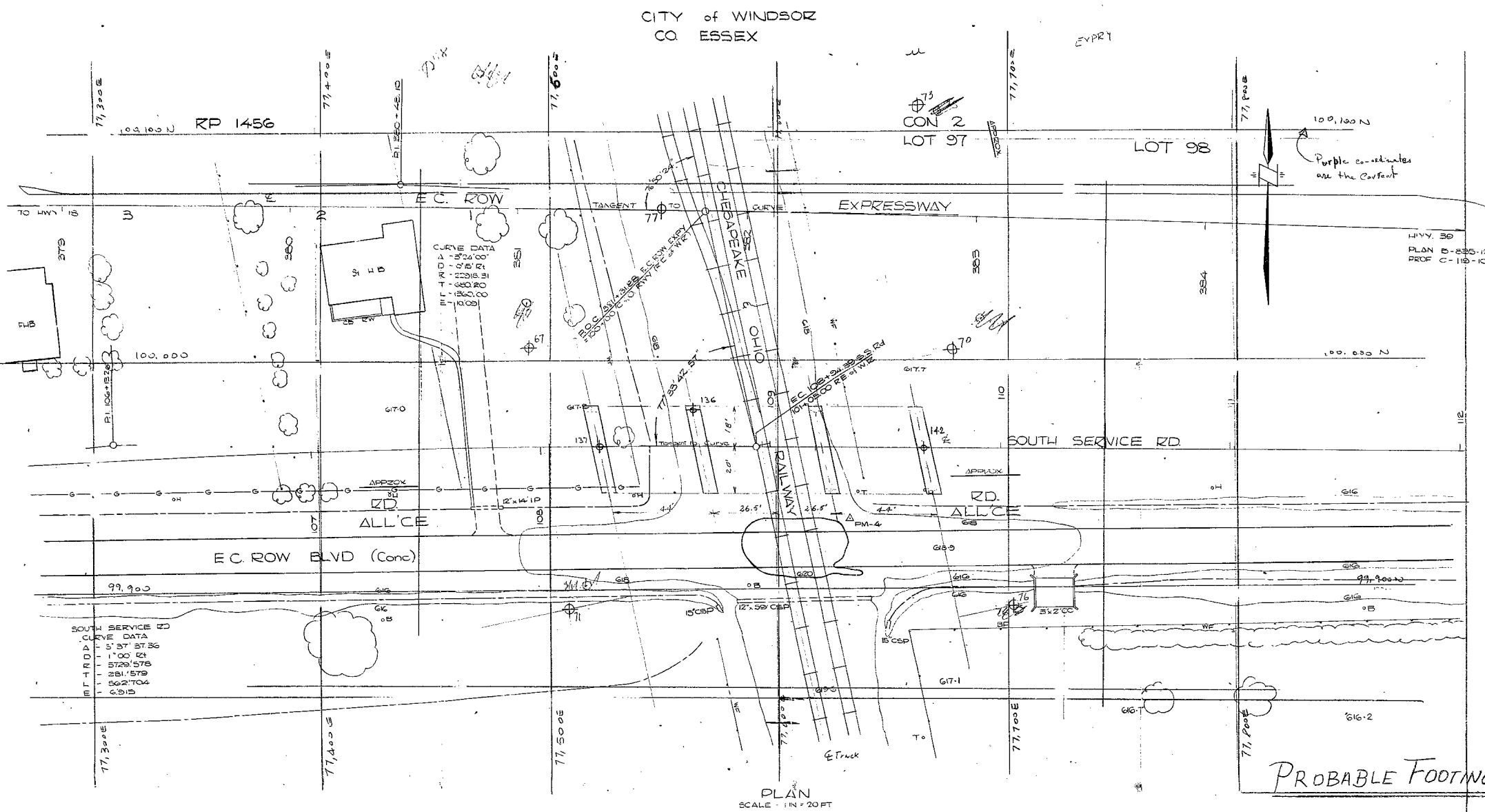


FOR REDUCED PLAN

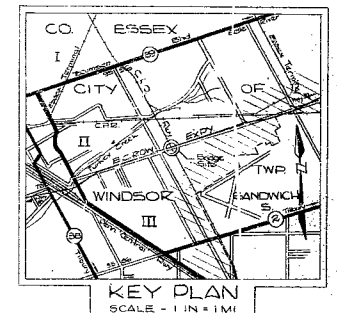
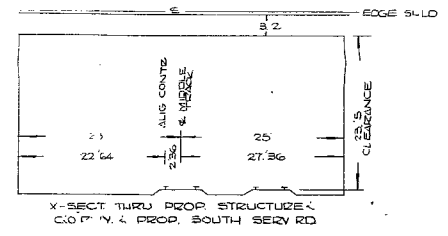


REVISIONS	
DATE	DESCRIPTION
MINISTRY OF TRANSPORTATION AND COMMUNICATIONS ONTARIO	
C&O RAILWAY O'HEADS SOUTH FRONTAGE RD.	
KING'S HIGHWAY No. E.C. ROW EXPY. DIST. No. 1	
CO. ESSEX	
TWP. CITY OF WINDSOR LOT 97496 CON. 2	
FOOTING LAYOUT	
APPROVED	CONTRACT No.
DESIGN C.F.F. CHECK B.K.	W.P. No. 257-66-07
DRAWING A.K. CHECK C.F.F.	SITE No. 6-293 SHEET 3
DATE AUG. LOADING HS 20-44	

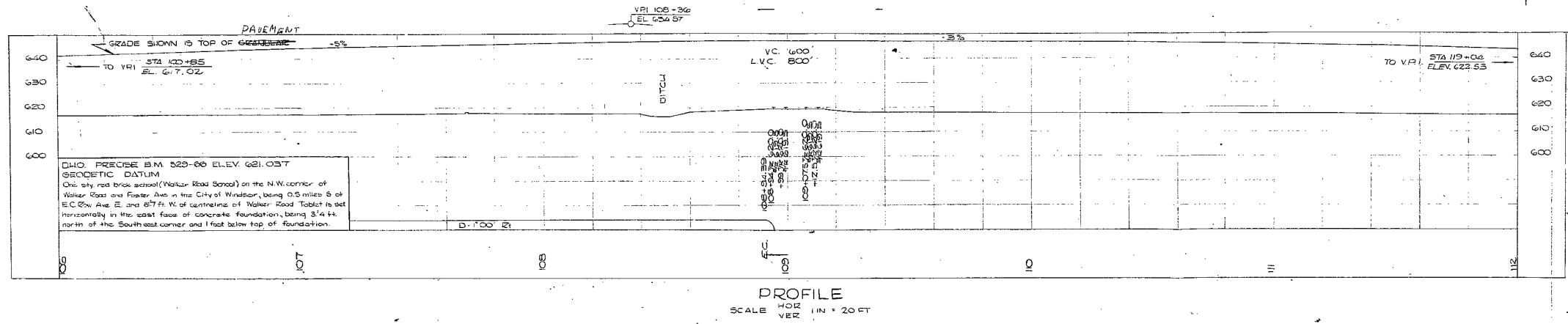
4057-8 B



X-SECT. PROPOSED STRUCTURE
SOUTH SERVICE RD & C.O. RY



PROBABLE FOOTING LOCATIONS



WP 257-66-07 71-11116

DATE	REVISIONS & ADDITIONS	BY	CHKD

ONTARIO DEPARTMENT OF
TRANSPORTATION & COMMUNICATIONS
DESIGN SERVICES BRANCH
ENGINEERING SURVEYS OFFICE

BRIDGE SITE 4037-8

PROPOSED CROSSING
AT
CHESAPEAKE & OHIO RY
AND
EC ROW EXPRESSWAY
SOUTH SERVICE ROAD

LOT 97 CON 12
CITY OF WINDSOR COUNTY OF ESSEX

SCALE AS SHOWN DISTRICT I CHATHAM REGION SOUTH WESTERN

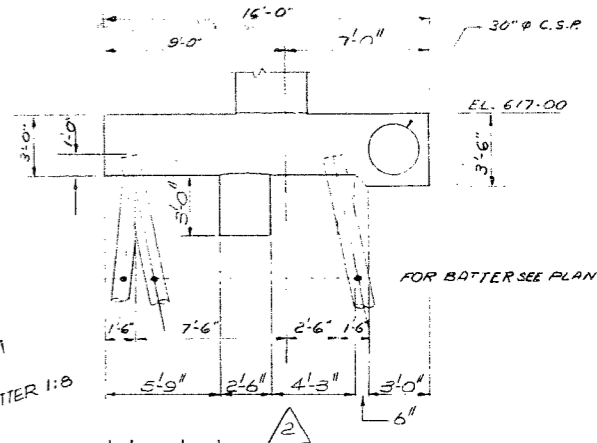
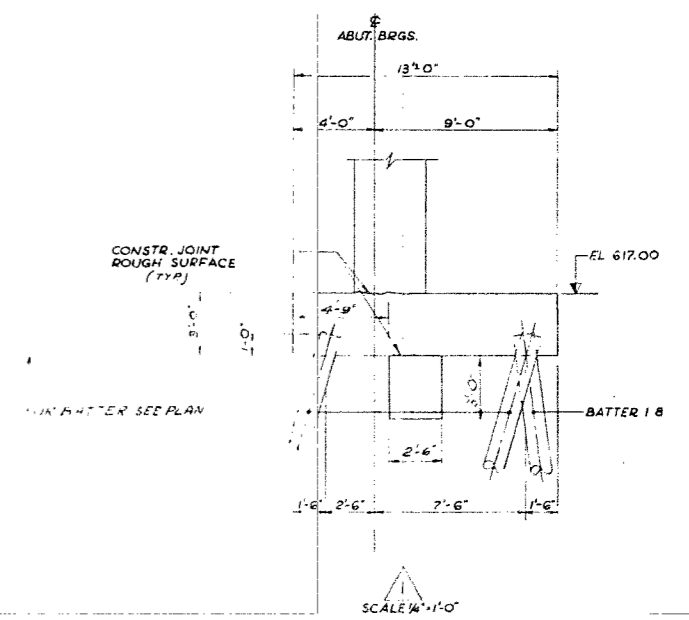
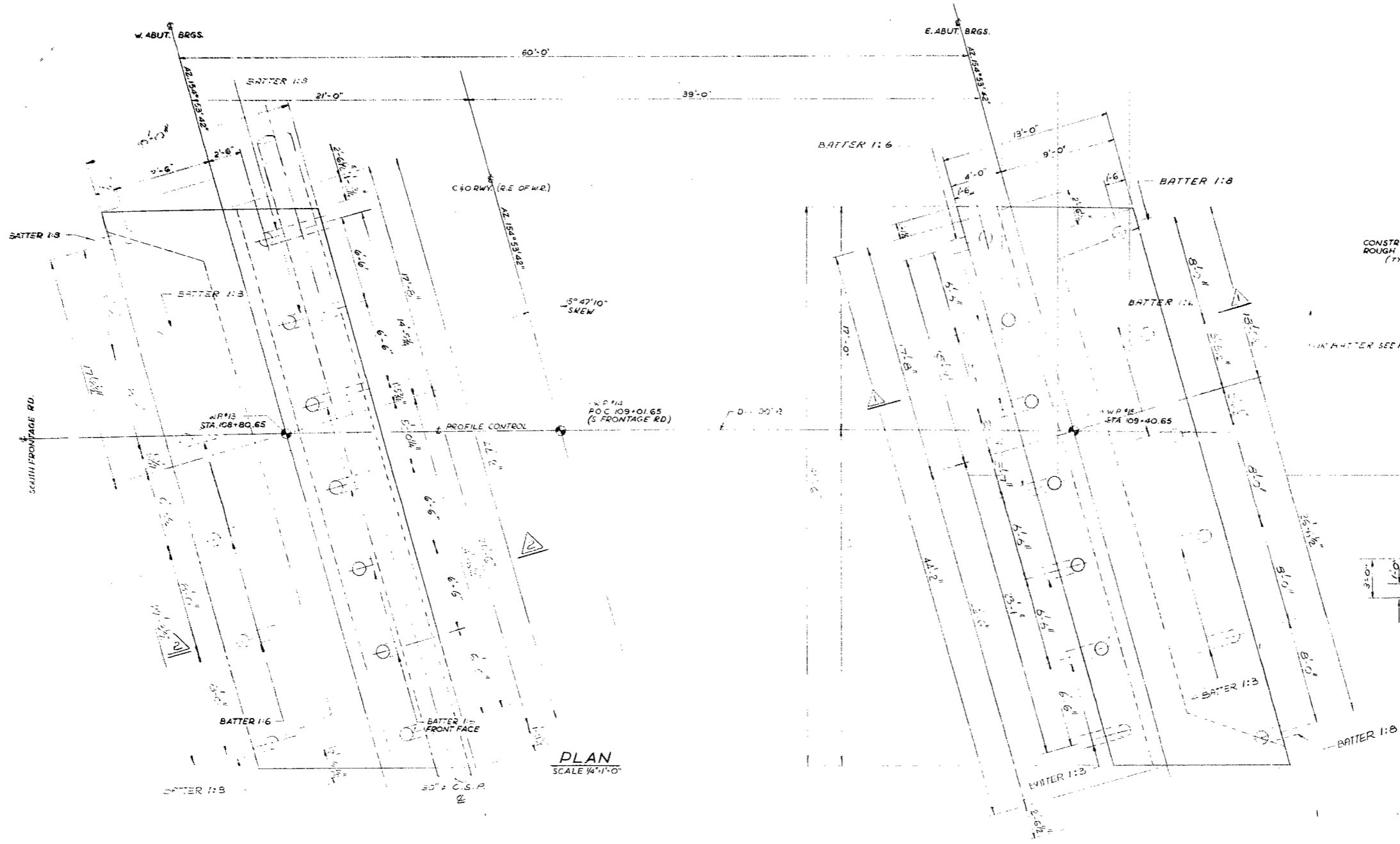
WO 9332-257-66-08 Date of Survey JULY 68 Plan JULY 71 SITE

