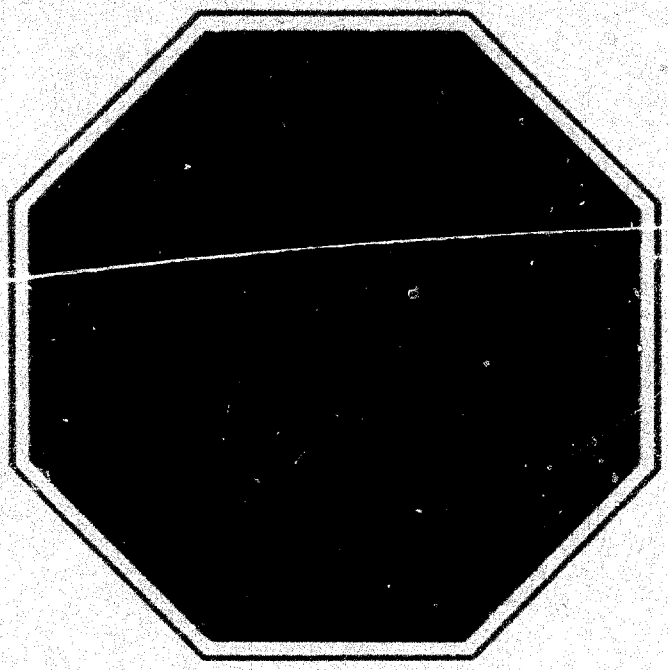
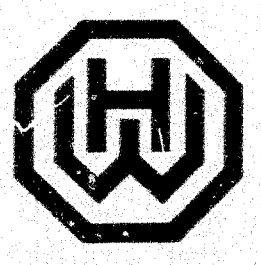
66-F-260M

TWO CREEKS DRAIN

ROMNEY





WARNOCK HERSEY SOIL INVESTIGATIONS LTD.

ABSTRACT: Warnock Hersey Soil Investigations Limited carried out a Soil investigation on behalf of C. C. Randall Associates at the site of two bridges over the Two Creeks Drain in Romney Township.

Spread footings may be used if the relative economy of this method versus piles favours this method. The bearing capacities are:-

Bridge A.	West Abutment	1.0 Ton/sq.ft. at depth 30 ft.
	East Abutment	.7 Ton/sq.ft. at depth 12 ft.
Bridge B.	Both Abutments	.6 Ton/sq.ft. at depth 10 ft.

Sheet piling and dewatering of the excavation will be required.

TABLE OF CONTENTS

INVESTIGATION: Warnock Hersey Soil Investigations Limited was engaged by C. C. Russell Armstrong Consulting Engineers, to carry out a Soil Investigation at two bridge sites on the Two Creeks Drain in the Township of Romney. One bridge is located on the Third Concession Road and referred to as Bridge A. The second, Bridge B, is located on the 6 - 7 sideroad. Drilling was carried out between March 14th and April 2nd, 1966.

SITE & GEOLOGY: The two bridge sites are located at crossings over the Two Creeks Drain south-east of the Village of Wheatley. The terrain lies at the boundary between a till plain to the north and sand plain to the south-west.

PROCEDURE: The borehole locations were laid out by a member of our engineering staff and are shown on the site plan included with this Report.

Boring was carried out using the washboring procedure, and standard split spoon samples were taken ahead of the BX size pipe used to case the holes. For each split spoon sample, the penetration blows to drive the sampler one foot were recorded. The energy of each blow was 4200 inch-pounds obtained by a 140 pound hammer falling a distance of 30 inches.

Continued . . . . .

[illegible] (Cont'd)

These penetration blows (N value) in sand and finer grained soils provide an empirical means of determining the strength, density, and bearing value of the soil. All samples were returned to our laboratory for examination and classification.

Water levels were observed and recorded at the time of drilling.

The Report is given in two parts with reference to Bridge A and Bridge B respectively.

Continued . . . . .

BORE 4

(On Third Concession Road)

SOIL CONDITIONS: There is a layer of loose sandy loam fill at this site extending to depth 10 feet. Below this is a layer of loose medium sand varying in thickness from 1 feet to 15 feet. Below the sand is a firm to stiff grey silty clay extending to refusal at depth 92 feet.

The borehole logs are included with this Report.

Laboratory tests show the average shear strength of the silty clay to be approximately 500 lbs./sq.ft.

The consolidation curve is included with this Report.

FOUNDATIONS: The west abutment would have to be founded at depth 30 feet to get below the loose sand. This would require excavation at least 20 feet below the water table. The sand would require sheet piling and drainage to lower the water table. The bearing capacity of the silty clay would be 1 Ton per square foot. At this soil pressure there should be little settlement of the abutment. Even though the bed of silty clay extends nearly 60 feet in depth, unless the existing overburden pressure is exceeded

Continued . . . . .

