

#63-F-265 M

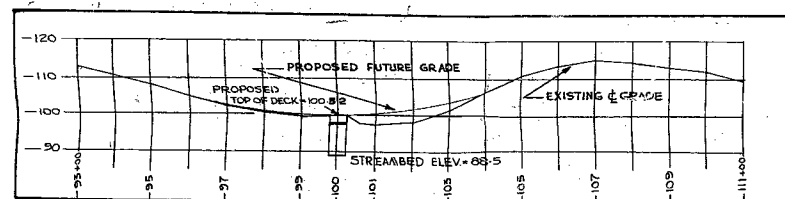
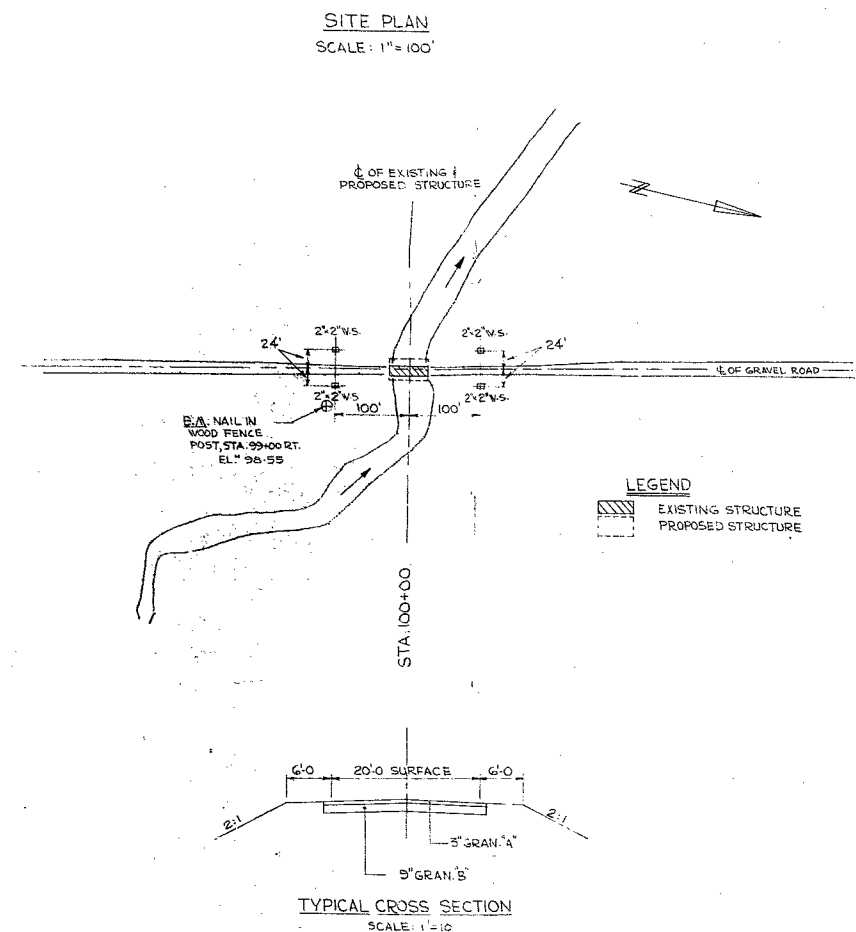
TOWNLINE BRIDGE^{#243}