SURVEY BY
Chief of Party PHOTOGAMMETRY
Supervisor - G. W. HOARE

DRAWN BY
S. L. ROY
Supervisor - G. W. HOARE

CHECKED BY
Draftsman - G. W. HOARE

PLAN E-5309-1



PLAN
SCALE 1/4\"/>

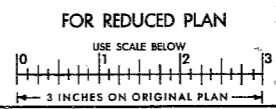
LIST OF 12\"/>

LOCATION	NO. PILES	LENGTH	DESIGN LOAD
WEST ABUT.	13	138'-0"	120 T/PILE
EAST ABUT.	15	138'-0"	120 T/PILE

W.P.	STATIONS	CO-ORDINATES	
		NORTH	EAST
13	108 + 80.65	36 27 52.38	87 04 18.93
14	109 + 01.65	36 27 55.84	87 04 39.65
15	109 + 40.65	36 27 62.00	87 04 78.15

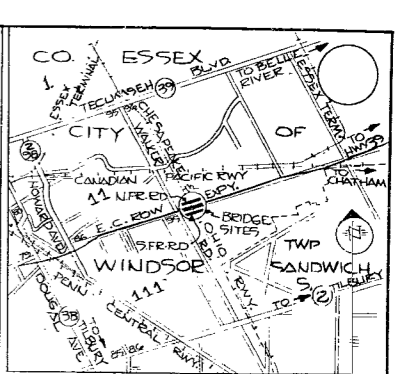
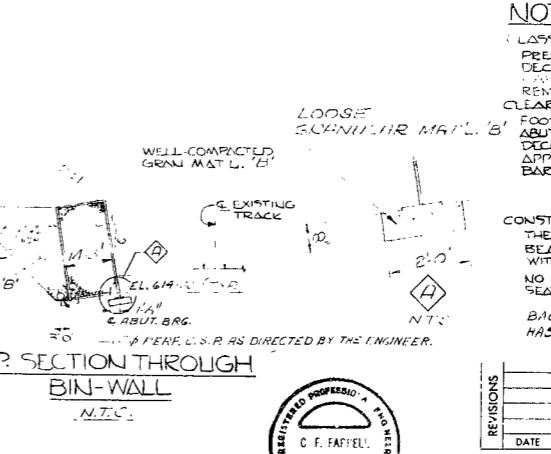
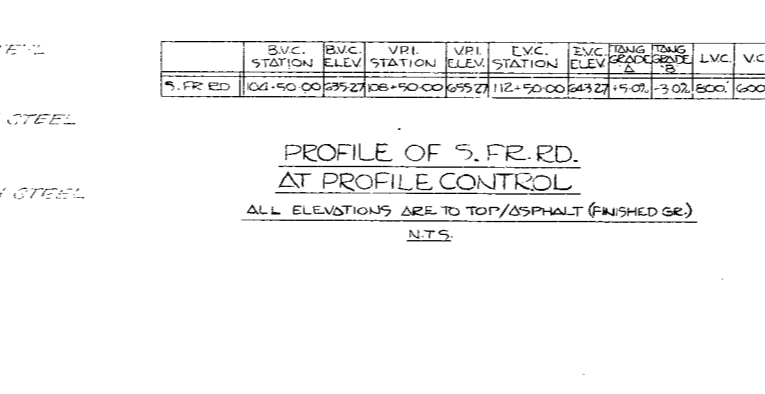
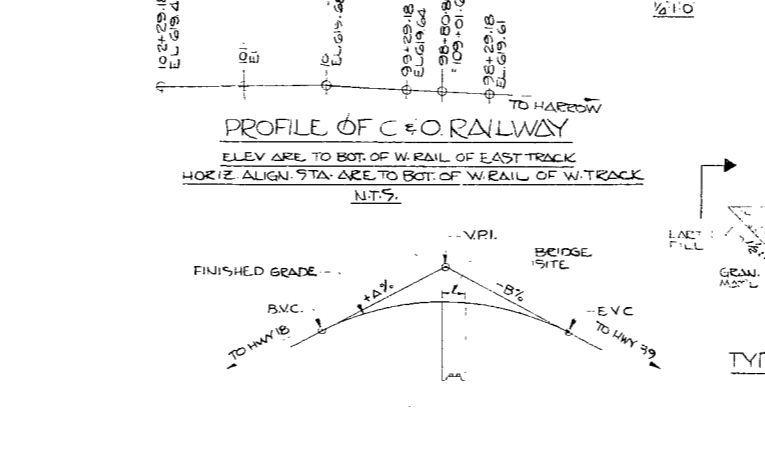
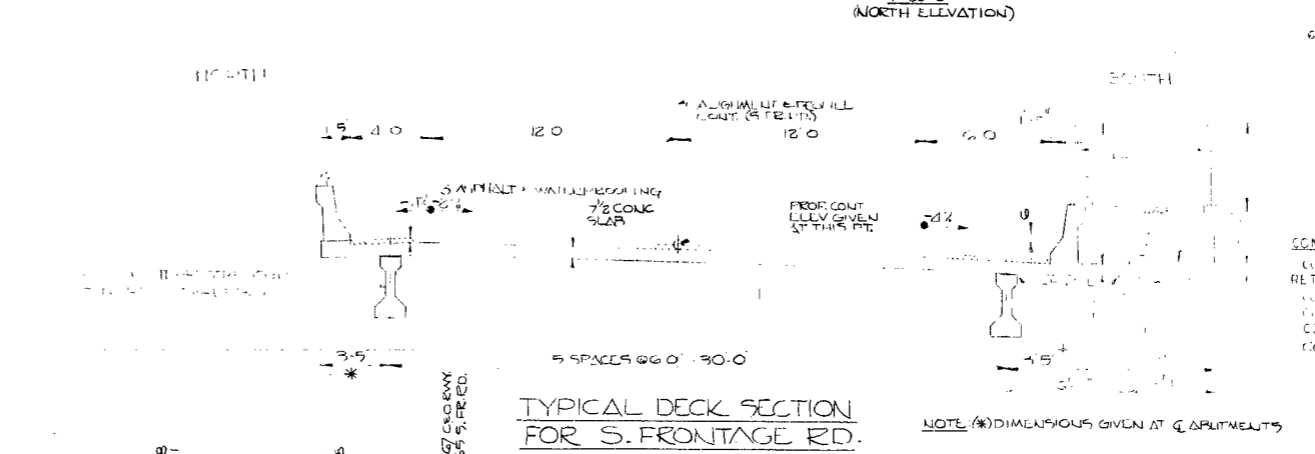
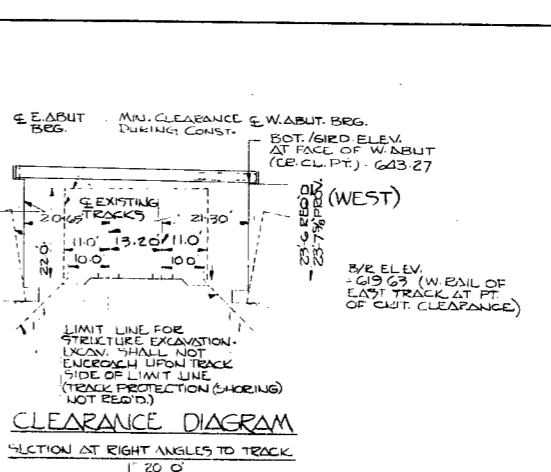
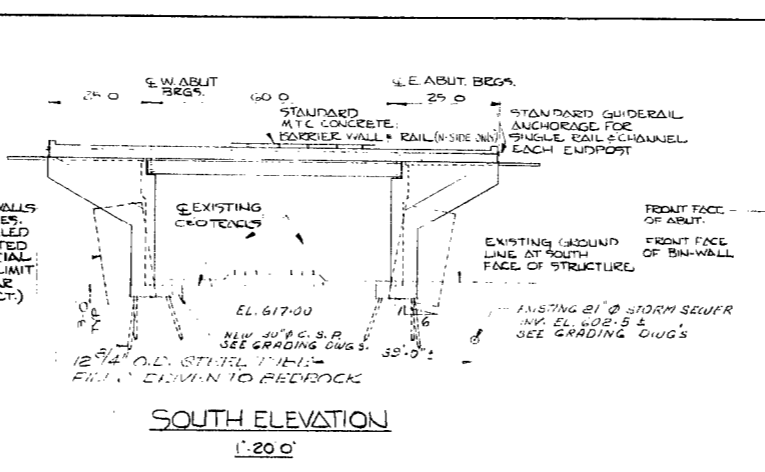
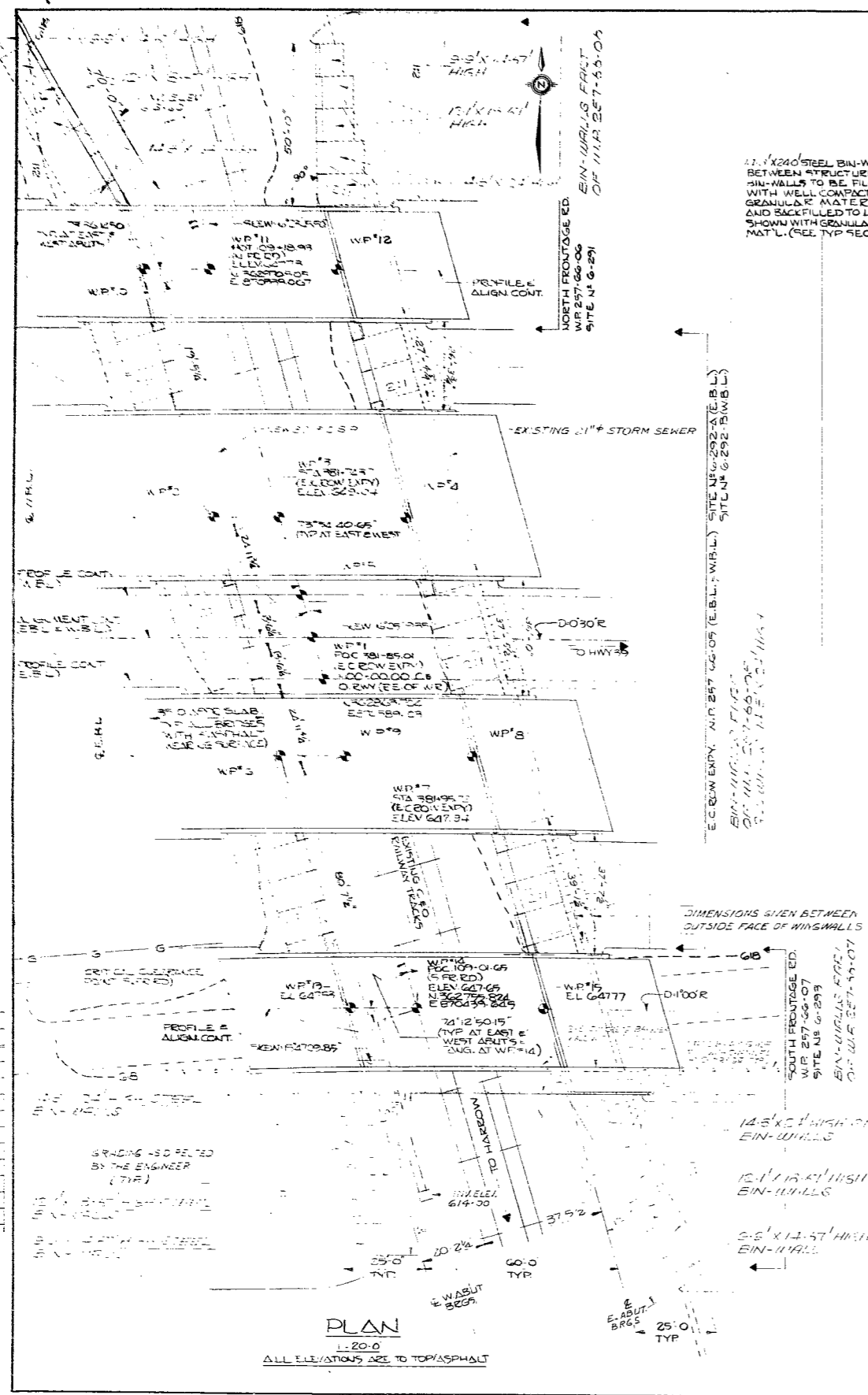
NOTE:
FOOTINGS TO BE POURED
AGAINST UNDISTURBED GROUND.