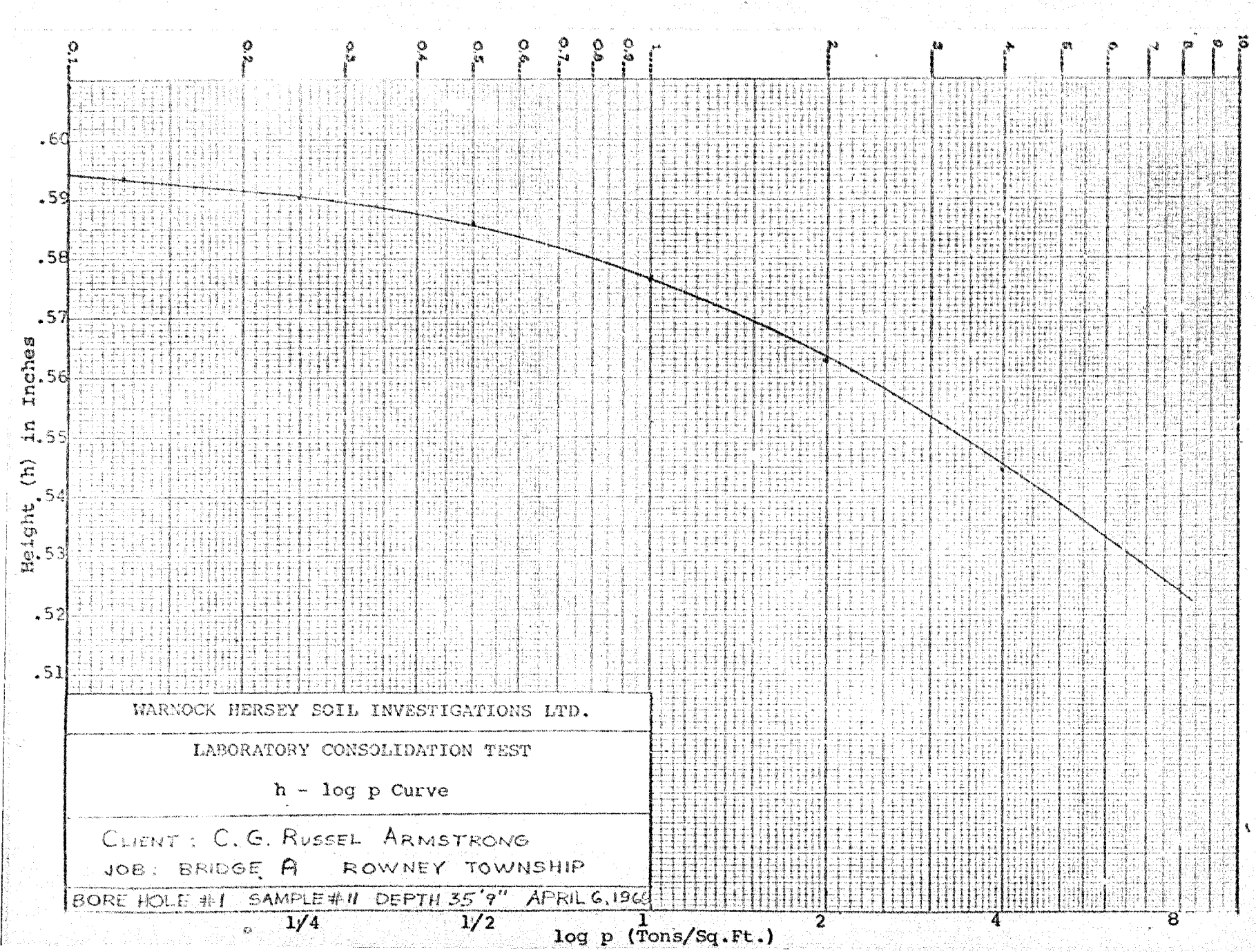
DISCUSSION: (cont'd)

there would be no tendency for consolidation to occur.

The east abutment should be founded at depth 12 feet to get below the loose sandy fill. The bearing capacity at that level would be 0.7 Tons/sq.ft. As this value exceeds the overburden pressure, there will be some tendency for consolidation to occur and hence some settlement will take place. This settlement cannot be estimated until the abutment size and loading is known, however, the consolidation curve is given with the Report.

If the computed settlement cannot be tolerated then friction piles should be used to transfere the loads to a lower depth.

Continued . . . . .


0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
2
3
4
5
6
7
8
9
10
.60
.59
.58
.57
.56
.55
.54
.53
.52
.51
Height (h) in Inches
WARNOCK HERSEY SOIL INVESTIGATIONS LTD.
LABORATORY CONSOLIDATION TEST
h - log p Curve
CLIENT : C. G. RUSSEL ARMSTRONG
JOB : BRIDGE A ROWNEY TOWNSHIP
BORE HOLE #1 SAMPLE #11 DEPTH 35'9" APRIL 6, 1960
1/4
1/2
1
2
4
8
log p (Tons/Sq.Ft.)

