

28-2

Mr. A. M. Togo,
Bridge Engineer.
Materials & Research Section.

May 11, 1959.

FOUNDATION REPORT -

Attention: Mr. E. McCombie.

Re: Proposed Big Creek Diversion,
Development Road #461 -
Lots 12 & 13, Con. VII, -
Approximately 4 Miles East of
Langton, Twp. North Walsingham.

In response to a request from your Mr. Kleinstieber, we have carried out a subsoil investigation at the above noted bridge site. The detailed results of the field and laboratory work are presented in the attached report prepared by our Mr. I. Johnston.

For your convenience, the principal comments pertaining to the means of obtaining support for the foundation members are summarized as follows:-

- (1) Subsoil stratigraphy at the proposed structure location consists of an upper stratum of loose organic sand (20 feet in thickness) which is underlain by a dense silt deposit of low compressibility.
- (2) Because of the loose state of the upper layer of organic sand, shallow footings cannot be used to support the piers and abutments. Large displacement type end bearing piles, founded in the underlying dense silt stratum, are the obvious means of obtaining footing support. Treated timber piles with a design load of 20 tons per pile, or higher capacity steel monstube type piles are recommended. For large displacement type timber piles, the pile tip elevation to result in 20-ton capacity, is estimated at or above elevation 565.0'.

cont'd. /2 ...

(2) (cont'd.) ...

At the intermediate pier locations it is recommended that piles be cut off at or below Elev. 590' and capped. It is understood that consideration was being given to carrying the pile shafts up to the elevation of the underside of girders or lower chord of the truss. This is not recommended due to the loose state of the upper 20 feet of organic sand existing at the site. Horizontal thrusts at the pile cap should be taken completely by batter piles.

- (3) At the abutment locations, it is recommended that the approach fills be placed to an elevation 7 feet below final grade. Piles should then be driven through the fill and cut off, that the abutment footing has at least 6 feet of cover when the fill is brought up to grade. The fill should be carried up to 2 feet within bridge seat elevation and sloped at a 2:1 slope away from the breastwall of the abutment (similar to a spill-through type of abutment).
- (4) A simply-supported structure is recommended; total and differential settlements will be well within tolerable limits.
- (5) Embankment and abutment breastwall fill slopes of 2:1 are satisfactory to prevent foundation instability of the earth fill sections.

We trust that the contents of this report will provide you with sufficient data for you to complete the design of this structure. If clarification of data contained in this report is required, please do not hesitate to contact our office.

L. G. Sederman

L. G. Sederman,
PRINCIPAL SOILS & FOUNDATION ENGR.

LGS/KdeF
Encl.

cc: Messrs. A. M. Toye
H. A. Tregaskes
B. C. Ramsay
W. L. Fraser
J. Roy
Dr. P. Karrow

Foundations Office

File.

FOUNDATION REPORT

on

Proposed Big Creek Diversion,
Development Road #461 -
Lots 12 & 13, Con. VII, -
Approximately 4 Miles East of
Langton, Twp. North Walsingham.

Plan No: 802 B-7

Profile No: 802 B-3

Distribution:

Mr. A. M. Teye,
Bridge Engineer. (2)

Mr. H. A. Tregaskes,
Construction Engineer. (1)

Mr. D. G. Ramsay,
Design Office. (2)

Mr. W. L. Fraser,
District Engineer,
London, Ontario. (1)

Mr. J. Roy,
Regional Soils Engr.,
London Regional Office. (1)

Dr. P. Karrow,
Department of Mines. (1)

Foundations Office. (1)

File. (1)

W.P. (none)

W.J. F-59-20.

INTRODUCTION:

A bridge foundation investigation was carried out at the crossing of Development Road #461 and Big Creek, in the County of Norfolk, Township of North Walsingham, Lots 12 & 13, Concession VII. The centre line of the proposed creek diversion is at Station 36+00.

DESCRIPTION OF THE SITE:

The site is located on the Norfolk Sand Plain which includes the greater part of Norfolk County.

The sands and silts of this region were deposited as a delta in glacial lakes Whittlessey and Warren. The area is drained through small rivers flowing directly to Lake Erie. These rivers have cut deep valleys across the sand plain, often being incised 75 to 100 feet. The site of the proposed structure is in one such incision in the plain. At the proposed creek crossing, Big Creek has split into two channels, forming a wide valley. The two branches will be diverted to a single channel under the proposed bridge.

FIELD AND LABORATORY RESULTS:

During the field investigation which was carried out between March 16 and March 20, 1959, six bore holes and five dynamic cone penetration tests were driven. Two of the dynamic cone penetration tests are recorded separately (i.e. - B.E. 2 and 7) while the remainder were driven adjacent to bore holes and are recorded with the results of the boreholes. The locations of the

FIELD AND LABORATORY RESULTS: (cont'd.) ...

boreholes and estimated subsoil stratigraphy are included on Drawing No. F 59-20A. A summary of the borehole logs are attached as Appendix I. The boreholes were terminated some 30 to 40 feet below ground surface in a layer of dense silty clay. Sampling was carried out using a 2" O.D. split barrel sampler in non-cohesive soil, and 2" I.D. thin walled Shelby sampler in the cohesive material.