NOTE: - DRIVING ENERGY MUST NOT EXCEED 30,000 FT.
LBS/BLOW WHEN PILES ARE PENETRATING
THE ZONE BELOW EL. 495.00.



REVISIONS			
DATE	BY	DESCRIPTION	
MINISTRY OF TRANSPORTATION AND COMMUNICATIONS ONTARIO			
40J7-8			
C&O RAILWAY O'HEADS SOUTH FRONTAGE RD.			
KING'S HIGHWAY No. E.C. ROW EXPI.		DIST. No. 1	
CO. ESSEX			
TWP. CITY OF WINDSOR		LOT 974 98	CON. 2
FOOTING LAYOUT			
APPROVED	STRUCTURAL ENGINEER	CONTRACT No.	
DESIGN	C.F.F. CHECK	W.P. No.	257-66-07
DRAWING	A.K.S.R. CHECK	C.F.F.	
DATE	MAR. 1976	LOADING	HS 20-44
		SITE No.	6-293
SHEET 3			

APR 13 1976



- LIST OF DRAWINGS**
- 6-293-1 GENERAL LAYOUT
 - 2 BORE HOLE LOCATIONS & SOIL STRATA
 - 3 FOOTING LAYOUT
 - 4 ABUTMENTS
 - 5 PRESTRESSED GIRDERS & BEARINGS
 - 6 DECK
 - 7 CONCRETE BARRIER WALL (N. SIDE)
 - 8 CONCRETE BARRIER WALL (S. SIDE)
 - 9 35" DIA. STEEL RAILING
 - 10 35" DIA. STEEL RAILING
 - 11 35" DIA. STEEL RAILING
 - 12 35" DIA. STEEL RAILING
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 - 100 35" DIA. STEEL RAILING

CONCRETE QUANTITIES

CONCRETE IN ABUTMENTS, WALLS AND RETAINING WALLS 4100 C.Y.

CONCRETE IN DECK AND DIAPHRAGMS 1200 C.Y.

CONCRETE IN BARRIER WALLS 200 C.Y.

CONCRETE IN APPROACH SLABS 100 C.Y.

CONCRETE IN STEEL TRUSS FILLS 100 C.Y.

NOTES:

1. LAYERS OF CONCRETE:
PRESTRESSED GIRDERS 5000 P.S.I.
DECK, BARRIER WALLS, TUBE PILES 10000 P.S.I.
REMAINDER 3000 P.S.I.

2. CLEAR COVER TO REINFORCING STEEL:
FOOTINGS 3"
ABUTMENTS 3" (EXCEPT AS NOTED)
DECK 1" BOTTOM, 2" TOP
APPROACH SLABS 2"
BARRIER WALLS 1 1/2"

CONSTRUCTION NOTES:

THE CONTRACTOR IS RESPONSIBLE FOR FINISHING THE BEARING SEATS DEAD LEVEL TO THE SPECIFIED ELEVATIONS WITHIN A TOLERANCE OF 1/8".

NO CONCRETE SHALL BE PLACED ABOVE THE ABUTMENT BEAS SEATS UNTIL THE CONCRETE IN THE DECK HAS BEEN PLACED.

BACKFILL SHALL NOT BE PLACED UNTIL DECK HAS BEEN POURED AND CURED.

REVISIONS	DATE	BY	DESCRIPTION

DEPARTMENT OF TRANSPORTATION AND COMMUNICATIONS
ONTARIO

40J7-8

C & O RAILWAY O'HEADS
SOUTH FRONTAGE ROAD

KING'S HIGHWAY No. 2, C. ROWEN PLY. DIST. No. 1
CO. ESSEX

TWP. CITY OF WINDSOR LOT 97E98 CON. 2

GENERAL LAYOUT

APPROVED: [Signature] SITE No. 6-293 W.P. No. 257-66-07

DESIGN: C.F.F. CHECK: C.F.F. CONTRACT No. [Blank]

DRAWING: J.M.K. CHECK: C.F.F. DRAWING No. 6-293-1

DATE: MAR. 87C LOADING: H-25-24



DOCUMENT MICROFILMING IDENTIFICATION

61-20 SEP 1970

GEOCRES No. 40J7-8
DIST. 1 REGION Southwestern
W.P. No. 257-66-07
CONT. No. 77-43
W. O. No. _____
STR. SITE No. 6-293
HWY. No. _____
LOCATION C + O Railway X-ing
(South Service Rd)

OVERSIDE DRAWINGS TO BE INCLUDED WITH THIS REPORT. 4

REMARKS: documents to be unfolded
before microfilming

FOUNDATION INVESTIGATION REPORT
For
The Proposed E.C. Row Expressway
South Service Rd. and C. & O. Railway Crossing
Lot 97 Con. 2
City of Windsor - County of Essex
District #1 (Chatham Ont.)
W.J. 71-11116 W.P. 257-66-07

1. INTRODUCTION:

A request for a foundation investigation at the crossing of the proposed E.C. Row Expressway South Service Road and the Chesapeake & Ohio Railway, was received from Mr. A. P. Watt, Regional Bridge Planning Engineer, in a memorandum dated October 12, 1971.

A preliminary foundation investigation covering this area was carried out in April 1968. (68-11-15-3). A more detailed field investigation was subsequently carried out to determine the subsoil conditions existing at the site.

This report contains the results of both investigations and our recommendations pertaining to the design of the proposed structure foundations and approach embankments.

2. DESCRIPTION OF THE SITE:

The site of the proposed overpass structure is situated in the eastern part of the City of Windsor, just north of the intersection of the existing E.C. Row Blvd. and the C. & O. Railway.

The surrounding terrain, with the exceptions of the approx. 2 ft. high railway embankment and the approx. 3 ft. deep drainage ditches, is flat and cultivated farmland.

Physiographically, the site is located in the region referred to as the St. Clair Clay Plain.

3. FIELD AND LABORATORY INVESTIGATION PROCEDURES:

A total of seven sampled boreholes and five dynamic cone penetration tests was carried out during the course of the field work. Boring was achieved by means of bombardier mounted continuous flight auger machines, and conventional diamond drilling equipment adapted for soil sampling purposes. During the field work, disturbed samples were obtained by means of a standard split-spoon sampler. The energy used in driving it, conformed to the requirements of the standard penetration test. 'Undisturbed' samples were recovered using 2-inch I.D. Shelby tubes which were pushed into the soil hydraulically or by hand. Where possible, field vane tests were carried out at elevations generally 12 inches below sample depths.

Dynamic cone penetration tests were carried out adjacent to each borehole with the exception of B.H.'s # 67 and #76. Driving energy to advance the cone was 350 ft.-lbs. per blow.

The bedrock was proved at one borehole location using AXT Rock Coring equipment.

All boreholes were surveyed in the field by personnel from London Region Engineering Surveys Section. The locations and elevations of the borings are shown on Drawing No. 71-11116A which accompanies this report.

All samples were visually examined and classified at the site as well as in the laboratory. Following this inspection laboratory tests were carried out on selected samples to determine the following physical properties:

Atterberg Limits

Moisture Content

Grain-Size Distribution

Undrained Shear Strength

Bulk Density

The test results are summarized on the Record of Borehole sheets contained in the Appendix of this report.

4. SOIL TYPES AND SOIL CONDITIONS:

4.1) General:

Generally uniform subsoil conditions were found to prevail over the site area. The subsoil consists of a deep deposit of cohesive soil, followed by limestone bedrock. The boundaries between different deposits are shown on the Record of Borehole sheets attached to the Appendix. The estimated stratigraphical profile of drawing 71-11116A 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 with Sand and Traces of Gravel:

This deposit was intersected in all borings and extends from immediately below the ground surface, down to the bedrock surface for a minimum depth of 131 ft. The material in the deposit consists of clayey silt with sand and traces of gravel. A plot of Plasticity Index versus Liquid Limit (Fig. 1) shows the points to fall within the CL zone. In some boreholes relatively thin layers of granular soils were found to occur within the main deposit.

A highly overconsolidated zone due to desiccation and/or weathering, with a thickness ranging from 11 to 16 ft. was found to extend

from the upper surface of the stratum. This zone is brown in colour due to oxidation and apart from the upper 3 to 5 ft. (frost affected zone) has a very stiff to hard consistency. 'N' values ranged from 21 to 92 blows per foot. Based on the Standard Penetration Test results only, the undrained shear strength of this desiccated zone is estimated to be in the order of 2,500 PSF to 10,000 PSF. Below the desiccated layers the colour of the soil is grey and the consistency ranges somewhat randomly from stiff to hard. For design purposes the following undrained shear strength values are suggested:

Ground Level - El. 611	2,000 PSF
El. 611 - El. 600	5,000 PSF
El. 600 - El. 593	2,500 PSF
El. 593 - El. 487	1,500 PSF

Physical properties of the overall deposit, as determined from field and laboratory tests, are as follows:

Natural Moisture Content: (%)	11 - 19
Liquid Limit: (%)	21 - 28
Plastic Limit: (%)	12 - 15
Bulk Density: (PCF)	134 - 138
Unconfined Shear Strength: (PSF)	727 - 1,480
Field Vane Test: (PSF)	1,440 - 2,000 +
Sensitivity:	1.2 - 1.8
'N' Value: (Blows/Ft.)	6 - 92

Typical Grain-Size distribution curves are included in the Appendix of this report. (Fig. 2)

4.3) Limestone Bedrock:

Bedrock at this site was found to consist of generally sound limestone at El. 487 (B.H. # 70)

5. GROUNDWATER CONDITIONS:

The following groundwater levels were observed during the field investigation:

B.H. # 67	Not Established
70	"
71	"
76	"
136	El: 612.8
137	El: 613.1
142	Not Established

It is pointed out, that the foregoing quoted figures may not represent the true groundwater levels, due to the relatively impermeable nature of the subsoil and the short duration of the field work.