LOT 32, CON. XV

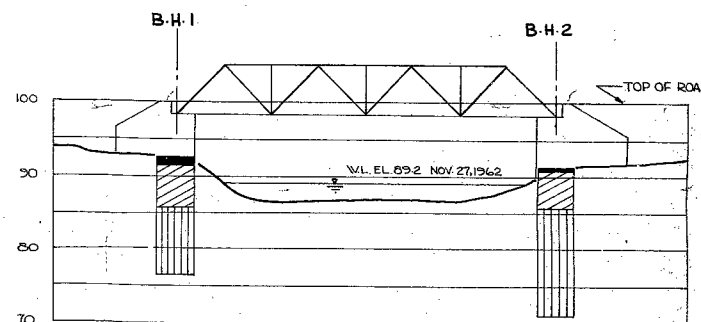
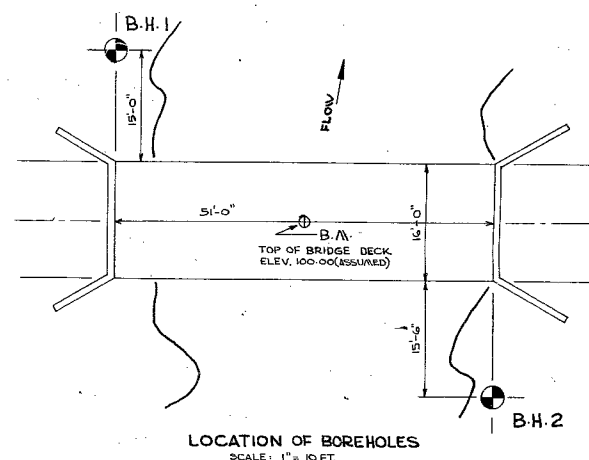
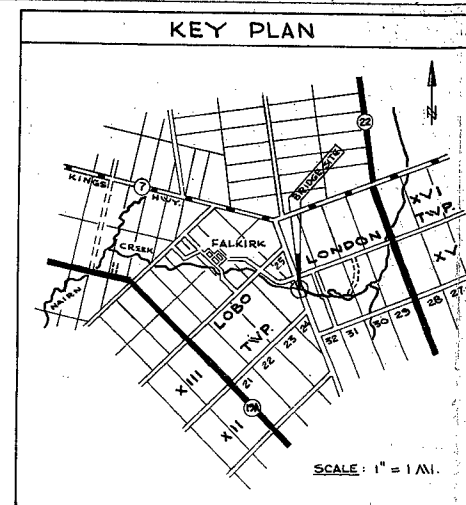
LONDON TWP.

LOT 24, CON. XIII

LOBO TWP.



ROAD PROFILE
SCALE: HORIZ. 1" = 200 FT.
VERT. 1" = 20 FT.



LEGEND
 TOPSOIL
 GREY CLAYEY SILT
 SAND & GRAVEL WITH SILT & CLAY SEAMS

SUBSURFACE PROFILE (LOOKING WEST)
SCALE: 1" = 10 FT.

DATA

- SPECIAL FEATURES:** - REASONABLY FLAT SURROUNDING TERRAIN
- UPSTREAM STRUCTURES:** - 0.70 MI. UPSTREAM, - 45' SPAN - STEEL TRUSSES, - NET X-SECTIONAL AREA AT H.W. = 270 SQ. FT., - HEIGHT ABOVE N.H.W.L. = 2.5 FT. APPROX., - NO FLOODING OR SCOUR.
- DOWNSTREAM STRUCTURES:** - 0.70 MI. DOWNSTREAM, - 45' SPAN - STEEL TRUSSES, - NET X-SECTIONAL AREA AT H.W. = 360 SQ. FT., - HEIGHT ABOVE N.H.W.L. = 2.5 FT. APPROX., - NO FLOODING OR SCOUR.
- EXISTING STRUCTURE:** - 40' SPAN - STEEL TRUSSES & CONC. DECK, - NET X-SECTIONAL AREA AT H.W. = 368 SQ. FT., - HEIGHT ABOVE N.H.W.L. = 3.5 FT. APPROX.
- Reasons why these bridges are fair indications of size of proposed bridge:** - ACCORDING TO LOCAL RESIDENTS, THESE EXISTING BRIDGES HAVE BEEN ADEQUATE DURING PEAK FLOOD PERIODS. ALSO, NO EVIDENCE OF SCOUR EXISTS AT THESE BRIDGES. THEREFORE, PROPOSED STRUCTURE = 40' x 8' = 368 SQ. FT.
- Is the stream gradient liable to be lowered?** NO
- Navigation clearance required, if any:** - N.A.
- Railway clearance required, if any:** - N.A.
- Is a temporary detour required?** YES
Who will build it? CONTRACTOR
Who will maintain it? CONTRACTOR
- Information on water level according to local residents:** - HIGH WATER ELEV. = 94.5
LOW WATER ELEV. = 89.0
- Road Design Information:** - ESTIMATED A.D.T. = 100

STRUCTURAL DATA

- Net span and type of bridge:** - 40' RIGID FRAME
- Roadway width on bridge:** - 28'
- Number and width of sidewalks:** - NONE
- Skew Angle:** - NONE
- Approximate Volume of Concrete:** _____
- Approximate Weight of Reinforcing Steel:** _____
- Drainage Area:** - 20.4 SQ. MI.

