

#67-F-271M

BURNHAMTHORPE

ROAD

RENFORTH CREEK

ETOBICOKE

THE BOROUGH OF ETOBICOKE
STRUCTURAL ENGINEERING DEPARTMENT
550 BURNHAMTHORPE ROAD
ETOBICOKE, ONTARIO

67-A-27 M
FOUNDATION INVESTIGATION
YOUR JOB NO. 9248
BRIDGE SITE *RENFORTH C.K.*
BURNHAMTHORPE ROAD AND ~~THE WEST MAIN~~
ETOBICOKE, ONTARIO

Project: J3924

October, 1967

William Trow Associates Limited

90 Milvan Drive
Weston, Ontario
749-1290

William Trow

Project: J3924

Soil Mechanics
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Associates Ltd.

The Borough of Etobicoke,
Structural Engineering Department,
550 Burnhamthorpe Road,
Etobicoke, Ontario.

October 20, 1967

Your Job No. 9248

Attention: Mr. T. Yeh, P.Eng.

Foundation Investigation
Bridge Site
Burnhamthorpe Road and the West Mall
Etobicoke, Ontario

Dear Sirs:

In accordance with your authorization, work order number 250 of September 12th, 1967, we have completed a foundation investigation at the above noted site. The nature of the authorization and the restricted access to the site limited the field work to 2 boreholes at the sides of the valley put down with continuous auger equipment, and a shallow third borehole put down in the creek valley using hand auger equipment. The following findings and recommendations have been based upon this field work.

1) The subsoil stratigraphy consists of embankment fill and softened clayey silt followed by a deposit of dense to very dense silt till. In Hole 1 the silt till is underlain by a 5 foot stratum of dense silty sand and the hole was terminated in a very dense sandy silt till

at El 408 feet. Fill deposits of stiff clayey silt extended to a depth of 8 feet on the east bank at Hole 1 where the approach embankment has been built.

Groundwater levels in Holes 1 and 2 were found to be approximately at creek level at about El 434 feet.

2) It is recommended that the bridge be founded on the silt till deposits on spread footings designed to a safe net bearing pressure of 4 tons per square foot.

The alluvial clayey silt deposits and any softened pockets of silt till should be removed at the abutment locations and the footing excavations should be taken down at least 4 feet depth into very dense silt till and a minimum distance of 4 feet below creek bed level. Holes 1 and 2 indicate an expected founding level for both abutments of approximate El 425 - 428 feet.

3) Before excavating the footing the clayey silt should be excavated and used to form a dyke to divert the creek well away from the proposed excavation. The excavations themselves should be oversize to accommodate perimeter drains to carry away any minor seepage to a pump for disposal, and the side slopes should be cut back to a maximum of 45 degrees to the horizontal for stability. Heavy equipment should be

kept away from proposed footing base as this will tend to work and soften the silt, and the final cleaning operation should be carried out by hand before pouring the bases.

4) Expected settlements under the recommended loading will be less than one inch.

5) There are no expected stability problems associated with the approach embankments. At the location of the south approach embankment the clayey silt should be loaded back from the footing excavation on a slope of 10 horizontal to one vertical. This will eliminate any abrupt settlement at the bridge pier location. The embankment fill should be compacted to at least 100% standard Proctor density. After stripping all topsoil and vegetation from the area of Hole 3, the cut material will make good fill for the adjacent south embankment provided the moisture content can be kept at or lower than the plastic conditions.

6) If the approach fill does not spill through the abutments, they must be designed to withstand the lateral earth pressure exerted by the retained soil. The earth pressure, p , on the walls at any depth, h , can be estimated from the expression:

$$p = K \left[\gamma(h-h_1) + \gamma_s h_1 + q \right]$$

where: $K = 0.35$, the recommended earth pressure coefficient assuming the walls to be rigid, or 0.25 assuming a slight inward movement is possible and permissible

$\gamma = 130$ pcf, the estimated unit weight of the retained soil

$\gamma_s = 65$ pcf, the estimated submerged weight of the retained soil

$h_1 =$ height of the water table above the point being considered

$q =$ surcharge, if any, acting at the top of the wall

This calculation assumes that drainage facilities will be provided behind the wall so that the water table remains more or less constant and the same level in the front and back of the wall.

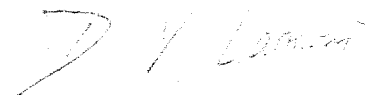
If the fill does not spill through the abutments, the abutments and wing walls must be checked for horizontal sliding along the base if spread footings are used. The frictional force developed along the base can be calculated using a friction coefficient of 0.7 . If the resisting force is less than 2 times the estimated sliding force, the footing base can be extended under the fill to increase the weight of backfill carried by it. In this manner, the resistance to sliding can be increased.