A summary of the laboratory results for each borehole is recorded in Appendix I.

SOIL TYPES ENCOUNTERED:

In order of stratigraphic succession from ground surface to the depth at which the borings were terminated, the following soil types have been defined:-

(a) Grey, Fine-Medium Sand with Organic Material:

This stratum was encountered in all boreholes from ground surface to a depth of approximately 20 feet. The water table at the time of the investigation, was found to be one foot below ground surface. A high organic content was noted in most samples of this material with a measured value by the Ignition Method, of 31.1% organics, recorded for one sample. Average values of "N" for this material vary from 0 to 29 with a value of 4 being representative. Because of this low "N" value, very little skin friction could be developed by piling penetrating this material. Lateral support for piling would also be very

cont'd. /2 ...

SOIL TYPES ENCOUNTERED: (cont'd.) ...

(a) Grey, Fine-Med. Sand with Organic Mat'l: (cont'd.)...
small in this stratum. Due to the relatively free draining character of this material, settlements resulting from embankment loading would, for all practical purposes, be complete at the end of construction.

(b) Dense, Grey Silt with Some Clay:

Immediately underlying the layer of loose sand, a dense layer of silt was encountered. Borings were terminated in this stratum. Values of "N" exceed 50, indicating that large displacement piles will meet refusal in this layer. An estimated refusal depth for this type of pile is elevation 565'; however, variation in penetration results show that this depth may vary 5 to 8 feet. Consolidation tests on the dense silt gives values of the compression index of .27 and .06 which are indicative of a relatively incompressible soil type. Settlements due to consolidation of this stratum will be 90% complete in 3 to 4 years.

FOUNDATION CONSIDERATIONS:

The loose nature of the upper sand stratum found near the ground surface, in the vicinity of the proposed bridge, rules out the possibility of spread footings. A piled foundation will be required to support the proposed bridge.

Large displacement type piles will meet practicable refusal at elevation 565'. At this elevation, wooden piles will be capable of carrying 15 to 20 tons. Higher capacity steel monotube type piles do not appear necessary from a capacity

FOUNDATION CONSIDERATIONS: (cont'd.) ...

requirement. At the pier locations pile cut off elevation for wooden piles should be below the estimated future water table or approximately 590'.

Piles for piers should not be carried above existing ground level because of the poor lateral support offered by the material in the upper 10 to 20 feet and because of the short depth of pile penetration. With pier pile caps at 590', support for the trusses or girders may be obtained by steel towers or concrete columns founded on the pile cap. This will necessitate an unsupported column length of approximately 25 feet which is acceptable for this type of bridge. Piles supporting the abutments may be driven through the previously placed approach fills with cut-off elevation specified so that the abutment footing has at least 7 feet of cover. Care should be taken that the type of material used adjacent to the abutments is suitable for the penetration of wooden piles.

Settlement calculations indicate that at the abutment locations a movement of the order of two inches can be expected; at the intermediate pier locations a movement of approximately one inch has been calculated - this gives rise to a probable differential movement of approximately one inch between abutment and the adjacent pier.

Some scour was noted on the existing bridge abutments and this should be considered when constructing the proposed bridge. The top layer of fine-medium sand with organic material

FOUNDATION CONSIDERATIONS: (cont'd.) ...

is easily removed by the action of water. Protection of the bridge piers with short sheet piling is worthy of consideration. With the spill-through type of abutment, the toe of the fill may require rip-rap protection from high water conditions.

CONCLUSIONS:

- (a) A loose layer of sand and organic material was found to exist to depth of approximately 20 feet. This material is underlain by a dense silt stratum.
- (b) A simply-supported structure with spill-through type abutments may be most satisfactory. A wooden pile foundation is recommended. Piles for the abutment footing may be driven through the fill, but piles for the piers should be capped near existing ground level. Wooden piles will have a supporting capacity of 20 tons if driven to refusal or elevation 565'.
- (c) Settlements associated with this structure will be well within tolerable limits.
- (d) Some consideration should be given to protect the toe of fill and piers from scour.

Ian J. Johnston
I. Johnston,
FOUNDATIONS ENGR.

APPENDIX I.

SUMMARY OF FIELD & LABORATORY TESTS

JOB F 59-20

W.P. None

[illegible]

SUMMARY OF FIELD & LABORATORY TESTS

JOB F 59-20W.P. None.

