

G.I.-30 SEPT. 1976

GEOCRES No. 4079-18DIST. 1 REGION W.P. No. 626-71-05CONT. No. 80-18W. O. No. STR. SITE No. B-2HWY. No. 40 (old)LOCATION Whitebread Drain #1No of PAGES -OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT.REMARKS:

### NOTES:

- CLASS OF CONCRETE

PRESTRESSED SLABS

DECK, SIDEWALK & BARRIER WALLS

REMAINDER

35 MPa

30 MPa

20 MPa
- REINFORCING STEEL

GRADE 400

BAR MARK WITH SUFFIX C DENOTES COATED BAR
- CLEAR COVER TO REINFORCING STEEL

FOOTINGS & ABUTMENTS 3"

DECK - TOP 2" BOT. 1"

OR AS NOTED ON DRAWINGS
- CONSTRUCTION NOTES

THE CONTRACTOR IS RESPONSIBLE FOR FINISHING THE BEARING SEATS TO THE SPECIFIED ELEVATIONS WITH A TOLERANCE OF  $\pm 1/8"$ .

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

TO ACHIEVE THE MINIMUM CLEAR COVER OF 2" SPECIFIED AT TOP OF DECK, THE TOP LAYER OF REINFORCEMENT SHALL BE PLACED PRIOR TO CONCRETING, WITH A CLEAR COVER OF  $2\frac{1}{2} \pm \frac{1}{2}"$  TOLERANCE.

### CONCRETE QUANTITIES:

- CONCRETE QUANTITIES ARE LISTED BELOW FOR THE APPROPRIATE CONCRETE LUMP SUM TENDER ITEMS:

CONCRETE IN ABUTMENTS AND WINGWALLS - 65 CU. YD.

CONCRETE IN DECK - 68 CU. YD.

CONCRETE IN BARRIER WALLS - 13 CU. YD.

CONCRETE IN APPROACH SLABS - 38 CU. YD.