2) Scour protection must be provided for the abutments. After constructing the abutment footings the excavation facing the stream should be backfilled with pit-run gravel or crushed stone with a blanket of boulders

at stream level. Rip-rap should then be placed on the fill as a final protection.

Should you have any queries concerning the contents of this report please do not hesitate to contact this office.

Yours very truly,



D.Y. Larmour, W.Sc.

DYL/ss
Encls.

Dist:- (4)



K. Peaker, P.Eng.

WILLIAM TROW ASSOCIATES LTD.

SOIL INVESTIGATIONS SOIL MECHANICS CONSULTATION

LEGEND

DRAWING NO. 2
PROJECT NO. J3924

BOREHOLE NO. 1
PROJECT Bridge Site
LOCATION Burnhamthorpe Rd. and the West Mall.
HOLE LOCATION See Dwg. 1
HOLE ELEVATION 444.8 ft.
DATE See Dwg. 1

PENETRATION RESISTANCE

2" O.D. SPLIT TUBE —○—○—○—
2" I.D. SHELBY TUBE —*—*—*—*—
2" DIA. CONE —————

SHEAR STRENGTH

UNDRAINED TRIAXIAL AT OVERBURDEN PRESSURE ⊕
UNCONFINED COMPRESSION ⊗
VANE TEST AND SENSITIVITY (S) ⊕³

NATURAL MOISTURE CONTENT AND LIQUIDITY INDEX

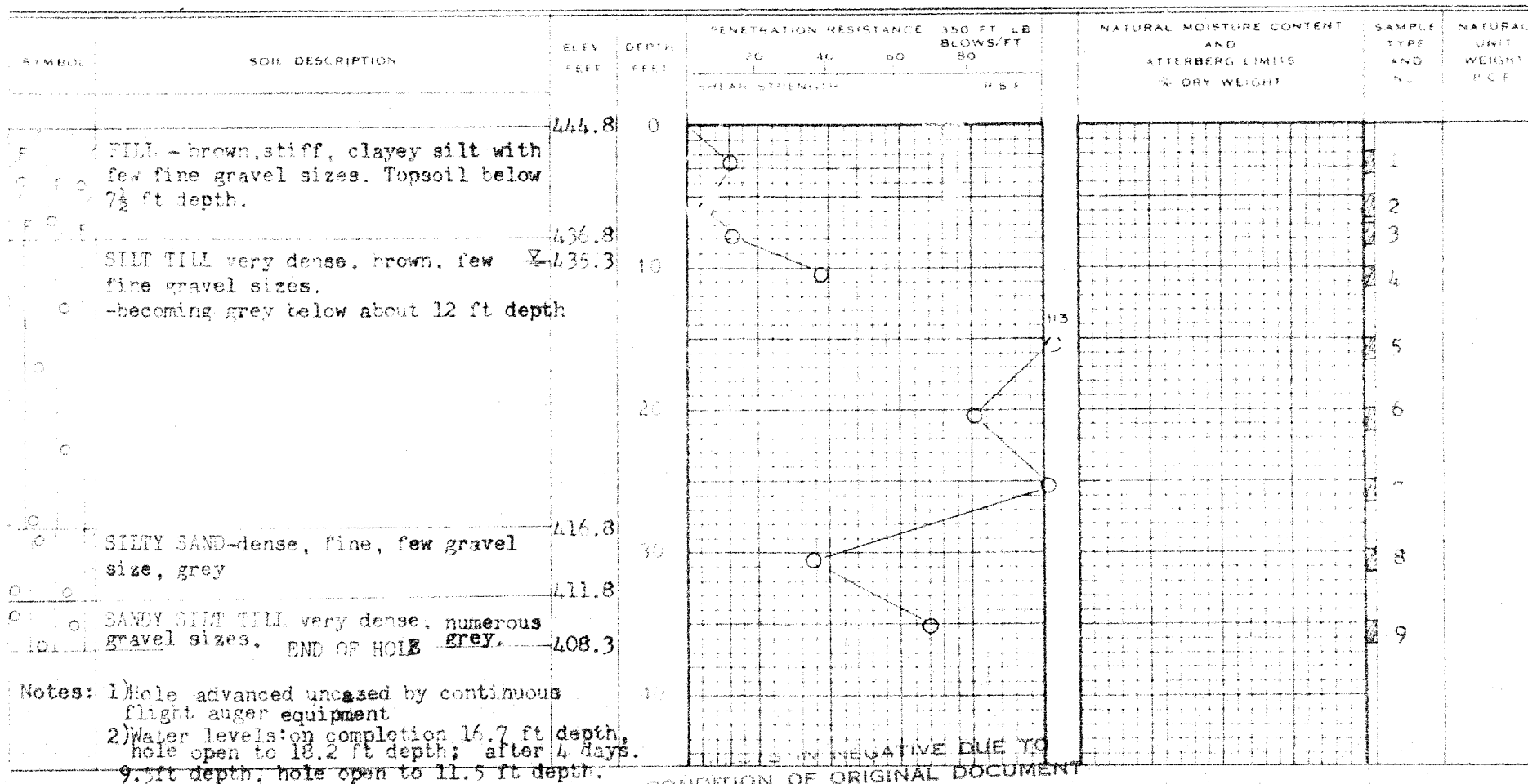
ATTERBERG LIMITS

LIQUID LIMIT —○—

PLASTIC LIMIT ———

SAMPLE TYPE

2" O.D. SPLIT TUBE —○—
2" I.D. SHELBY TUBE —*—
3" O.D. SHELBY TUBE ———



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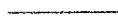



SITE INVESTIGATIONS SOIL MECHANICS CONSULTATION

LEGEND

DRAWING NO. 3
PROJECT NO. J3924


BOREHOLE NO. 2
PROJECT Bridge Site
LOCATION Burnhamthorpe Road and The West Mall