HOLE NO.	SAMP. NO.	SAMPLE DEPTH (FEET)	MATERIAL DESCRIPTION	PENET'N RESIST. BLOWS/FT.	MOIST. CONT. %	PLASTIC LIMIT %	LIQUID LIMIT %	SHEAR STRENGTH p.s.f.	UNIT WEIGHT p.c.f.	REMARKS
4	1	9'-11'	Grey silty sand	4	86.7				80.8	
4	2	12'-14'	Grey fine sand with organic material.	2	41.8				104.8	
4	3	15'-17'	Grey fine sand with organic material.	29	24.1				-	
4	4	20'-22'	Grey dense silt with some clay.	42	19.3			7060	132.0	
4	5	34'-35'6"	Grey dense silt with some clay.	44	19.7					
4	6	40'-41'6"	Grey dense silt with some clay.	74	22.8					
5	1	6'-8'	Grey fine sand with some silt.	-	21.8			-	122.0	
5	2	9'-11'	Grey silty fine sand.	4	27.0			-	118.0	
5	3	12'-14'	Grey medium sand with organic material and some silt.	-	15.0			-	117.3	
5	4	15'-17'	Grey silty finesand with organic material.	-	27.1			-	127.8	
5	5	20'-22'	Grey dense silt with some clay layers.	17	21.5			9150	129.0	
5	6	30'-32'	Grey dense silt with some clay layers.	44	19.8			7030	130.0	
5	7	40'-42'	Grey dense silt with some clay layers.	64	21.3			-	118.7	

cont'd. /3 ...

TABLE NO. I (cont'd.) ...

SUMMARY OF FIELD & LABORATORY TESTS

JOB F 59-20.
W.P. None

SOLE NO.	SAMP. NO.	SAMPLE DEPTH (FEET)	MATERIAL DESCRIPTION	PENET'N RESIST. BLOWS/FT.	MOIST. CONT. %	PLASTIC LIMIT %	LIQUID LIMIT %	SHEAR STRENGTH p.s.f.	UNIT WEIGHT p.c.f.	REMARKS
6	1	5'-7'	Grey fine-medium sand with some silt.	-	23.8				121.2	
6	2	10'-12'	Grey fine-medium sand - possibly organic material.	-	27.1				-	
6	3	15'-17'	Grey fine sand with organic material.	4	33.7				120.0	
6	4	20'-22'	Grey silt with some clay layers.	14	22.6			680	126.8	Sensitivity - 1.7
6	5	30'-32'	Grey silt with some clay layers.	32	19.5			8290	128.8	
6	6	40'-42'	Grey silt with some clay layers.	43	18.1			1640	121.2	
8	1	5'-7'	Grey fine-medium silty sand with organic material.	-	26.2				127.2	
8	2	10'-12'	Grey fine sand with some silt and organic material.	4	22.0			5715	128.5	
8	3	15'-17'	Grey silty fine sand with organic material.	4	23.0				124.0	
8	4	18'-20'	Grey silty fine sand with some organic material.	36	18.4			6160	128.0	
8	5	20'-22'	Grey silty fine sand.	23	17.3				128.8	
8	6	25'-27'	Grey silty fine sand changing to fine silt.	27	15.2					
8	7	32'-34'	Grey silt with some clay.	30	17.4			1715	127.8	
8	8	35'-37'	Grey silt with some clay.	41	17.4			1,050	129.9	
8	9	40'-41'	Grey silt with some clay and gravel.	55	17.6			9220	129.0	

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS AND RESEARCH SECTION

W.P. _____ BORE HOLE NO. 1 _____

JOB F-59-20 STATION 36+73

DATUM Geodetic. COMPILED BY B.K.

BORING DATE Mar. 17/59. CHECKED BY _____

LEGEND

2" DIA. SPLIT TUBE _____
2" SHELBY TUBE _____
2" SPLIT TUBE _____
2" DIA. CONE _____
2" SHELBY _____
CASING _____

SS	1/2 UNCONFINED COMPRESSION (Qu)	O
TW	VANE TEST(C) AND SENSITIVITY(S).	+S
	NATURAL MOISTURE AND	L
	LIQUIDITY INDEX	X
	LIQUID LIMIT	
	PLASTIC LIMIT	

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET	STRENGTH AND PENETRATION RESISTANCE			
				2000	4000	6000	8000 P.S.F.
	Ground Level.	599.8		50	100	150	200 BLOWS/FT.
	Grey fine-med. sand with slight amount of clay	584.8	10				
	Grey silty sand.	581.8	20				
	Grey silt.	575.8	30				
	Grey clayey silt.	552.8	40				
	Grey silt with some clay.	533.3	50				
	End of Borehole	66.5	70				
	<u>Note:</u> Gas in borehole		80				

CONSISTENCY		SAMPLE	NATURAL UNIT WT. P.C.F.
MOIST. CONTENT - % DRY WT.			
10	20	30	
TW 1		-	
TW 2		121.0	
SS 3		-	
SS 4		-	
SS 5		-	
TW 6		126.0	
TW 7		127.8	
TW 8		128.7	
TW 9		129.0	
TW 10		-	
SS 11		-	

Borehole No. 1

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS AND RESEARCH SECTION

W.P. _____ BORE HOLE NO. 2 _____

JOB E 59-20. STATION 35+28

DATUM Geodetic. _____ COMPILED BY B.K. _____

BORING DATE Mar. 19/59 CHECKED BY _____

2" DIA. SPLIT TUBE _____
2" SHELBY TUBE _____
2" SPLIT TUBE _____
2" DIA. CONE _____
2" SHELBY _____
CASING _____

LEGEND

1/2 UNCONFINED COMPRESSION (Qu)	---	O
VANE TEST (C) AND SENSITIVITY (S)	---	+ S
NATURAL MOISTURE AND		
LIQUIDITY INDEX	---	X
LIQUID LIMIT	---	o
PLASTIC LIMIT	---	

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET	STRENGTH AND PENETRATION RESISTANCE	
				P. S. F.	
	Ground Level.	599.0		50	100 150 200
				LOWE'S	
			10		
			20		
			30		
			40		
			50		
			60		
			70		
			80		

CONSISTENCY		SAMPLE	NATURAL
MOIST. CONTENT- % DRY WT.			UNIT WT. P.C.F.