### LIST OF DRAWINGS:

- 13-2-1 GENERAL PLAN

2 BOREHOLE LOCATIONS & SOIL STRATA

3 FOOTINGS

4 ABUTMENTS

5 PRESTRESSED SLAB DETAILS

6 DECK

7 BARRIER WALL

8 BARRIER WALL WITH SIDEWALK

9 STEEL RAILING (SINGLE TUBE)

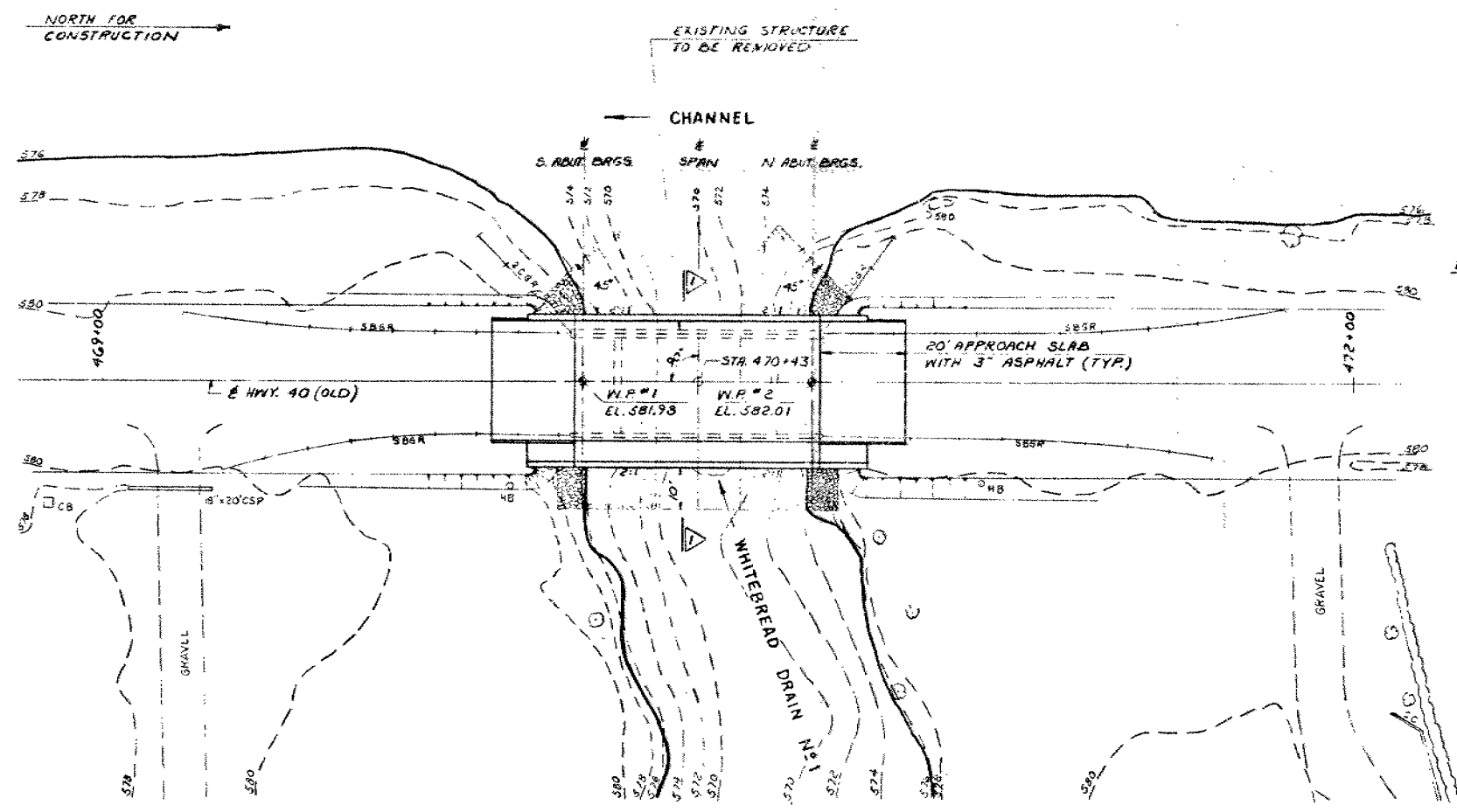
10 20 FT. APPROACH SLAB

11 AS CONSTRUCTED ELEV. & DIM.

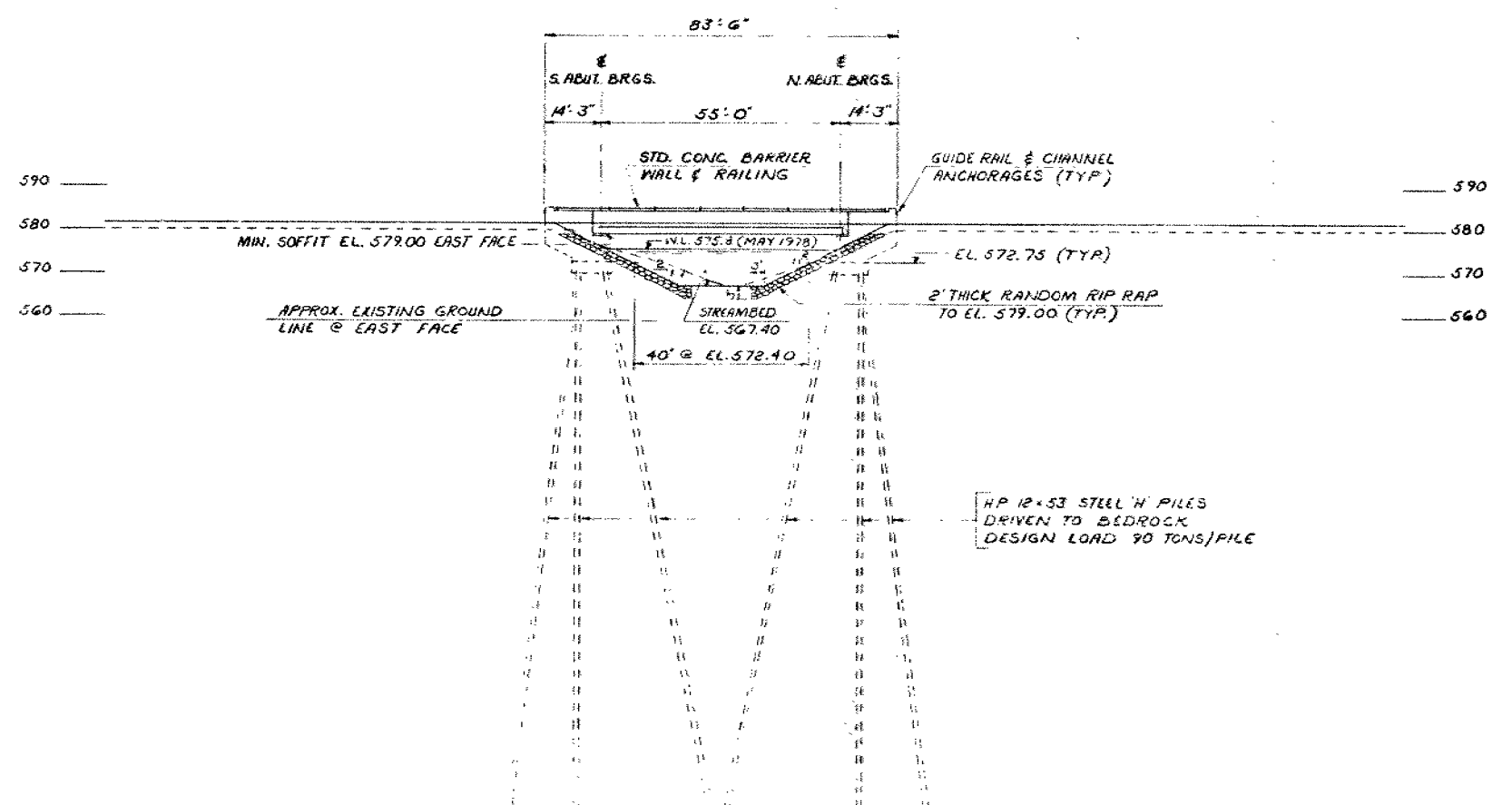
12 STANDARDS I

13 STANDARDS II

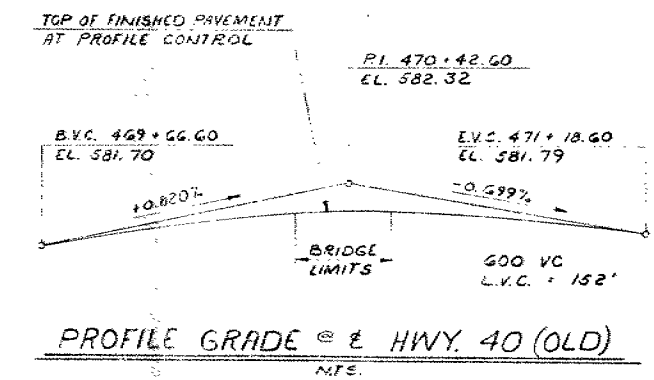
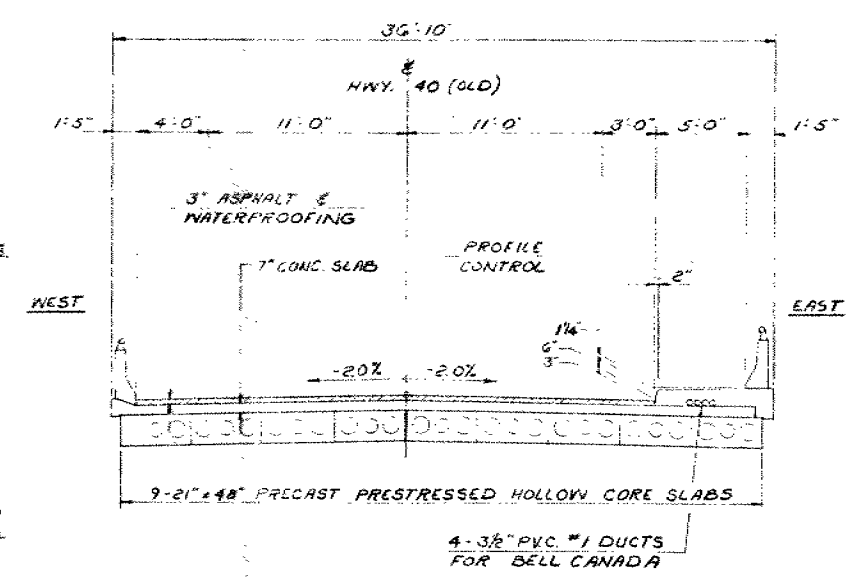
14 STANDARDS III



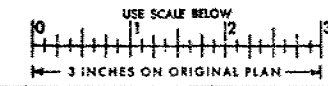
PLAN  
1" = 20'



ELEVATION  
1" = 20'



FOR REDUCED PLAN  
USE SCALE BELOW



REVISIONS	DATE	BY	DESCRIPTION
1			
2			
3			

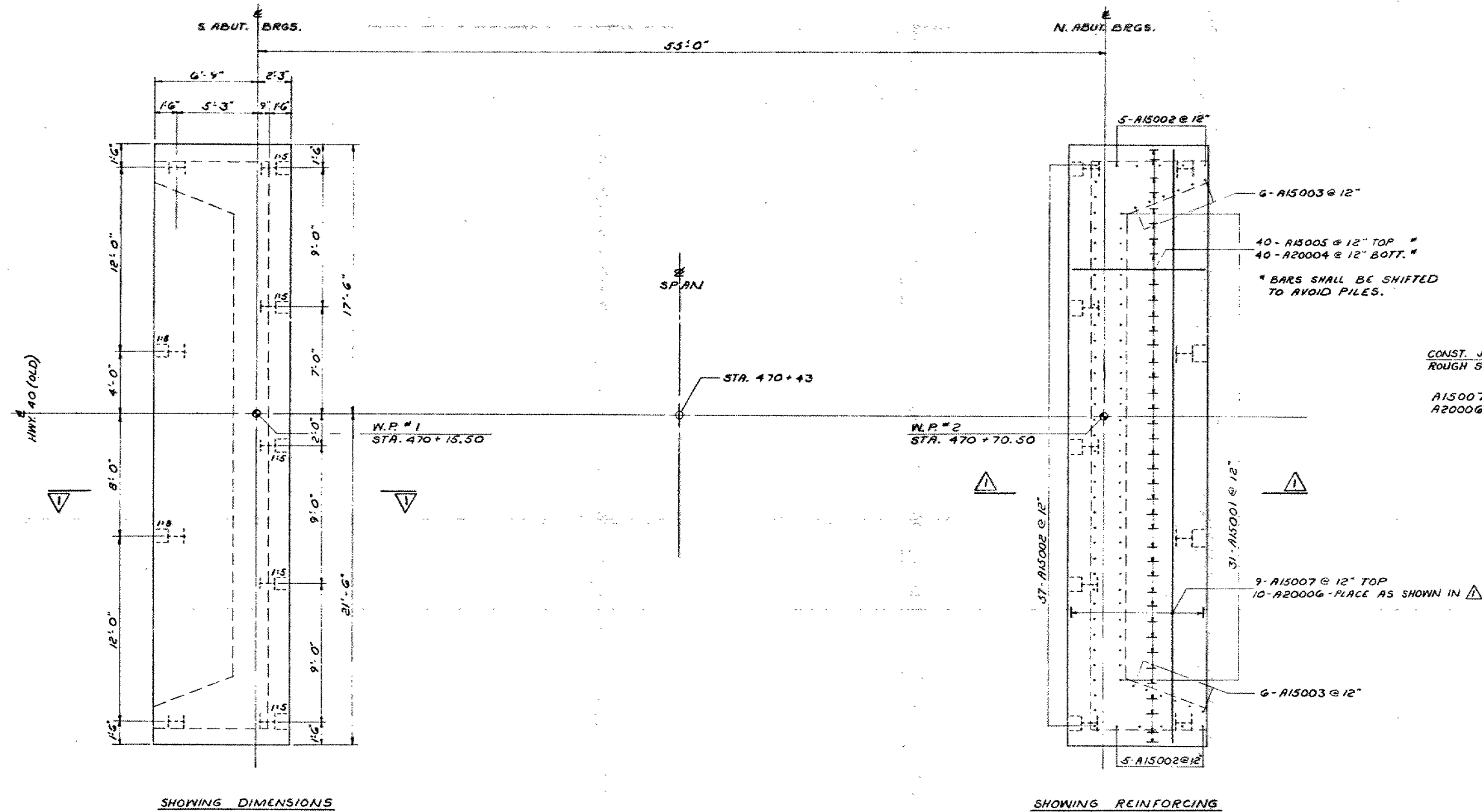
DESIGN	CHECK	LOADING	DATE
DRAWING	CHECK	SITE	DATE

CONT No  
WP No 626-71-05

WHITEBREAD TAP DRAIN "1 BR.