HOLE LOCATION See Dwg. 1
HOLE ELEVATION 435.8 ft.
LATITUDE See Dwg. 1


PENETRATION RESISTANCE

2" O.D. SPLIT TUBE 
2" I.D. SHELBY TUBE 
2" DIA. CONE 
SHEAR STRENGTH
UNDRAINED TRIAXIAL 
AT OVERBURDEN PRESSURE
UNCONFINED COMPRESSION 
VANE TEST AND SENSITIVITY IS 

NATURAL MOISTURE CONTENT AND LIQUIDITY INDEX

ATTERBERG LIMITS

LIQUID LIMIT 

PLASTIC LIMIT 

SAMPLE TYPE

2" O.D. SPLIT TUBE
2" I.D. SHELBY TUBE
3" O.D. SHELBY TUBE

SYMBOL	SOIL DESCRIPTION	ELEVATION		DEPTH		PENETRATION RESISTANCE		NATURAL MOISTURE CONTENT		ATTERBERG LIMITS		SAMPLE TYPE	
		FEET	METERS	FEET	METERS	30 FT. LB. BLOW/FT.	PSF	PERCENT	WET WEIGHT	PERCENT	WET WEIGHT	TYPE	UNIT
	CLAYEY SILT- firm, brown, highly plastic, dense silt till at 5 ft. depth.			435.8	0								
	End of Borehole			430.8									

Notes: 1) Hole advanced by hand auger.
2) Water level at 0.5 ft. depth on completion of boring.

DEFECTS IN NEGATIVE DUE TO
CONDITION OF ORIGINAL DOCUMENT

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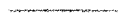



SITE INVESTIGATIONS SOIL MECHANICS CONSULTATION

LEGEND

DRAWING NO. 4
PROJECT NO. 33924


BOREHOLE NO. 3
PROJECT Bridge Site
LOCATION Burnhamthorpe Road and The West Mall
HOLE LOCATION See Dwg. 1
HOLE ELEVATION 449.2 ft.
DATE See Dwg. 1


PENETRATION RESISTANCE

2" O.D. SPLIT TUBE 
2" I.D. SHELBY TUBE 
2" DIA. CONE 
SHEAR STRENGTH
UNDRAINED TRIAXIAL AT OVERBURDEN PRESSURE 
UNCONFINED COMPRESSION 
VANE TEST AND SENSITIVITY (S) 