Borehole No. 2

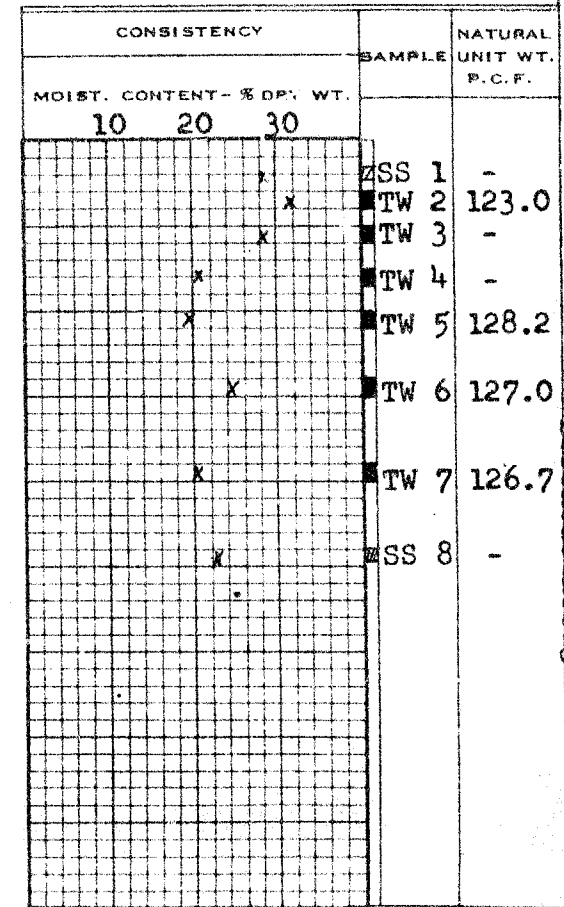
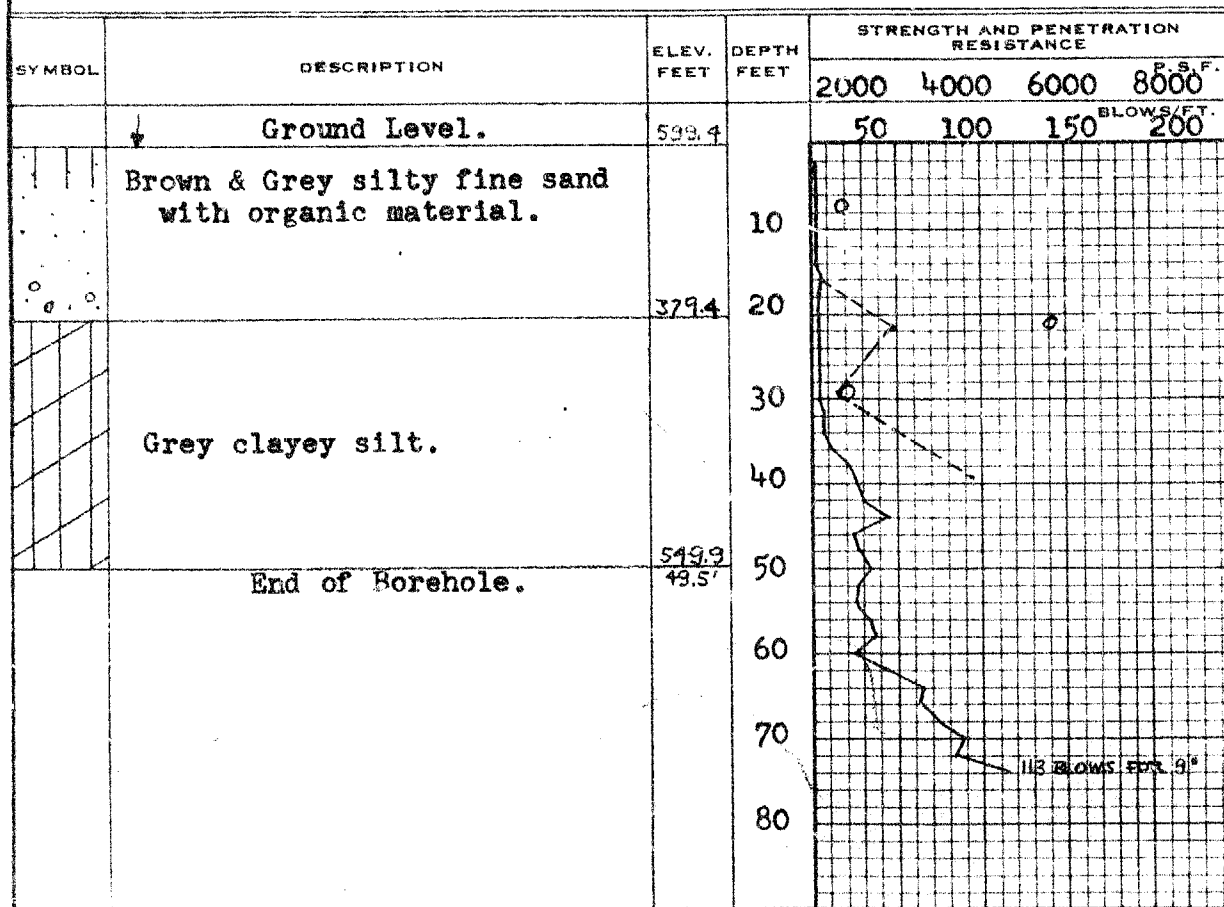
DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS AND RESEARCH SECTION