LABORATORY RESULTS

Hole A

Borehole No.	Sample No.	Depth	Moisture Content in %	Bulk Density in lbs./cu. ft.	Unconfined Shear Strength lbs./sq. ft.
1	9	30 - 32	24.4	126.2	460
1	11	35 - 37	24.1	122.2	370
1	13	40 - 42	22.9	125.8	-
1	15	45 - 47	21.5	124.2	730
1	17	50 - 52	23.4	126.0	-
1	19	55 - 57	23.3	119.6	-
2 *	8	25 - 27	22.4	120.4	1330
2	10	30 - 32	21.8	124.2	-
2	12	35 - 37	23.9	127.2	-
2	15	45 -	21.8	125.0	-
2	17	55 - 57	23.2	122.7	460
2	19	65 - 67	18.9	129.1	564
2	21	75 - 77	27.1	117.0	-
2	23	85 - 87	.3	1[illegible]	590

* This value is too high.

Warnock Hersey Soil Investigations Ltd

Office Report Of Soil Exploration

Casing BX Diameter 2 7/8" Elevn. 100.05'
Casing Hammer Wt. 350 lbs. Drop 24"
Sample Hammer Wt. 140 lb. Drop 30"

Client C.G.Russel Armstrong Order Number 62-66-91
BRIDGE A- Two Creeks Drain Borehole Number 1
Rowney Township Date March 15,16, 1906.

SAMPLE CONDITION & TYPE Ref. B.M. Elevation 100.0 of Bridge & Road

Disturbed
Good
Lost

CS - Chunk
DO - Drive Open
DF - Drive Footvalve
TO - Thinwalled Open
WS - Washed Sample
RC - Rock Core

V - In-situ Vane Shear Test
M - Mechanical Analysis
U - Unconfined Compression
Qc - Triaxial Consolidated Quick
Q - Triaxial Quick
S - Triaxial Slow

ABBREVIATIONS
- Unit Weight
K - Permeability
C - Consolidation
CA - Casing
WL - Water Level in Casing
WT - Water Table in Soil

Elevn. Depth Feet	Description	Strata Plot	Elevation Scale Feet	SHEAR STRENGTH ~~tons/sq. ft. or Qu/2~~ PENETRATION TESTS standard energy 4200 in. lb. blows/foot of penetration	WATER CONTENT ~~W.L. A.L.~~ w%	Condition	Type	Number	Pen. Resistance	Depth Elevn. Recovery Feet
100.05	Brown sandy loam fill; Loose (SC)		0	20 40 60	80		DO	1	8	2'-3'
			5				DO	2	9	5'-6'
			W.L- 8'0"				DO	3	14	7½-8'
90.05			10				DO	4	12	10'-11'
	Brown Fine to Medium Sand, Loose, Sharp Grains (SW)						DO	5	10	12'-13'
			15				DO	6	12	15'-16'
80.05			20				DO	7	17	20'-21'
	Grey Medium Sand, Compact, Sharp grains (SW)									
75.05			25				DO	8	10	25'-26'
	Grey Coarse Sand; Loose, Sharp Grains. (SW)									
72.05										
	Grey Silty Clay, Stiff (CL)		30				TO	9	-	30'-32'
			35				DO	10	9	34'-35'
							TO	H	-	35'-37'
			40				DO	12	5	39'-40'
							TO	13	-	40'-42'
							DO	14	6	42'-43'
			45				TO	15	-	45'-47'
							DO	16	7	47'-48'
50.05			50							

Warnock Hersey Soil Investigations Ltd

Office Report Of Soil Exploration

Casing BX Diameter 2 7/8" Elevn. 100.05'
Casing Hammer Wt. 350 lb. Drop 24"
Sample Hammer Wt. 140 lb. Drop 30"

Client C.G.Russel Armstrong Order Number 62-66-91
Bridge A - Two Creeks Drain Borehole Number 1 (Cont'd)
Romney Township Date March 15 & 16, 1966.

SAMPLE CONDITION & TYPE

Disturbed
Good
Lost

CS - Chunk
DO - Drive Open
DF - Drive Footvalve
TO - Thinwalled Open
WS - Washed Sample
RC - Rock Core

ABBREVIATIONS

V - Insitu Vane Shear Test
M - Mechanical Analysis
U - Unconfined Compression
Qc - Triaxial Consolidated Quick
Q - Triaxial Quick
S - Triaxial Slow

- Unit Weight
K - Permeability
C - Consolidation
CA - Casing
WL - Water Level in Casing
WT - Water Table in Soil

SOIL PROFILE

Elevn. Depth Feet	Description	Strata Plot	Elevation Scale Feet
50.05			50
	Grey SILTY CLAY, stiff. (CL)		
			55
			60
			65
			70
			75
			80
			85
			90
7.55			92'6"
	Refusal at 92' 6"		
	Water level at 8'0" after completion.		

SHEAR STRENGTH
tons/sq. ft. or Qu/2

PENETRATION TESTS
standard energy 4200 in. lb.
blows/foot of penetration
20 40 60 80

WATER CONTENT
% dry wt.
P.L. L.L.