6. DISCUSSION AND RECOMMENDATIONS:

6.1) General:

It is proposed to build a three-span (44'-53'-44') overpass structure at the crossing of the E.C. Row Expressway South Service Road and the C. & O. Railway. The proposed profile grade of the South Service Road will be approximately 27 ft. above the existing C. & O. Railway grade (rail) of elevation 620.

As described in the previous paragraphs of this report, the subsoil at the site consists of a deep deposit of clayey silt with sand and traces of gravel, underlain by limestone bedrock. The upper portion of the deposit contains an 11 to 16 ft. thick, very stiff to hard desiccated zone. Below this zone the undrained shear strength of the material decreases. The desiccated crust appears to be suitable for spread footing type foundations.

Because of the compressible nature of the subsoil, it is inevitable that consolidation settlements will occur over a long-term period due to the imposed loads of structure and embankment. Past experience, however, indicates that these settlements will be of a minor nature.

6.2) Foundations:

(a) Spread Footings in Original Ground:

The entire structure may be supported on spread footings placed within the very stiff to hard desiccated zone of the subsoil between El. 611 and El. 600. A safe net pressure of 3.5 TSF may be assumed for design purposes.

The desiccated zone is susceptible to softening on contact with water, therefore, it is recommended that the base of the footing excavations be protected by a concrete working slab, immediately on exposure.

All foundations should be protected against frost action by at least 4 feet of earth cover. No dewatering problems are anticipated.

The estimated maximum settlement will be in the order of 1.0 and 1.5 inches under the pier footings.

(b) Spread Footings on Compacted Fill:

As an alternative, the abutments may be supported on spread footings placed on well compacted, suitable granular material within the approach fills. A safe design load of 2.0 TSF may be assumed. The granular material should consist of G.B.C. Class 'A' and should be fully compacted according to the current standards. A detailed construction scheme is outlined on Figure 3 of the Appendix.

(c) Perched Abutments on Short Piles:

As a second alternative, the abutments may be constructed within the approach fills and supported on short piles driven through

the fill and some 10.0 ft. into the original ground.. In the case of 12-3/4" O.D. and 1/4" thick wall steel tube piles, a safe design load of 25 tons per pile may be used.

It should be pointed out, that this latter proposal is based on experience with similar structures and similar subsoil conditions in the general area.

Regardless of which method is adopted, (a, b or c), the structure should be built to accommodate the 3.0 and 3.5 inches of differential settlement between the abutments and piers.

(d) End-Bearing Piles:

As another alternative, the abutments and piers may be supported on steel H-piles driven to bedrock. The maximum allowable load for the particular steel section may be assumed for design purposes.

6.3) Approach Embankments:

The shear strength of the subsoil is such that it will be able to safely support the 31-ft. high approach embankments constructed with 2:1 side slopes. 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.

Based on performance of structures and embankments built in the same general area and under somewhat similar subsoil conditions, it is estimated that a maximum settlement of 4 to 5 inches will take place over a long period of time under the fill at abutment locations.

To minimize the effect of differential settlements between the abutments and pier footings, it is recommended that the approach embankments be built in advance of the structure for as long a period as possible.

The topsoil and the soft surficial material should be removed in accordance with the pertinent standards within the construction area.

7. MISCELLANEOUS:

The field investigation was carried out during the periods April 1 to 4, 1968, and November 17 to 18, 1971, under the supervision of Mr. A. Prakash and Mr. P. Payer, Project Foundation Engineers.

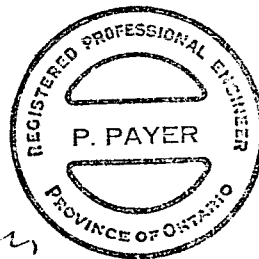
Equipment was owned and operated by Dominion Soil Investigation Ltd., and Master Soil Investigation Ltd.

This report was written by Mr. P. Payer, and reviewed by Mr. K. G. Selby, Supervising Foundation Engineer.

P. Payer
P. Payer, P. Eng.

K. G. Selby

K. G. Selby, P. Eng.



December 1971

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 67 (68-11015-3) FOUNDATION SECTION

JOB 71-11116 LOCATION Co-ords.. 100, 006N; 77, 491E. ORIGINATED BY A.P.
W.P. 257-66-07 BORING DATE April 1 & 2, 1968 COMPILED BY AMS
DATUM Geodetic BOREHOLE TYPE Cont. flight auger CHECKED BY AL

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		20	40	60	80	100	w_p	w	w_L		
616.7	Ground level														
0.0			1	SS	12										
			2	SS	38										
			3	SS	—										
			4	SS	—										
			5	SS	—										
			6	SS	—										
	Clayey silt with sand. traces of gravel.		7	TW	PH										
			8	TW	PH										
	Hard to Very Stiff		9	TW	PH										
			10	TW	PH										
			11	SS	lll										
			12	TW	PM										
563.7															
53.0	End of Borehole														

DEPARTMENT OF HIGHWAYS- ONTARIO

MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 71 (68-11015-3) FOUNDATION SECTION

JOB 71-11116 LOCATION Co-ords. 99, 892N; 77, 508E.

ORIGINATED BY AP

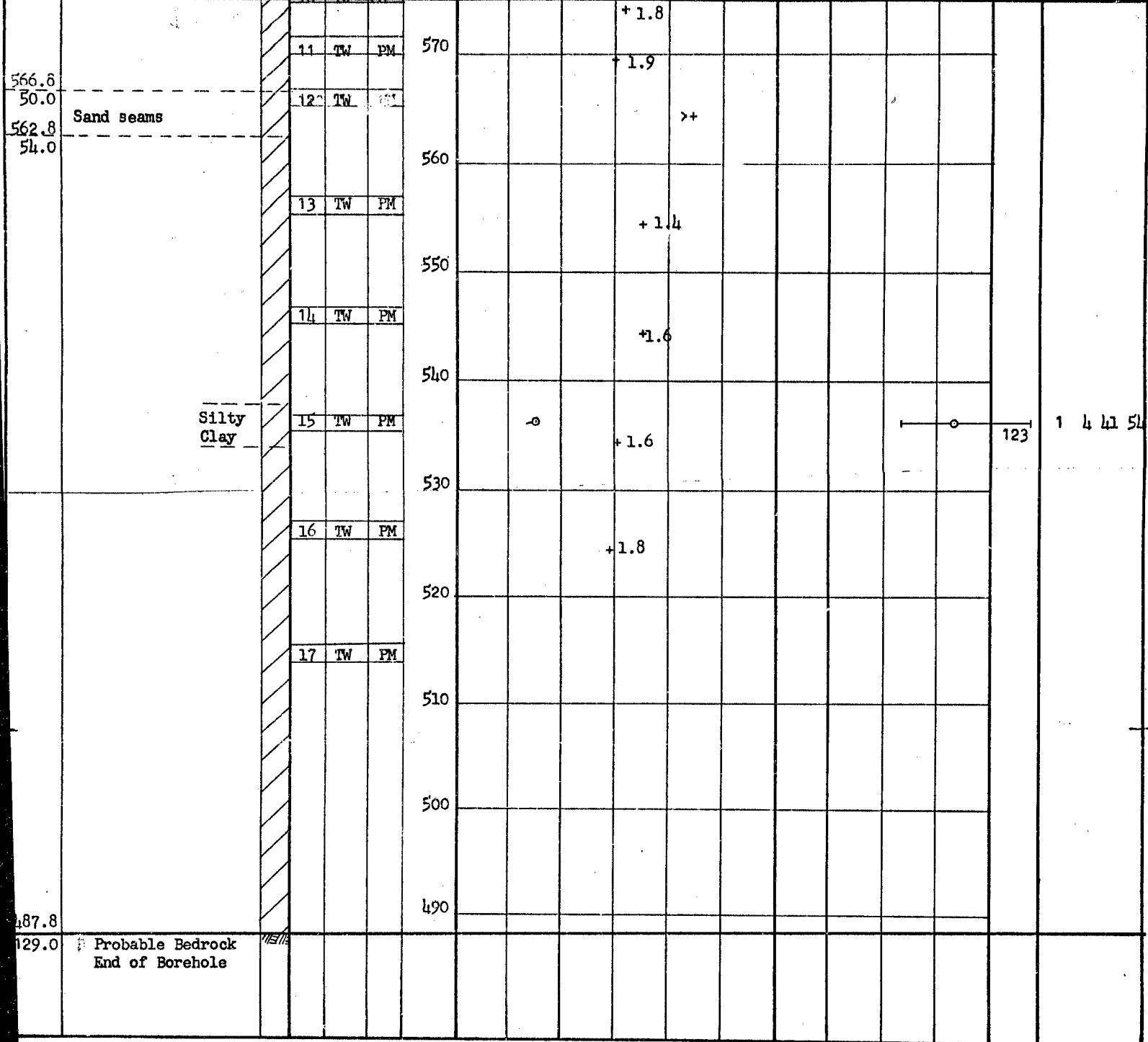
W.P. 257-66-07 BORING DATE April 2 & 3, 1968

COMPILED BY AMS

DATUM Geodetic BOREHOLE TYPE Cont. flight auger

CHECKED BY *[Signature]*

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION	RESISTANCE	LIQUID LIMIT	PLASTIC LIMIT	WATER CONTENT	BULK DENSITY	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	10 20 30			
616.8	Ground Level							○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE						
0.0	Hard to Very Stiff Stiff Clayey silt with sand, traces of gravel.		1	SS	13								3 30 38 29	
			2	SS	49									
			3	SS	92									
			4	SS	71									
			5	SS	22									
			6	SS	—									
			7	TW	PM			b	+1.3					135
			8	TW	PM				+1.4					
			9	TW	PM				+1.2					
			10	TW	PM			b	+1.8					134
			11	TW	PM				+1.9					
566.8	Sand seams		12	TW	PM			>+						
50.0														
562.8														
54.0			13	TW	PM			+1.4						



DEPARTMENT OF HIGHWAYS- ONTARIO

MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 71 (68-11015-3) FOUNDATION SECTION

JOB 71-11116

LOCATION Co-ords. 99, 892N; 77, 508E.

ORIGINATED BY AP

W.P. 257-66-07

BORING DATE April 2 & 3, 1968

COMPILED BY AMS

DATUM Geodetic

BOREHOLE TYPE Cont. flight auger

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					SHEAR STRENGTH P.S.F.					WATER CONTENT %				
							20	40	60	80	100	UNCONFINED + FIELD VANE QUICK TRIAXIAL x LAB. VANE					10 20 30				
							500	1000	1500	2000	2500										
616.8 0.0	Ground Level																				
	Hard to Very Stiff Stiff Clayey silt with sand, traces of gravel.		1	SS	13																
			2	SS	49	610															
			3	SS	92																
			4	SS	71																
			5	SS	22	600															
			6	SS	—																
			7	TW	PM	590															
			8	TW	PM																
			9	TW	PM	580															
			10	TW	PM																
			11	TW	PM	570															
566.8 50.0	Sand seams		12	TW	PM																
562.8 54.0																					
			13	TW	PM	560															

Hard to
Very Stiff
StiffClayey silt
with sand,
traces of
gravel.