W.P. _____ BORE HOLE NO. 3
 JOB F 59-20. STATION 35+72
 DATUM Geodetic COMPILED BY B.K.
 BORING DATE Mar. 18/59 CHECKED BY _____

LEGEND

2" DIA. SPLIT TUBE _____ ☒ SS 1/2 UNCONFINED COMPRESSION (Qu) _____ O
 2" SHELBY TUBE _____ ☒ TW VANE TEST (C) AND SENSITIVITY (S) _____ +
 2" SPLIT TUBE _____ ○ NATURAL MOISTURE AND LIQUIDITY INDEX _____ X
 2" DIA. CONE _____ LIQUID LIMIT _____
 2" SHELBY _____ PLASTIC LIMIT _____
 CASING _____



Borehole No. 3

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS AND RESEARCH SECTION

W.P. _____ BORE HOLE NO. 4
 JOB F 59-20 STATION 35+27
 DATUM Geodetic COMPILED BY B.K.
 BORING DATE Mar. 18/59 CHECKED BY _____

LEGEND

2" DIA. SPLIT TUBE _____ ☒ SS 1/2 UNCONFINED COMPRESSION (Qu) _____ O
 2" SHELBY TUBE _____ ☒ TW VANE TEST (C) AND SENSITIVITY (S) _____ +
 2" SPLIT TUBE _____ ☒ NATURAL MOISTURE AND LIQUIDITY INDEX _____ LI
 2" DIA. CONE _____ ☒ LIQUID LIMIT _____ X
 2" SHELBY _____ ☒ PLASTIC LIMIT _____ ☒
 CASING _____ ☒ ☒

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET	STRENGTH AND PENETRATION RESISTANCE			
				2000	4000	6000	8000
	Ground Level	593.9		50	100	150	200
	Some Clay. Grey fine sand with organic material. Some gravel.	580.9					
	Grey dense silt with some clay.	558.4					
	End of Borehole.	41.5'					

CONSISTENCY			SAMPLE	NATURAL UNIT WT. P.C.F.
MOIST. CONTENT - % DRY WT.				
10	20	30		
<pre>graph TD A["MOIST. AT 10' 86.7'"] --> B["TW 1 80.8"] A --> C["TW 2 104.8"] A --> D["TW 3 -"] C --> E["TW 4 132.0"] D --> F["Lost"] E --> G["Lost"] F --> H["SS 5 -"] H --> I["SS 6 -"]</pre>			Lost	
			Lost	
			TW 1	80.8
			TW 2	104.8
			TW 3	-
			TW 4	132.0
			Lost	
			Lost	
			SS 5	-
			SS 6	-