Field Investigation Made By
J. P. McIntyre DEC. 17, 1962



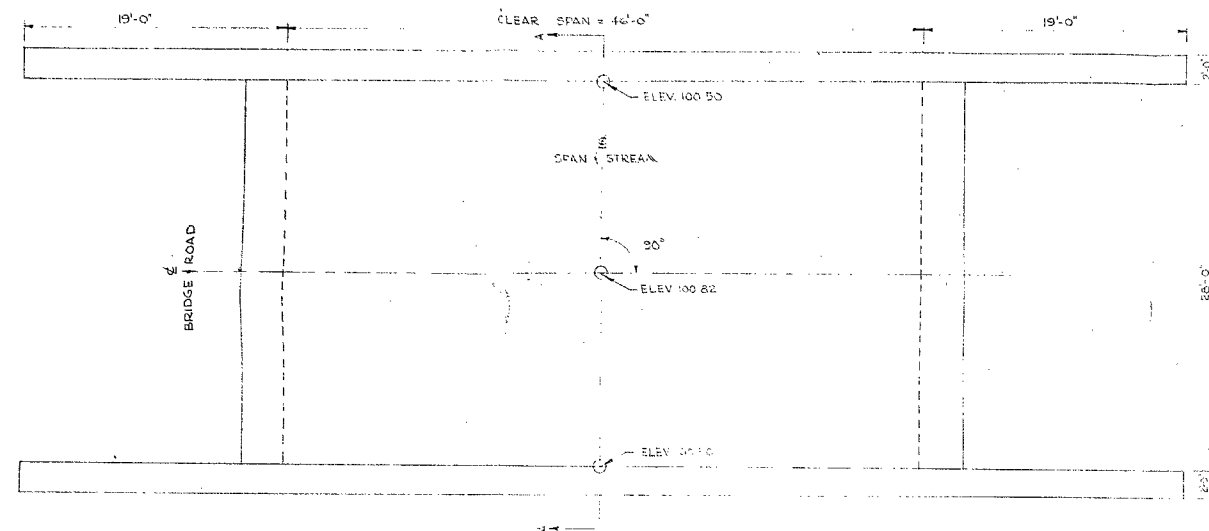
PAGE 1 OF

COUNTY OF MIDDLESEX
PROPOSED
BRIDGE NO. 243
 LOT 32, CON. XV, LONDON TWP.
 LOT 24, CON. XIII, LOBO TWP.

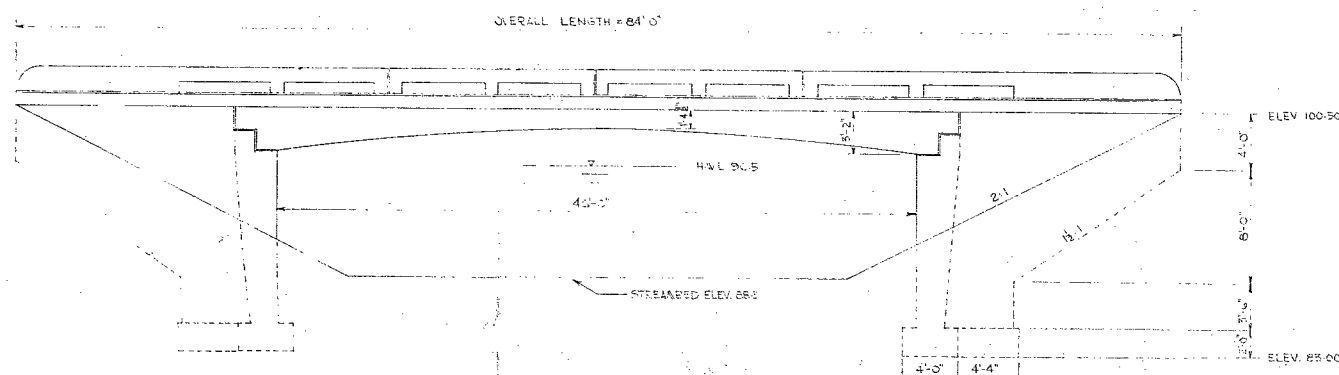
SCALE: AS SHOWN
 DRAWN BY: J.P.M.
 DATE: DEC. 27, 1962