SAMPLES

Condition	Type	Number	Pen. Resistance	Elevn. Recvy. Feet
	TO	17	-	50-52'
	DO	18	7	52-53'
	TO	19	-	55-57'
	DO	20	8	60-61'
	DO	21	9	65-66'
	DO	22	11	70-71'
	DO	23	11	75-76'
	DO	24	12	80-81'
	DO	25	14	85-86'

Warnock Hersey Soil Investigations Ltd

Office Report Of Soil Exploration

Casing BX Diameter 2 7/8" Elevn. 90.38'
Casing Hammer Wt. 350 lb. Drop 24"
Sample Hammer Wt. 140 lb. Drop 30"

Client C.G.Russel Armstrong Order Number 62-66-91
Bridge "A" - Two Creeks Drain Borehole Number 2
Rowney Township Date March 17,19,1966.

SAMPLE CONDITION & TYPE

Disturbed
Good
Lost

CS - Chunk
DO - Drive Open
DF - Drive Footvalve
TO - Thinwalled Open
WS - Washed Sample
RC - Rock Core

ABBREVIATIONS

V - Insitu Vane Shear Test
M - Mechanical Analysis
U - Unconfined Compression
Qc - Triaxial Consolidated Quick
Q - Triaxial Quick
S - Triaxial Slow

- Unit Weight
K - Permeability
C - Consolidation
CA - Casing
WL - Water Level in Casing
WT - Water Table in Soil

SOIL PROFILE

Elevn. / Depth Feet	Description	Strata Plot	Elevation Scale Feet
90.38	Brown Sandy Loam Fill, Loose, (SC)		0
80.38	Grey Medium Sand, Loose (SM)		10
78.38	Grey Silty clay, firm to Stiff (GC)		15
			20
			25
			30
			35
52.38	Grey Sandy Clay (SC)		40
49.38	Grey Silty Clay, Stiff, (CL)		45
40.38			50

SHEAR STRENGTH

~~tons/sq. ft. or Cu/2~~

PENETRATION TESTS
standard energy 4200 in. lb.
blows/foot of penetration

20 40 60 80

WATER CONTENT

~~W p l.~~ ~~W l.~~

SAMPLES

Condition	Type	Number	Pen. Resistance	Depth Elevn. Density Feet
DO	1	7		2-3'
DO	2	7		5-6'
DO	3	6		7-8'
DO	4	4		10-11'
DO	5	14		12-13'
DO	6	14		15-16'
DO	7	11		20-21'
TO	8	-		25-27'
DO	9	9		28-29'
TO	10	-		30-32'
DO	11	7		33-34'
TO	12	-		35-37'
DO	13	11		38-39'
DO	14	17		40-41'
TO	15	-		45-47'

Warnock Hersey Soil Investigations Ltd

Office Report Of Soil Exploration

Casing BX Diameter 2 7/8" Elevn. 50.39'
Casing Hammer Wt. 350 lb. Drop 24"
Sample Hammer Wt. 140 lb. Drop 30"

Client C.G.Russel Armstrong Order Number 62-66-91
Bridge "A"- Two Creeks Drain Borehole Number 2 (Cont'd)
Rowney Township Date March 17,19, 1966.

SAMPLE CONDITION & TYPE

Disturbed
Good
Lost

CS - Chunk
DO - Drive Open
DF - Drive Footvalve
TO - Thinwalled Open
WS - Washed Sample
RC - Rock Core

ABBREVIATIONS

V - Insitu Vane Shear Test
M - Mechanical Analysis
U - Unconfined Compression
Qc - Triaxial Consolidated Quick
Q - Triaxial Quick
S - Triaxial Slow

- Unit Weight
K - Permeability
C - Consolidation
CA - Casing
WL - Water Level in Casing
WT - Water Table in Soil

SOIL PROFILE				SHEAR STRENGTH tons/sq. ft. or Qu/2	WATER CONTENT %	SAMPLES				
Elevn. Depth Feet	Description	Strata Plot	Elevation Scale Feet	PENETRATION TESTS standard energy 4200 in. lb. blows/foot of penetration	⊡ p.l. △ l.l.	Condition	Type	Number	Pen. Resistance	Depth Elevn. Recov. Feet
40.38	Grey SILTY CLAY; stiff. (CL)		50	20 40 60 80			DO	16	11	50-51'
			55				TO	17	-	55-57'
			60				DO	18	10	60-61'
			65				TO	19	-	65-67'
			70				DO	20	11	70-71'
			75				TO	21	-	75-77'
			80				DO	22	14	80-81'
			85				TO	23	-	85-87'
			90				DO	24	21	90-91'
-1.37	Refusal at 91' 9"		91'9"							

[illegible]

[illegible]