NATURAL MOISTURE CONTENT AND LIQUIDITY INDEX


ATTERBERG LIMITS


LIQUID LIMIT 

PLASTIC LIMIT 

SAMPLE TYPE

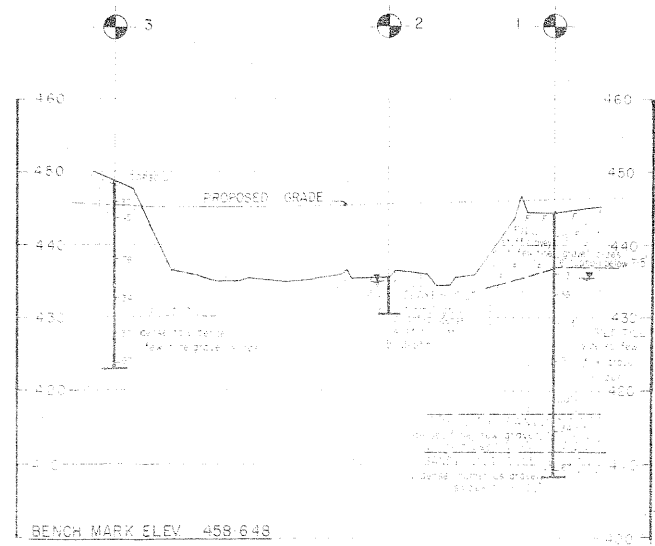
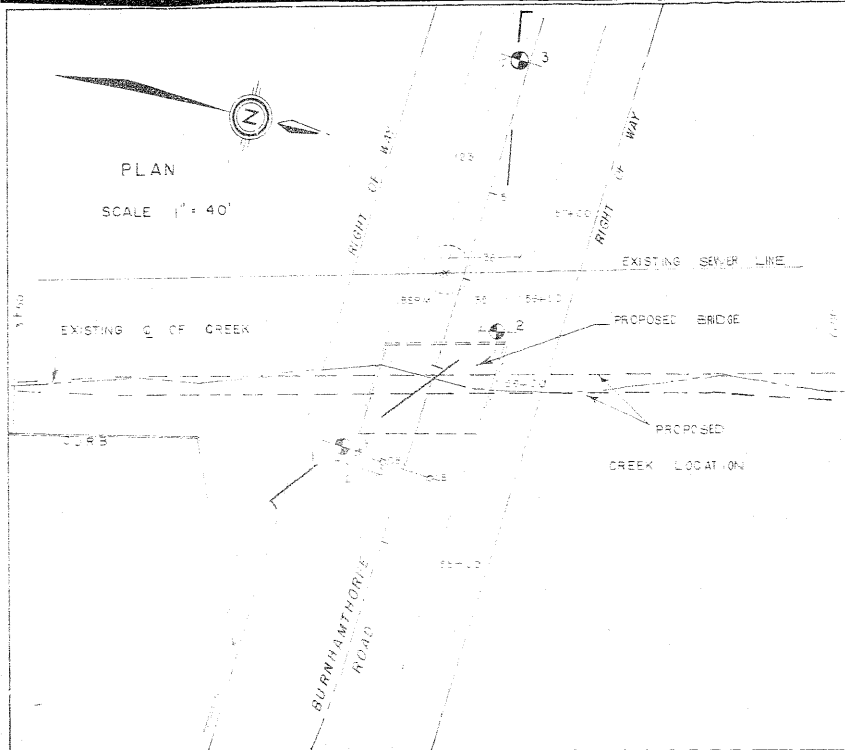
2" O.D. SPLIT TUBE 

2" I.D. SHELBY TUBE 

3" O.D. SHELBY TUBE 

DEPTH FEET	SOIL DESCRIPTION	ELEV. FEET	PENETRATION RESISTANCE 250 FT. LB. BLOWS/FT.	NATURAL MOISTURE CONTENT AND ATTERBERG LIMITS GRAIN WEIGHT	SAMPLE TYPE	NATURAL MOISTURE CONTENT
0	2 inches TOPSOIL	449.2				
1	SILT CLAY- very dense, brown, moist, few fine gravel sizes, -becoming grey and slightly less dense below about 12 ft.depth,					
2						
3						
4	-few thin wet sand seams at 15 ft. depth,					
5						
6	-becoming very dense again below 22 ft.depth.					
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Notes: 1) Hole advanced uncased by continuous
flight auger equipment.
2) Hole dry and open to 24.4 ft. depth
on completion of boring.
Hole later blocked by children.



INTERPRETED SUBSOIL STRATIGRAPHY

SCALE: HOR. 1 IN. = 40 FT.
VERT. 1 IN. = 10 FT. (elevation)

NOTE -
Samples will be kept for 3 months from the date of this report unless otherwise directed.

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.

William Trow & Associates Ltd.
FOUNDATION INVESTIGATION

PROPOSED BRIDGE
BURNHAMTHORPE ROAD

TORONTO ONTARIO

PROJ. 3 924	DATE OCT. 1967	DWG. N° 1
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