Borehole No. 4

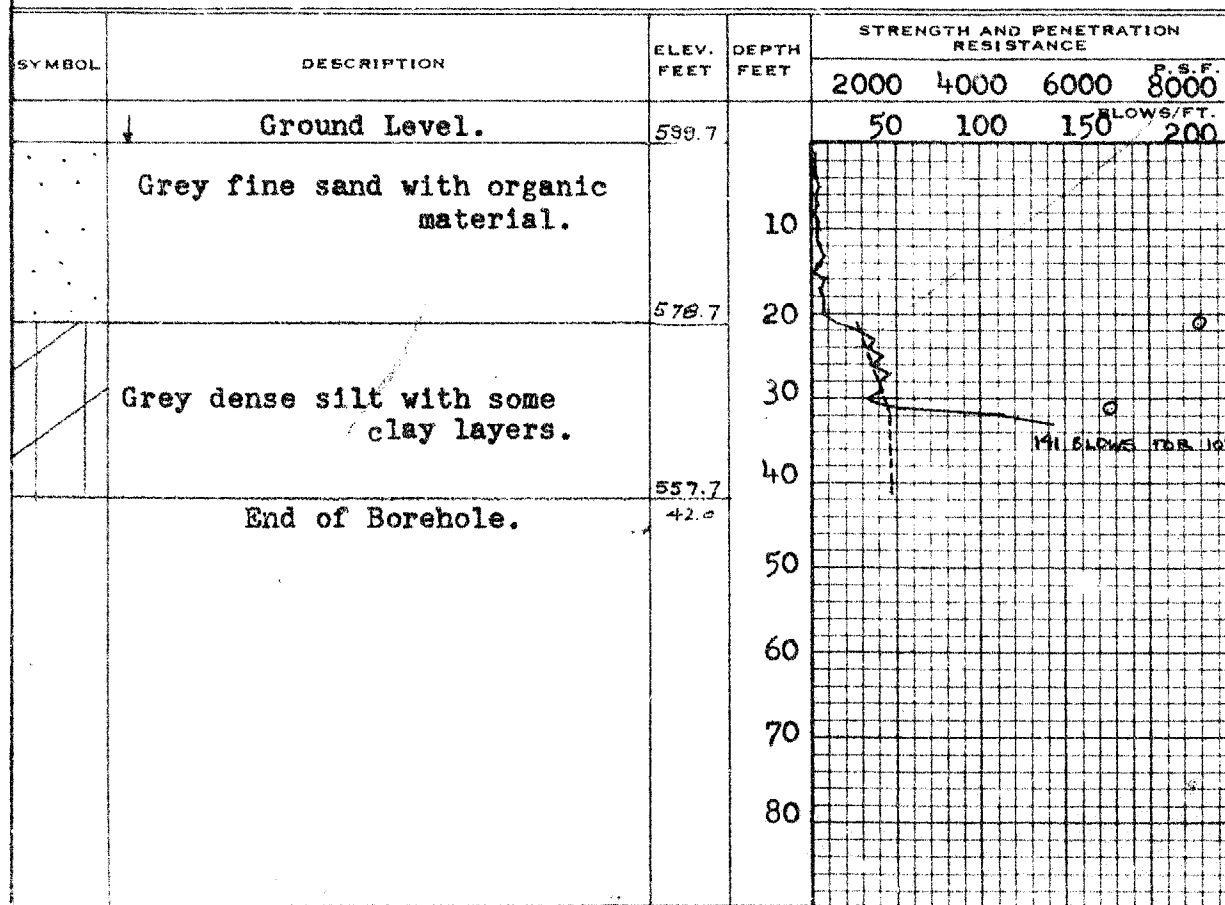
DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS AND RESEARCH SECTION

W.P. _____ BORE HOLE NO. 5.
 JOB F 59-20 STATION 36+73.
 DATUM Geodetic. COMPILED BY B.K.
 BORING DATE Mar. 18/59 CHECKED BY _____

2" DIA. SPLIT TUBE _____
 2" SHELBY TUBE _____
 2" SPLIT TUBE _____
 2" DIA. CONE _____
 2" SHELBY _____
 CASING _____

LEGEND

SS 1/2 UNCONFINED COMPRESSION (Qu) _____ O
 TW VANE TEST (C) AND SENSITIVITY (S) _____ +
 NATURAL MOISTURE AND LIQUIDITY INDEX _____ LI
 LIQUID LIMIT _____
 PLASTIC LIMIT _____



CONSISTENCY			SAMPLE	NATURAL UNIT WT. P.C.F.
MOIST. CONTENT- % DRY WT.				
10	20	30		
		X	TW 1	122.0
		X	TW 2	118.0
X		X	TW 3	117.3
		X	TW 4	127.8
	X		TW 5	129.0
	X		TW 6	130.0
	X		TW 7	118.7

Borehole No. 5

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS AND RESEARCH SECTION

W.P. _____ BORE HOLE NO. 6.
JOB F 59-20. STATION 36+28.
DATUM Geodetic COMPILED BY B.K.
BORING DATE Mar. 19/59 CHECKED BY _____

2" DIA. SPLIT TUBE _____
2" SHELBY TUBE _____
2" SPLIT TUBE _____
2" DIA. CONE _____
2" SHELBY _____
CASING _____

LEGEND

SS 1/2 UNCONFINED COMPRESSION (Qu) _____ O
TW VANE TEST (C) AND SENSITIVITY (S) _____ +s
NATURAL MOISTURE AND LIQUIDITY INDEX _____ LI
LIQUID LIMIT _____ X
PLASTIC LIMIT _____

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET	STRENGTH AND PENETRATION RESISTANCE			
				2000	4000	6000	8000
	Ground Level.	599.0		50	100	150	200
	Grey fine-medium sand with organic material.	581.0	10				
	Grey silt with some clay layers.	557.0	20				
	End of Borehole.		40				
			50				
			60				
			70				
			80				

CONSISTENCY			SAMPLE	NATURAL UNIT WT. P.C.F.	
MOIST. CONTENT - % DRY WT.					
10	20	30			
		X	TW 1	121.2	
		X	TW 2	-	
			X	TW 3	120.0
		X	TW 4	126.8	
		X	TW 5	128.8	
		X	TW 6	121.2	

Borehole No. 6.

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS AND RESEARCH SECTION

W.P. _____ BORE HOLE NO. 7. _____

JOB F 59-20. STATION 35+72.

DATUM Geodetic. COMPILED BY B.K.