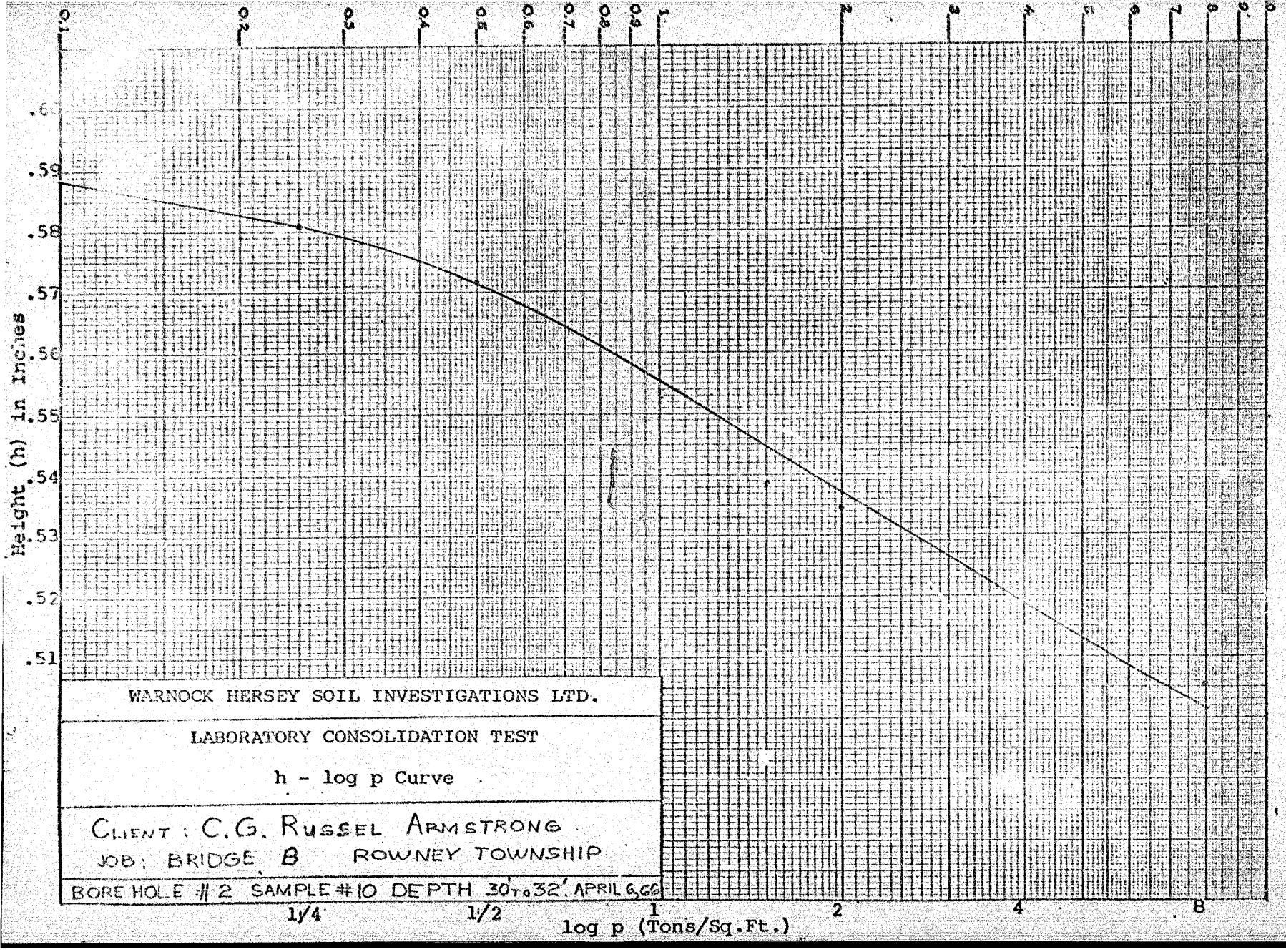
Soil Conditions: The soil conditions at this site are very similar with a loose sandy loam at the surface underlain by a grey silty clay below depth 10 feet. Rock was encountered in borehole No. 1 at depth 65 feet. It was cored for a depth of 5 feet with 100 % recovery.

Laboratory tests show the shear strength to be approximately 450 lbs./sq.ft. - just slightly weaker than Bridge Site A. A consolidation curve is also given with this report, and shows the material to be a little more compressible than at Bridge Site A.

[illegible]: Conditions are more uniform at this site. The borehole logs for the north and south abutments are very similar. Footings should be placed at depth 10 feet to get below the loose sandy loam.

The water level is at depth five feet so that dewatering during excavation will be required. At depth 10 feet the bearing capacity on a spread footing would be 3.5 Tons/sq.ft. As this exceeds the overburden pressure, settlement computations should be made to determine if it is a problem.

Continued . . . . .


0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
2
3
4
5
6
7
8
9
10
.60
.59
.58
.57
.56
.55
.54
.53
.52
.51
Height (h) in Inches
WARNOCK HERSEY SOIL INVESTIGATIONS LTD.
LABORATORY CONSOLIDATION TEST
h - log p Curve
CLIENT : C.G. RUSSEL ARMSTRONG
JOB: BRIDGE B ROWNEY TOWNSHIP
BORE HOLE # 2 SAMPLE #10 DEPTH 30' TO 32' APRIL 6,66
1/4
1/2
1
2
4
8
log p (Tons/Sq.Ft.)