FOOTINGS

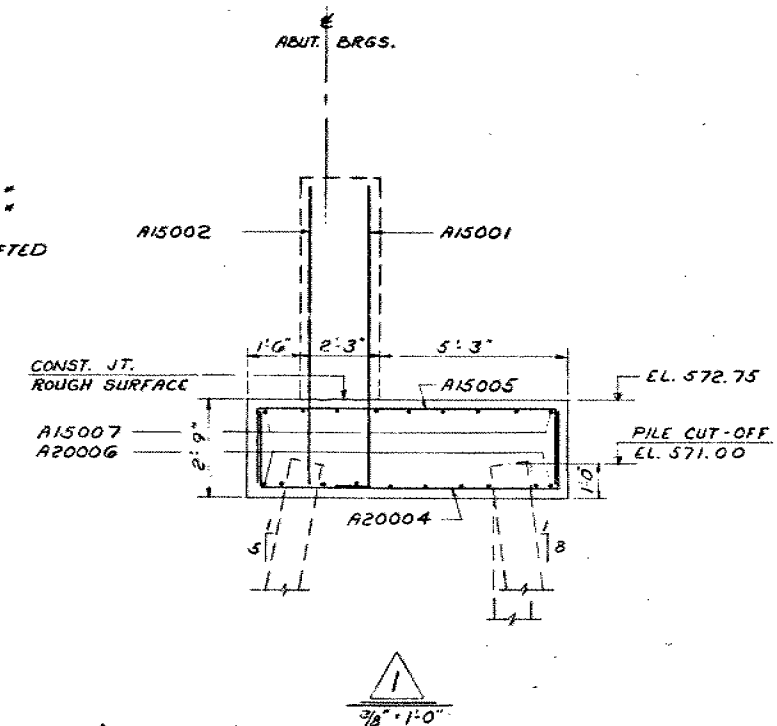
SHEET



SHOWING DIMENSIONS

SHOWING REINFORCING

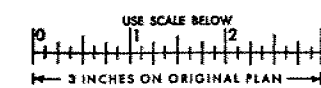
PLAN  
1/4" = 1'-0"



STEEL 'H' PILE DATA				
LOCATION	BATTER NO.	LENGTH	TYPE	
S. ABUT.	VERT. 2	125'	HP 12 x 53	
	1:8 2	126'		
	1:5 5	127'		
N. ABUT.	VERT. 2	125'	HP 12 x 53	
	1:8 2	126'		
	1:5 5	127'		

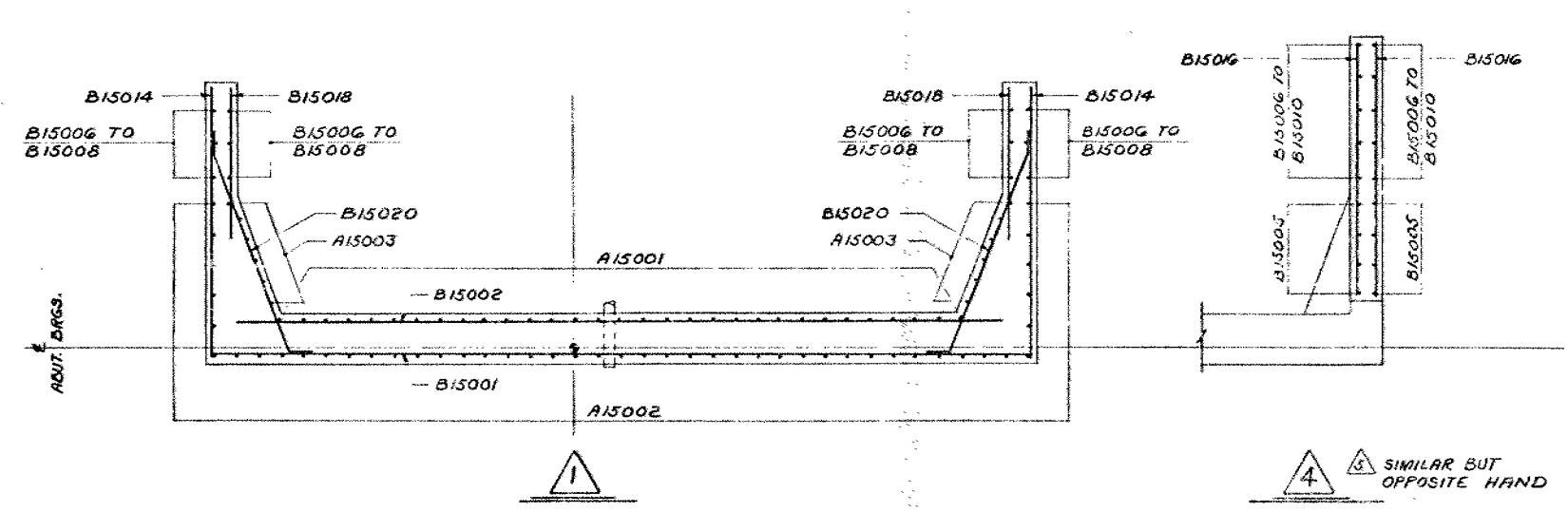
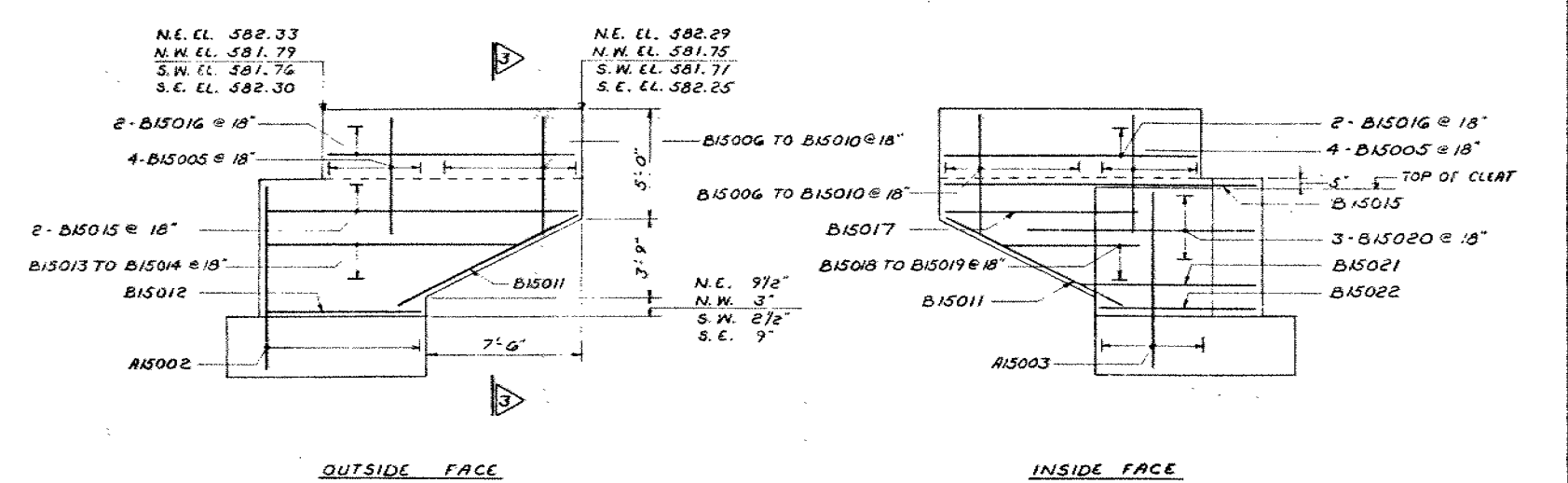
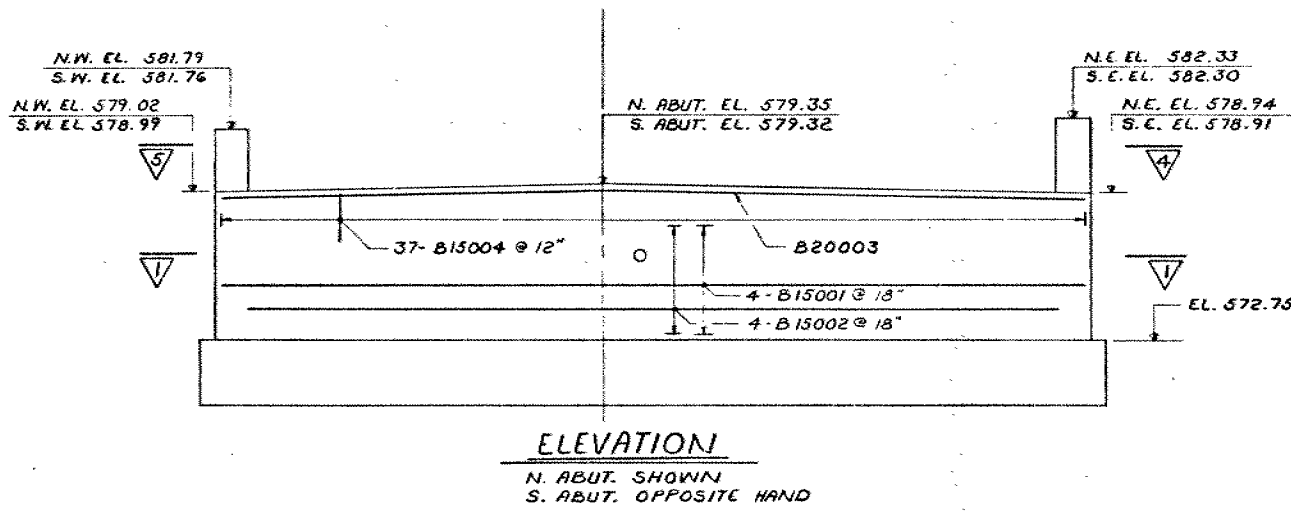
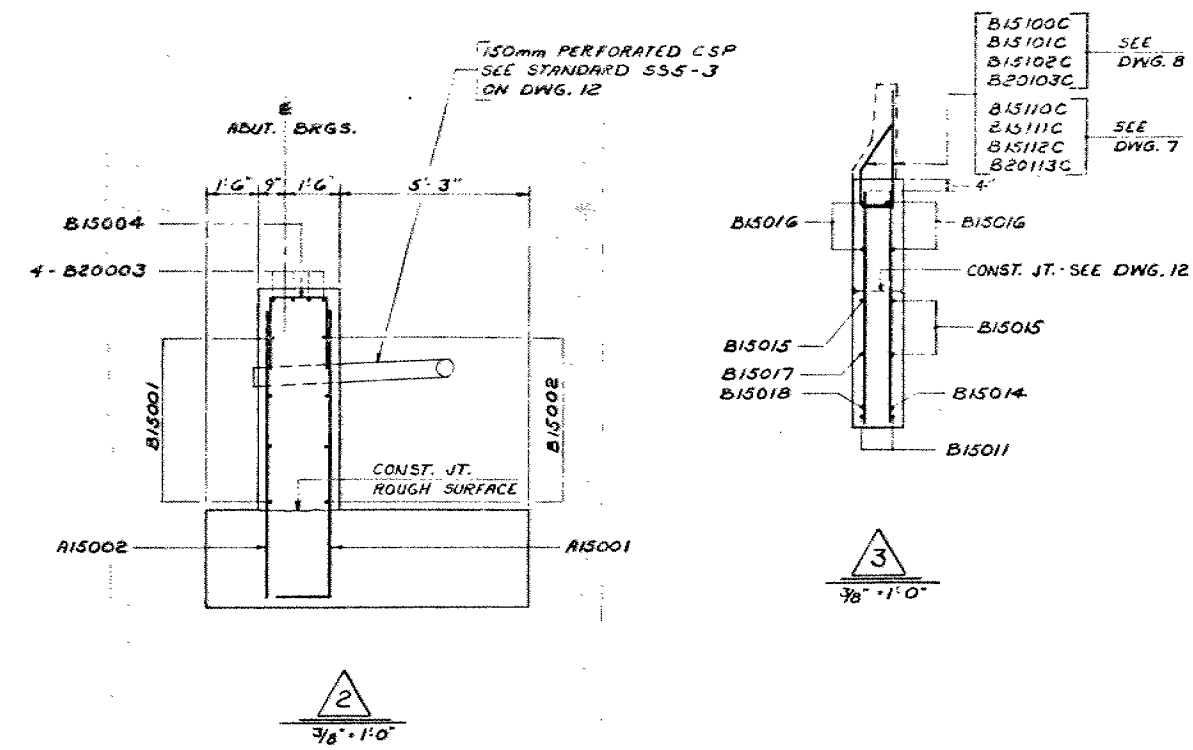
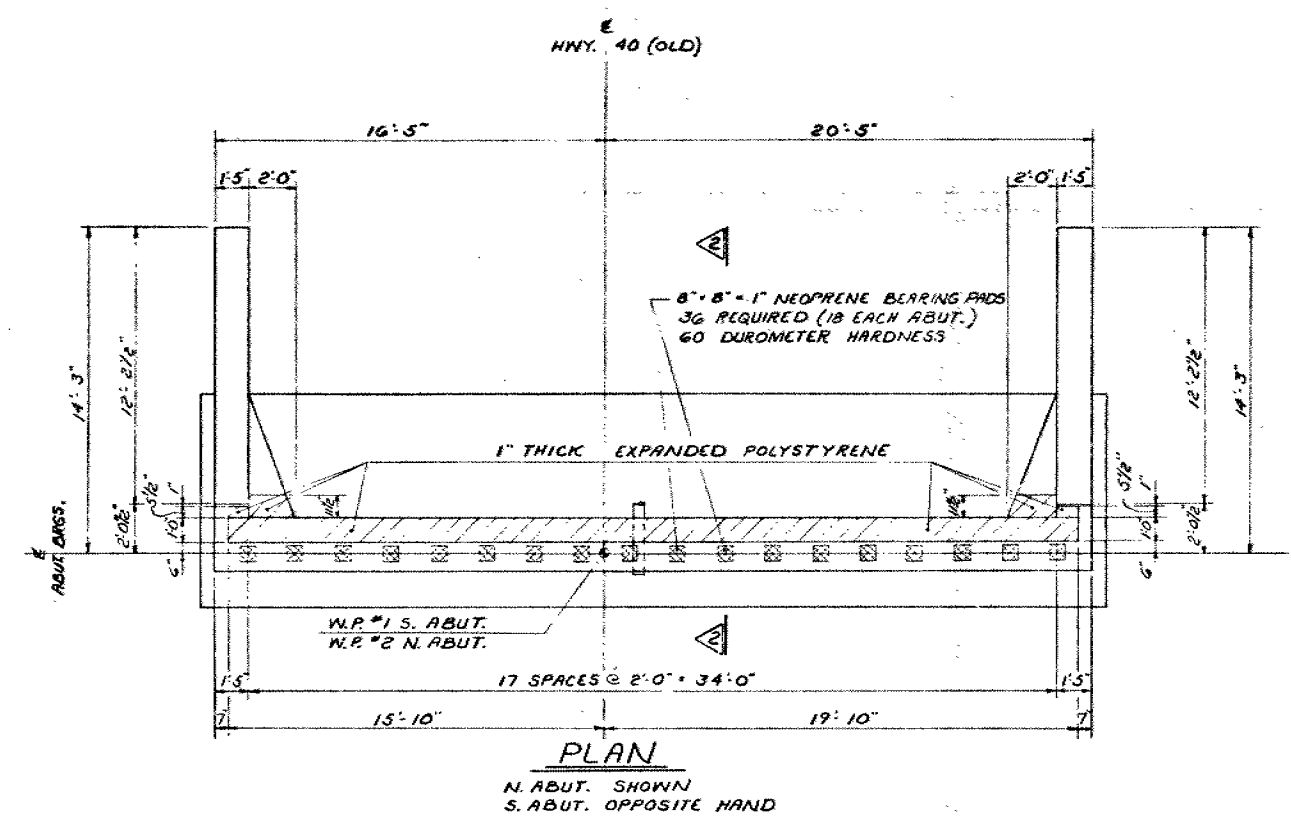
- NOTES:
1. SPACING OF PILES TO BE MEASURED AT UNDERSIDE OF FOOTING.
  2. PILE LENGTH SHOWN ON THE DRAWING IS THE THEORETICAL LENGTH BELOW CUT-OFF.