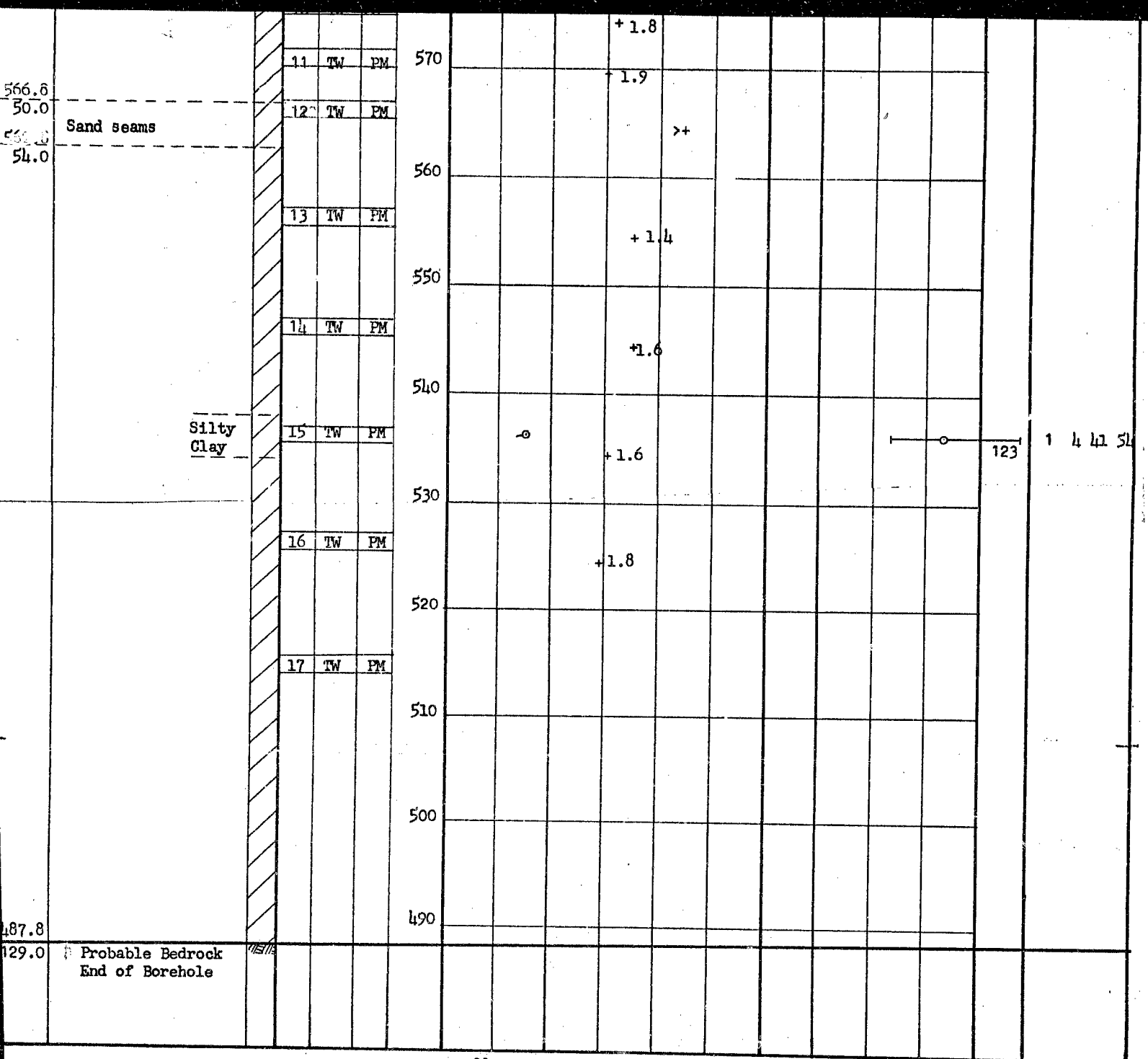
3 30 38 29

135

134

>+

+ 1.4



DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 76 (68-11-15-3) FOUNDATION SECTION

JOB 71-11116 LOCATION Co-ords. 99, 892N; 77, 702E. ORIGINATED BY A.P.
W.P. 257-66-07 BORING DATE April 4, 1968 COMPILED BY AMS
DATUM Geodetic BOREHOLE TYPE Cont. flight auger 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	20	40	60	80	100	PLASTIC LIMIT — w_p	WATER CONTENT — w		
617.0	Ground Level															
0.0	Clayey silt with sand, traces of gravel Hard to Very Stiff Stiff		1	SS	16	610										
			2	SS	65											
			3	SS	81											
			4	SS	71	600										
			5	SS	28											
			6	SS	19											
			7	TW	PH	590				9					135	3 27 41 29
			8	TW	PH					+1.6						
			9	SS	31					+1.6						
			10	TW	PM	580				+1.8						
			11	SS	14					+1.6						
			12	TW	PH					+1.8						
564.0	End of Borehole					570										
53.0																

CHECKED BY *AK*

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT		LIQUID LIMIT — w_L PLASTIC LIMIT — w_p WATER CONTENT — w		BULK DENSITY γ P.C.F.	REMARKS	
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		20	40	60	80			100
616.8							SHEAR STRENGTH P.S.F. ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB. VANE						
0.0	Clayey silt with sand and trace of gravel Stiff to H rd		1	SS	15								
			2	SS	42	610							
			3	SS	59								
			4	SS	52								
			5	SS	30	600							
			6	SS	21								
594.3			7	SS	20								
22.5	End of Borehole					590							

FOUNDATION SECTION

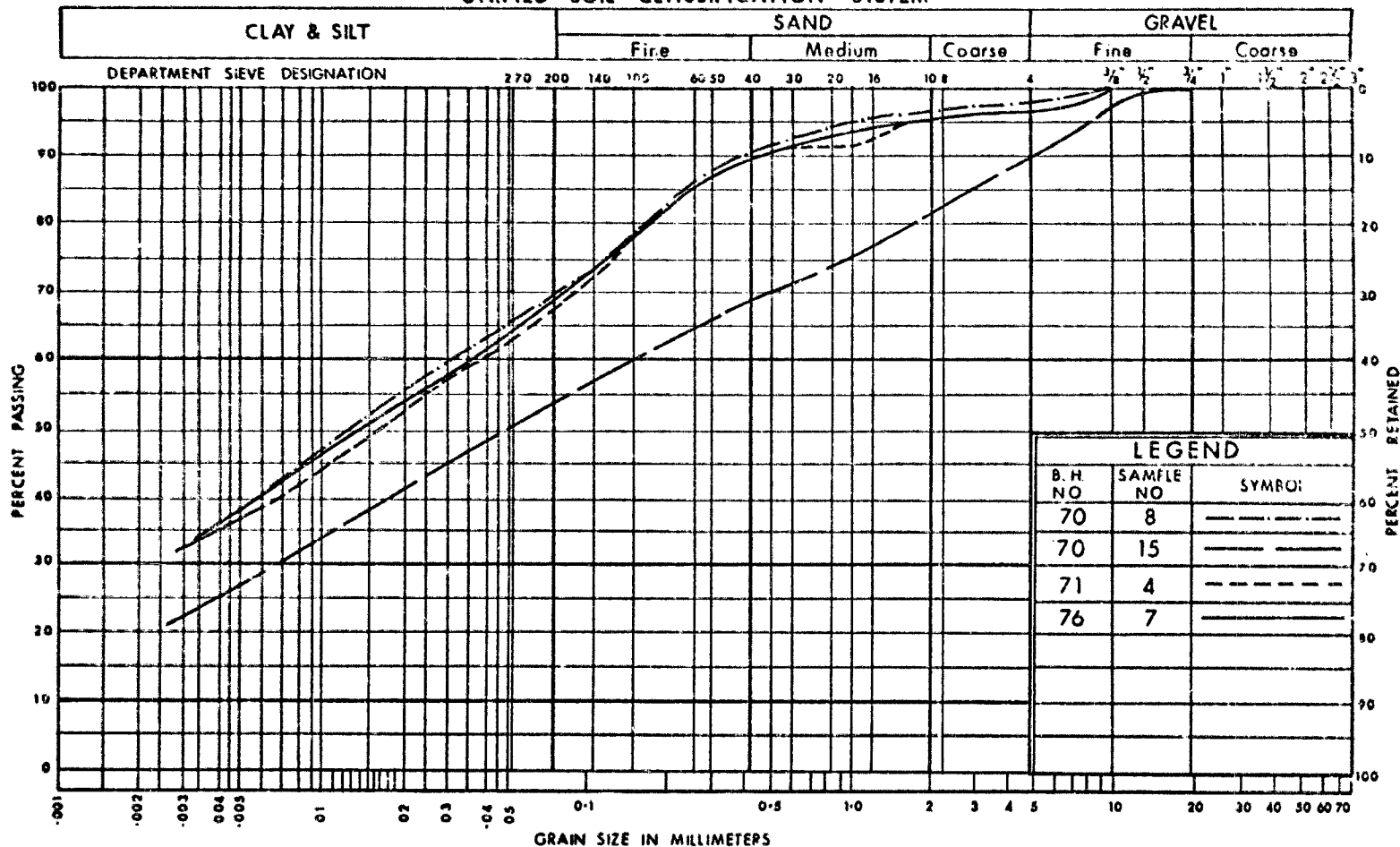
ORIGINATED BY P.P.

COMPILED BY P.F.

CHECKED BY *AK*

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION	RESISTANCE	LIQUID LIMIT ——— w_L	BULK DENSITY γ 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	100		
							SHEAR STRENGTH P.S.F.					WATER CONTENT %			
									w_p ——— w ——— w_L						
</															