[illegible]

Bench II

Borehole No.	Sample No.	Depth	Moisture in %	Bulk Density in lbs/cu.ft.	Unconfined Shear Strength lbs/sq.ft.
1	7	20 - 22			
1	10	30 - 32	21.3	125.0	-
1	12	40 - 42	20.4	120.5	455
1	15	55 - 57	22.4	126.0	571
2	8	25 - 27	22.3	130.0	504
2	10	30 - 32	23.9	122.5	[illegible]
2	12	35 - 37	22.5	125.1	521
2	14	40 - 42	20.0	127.2	-
2	16	45 - 47	23.7	124.1	-
2		50 - 52	23.2	123.2	[illegible]
2		55 - 57	23.0	127.0	
2	23	65 - 67	22.5	126.0	[illegible]
2	25	70 - 72	24.1	124.0	-

Warnock Hersey Soil Investigations Ltd

Office Report Of Soil Exploration

Casing BX Diameter 2 7/8" Elevn. 100.25'
Casing Hammer Wt. 350 lbs Drop 24"
Sample Hammer Wt. 140 lbs Drop 30"

Client C.G.Russell
Armstrong. Bridge "B",
Two Creeks Drain, Rowney
Township.

Order Number 62-66-91
Borehole Number 1
Date March 21-24, 1966

SAMPLE CONDITION & TYPE REF BM EL 100.0 - CENTRE OF BRIDGE & ROAD

Disturbed
Good
Lost

CS - Chunk
DO - Drive Open
DF - Drive Footvalve
TO - Thinwalled Open
WS - Washed Sample
RC - Rock Core

V - Insitu Vane Shear Test
M - Mechanical Analysis
U - Unconfined Compression
Qc - Triaxial Consolidated Cell
Q - Triaxial Quick
S - Triaxial Slow

ABBREVIATIONS

- Unit Weight
K - Permeability
C - Consolidation
CA - Casing
WL - Water Level in Casing
WT - Water Table in Soil

SOIL PROFILE				SHEAR STRENGTH ~~tons/sq. ft. or Cu/2~~ PENETRATION TESTS standard energy 4200 in. lb blows/foot of penetration		SAMPLES				
Elevn. ~~Depth~~ Feet	Description	Strata Plot	Depth Elevation Scale Feet	0 20 40 60 80 100	Water Content	Condition	Type	Number	Pen. Resistance	Depth Elevn. Recvry. Feet
100.25	Brown sandy loam. (SC)		0			DO		1	9	2-3
		WL	5' 5"6"			DO		2	12	5-6
94.75	Brown and grey fine sand; loose sharp grains. (SW)					DO		3	9	7-8
			10 10'5"			DO		4	26	10-11
89.75	Grey silty clay stiff. (CL)					DO		5	16	12-13
			15			DO		6	17	15-16
			20			TO		7	-	20-22
						DO		8	16	22-23
75.25	Grey silty clay firm. (CL)		25			DO		9	10	25-26
			30			TO		10	-	30-32
			35			DO		11	10	35-36
			40			TO		12	-	40-42
			45			DO		13	8	45-46
50.25	CON'T		50							

Warnock Hersey Soil Investigations Ltd

Office Report Of Soil Exploration

Casing BX Diameter 2 7/8" Elevn. 100.25
Casing Hammer Wt. 350 lb. Drop 24"
Sample Hammer Wt. 140 lb. Drop 30"

Client C. G. Russell
Armstrong. Bridge "B",
Two Creeks Dam, Rowney
Township.

Order Number 62-S6-91
Borehole Number 1 (Cont)
Date March 21-24, 1966

SAMPLE CONDITION & TYPE

Disturbed
Good
Lost

CS - Chunk
DO - Drive Open
DF - Drive Footvalve
TO - Thinwalled Open
WS - Washed Sample
RC - Rock Core

ABBREVIATIONS

V - Insitu Vane Shear Test
M - Mechanical Analysis
U - Unconfined Compression
Qc - Triaxial Consolidated Quick
Q - Triaxial Quick
S - Triaxial Slow

- Unit Weight
K - Permeability
C - Consolidation
CA - Casing
WL - Water Level in Casing
WT - Water Table in Soil

SOIL PROFILE			SHEAR STRENGTH	WATER CONTENT	SAMPLES				
Elevn. / Depth	Description	Strata Plot	Depth Scale	~~tons/sq. ft. or Cu/2~~	~~w%~~	Condition	Type	Number	Pen. Resistance	Depth / Elevn. / Recvry.
Feet			Feet	PENETRATION TESTS standard energy 4200 in. lb. blows/foot of penetration	~~P.L.~~ ~~A.L.~~					Feet
50.25			50	20 40 60 80 100						
	Grey SILTY CLAY ; firm.		55			DO	14	7		50-51
						TO	15	-		55-57
			60			DO	16	8		60-61
			65			DO	17	7		65-66
			70			DO	18	8		70-71
			75			DO	19	10		75-76
			80			DO	20	11		80-81
			85			RC	21	-		85-90 Recy. 100%
10.25	End of Hole 90'0" Water level at 5'0" after completion.		90							