FOR REDUCED PLAN



REVISIONS	DATE	BY	DESCRIPTION
1			
2			
3			

DESIGN JFM CHECK LOADING H20-44 DATE 79-06  
DRAWING JFM CHECK SCR SITE No 13-2 DWG 3



SCALE: 1/4" = 1'-0" UNLESS NOTED OTHERWISE

FOR REDUCED PLAN			
USE SCALE BELOW			
10	1	2	3
3 INCHES ON ORIGINAL PLAN			
REVISIONS	DATE	BY	DESCRIPTION
DESIGN	JAM	CHECK	LOADING H 520-44 DATE 79-01
DRAWING	JAM	CHECK	SITE No 3-2 DWG 4

ENGINEERING MATERIALS OFFICE  
SOIL MECHANICS SECTION

*CONT. 80-18*

WP 626-71-05 DIST 1

HWY 40 (old) STR SITE 13-2

Whitebread Drain #1 Bridge  
4.7 Miles West of  
Wallaceburg West Limits

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SAMPLE DISPOSITION NOTICE		
TYPE	DISCARD AFTER	RECOMM. BY
JARS	79-07-24	148
TUBES	79-07-24	148
ROCK CORES	79-07-24	148

# FOUNDATION INVESTIGATION REPORT

For

Whitebread Drain #1 Bridge  
4.7 Miles West of  
Wallaceburg West Limits  
W.P. 626-71-05, Site 13-2  
Hwy. 40 (old), District #1, Chatham

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## INTRODUCTION

This report contains the results of the foundation investigation carried out at the above mentioned site. The fieldwork which consisted of two boreholes was carried out on April 18 and 19, 1979. The boreholes were advanced using an auger machine equipped with hollow stem augers and BXL rock coring techniques to a depth of 142.0 feet below the ground surface.

## SITE DESCRIPTION

The site of the proposed new structure is situated approximately 4.7 miles west of Wallaceburg west limits on Hwy. 40 (old), Lot A, Con. IV, Township of Gore of Chatham, County of Kent. At this location the highway runs parallel to a channel of the St. Clair River on the west. To the east the land is flat and used for agriculture with some residential housing present along the highway.