ENGINEER

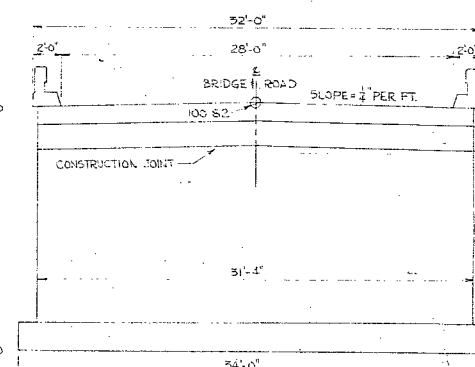
STRUCTURE SITE NO. 20-138



DECK PLAN



EAST-WEST ELEVATION



SECTION A-A

GENERAL NOTES

1. Structure to be built in accordance with D.H.O. Specs. Form 9, revised October 1959 and County of Middlesex supplemental specifications.
2. Excavation for footing to be finished by hand to the next dimension and the concrete shall be placed on undisturbed material on front, back, and bottom faces.
3. Excavation for footing shall be made as neat as possible but in any case shall be filled completely with footing concrete.
4. Footing depth is subject to revision by the Engineer.
5. Footings are designed for an allowable soil pressure of 6.0 k/sq. ft.
6. Reinforced Concrete shall have a minimum compressive strength of 3000 p.s.i. in 28 days and maximum slump of 3". County to design a mix on receiving samples of sand and aggregate from the successful bidder.
7. Note the added addendum in County specifications regarding the addition of an admixture containing an air entraining agent. For estimating purposes assume that 1 lb. of Highway Pozzolith shall be added per bag of cement.
8. Maximum Size Aggregate:
 - 3" in deck slabs, curb, and guard rails
 - 1 1/2" in footing
 - 1" elsewhere
9. Concrete Cover (main reinforcing)
 - 3" in contact with earth and water
 - 3" in top deck
 - 1 1/2" in bottom of deck
 - 2" elsewhere
10. Deck falsework shall not be struck until all backfill has been placed and compacted behind the abutments to the satisfaction of the Engineer.
11. All exposed concrete edges to have 1" chamfer unless otherwise noted.
12. Drain pipes and joint materials shall be supplied by the Contractor.
13. Construction year to appear on two diagonally opposite corners. Templates to be supplied by the County.
14. Design Loading: H 20 - S 16
15. Estimated Concrete: _____
16. Estimated Reinforcing Steel: _____

TOTAL ESTIMATED COST = \$35,000



PAGE 2 OF

COUNTY OF MIDDLESEX	
PROPOSED	
BRIDGE NO. 243	
LOT 52, CON. XV, LONDON TWP.	
LOT 24, CON. XIII, 1080 TWP.	
SCALE: 3/16"=1 FT.	J.P. McInyre
DRAWN BY: J.P.M.	ENGINEER
DRWG. NO. 100-101	DATE DEC. 27, 1962

SOME DEFECTS IN NEGATIVE DUE

TO CONDITION OF ORIGINAL DOCUMENTS

MEMORANDUM

To: Mr. A. Stermac
Principal Foundation Engineer,
Materials & Research Section,

FROM: G.C.E. Burkhardt,

Bridge Division,

DATE: January 8, 1963.

Our File Ref. BA 1561


IN REPLY TO

SUBJECT: County of Middlesex,
Proposed Townline Bridge #243,
Lot 32, Con XV, London Twp.,
Lot 24, Con XIII, Lobo Twp.,
Structure Site #20-138,

Attached please find one copy of the Foundation Report,
by Dominion Soil Investigation Limited, one copy of the Pre-
liminary Plans and one copy of the District's letter for your
comments.

We would like to approve the plans before January 25,
1963 and we would appreciate it very much, if we could
have your comments within the next two weeks.

GCEB/dm


G.C.E. Burkhardt,
for K.L. Kleinsteinber,
Municipal Bridge Liaison Eng.,

*Advised by phone earlier well point outside excavation 8 ft deep
or pump advanced if excavation by 3 or 4 feet as excavation proceeds
ryh
2/1/63*



Department of Highways

London-----Ontario
Jan. 2, 1963
P. O. Box 217

Mr. K. L. Kleinsteinber,
Municipal Bridge Liaison Engineer,
Dept. of Highways,
Parliament Bldgs.
Toronto, Ontario.