UNIFIED SOIL CLASSIFICATION SYSTEM



DEPARTMENT
TRANSPORTATION AND COMMUNICATIONS



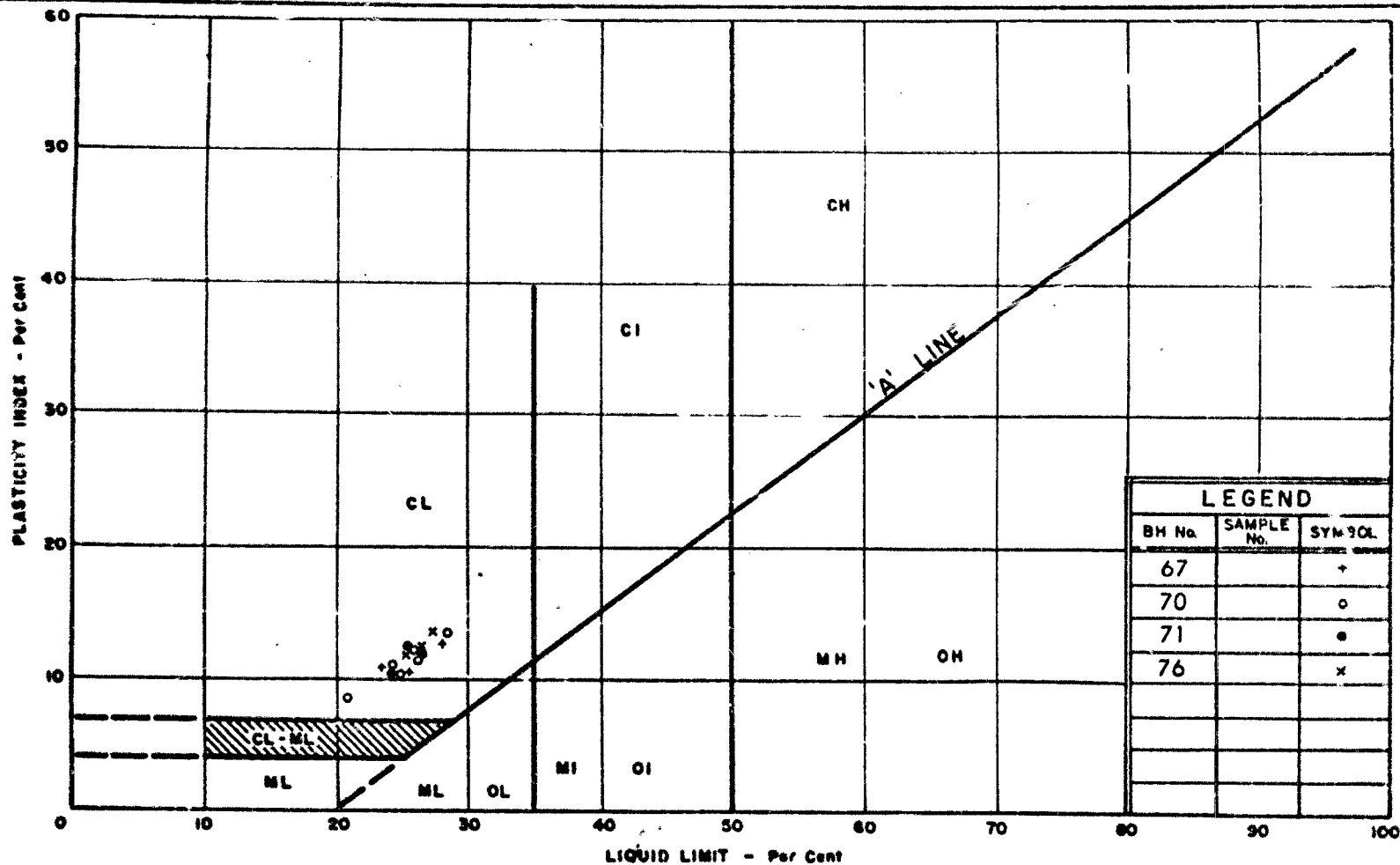
DESIGN SERVICES
BRANCH

GRAIN SIZE DISTRIBUTION
CLAYEY SILT
WITH SAND, TRACE OF GRAVEL

W.P. No. 257-66-07

JOB No. 71-11116

FIG. 1



DEPARTMENT OF HIGHWAYS
MATERIALS and
TESTING
DIVISION

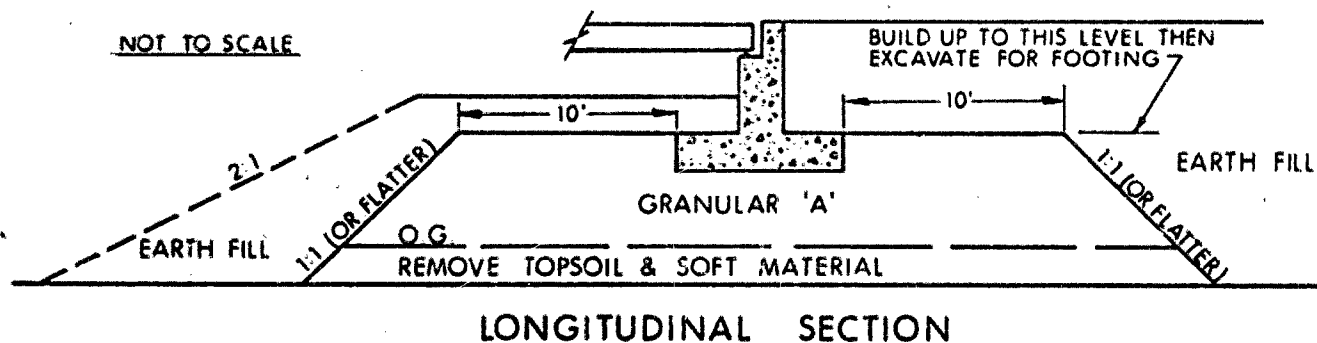
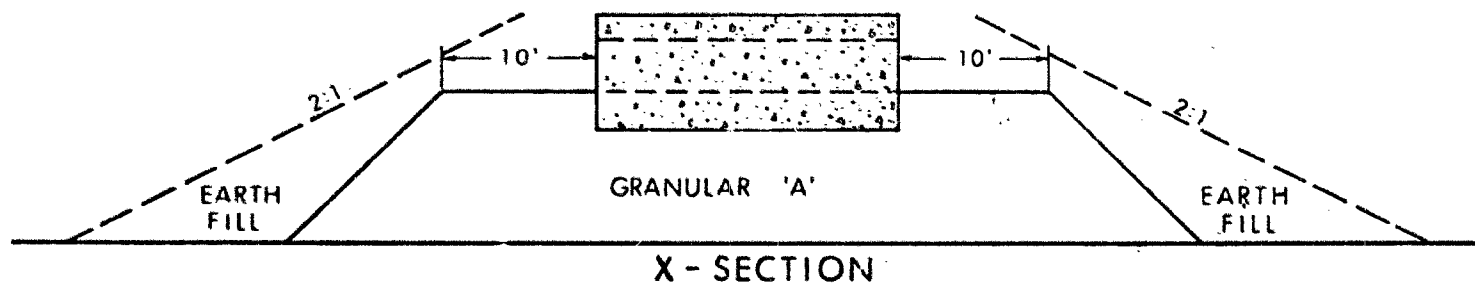
PLASTICITY CHART CLAYEY SILT

WR No. 257-66-07

JOB No. 71-11116

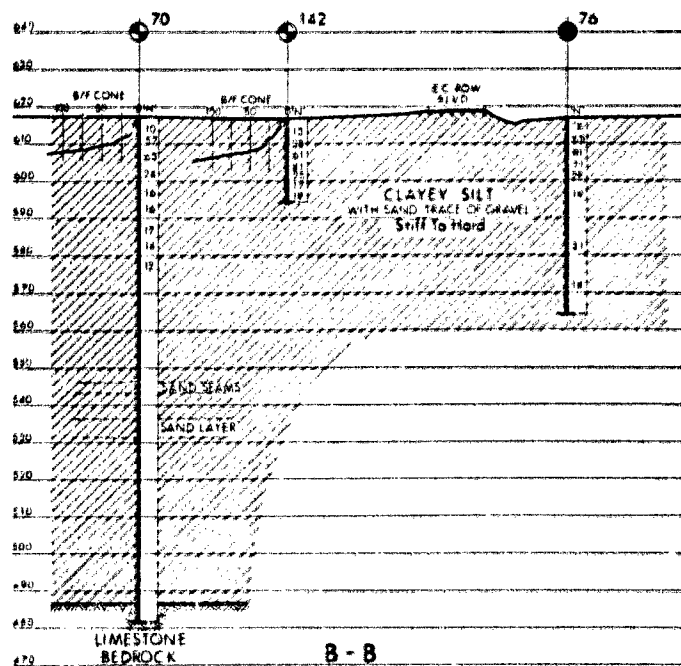
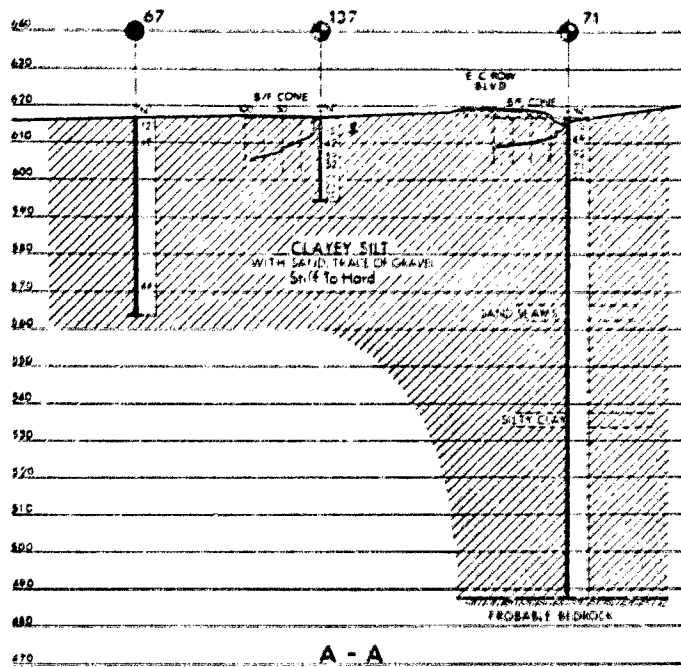
FIG. 2

ABUTMENT ON COMPACTED FILL SHOWING GRANULAR 'A' CORE



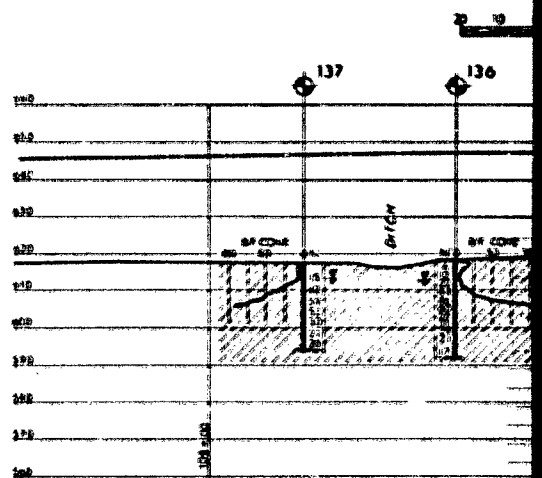
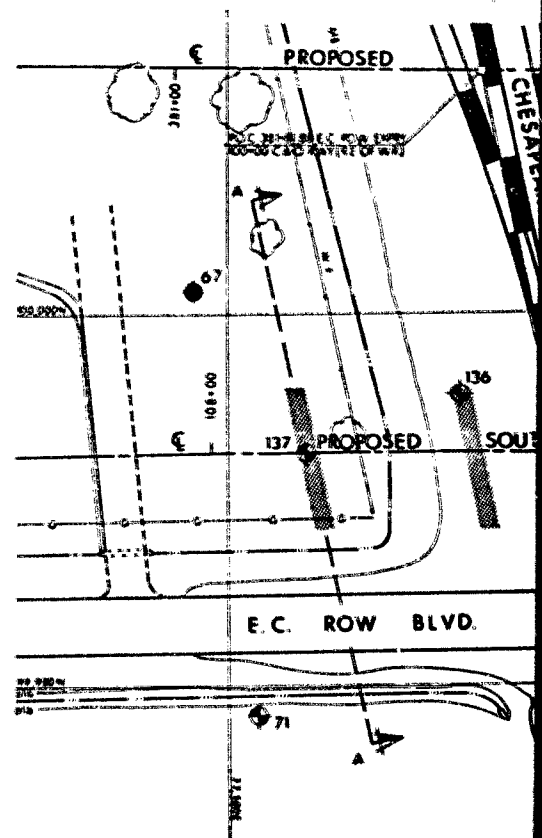
NOTES