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

## SUBSURFACE CONDITIONS

Generally, the surface conditions consist of up to 14 feet of clayey silt to silty clay containing occasional layers of silty sand followed by an extensive deposit of silty clay overlying sound shale bedrock at a depth of 134 feet below the ground surface.

Reference should be made to the Record of Borehole Sheets contained in the report appendix on which are summarized the results of field and laboratory tests and to Drawing 1347401-A which contains the

locations and elevations of the borings. A description of the soil types encountered from ground level downwards is given below.

#### Clayey Silt to Silty Clay, Traces of Sand

Immediately below the ground surface a 12.5 to 14 foot thick deposit of clayey silt to silty clay containing traces of sand exists. The upper 7.5 to 9 feet contains occasional inclusions of organic material. In B.H. #1 a 2.5 foot thick layer of silty sand exists within the stratum at a depth of 7.5 feet.

The natural moisture content as determined in the laboratory ranged between 16 and 22% with an average of 19%.

Standard Penetration Tests carried out within this stratum yielded 'N' values ranging from 4 to 18 blows/foot. Therefore, the consistency of this deposit can be described as being firm to stiff.

#### Silty Clay

Underlying the above stratum is an extensive deposit of silty clay containing occasional silt seams. The thickness of this stratum was proven in B.H. #1 to be 120 feet.

Field vanes carried out within this stratum yielded an undrained shear strength ranging from 480 to 1220 psf with a sensitivity of 2 to 4. The laboratory unconfined test results yielded an undrained shear strength ranging from 115 to 700 psf. Overall, the consistency of the stratum can be described as soft to firm.

The natural moisture content of the stratum ranged from 29 to 52% with an average of 36%. The unit weight ranged from 112 to 122 pcf.

#### Bedrock

Sound shale bedrock probably of the Kettle Point formation, exists at elevation 446.5 or 134 feet below the ground surface. Bedrock was not proven in B.H. #2. Refer to the Diamond Drill Sheet attached to this report for a complete description of the rock core obtained.

Groundwater

The groundwater level was observed by measuring in the open boreholes after completion of the investigation. The groundwater level was found to exist at elevation 577.0. The water level in Whitebread Drain No. 1 was measured at elevation 576.4 at the time of the soil investigation.

## DISCUSSION AND RECOMMENDATIONS

### General

It is proposed to replace the existing single span composite steel and concrete bridge crossing the Whitebread Drain No. 1 on Hwy. 40 (old). The proposed structure is to be a 55 foot single span bridge. The profile grade is to be raised approximately one foot at the new structure.

### Structure Foundation

It is recommended that the proposed structure be founded on steel 'H' piles driven to bedrock located at elevation 446.5 $\pm$ . The piles may be designed to carry the full structural capacity of the pile section chosen.

The proposed footing will be below the prevailing water level in Whitebread Drain No. 1. Therefore, a dewatering scheme will be required. Braced, interlocking steel sheet piling driven to a minimum distance of 5 feet into the silty clay stratum may be utilized.

### Approach Embankment

The additional one foot fill height and widening constructed with 2:1 slopes will not cause any major stability problems. The fill should consist of well compacted acceptable material.

Minor long-term settlements will occur under the proposed approaches due to the weight of the additional fill. Therefore, the structure should be constructed with approach slabs.

### Other Considerations

To prevent erosion mainly due to wave action the slopes in the vicinity of the bridge should be rip-rapped according to hydrologic requirements.

For frost protection purposes the base of all pile caps should be provided with a minimum earth cover of four feet.

Suitable drainage measures should be installed to prevent the build-up of excess hydrostatic pressure behind the abutment walls.

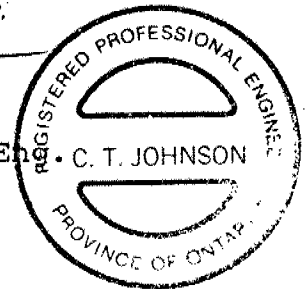
#### MISCALLENEOUS

The fieldwork for this investigation was carried out under the supervision of Mr. C.T. Johnson. The rock core obtained was examined by Mr. B.K. Glassford, Geologist. This report was written by Mr. C.T. Johnson and reviewed by Mr. K.G. Selby.

The equipment used was owned and operated by D.S.I.L. Drilling Inc., Scarborough.



C.T. Johnson, P. Eng.  
Project Engineer



K.G. Selby, P. Eng.  
Supervising Engineer

July, 1979

## APPENDIX



# RECORD OF BOREHOLE No 1

W P 626-71-05 LOCATION Sta. 470+78, o/s 21' Lt. E Hwy. 40 (old) ORIGINATED BY CTJ  
DIST 1 HWY 40 (old) BOREHOLE TYPE Hollow Stem Auger, Tricone, BXL Rock Core and COMPILED BY CTJ  
DATUM Geodetic DATE April 18 & 19, 1979 Cone Test CHECKED BY RS

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20 40 60 80 100	PSF					
580.5	Ground Level													
0.0	Clayey Silt to Silty Clay Traces of Sand Firm to Stiff Silty Sand	Reworked OCCASIONAL ORGANIC INCLUSIONS	1	SS	9		580							0 49 44 7
			2	SS	16									
			3	SS	18									
			4	SS	16									
566.5			5	SS	4		570							
14.0	Silty Clay Occasional Silt Seams		6	SS	4									
	Traces of Oil and Natural Gas at Depth Soft to Firm		7	TW	PM		560						119 121	
			8	SS	2									
			9	TW	Sank		550						112	
			10	SS	Sank									
	Occasional Layers of Clay		11	TW	Sank		540							
			12	SS	3		530							
	Traces of Sand and Gravel		13	TW	PH		520							
			14	SS	6		510							
			15	SS	11		500							
			16	SS	11		490							
			17	SS	8		480							
			18	SS	6		470							
461.5														

119.0

Continued

+3, x5: Numbers refer to  
Sensitivity

20  
15 5 (%) STRAIN AT FAILURE  
10



# RECORD OF BOREHOLE No 1 Continued

W P 626-71-05 LOCATION Sta. 470+78, o/s 21' Lt. of Hwy. 40 (old) ORIGINATED BY CTJ  
DIST 1 HWY 40 (old) BOREHOLE TYPE Hollow Stem Auger, Tricone, BXL Rock Core and COMPILED BY CTJ  
DATUM Geodetic DATE April 18 & 19, 1979 Cone Test CHECKED BY RS

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20	40	60	80	100					
461.5	Continued						460										
119.0							450										
446.5			19	SS	10												
134.0	Shale Bedrock Sound		20	RC BXL	Rec. 92%		440										RQD 68%
438.5	End of Borehole																
142.0																	



## RECORD OF BOREHOLE No 2

W P 626-71-05 LOCATION Sta. 469+98, o/s 19' Lt. & Hwy. 40 (old) ORIGINATED BY CTJ  
DIST 1 HWY 40 (old) BOREHOLE TYPE Hollow Stem Auger COMPILED BY CTJ  
DATUM Geodetic DATE April 19, 1979 CHECKED BY RS

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					UNIT WEIGHT $\gamma$ PCF	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES			20 40 60 80 100	100	PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>		
580.3	Ground Level						580	SHEAR STRENGTH PSF						
								○ UNCONFINED + FIELD VANE						
								● QUICK TRIAXIAL x LAB VANE						
								200 400 600 800 1000						
								WATER CONTENT (%)						
								15 30 45						
0.0	Clayey Silt to Silty Clay Traces of Sand Stiff		1	SS	7		580							
	Traces of Organic		2	SS	10									
			3	SS	8									
			4	SS	17		570							0 7 78 15
567.8			5	SS	3									
12.5	Silty Clay Occasional Silt Seams Firm		6	SS	2									
			7	TW	PM		560						117	
			8	SS	1									
			9	SS	2		550							
			10	TW	PM									
			11	SS	2		540							
537.3														
43.0	End of Borehole													

+3, x5: Numbers refer to  
Sensitivity

20  
15 5 (%) STRAIN AT FAILURE  
10

## EXPLANATION OF TERMS USED IN REPORT

**'N' VALUE:** AN INDICATOR OF SUBSOIL QUALITY. IT IS OBTAINED FROM THE STANDARD PENETRATION TEST (CSA STD. A119.1). SPT 'N' VALUE IS THE NUMBER OF BLOWS REQUIRED TO CAUSE A STANDARD 2 INCH O.D. SPLIT-BARREL SAMPLER TO PENETRATE 12 INCHES INTO UNDISTURBED GROUND IN A BOREHOLE WHEN DRIVEN BY A HAMMER WEIGHING 140 POUNDS, FALLING FREELY A DISTANCE OF 30 INCHES. FOR PENETRATIONS OF LESS THAN 12 INCHES 'N' VALUES ARE INDICATED AS THE NUMBER OF BLOWS FOR THE PENETRATION ACHIEVED. 'N' VALUES CORRECTED FOR OVERBURDEN PRESSURE ARE DENOTED THUS  $N_c$ .