BORING DATE Mar. 19/59 CHECKED BY _____

2" DIA. SPLIT TUBE _____
2" SHELBY TUBE _____
3" SPLIT TUBE _____
2" DIA. CONE _____
2" SHELBY _____
CASING _____

LEGEND

1/2 UNCONFINED COMPRESSION (Qu) _____	O
VANE TEST (C) AND SENSITIVITY (S) _____	+*
NATURAL MOISTURE AND	
LIQUIDITY INDEX _____	X
LIQUID LIMIT _____	
PLASTIC LIMIT _____	

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET	STRENGTH AND PENETRATION			
				RESISTANCE P.S.F.	BLOWS/FT		
	Ground Level.	599.4		50	100	150	200
			10				
			20				
			30				
			40				
			50				
			60				
			70				
			80				

CONSISTENCY	SAMPLE	NATURAL UNIT WT. P.C.F.
MOIST. CONTENT- % DRY WT.		

Borehole No. 7

DEPARTMENT OF HIGHWAYS - ONTARIO MATERIALS AND RESEARCH SECTION

W.P. _____ BORE HOLE NO. 8.
JOB F 59-20. STATION 35+27
DATUM Geodetic. COMPILED BY B.K.
BORING DATE Mar. 20/59 CHECKED BY _____

2" DIA. SPLIT TUBE _____
2" SHELBY TUBE _____
2" SPLIT TUBE _____
2" DIA. CONE _____
2" SHELBY _____
CASING _____

LEGEND

SS 1/2 UNCONFINED COMPRESSION (Qu) _____ O
TW VANE TEST (C) AND SENSITIVITY (S) _____ +
NATURAL MOISTURE AND LIQUIDITY INDEX _____ LI
LIQUID LIMIT _____ X
PLASTIC LIMIT _____

SYMBOL	DESCRIPTION	ELEV. FEET	DEPTH FEET	STRENGTH AND PENETRATION RESISTANCE			
				2000	4000	6000	8000
	Ground Level.	593.0		50	100	150	200
	Grey fine-medium silty sand with organic material.	573.0					
	Grey silt with clay and some gravel.	557.8					
	End of Borehole.	41.2					

CONSISTENCY			SAMPLE	NATURAL UNIT WT. P.C.F.
MOIST. CONTENT - % DRY WT.				
10	20	30		
		x	TW 1	127.2
		x	TW 2	128.5
		x	TW 3	124.0
			TW 4	-
	x		TW 5	128.8
	x		TW 6	-
	x		TW 7	127.8
	x		TW 8	129.9
	x		TW 9	129.0