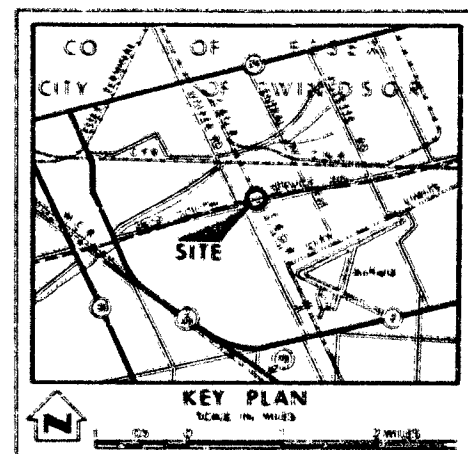
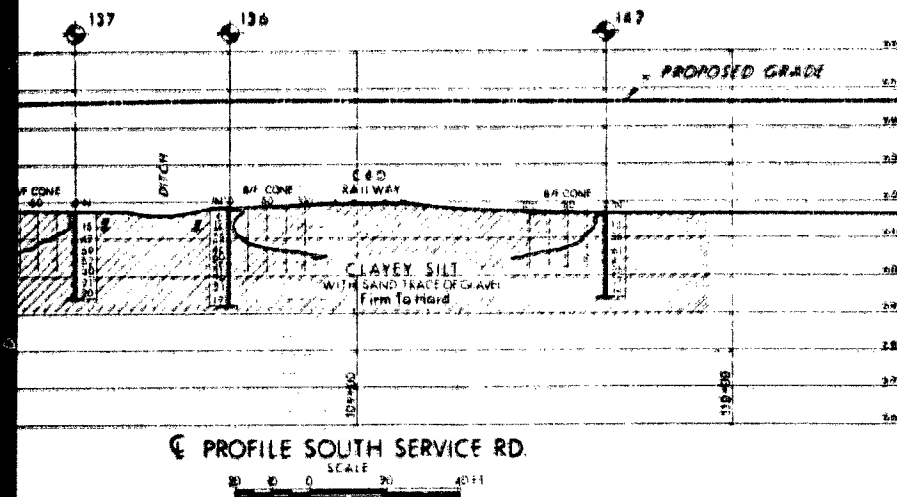
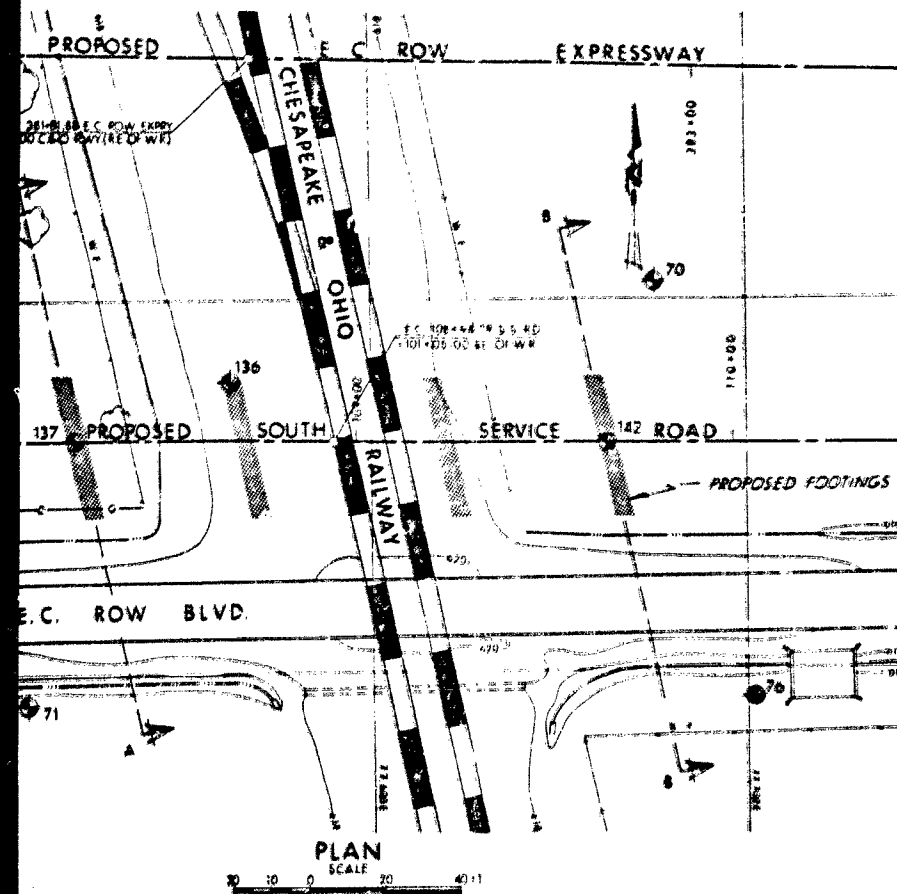
- 1 - REMOVE TOPSOIL &/OR SOFT SUBSOIL UNDER AREA OF COMPACTED GRANULAR 'A'.
- 2 - PLACE GRANULAR 'A' TO TOP OF FOOTING LEVEL, COMPACTED ACCORDING TO CURRENT D.T.C. STANDARDS.
- 3 - EXCAVATE COMPACTED GRANULAR 'A' MATERIAL FOR FOOTING.



SECTIONS

SCALE
30 0 30 40 FT





LEGEND			
◆	Bore Hole		
◆	Center of Mainline Road		
◆	Bore Hole & Center Road		
◆	Water Levels established on basis of High Watermark 1924 (1971) in Bore Holes 136 & 137 only		
BND	ELEVATION	CO-ORDINATES	
		NORTH	EAST
136	210.7	102,050	77,441
137	210.5	102,048	77,476
142	210.8	99,842	77,500
143	210.0	99,840	77,500
144	210.6	99,838	77,502
145	210.8	99,836	77,504
146	210.7	99,834	77,503

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

Bore Hole		Description	
136	210.7	CLAYEY SILT WITH SAND TRACES OF GRAVEL	Firm to Hard
137	210.5	CLAYEY SILT WITH SAND TRACES OF GRAVEL	Firm to Hard
142	210.8	CLAYEY SILT WITH SAND TRACES OF GRAVEL	Firm to Hard
143	210.0	CLAYEY SILT WITH SAND TRACES OF GRAVEL	Firm to Hard
144	210.6	CLAYEY SILT WITH SAND TRACES OF GRAVEL	Firm to Hard
145	210.8	CLAYEY SILT WITH SAND TRACES OF GRAVEL	Firm to Hard
146	210.7	CLAYEY SILT WITH SAND TRACES OF GRAVEL	Firm to Hard

DEPARTMENT OF TRANSPORTATION & COMMUNICATIONS
DESIGN SERVICES DIVISION - ROADWAY DIVISION

CHESAPEAKE & OHIO RAILWAY
SOUTH SERVICE ROAD

HIGHWAY NO. 10 E.C. ROW EXPRESSWAY (1971) 11
100 ESSER CITY OF WINDSOR

DATE 10/1/71 10/1/71 10/1/71

BORE HOLE LOCATIONS & SOIL STRATA

SHOWN AT 1:1000 SCALE AND 2:1 SCALE DRAWING NO. 71-11116A

DATE DECEMBER 21, 1971 10/1/71 10/1/71

APPROVED BY [Signature] 10/1/71 10/1/71

Mr. W. Katarynczuk,
District Construction Engineer,
Chatham.

Construction office,
Third Floor, Central Bldg.,

February 13, 1975.

Walker Road Overpass W.P. 257-66-04, Site 6-285,
C. & D. Rlwy. Overheads W.P. 257-66-05, Site 6-292 A & B,
" " " " -06, Site 6-291,
E.C. Row Expwy, District 1 - -07, Site 6-293.

This will confirm discussions and points agreed upon during our recent meeting in the Structural Design office.

Walker Road Overpass - There will be no need to pre-auger back row of piles in abutment footings as it was decided to re-locate all public utilities that are within 12 ft. of these piles.

Since the auger holes for the front row of piles are required to be larger than the diameter of the piles, the voids around the piles should be filled in the following sequence:

1. Auger the hole for the pile to a depth shown on the plan.
2. Drop pile in the hole.
3. Fill void with dry sand and heap the sand around the pile at the ground level.
4. Drive piles, placing more sand around the pile as the sand fills the void during driving.

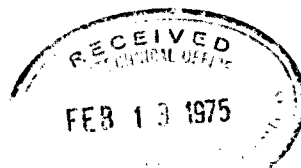
C. & O. Railway Overheads - No appreciable heave at the railway tracks is anticipated during driving of piles.

The 21" storm sewer in the vicinity of east abutment is to be replaced with reinforced sewer and therefore no problems are foreseen during driving as piles are more than 12 ft. away.

The 30" C.S.P. might be relocated to avoid excavation in proximity of the railway tracks. If this cannot be done, the plans will be revised to show the track protection for the pipe excavation and the construction sequence so that the pipe will be placed after the piles are driven.

K. Luczka,
Bridge Construction Engineer.

KL/JC



Mr. C. Grebski,
Structural Design Engineer,
Structural Design Section,
West Bldg., Downsview

Soil Mechanics Section,
Geotechnical Office,
West Bldg., Downsview.

J. Keen

August 27th, 1974.

W.P.'s 257-66-03,04,05,06,07,09,21
E.C. Row Expy., Windsor,
District #1 (Chatham)

Following is a summary of the main points of our discussion on August 22, 1974 regarding piled foundations for the abovementioned projects.

1. For the C. & O. Rwy. structures a cost estimate of spread footings versus piled foundations indicates a much smaller saving in favour of spread footings than previously anticipated. This is partly due to the fact that as a result of the recent pile tests we are able to reduce the number of piles required by about 25%. In view of this and other (mainly settlement) considerations it was decided to adopt the piled foundation design.

2. A restriction on the use of pile driving hammers delivering more than 30,000 ft.lbs. per blow when the pile tips are within 3 ft. of bedrock, to be incorporated in the contract, requires that the bedrock surface be defined accurately at locations where piles are to be driven. To achieve this it will be necessary for the Soil Mechanics Section to carry out additional borings at all of the structure sites. In order to meet the present design schedule this drilling work should be completed and reported on by the end of October 1974.

K.G. Selby
K.G. Selby
Supervising Engineer

KGS/rgb

c.c. A. Watt
J. Anderson

Files
Documents

MEMORANDUM

TO: Mr. A. Prakash
Foundations Section
West Bldg.

FROM: Structural Office
West Bldg.

ATTENTION:

DATE: June 18/74

OUR FILE REF.

IN REPLY TO

SUBJECT: C & O Railway Overheads
E.C. Row Expressway, Windsor, District #1
W.P. 257-66-05, Site 6-292 A & B, East & West Bound Lanes
W.P. 257-66-06, Site 6-291 North Frontage Road
W.P. 257-66-07, Site 6-293 South Frontage Road

This memo is to confirm that a value of 1 TON PER SQUARE FOOT for adhesion at the bottom of the footings may be used for the above structures. Also this value applies at the bottom of footing concrete elevation of 610.00.

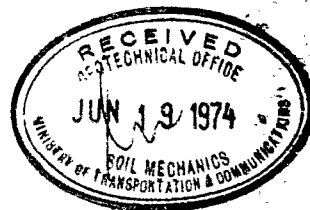
The above information given by phone to J. L. Keen
Tues., June 18, 1974.



J. L. Keen
Reg. Structural Design Eng.

JLK/ek

cc: C. Farrell



MINISTRY OF TRANSPORTATION AND COMMUNICATIONS, ONTARIO

MEMORANDUM

TO: Mr. A. G. Stermac
Principal Foundation Engineer
Foundation Office
West Bldg., DOWNSVIEW

FROM: Structural Planning
Southwestern Region

ATTENTION:

DATE: October 26, 1972

OUR FILE REF.

IN REPLY TO

SUBJECT: E. C. Row Expressway
Walker Road Overpass
C. & O. Railway Overheads
Foundation Investigation Reports Review
District 1, Chatham

Enclosed please find revised E plans with alignment and grade revisions (Oct. 1972) for the following structures on the E. C. Row Expressway and North and South Frontage Roads in Windsor.

(a) Walker Road Overpass, W.P. 257-66-04, Bridge Site 6-285
Site Plan E-4882-1, Rev. Oct. 1972

The original alignment and proposed foundation locations shown in red were the ones sent to you Oct. 12, 1971 and reported on in your Foundation Report W.O. 71-11113 dated December 9, 1971. The location of the Bore Hole and Cone Penetration Tests from your foundation report have been plotted on the enclosed E plans. The proposed new foundation locations are shown in blue on the two marked up E plans enclosed.

(b) C. & O. Railway Overhead on North Frontage Road, W.P. 257-66-06,
Bridge Site 6-291, Site Plan E-5308-1, Rev. Oct. 1972

The original alignment and proposed foundation locations shown in red were the ones sent to you on Oct. 12, 1971 and reported on in your Foundation Report W.O. 71-11115 dated Dec., 1971. The location of the Bore Hole and Cone Penetration Tests from your foundation report have been plotted on the enclosed E plans. The proposed new foundation locations on the revised alignment are shown in blue on the two marked up E plans enclosed.