**DYNAMIC CONE PENETRATION TEST (CSA STD. A119.3):** CONTINUOUS PENETRATION OF A CONICAL STEEL POINT (2" O.D. 60 CONE ANGLE) DRIVEN BY 350 FT-LB IMPACTS ON 'A' SIZE DRILL RODS. THE RESISTANCE TO CONE PENETRATION IS MEASURED AS THE NUMBER OF BLOWS FOR EACH 12 INCH ADVANCE OF THE CONICAL POINT INTO THE UNDISTURBED GROUND.

**SOIL QUALITY:** SOILS ARE DESCRIBED BY THEIR COMPOSITION AND CONSISTENCY OR DENSITY.

**CONSISTENCY:** COHESIVE SOILS ARE DESCRIBED ON THE BASIS OF THEIR UNDRAINED SHEAR STRENGTH AS FOLLOWS:

$S_u$ (PSF)	0 - 250	250 - 500	500 - 1000	1000 - 2000	2000 - 4000	> 4000
	VERY SOFT	SOFT	FIRM	STIFF	VERY STIFF	HARD

**DENSENESS:** COHESIONLESS SOILS ARE DESCRIBED ON THE BASIS OF SPT 'N' VALUES AS FOLLOWS:

'N' (BLOW/FT)	0 - 5	5 - 10	10 - 30	30 - 50	> 50
	VERY LOOSE	LOOSE	COMPACT	DENSE	VERY DENSE

**ROCK QUALITY:** ROCKS ARE DESCRIBED BY THEIR COMPOSITION AND STRUCTURAL FEATURES AND/OR STRENGTH.

**RECOVERY:** SUM OF ALL RECOVERED ROCK CORE PIECES FROM A CORING RUN EXPRESSED AS A PERCENT OF THE TOTAL LENGTH DRILLED IN THAT CORING RUN.

**MODIFIED RECOVERY:** SUM OF THOSE NATURALLY FRACTURED CORE PIECES, 4" IN LENGTH EXPRESSED AS A PERCENT OF THE LENGTH OF THE CORING RUN. THE ROCK QUALITY DESIGNATION (RQD), FOR MODIFIED RECOVERY, IS:

RQD (%)	0 - 25	25 - 50	50 - 75	75 - 90	90 - 100
	VERY POOR	POOR	FAIR	GOOD	EXCELLENT

**JOINTING AND BEDDING:**

SPACING	2"	2" - 12"	1' - 3'	3' - 10'	> 10'
JOINTING	VERY CLOSE	CLOSE	MOD. CLOSE	WIDE	VERY WIDE
BEDDING	VERY THIN	THIN	MEDIUM	THICK	VERY THICK

### ABBREVIATIONS & SYMBOLS




#### LABORATORY TESTING

TRIAxIAL TESTS ARE DESCRIBED IN TERMS OF WHETHER THEY ARE CONSOLIDATED (C) OR NOT (U) ISOTROPICALLY (I) OR NOT (A) AND SHEARED DRAINED (D) OR UNDRAINED (U) WITH PORE PRESSURE MEASUREMENTS (BAR OVER SYMBOLS) EG.  $\bar{C}IU$  = CONSOLIDATED ISOTROPIC UNDRAINED TRIAXIAL WITH PORE PRESSURE MEASUREMENT UNLESS OTHERWISE SPECIFIED IN REPORT ALL TESTS ARE IN COMPRESSION

#### FIELD SAMPLING

S S SPLIT SPOON  
W S WASH SAMPLE  
S T SLOTTED TUBE SAMPLE  
B S BLOCK SAMPLE  
C S CHUNK SAMPLE  
T W THINWALL OPEN  
T P THINWALL PISTON  
O S OSTERBERG SAMPLE  
F S FOIL SAMPLE  
R C ROCK CORE  
P H T.W. ADVANCED HYDRAULICALLY  
P M T.W. ADVANCED MANUALLY

#### EARTH PRESSURE TERMS

$\mu$  COEFFICIENT OF FRICTION  
 $\delta$  ANGLE OF WALL FRICTION  
 $k_o$  COEFFICIENT OF EARTH PRESSURE AT REST  
 $k_A$  COEFFICIENT OF ACTIVE EARTH PRESSURE  
 $k_P$  COEFFICIENT OF PASSIVE EARTH PRESSURE  
 $i$  ANGLE OF INCLINATION OF SURCHARGE   
 $w$  SLOPE ANGLE-BACKFACE OF WALL   
 $\beta$  ANGLE OF SLOPE   
 $N_q, N_c$  BEARING CAPACITY FACTORS  
 $D_f$  DEPTH OF FOOTING  
 $B, L$  FOOTING DIMENSIONS

#### INDEX PROPERTIES

$\gamma$  UNIT WEIGHT OF SOIL (BULK DENSITY)  
 $\gamma_w$  UNIT WEIGHT OF WATER  
 $\gamma_d$  UNIT DRY WEIGHT OF SOIL (DRY DENSITY)  
 $\gamma'$  UNIT WEIGHT OF SUBMERGED SOIL  
 $G_s$  SPECIFIC GRAVITY OF SOLIDS  
 $e$  VOIDS RATIO  
 $e_o$  INITIAL VOIDS RATIO  
 $e_{max}$   $e$  IN LOOSEST STATE  
 $e_{min}$   $e$  IN DENSEST STATE  
 $D_r$  RELATIVE DENSITY =  $\frac{e_{max} - e}{e_{max} - e_{min}}$   
 $n$  POROSITY  
 $w$  WATER CONTENT  
 $w_L$  LIQUID LIMIT  
 $w_p$  PLASTIC LIMIT  
 $w_s$  SHRINKAGE LIMIT  
 $I_p$  PLASTICITY INDEX =  $w - w_p$   
 $I_L$  LIQUIDITY INDEX =  $\frac{w - w_p}{I_p}$   
 $I_c$  CONSISTENCY INDEX =  $\frac{w_L - w}{I_p}$   
 $A_c$  ACTIVITY =  $\frac{I_p \text{ of soil}}{I_p \text{ of } 2\mu m \text{ Soil Fraction}}$   
 $O_m$  ORGANIC MATTER CONTENT  
 $S_r$  DEGREE OF SATURATION  
 $S$  SENSITIVITY =  $\frac{S_u(\text{undisturbed})}{S_u(\text{remoulded})}$

#### STRENGTH PARAMETERS

$\phi$  ANGLE OF SHEARING RESISTANCE  
 $\tau_f$  PEAK SHEAR STRENGTH  
 $\tau_R$  RESIDUAL SHEAR STRENGTH  
 $c$  COHESION INTERCEPT  
 $\sigma_1, \sigma_2, \sigma_3$  NORMAL PRINCIPAL STRESSES  
 $u$  PORE WATER PRESSURE  
 $u_e$  EXCESS  $u$   
 $r_u$  PORE PRESSURE RATIO  
 $q_u$  UNCONFINED COMPRESSIVE STRENGTH  
 $s_u$  UNDRAINED SHEAR STRENGTH  
 $\epsilon$  LINEAR STRAIN  
 $\gamma$  SHEAR STRAIN  
 $\nu$  POISSON'S RATIO  
 $E$  MODULUS OF ELASTICITY  
 $G$  MODULUS OF SHEAR DEFORMATION  
 $k_s$  MODULUS OF SUBGRADE REACTION  
 $m, n$  STABILITY COEFFICIENTS  
 $A, B$  PORE PRESSURE COEFFICIENTS

**NOTE:** EFFECTIVE STRESS PARAMETERS ARE DENOTED BY USE OF APOSTROPHE ABOVE THE SYMBOL, THUS:  
 $\phi'$  = EFFECTIVE ANGLE OF SHEARING RESISTANCE;  
 $\sigma'$  = EFFECTIVE NORMAL STRESS