Warnock Hersey Soil Investigations Ltd

Office Report Of Soil Exploration

Casing BX Diameter 2 7/8" Elevn. 99.52'
Casing Hammer Wt.350 lb. Drop 24"
Sample Hammer Wt.140 lb. Drop 30"

Client C. G. Russell Order Number 62-66-91
Armstrong. Bridge "B", Two Creeks Drain, Rowney Township. Borehole Number 2
Date March 21 - 27,1966

SAMPLE CONDITION & TYPE

Disturbed
Good
Lost

CS - Chunk
DO - Drive Open
DF - Drive Footvalve
TO - Thinwalled Open
WS - Washed Sample
RC - Rock Core

ABBREVIATIONS

V - Insitu Vane Shear Test
M - Mechanical Analysis
U - Unconfined Compression
Qc - Triaxial Consolidated Quick
Q - Triaxial Quick
S - Triaxial Slow

- Unit Weight
K - Permeability
C - Consolidation
CA - Casing
WL - Water Level in Casing
WT - Water Table in Soil

SOIL PROFILE				SHEAR STRENGTH	WATER CONTENT	SAMPLES					
Elevn. Datum Feet	Description	Strata Plot	Depth Elevation Scale Feet	tons/sq. ft. or Qu/2	w%	Condition	Type	Number	Pen. Resistance	Depth Elevn. Recvy. Feet
99.52			0	PENETRATION TESTS standard energy 4200 in. lb. blows/foot of penetration	■ p.l. ▲ l.l.					
	Brown sandy loam fill, loose. (SC)			20 40 60 80 100						
94.02			5'6" 5				DO	1	7	2-3
	Brown medium sand; loose; sharp (SW)						DO	2	9	5-6
89.52			10				DO	3	8	7-8
	Grey silty clay; very stiff. (CL)						DO	4	17	10-11
84.52			15				DO	5	20	12-13
	Grey silty clay, stiff. (CL)						DO	6	17	15-16
79.52			20				DO	7	7	20-2
	Grey silty clay, firm. (CL)						TO	8	-	23-
			25				DO	9	7	25-
			30				TO	10	-	30-
							DO	11	6	33
			35				TO	12	-	35
			40				DO	13	6	38
							TO	14	-	4
			45				DO	15	6	4
							TO	16	-	
49.52			50				DO	17	8	

Warnock Hersey Soil Investigations Ltd

Office Report Of Soil Exploration

Casing BX Diameter 2 7/8" Elevn. 99.52
Casing Hammer Wt. 350 lb. Drop 24"
Sample Hammer Wt. 140 lb. Drop 30"

Client C. G. Russell
Armstrong. Bridge "B",
Two Creeks Drain, Rowney
Township.

Order Number 62-66-91
Borehole Number 2 (Cont).
Date March 21 - 27, 1966

SAMPLE CONDITION & TYPE

Disturbed
Good
Lost

CS - Chunk
DO - Drive Open
DF - Drive Footvalve
TO - Thinwalled Open
WS - Washed Sample
RC - Rock Core

ABBREVIATIONS

V - Insitu Vane Shear Test
M - Mechanical Analysis
U - Unconfined Compression
Qc - Triaxial Consolidated Quick
Q - Triaxial Quick
S - Triaxial Slow

γ - Unit Weight
K - Permeability
C - Consolidation
CA - Casing
WL - Water Level in Casing
WT - Water Table in Soil

SOIL PROFILE				SHEAR STRENGTH ~~tons/sq. ft. or Qu/2~~	WATER CONTENT ~~w%~~	SAMPLES				
Elevn. ~~Depth~~ Feet	Description	Strata Plot	Depth Elevation Scale Feet	PENETRATION TESTS standard energy 4200 in. lb. blows/foot of penetration	~~P.L.~~ ~~L.L.~~	Condition	Type	Number	Pen. Resistance	~~Core~~ Recvry. Depth Feet
49.52			50	20 40 60 80 100						
	Grey SILTY CLAY; firm.						TO	18	-	50-52
			55				DO	19	9	53-54
							TO	20	-	55-57
							DO	21	9	58-59
			60				TO	22	-	60-62
			65				TO	23	-	65-67
							DO	24	10	68-69
			70				TO	25	-	70-72
			75				DO	26	-	75-76
			80				DO	27	14	80-81
			85							
			90							
			95				RC	28	-	92-97 100% Recty
2.52	End of Hole 97'0". Refusal at 85'0"		97'							

CONCLUSIONS

In both cases spread footings can be used if loads do not cause excessive settlement. However, if settlement is a serious consideration piles may have to be used to carry the loads down to a greater depth.