(c) C. & O. Railway Overhead on E. C. Row Expressway
W.P. 257-66-05, Bridge Site 6-292, Site Plan E-5307-1, Rev. Oct. '72

The original alignment and proposed foundation locations shown in red were sent to you on Oct. 12, 1971 and reported on in your Foundation Report W.O. 71-11114 dated Dec. 10, 1971. The location of the Bore Hole and Cone Penetration Tests from your foundation report have been plotted on the enclosed E plans. The proposed new foundation locations on the revised alignment are shown in blue on the two marked up E plans enclosed.

Mr. A. G. Stermac
Page 2
October 26, 1972

(d) C. & O. Railway Overhead on South Frontage Road,
W.P. 257-66-07, Bridge Site 6-293, Site Plan E-5309-1, Rev. Oct. '72

The original alignment and proposed foundation locations shown in red were sent to you on Oct. 12, 1971 and reported on in your Foundation Report W.O. 71-11116 dated Dec. 1971. The location of the Bore Hole and Cone Penetration Tests from your foundation report have been plotted on the enclosed E plans. The proposed new foundation locations on the revised alignment are shown in blue on the two marked up E plans enclosed.

Currently survey personnel from Southwestern Region are laying out the new alignment of the Central Avenue Extension. This alignment is approximately 700' west of the alignment previously sent you for the CN/CP Railway Overhead on Central Avenue Ext., W.P. 257-66-09, Bridge Site 6-287 and reported on by you in Foundation Report 71-11118 dated Dec. 1971. As soon as the new E plan for this bridge site has been prepared, we will be forwarding this to you with a request for a new foundation investigation. This is scheduled to be completed before November 15, 1972.

In view of the very tight schedule assigned to the Walker Rd., C. & O. and Central Avenue Extension structures, we are forwarding you now the information on the Walker Rd. and the C. & O. structures so that you may access what additional foundation investigation you may consider desirable in advance of the Central Ave. Ext. Railway Overhead foundation request in order that we may receive your foundation recommendations at the earliest possible date.

The E plans enclosed are all on the Ontario co-ordinate system rather than the project co-ordinate grid previously used. This involves both a horizontal translation and angular rotation to the former grid system.

We are enclosing ICES 0060 output sheets giving the new co-ordinates for all the Bore Holes and Cone Tests previously co-ordinated by you in the reports for Walker Rd. and the C. & O. Railway Overheads (4 reports). In this printout the original point has been identified by its No. in the report. The old co-ordinates appear in the print out with this No. The point is then redefined for the purpose of recalculating its new co-ordinates by adding 10, i.e.; BH 68 becomes BH 78 and the new co-ordinates established. Some notes in red have been added to the computer output to clarify this point. Since all the B. C. Row geometry is now being calculated on the Ontario grid (3rd Modified Traverse Mercator Grid System), would you please have the bore hole co-ordinates in your Foundation Reports W.O. 71-11113, 4, 5, and 6 shown on the drawing at the end of each report revised to the Ontario Grid also.

Mr. A. G. Stermac

Page 3

October 26, 1972

It should also be noted that the title of North and South Service Roads shown on the E plans has been revised to North and South Frontage Roads.

Enclosed please find photographs of the Walker Road Overpass and C. & O. Railway Overhead Bridge Sites.

In order to avoid any delays when replying to this memorandum would you please send a copy direct to Mr. J. L. Keen, Regional Structural Design Engineer.

B. J. McKenna

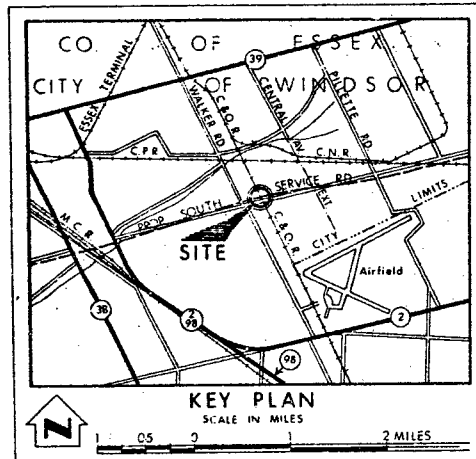
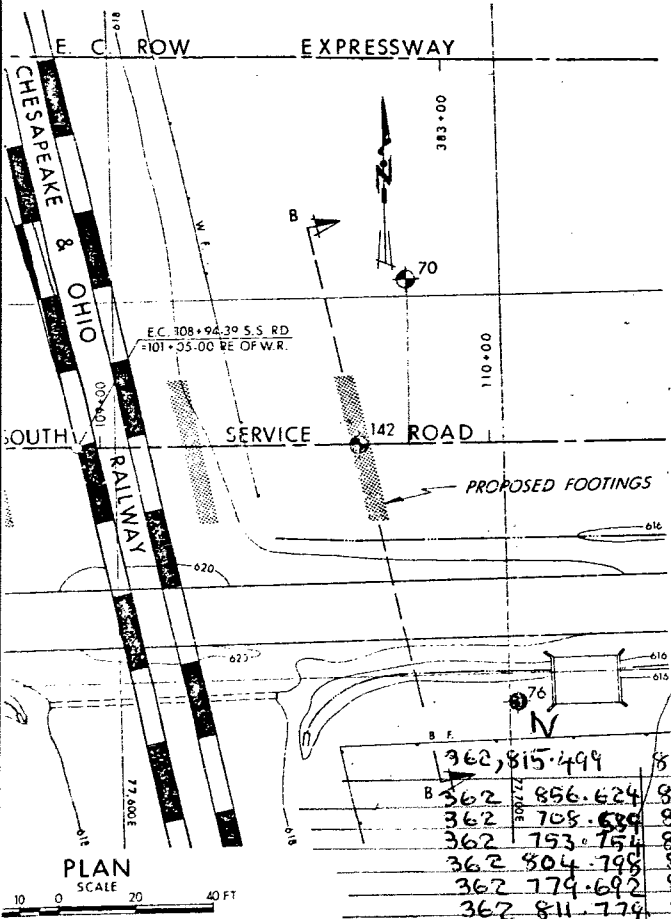
B. J. McKenna

Structural Location Engineer

BJMcK:sz

Enc.

cc C. Grebski
A. McConnell
A. Crowley
J. Anderson



LEGEND

Bore Hole

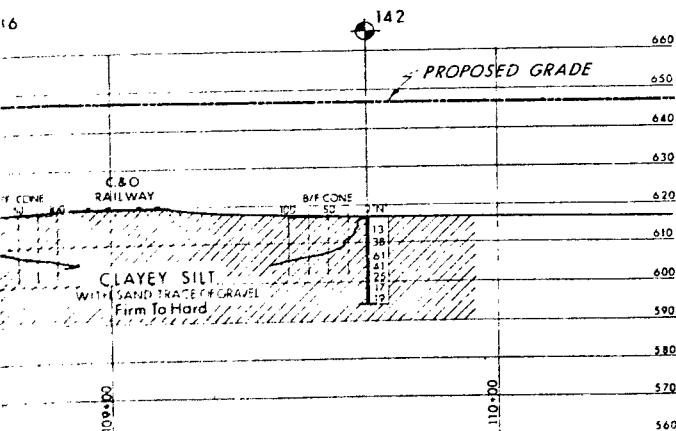
Cone Penetration Test

Bore Hole & Cone Test

Water Levels established at time of field investigation, NOV 1971 in Bore Holes 136 & 137 only.

NO.	ELEVATION	CO-ORDINATES	
		NORTH	EAST
67	616.7	100,006	77,491
70	617.5	100,004	77,676
71	616.8	99,892	77,508
76	617.0	99,892	77,702
136	618.6	99,978	77,562
137	616.8	99,962	77,521
142	616.7	99,961	77,663

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



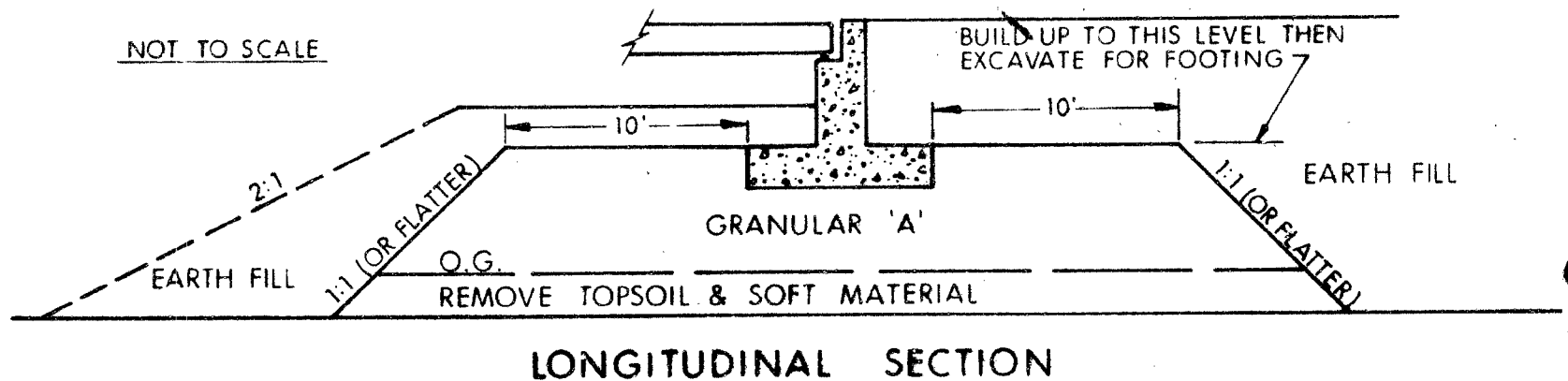
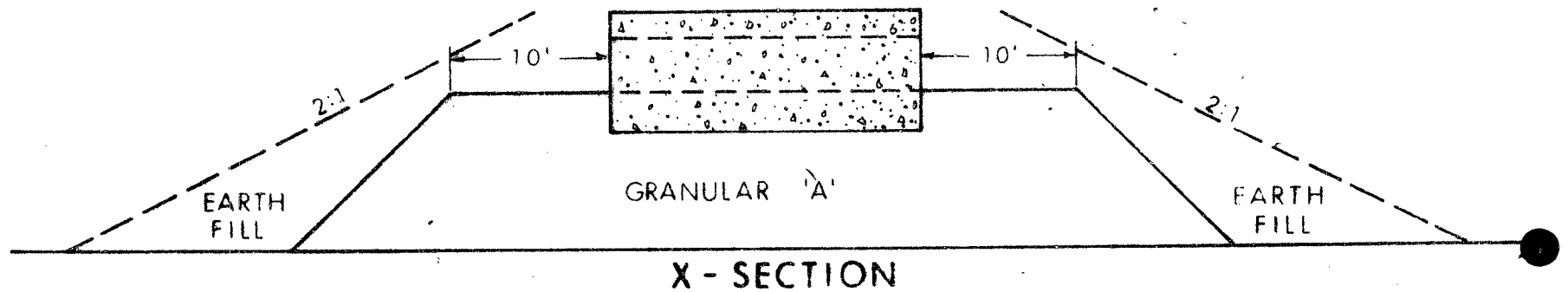
REVISIONS	DATE	BY	DESCRIPTION

DEPARTMENT OF TRANSPORTATION & COMMUNICATIONS
DESIGN SERVICES BRANCH — FOUNDATION OFFICE

**CHESAPEAKE & OHIO RAILWAY
AND
SOUTH SERVICE ROAD**

HIGHWAY NO. E.C. ROW EXPWY. DIST NO. 1
CO. ESSEX CITY OF WINDSOR

ABUTMENT ON COMPACTED FILL SHOWING GRANULAR 'A' CORE



NOTES

- 1 - REMOVE TOPSOIL &/OR SOFT SUBSOIL UNDER AREA OF COMPACTED GRANULAR 'A'.
- 2 - PLACE GRANULAR 'A' TO TOP OF FOOTING LEVEL, COMPACTED ACCORDING TO CURRENT ~~STANDARDS~~ STANDARDS.
- 3 - EXCAVATE COMPACTED GRANULAR 'A' MATERIAL FOR FOOTING.

FIG. 3