#### HYDRAULIC TERMS

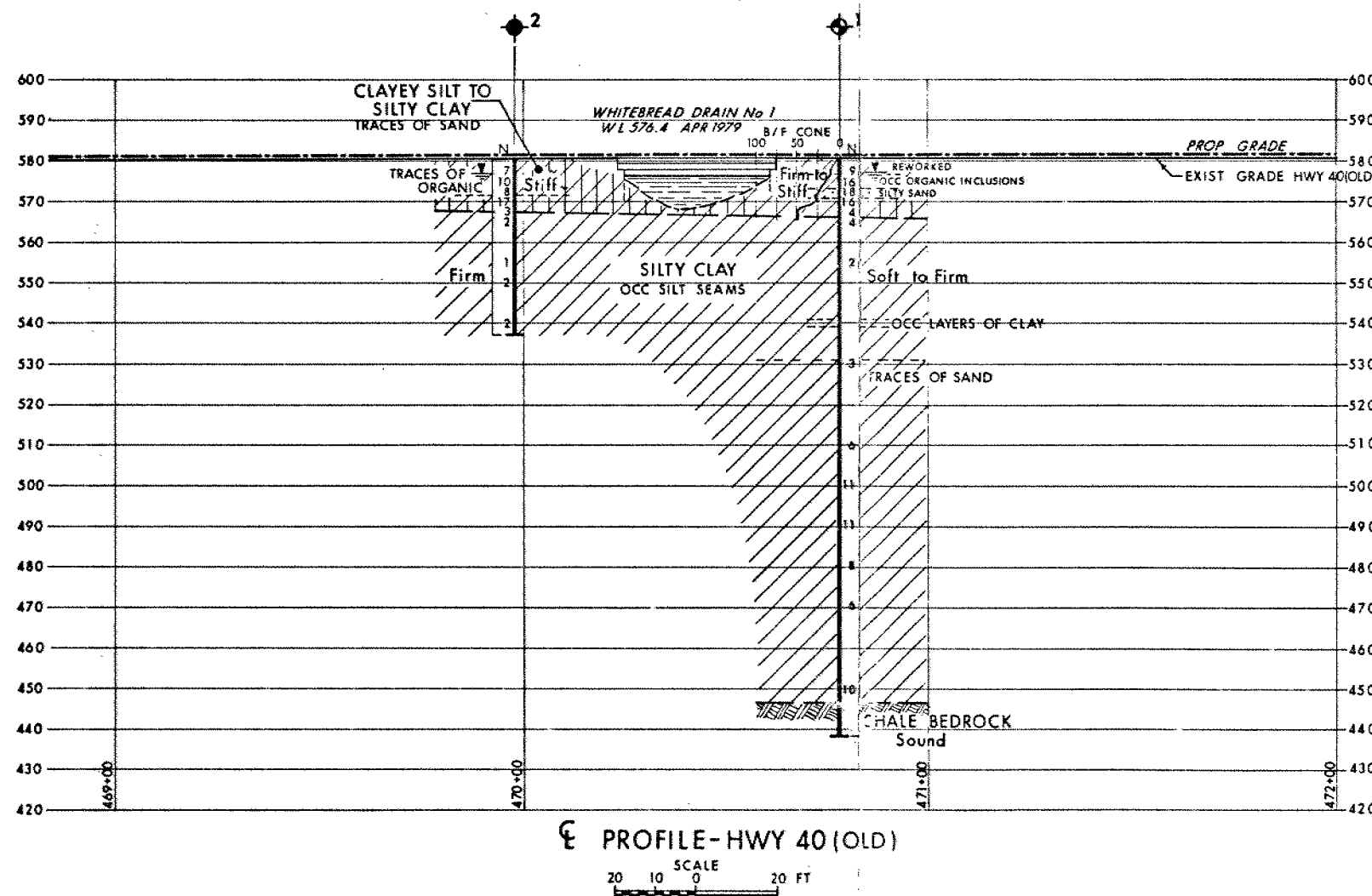
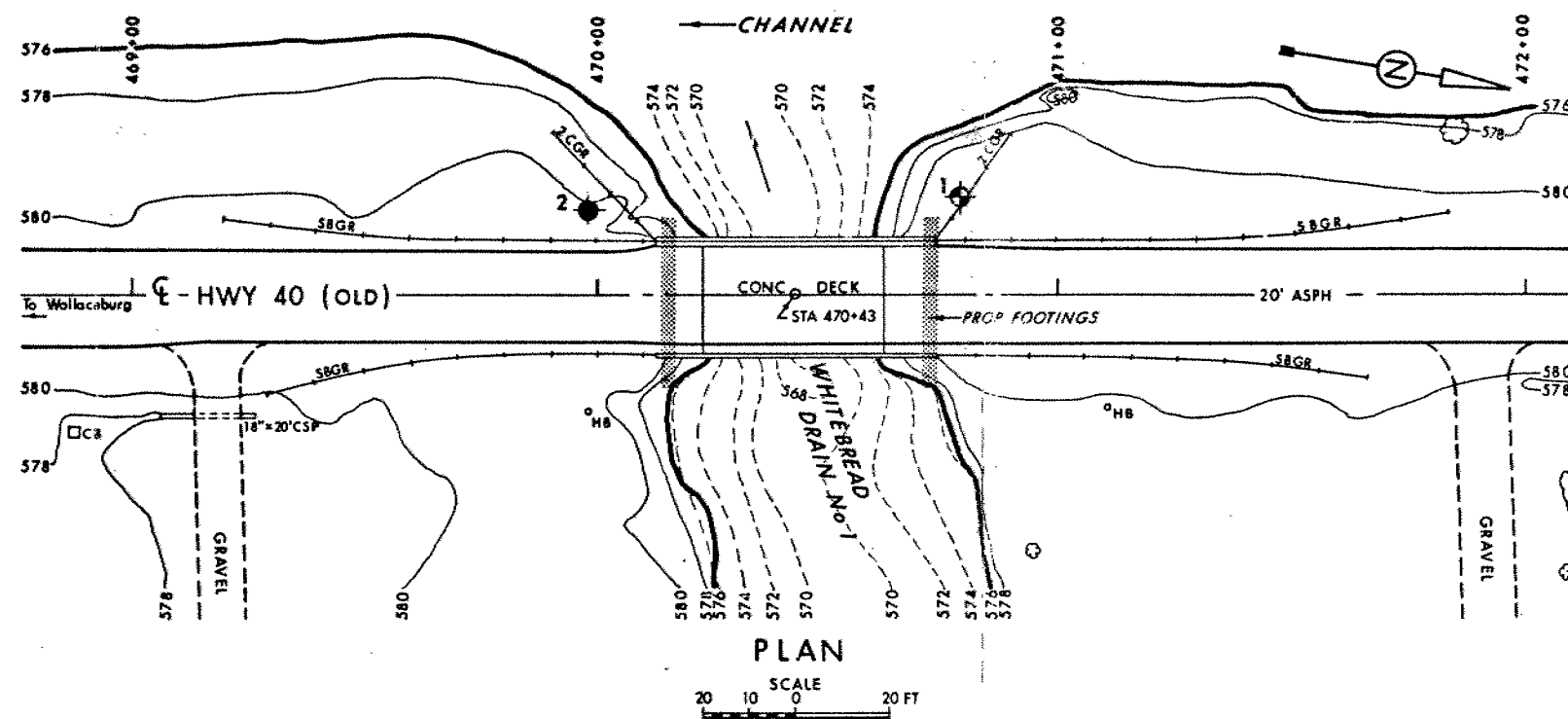
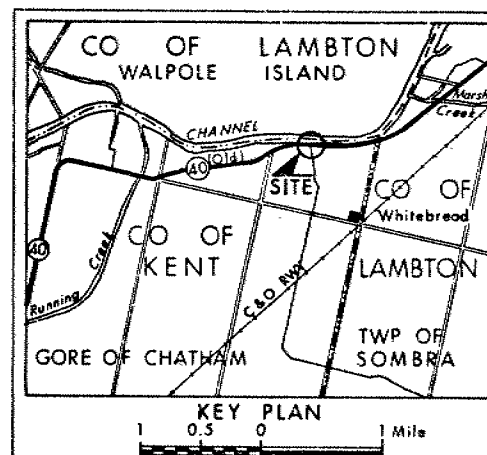
$h$  HYDRAULIC HEAD OR POTENTIAL  
 $q$  RATE OF DISCHARGE  
 $v$  VELOCITY OF FLOW  
 $i$  HYDRAULIC GRADIENT  
 $j$  SEEPAGE FORCE PER UNIT VOLUME  
 $\eta$  COEFFICIENT OF VISCOSITY  
 $k$  COEFFICIENT OF HYDRAULIC CONDUCTIVITY  
 $k_h$   $k$  IN HORIZONTAL DIRECTION  
 $k_v$   $k$  IN VERTICAL DIRECTION  
 $m_v$  COEFFICIENT OF VOLUME CHANGE  
 $c_v$  COEFFICIENT OF CONSOLIDATION  
 $C_c$  COMPRESSION INDEX  
 $C_r$  RECOMPRESSION INDEX  
 $d$  DRAINAGE PATH DISTANCE  
 $T_v$  TIME FACTOR  
 $U$  DEGREE OF CONSOLIDATION  
 $O_r$  OVERCONSOLIDATION RATIO (OCR)

CONT No  
WP No 626-71-05



WHITEBREAD DRAIN No 1  
[ 4.7 Mi. W. of Wallaceburg W. Limits ]  
BORE HOLE LOCATIONS & SOIL STRATA

SHEET



# LEGEND

- Bore Hole
- ⊕ Dynamic Cone Penetration Test (Cone)
- ⊕ Bore Hole & Cone
- 'N' Blows/ft (Std Pen Test 350 ft lbs energy)
- CONE Blows/ft (60° Cone, 350 ft lbs energy)
- W.L. at time of investigation Apr. 1979

No	ELEVATION	STATION	OFFSET
1	580.5	470+78	21'LT
2	580.3	469+98	19'LT

## -NOTE-

The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence.