The relative economy of piling through the loose sand versus excavation and footing construction should also be checked.

If it is decided to use footings, the excavation will require sheet piling and dewatering. The bearing capacities, barring settlement considerations, are:-

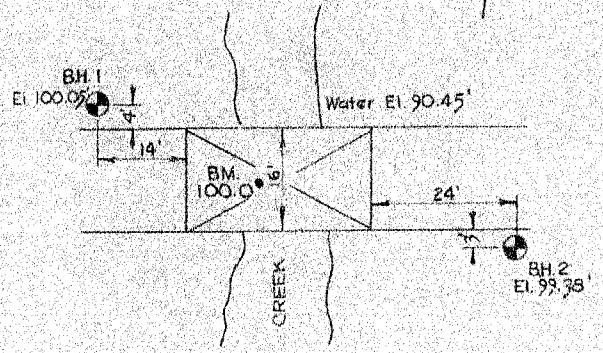
Bridge A:	West Abutment	1.0 Tons/sq. ft.
	East Abutment	0.7 Tons/ sq. ft.
Bridge B:	Both Abutments	0.6 Tons/sq.ft.

Respectfully submitted,

WARWICK MERSEY SOIL INVESTIGATIONS LTD.

W. J. Dickson M.Sc. P.Eng.
Manager

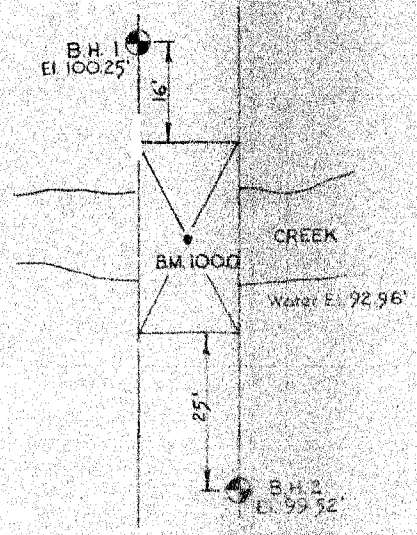
WJD/jb



PLAN

BRIDGE "A"

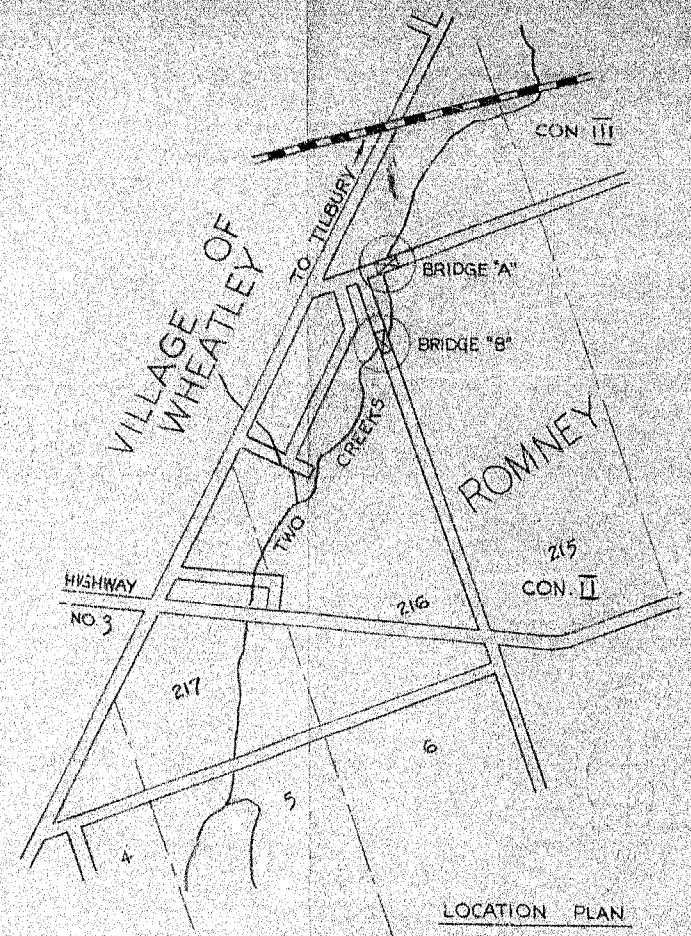
SCALE 1" = 20'



PLAN

BRIDGE "B"

SCALE: 1" = 20'



LOCATION PLAN

WARDROP HERRICK SOIL INVESTIGATIONS LTD

BOREHOLE LOCATIONS
FOR 2 BRIDGES OVER TWO CREEKS DRAI
ROMNEY TOWNSHIP, ONT.

C.C. RUSSEL, ARMSTRONG
BARTLET BUILDING, 76 UNIVERSITY AVE.
WINDSOR, ONTARIO

JOB NO. 62-6691	APP'D. BY	SCALE
DATE APR 5 1966	DR'N BY C.M.	AS SHOW