Borehole No. 8

59-F-20

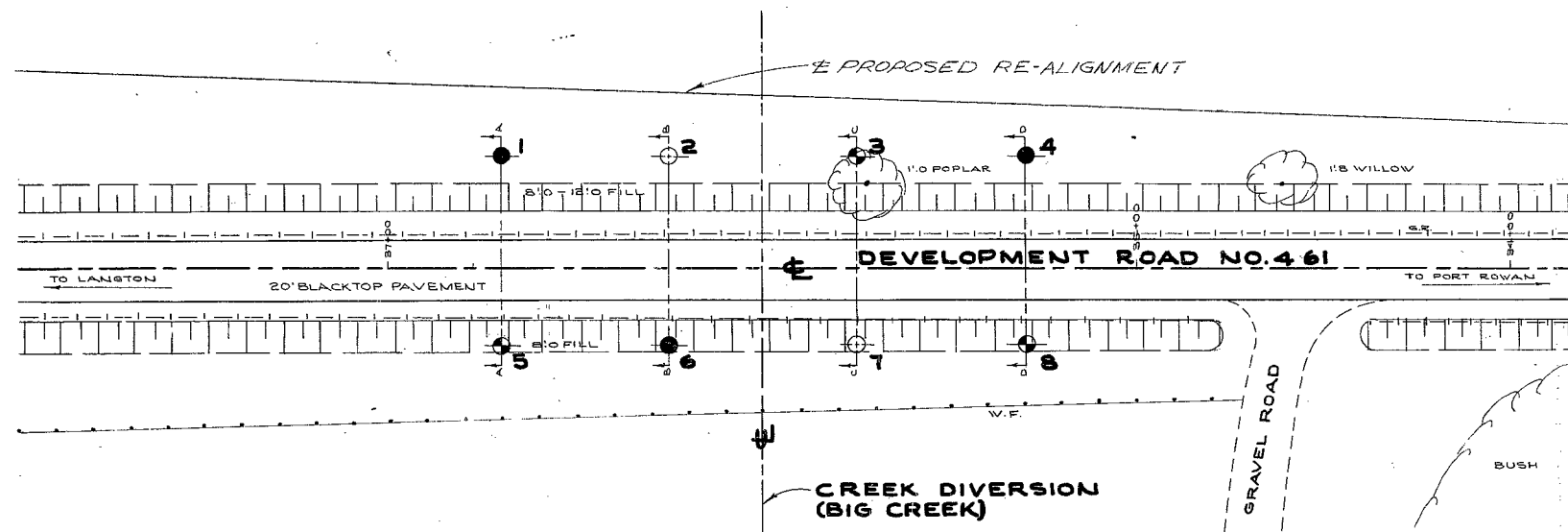
DEV. RD. # 461

BIG CREEK

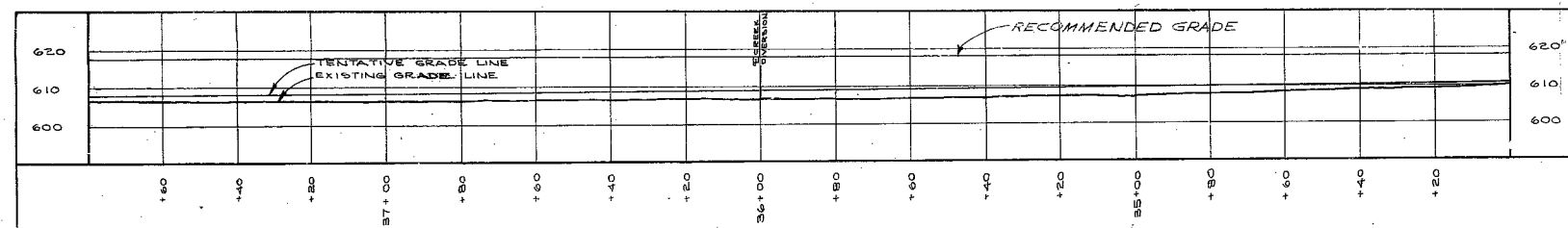
DIVERSION

CON. # 7

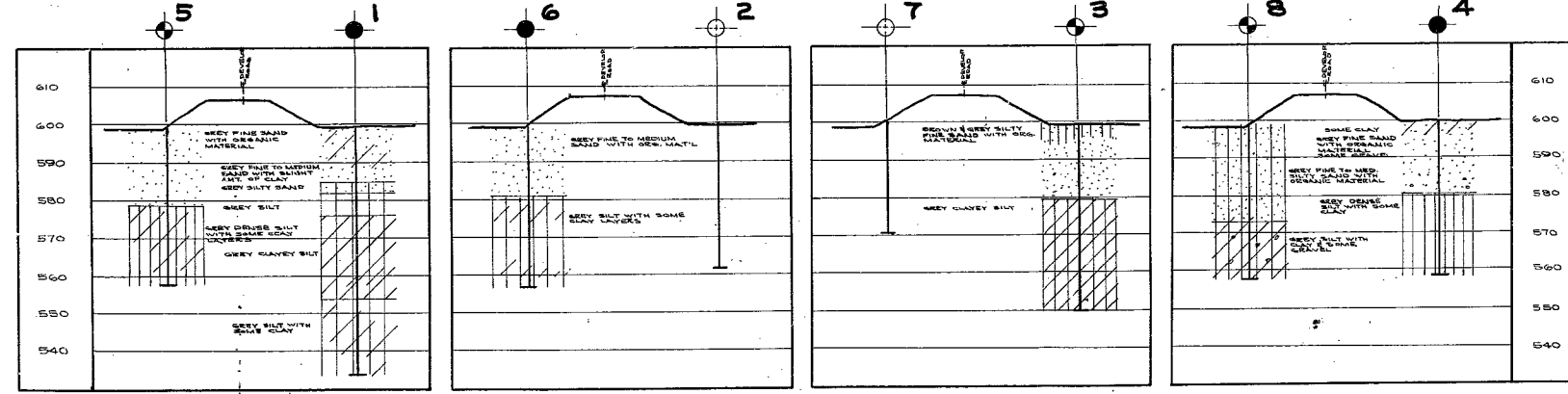
4 MILES E. OF
LANGTON



PLAN



PROFILE

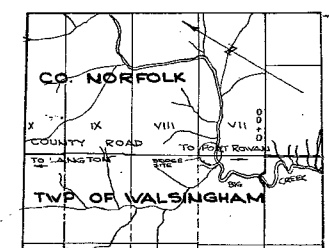


A-A

B-B

C-C

D-D



KEY PLAN
1/4" = 1 MI.

LEGEND			
BORE HOLE			
PENETRATION HOLE			
BORE & PENETRATION HOLE			
HOLE NO.	ELEVATION	STATION	DISTANCE FROM 'E'
1	599.8'	36+73	30' RT.
2	599.0'	35+23	30' RT.
3	599.4'	36+72	30' RT.
4	599.9'	35+27	30' RT.
5	599.7'	36+73	20' LT.
6	599.0'	35+28	20' LT.
7	599.4'	35+72	20' LT.
8	599.0'	35+27	20' LT.

DEPARTMENT OF HIGHWAYS-ONTARIO
MATERIALS RESEARCH SECTION

**CREEK DIVERSION
PROPOSED CROSSING**

SHOWING POSITIONS & ELEVATIONS OF HOLES

Hwy. DEVELOPMENT RD. 461 DISTRICT 2 COUNTY NORFOLK
TOWNSHIP NORFOLK WALSINGHAM LOT 12, 13 CON. VII
LOCATION 1/4 MI. EAST OF LANSTON (APP.)

DRAWN BY: TMELLORS CHECKED BY: W.P. HILL
DATE: MAR. 25/59 APPROVED BY: DRAWING NO. F59-20A
SCALE 1" = 20'