REVISIONS	DATE	BY	DESCRIPTION

GEORES No 4019-18

HWY No 40 (OLD) DIST 1  
SUBMITTED 11/17/79 DATE July 17, 1979 SITE 13-2  
DRAWN RS CHECKED APPROVED DWG 6267103-A



## HOLE NO. \_\_\_\_\_ SHEET NO. \_\_\_\_\_

ELEV. COLLAR \_\_\_\_\_  
 DATUM \_\_\_\_\_  
 DATE STARTED \_\_\_\_\_  
 DATE COMPLETED \_\_\_\_\_  
 DRILLED BY \_\_\_\_\_  
 LOGGED BY \_\_\_\_\_

PROPERTY \_\_\_\_\_ W.P.626-71-05  
LOCATION \_\_\_\_\_ Hwy.40 (Old)  
\_\_\_\_\_ 5 mi. W. of Wallaceburg  
\_\_\_\_\_  
LATITUDE \_\_\_\_\_  
DEPARTURE \_\_\_\_\_  
BEARING \_\_\_\_\_

TOTAL FOOTAGE \_\_\_\_\_

[illegible]

DATE OF EXAMINATION May 18, 1979

B.K.Glassford

Mr. A.E. McKim  
Head, Southwestern Section  
Structural Office  
2nd Floor, West Building

Soil Mechanics Section  
Engineering Materials Office  
Room 315, Central Building

79 05 11

Mr. J. Keen

Re: Whitebread Tap Drain No. 1 Br.  
W.P. 626-71-05, Site 13-2  
Hwy. 40 (Old), District 1, Chatham

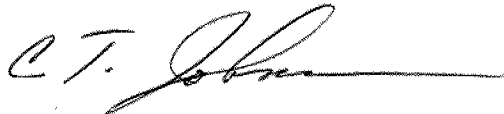
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In our memorandum of 78 10 16 we provided recommendations for the above structure based on soil investigations carried out within a two mile radius of the site. We recently completed the soil investigation at the above site to confirm these recommendations.

Briefly, the subsoil at this site was found to consist of 12.5 to 14 feet of clayey silt containing occasional layers of sand followed by an extensive deposit of firm silty clay overlying sound shale bedrock at elevation 446.5.

Therefore, as recommended in our previous memorandum, the structure may be founded on end bearing steel 'H' piles driven to bedrock located at elevation 446.5<sub>+</sub>.

A detailed foundation investigation and design report will be forwarded as soon as possible.



C.T. Johnson  
Project Engineer

CTJ/gs

cc: Files ✓



## Memorandum

To: Mr. A.P. Watt  
Head, Structural Section  
Southwestern Region  
London

Attention:

Our File Ref.

From: Soil Mechanics Section  
Engineering Materials Office  
Room 315, Central Building  
Downsview

Date: 78 10 16

In Reply to

Subject: Re: Whitebread Drain #1 Bridge  
4.7 Miles West of Wallaceburg West Limits  
Hwy. 40, District 1, Chatham  
W.P. 626-71-05, Site 13-2

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In reply to your foundation request (78 10 05) for the above structure replacement, our comments and recommendations are as follows.

1. Foundation Investigation Reports within a 2 mile radius of this project were reviewed.
2. At these locations, in general, the subsoil was found to consist of a surficial layer (10-30 feet thick) of very loose to compact silty sand to sandy silt with traces of gravel and clay, followed by an extensive deposit of very soft to stiff silty clay with some sand and trace of gravel. This 90 to 115 foot thick cohesive stratum was found to be underlain by a relatively thin layer of very dense glacial till. Shale type bedrock was encountered between elevation 460 and elevation 480.
3. Based on the foregoing it is our assumption that similar subsoil conditions exist at the crossing of Hwy. 40 and Whitebread Drain #1 Bridge.
4. It is, therefore, recommended that the new structure be founded on end-bearing piles driven to bedrock (some 95 feet to 120 feet below existing ground level) and designed for the maximum capacity of pile section chosen.
5. A somewhat more accurate pile length will be given to your office upon the completion of a limited field investigation.
6. No stability problems are anticipated for the approximate 1 foot high additional fill.

cont'd.....

We hope that the recommendations given in this memorandum will enable you to proceed with the design without any delay.

Should you require additional information, please contact our office.



P. Payer  
Senior Engineer

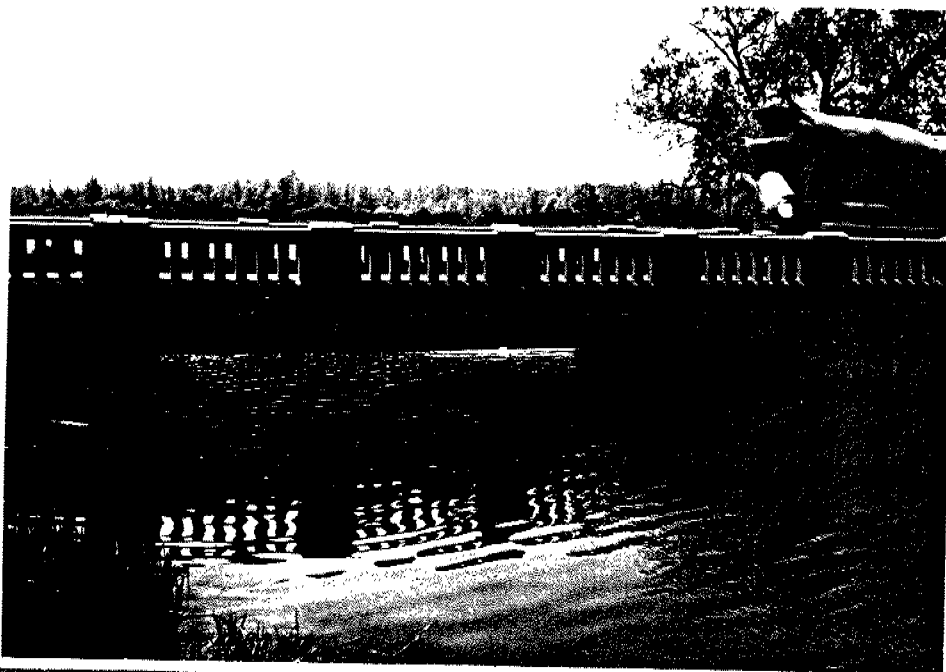
PP/gs

cc: J.R. Roy  
A. Wittenberg  
J.H. Blevins  
A.E. McKim  
G.A. Wrong  
B.J. Giroux  
R.S. Pillar  
R. Hore (Ministry of the Environment)  
Files ✓

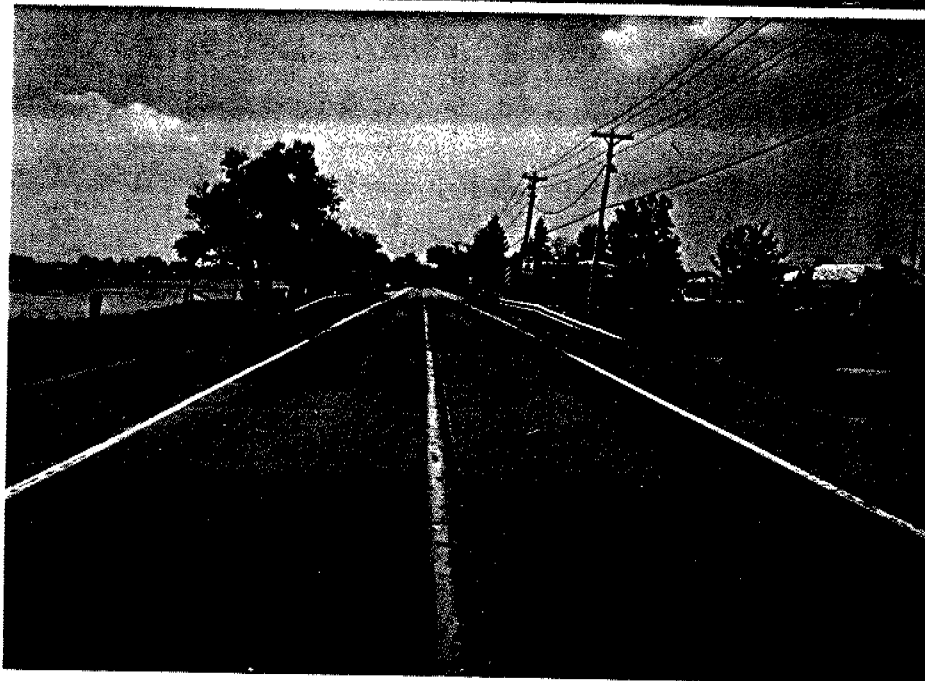
WP 626 71-05 SITE 13-2 WHITEBREAD DRAIN #1 BRIDGE  
WY 40 DIST. 1



EAST ELEVATION



EAST  
ELEVATION



LOOKING NORTH  
ALONG HWY 40