Dear Sir:

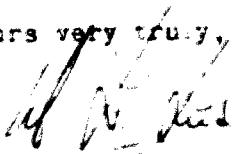
RE: COUNTY OF MIDDLESEX
Proposed Bridge #243
Lot 32, Conc. XV, London Twp.
Lot 24, Conc. XIII, Lobo Twp.

We forward herewith four copies of the preliminary plans for the above noted structure, together with one copy of the related foundation report by Dominion Soil Investigation Limited, for your approval.

The foundation report indicates that a severe artesian water condition may be encountered in the footing excavation, which will require special treatment during footing concreting. I am advised by the assistant county engineer that any special treatment in this respect will be covered in the contract special provisions and on the final structure drawings.

Your early reply is requested.

Yours very truly,



W. L. Lees
ASSISTANT CHIEF MUN. ENGINEER

ALL:DP
ENCL.

D. H. O.
TORONTO
RECEIVED

JAN 3 1963

BRIDGE
OFFICE

STRUCTURE SITE No. 20-138

MR. F.B.D. ARNOLD
COUNTY ENGINEER
COUNTY OF MIDDLESEX
COUNTY BUILDINGS
LONDON ONTARIO

Report on
SOIL INVESTIGATION

for

ROAD BRIDGE, TOWNLINE ROAD

LOT 32, CONCESSION XV, LONDON TWP.
LOT 24, CONCESSION XIII, LOBO TWP.

by

DOMINION SOIL INVESTIGATION LIMITED
363 Queens Avenue
LONDON ONTARIO

Reference No. 2-11-14
November
1962

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LOCATION OF BOREHOLES AND SUBSURFACE PROFILE	2
GEOTECHNICAL DATA SHEET	3

INTRODUCTION

In accordance with a letter of authorization dated November the 21st, 1962 from the Middlesex County Engineer's office, a soil investigation has been carried out at a site on the Townline Road between the townships of London and Lobo, where it is proposed to replace an existing road bridge with a new structure.

It is understood that the new bridge is intended to be a rigid-frame structure of approximately the same span and in the same position as the existing one.

The purpose of this investigation was to reveal the subsurface conditions and to determine the necessary soil properties for the design and construction of foundations.

I DESCRIPTION OF SITE AND GEOLOGY

The site lies 6 miles to the west of the Village of Elginfield in an extensive physiographic region known as the Horseshoe Moraines. These are a series of roughly parallel ridges of glacial debris which, on the western leg, follow the line of the Lake Huron shore. The site is located on a relatively flat till plain between two such ridges. The creek, which is a tributary stream of the Ausable River, rises in the high ground to the east, and has cut a shallow V-shaped valley through the till plain.

II FIELD WORK

Field work was carried out on the 26th and 27th of November 1962, and consisted of 2 boreholes at the locations shown on enclosure 2. Dynamic cone penetration tests were performed adjacent to each borehole to provide a continuous record of the density of the soil in the upper layers. Standard Penetration tests were made at frequent intervals of depth. These latter tests provided disturbed samples of the strata and a measure of their relative density or consistency.

The results of the field tests are recorded on enclosure 3. Elevations have been referred to the level of the deck of the existing bridge which has been given the nominal elevation 100.0 feet.

III SUBSURFACE CONDITIONS

Details of the stratification at each borehole are shown on enclosure 3 and a general picture of the subsurface conditions is provided by the profile on enclosure 2.

The upper 6 to 7 feet of soil in both boreholes is a very stiff to hard grey clayey silt. Below this level there is a very dense granular deposit containing all sizes of sand and gravel particles intermixed in an irregular manner with seams of silt and silty clay.

Artesian conditions were encountered in both boreholes near the top of the gravel layer. The excess head of water amounted to 2.5 p.s.i. and is probably caused by a rise in the level of the gravel layer, either in an upstream direction or up the sides of the valley.

IV FOUNDATIONS

The dense strata offer adequate bearing capacity to support spread footings. The elevation of the bed of the creek is approximately 87.0 feet, so that allowing 4 to 5 feet for scour the footing elevation should be 83.0 or 82.0 feet. At this level a soil pressure of 6000 p.s.f. is recommended for spread footings. This is the gross value which includes the weight of fill, above the footings.

Providing that the footings are poured on a clean undisturbed grade, the settlement associated with the recommended soil pressure is expected to be negligible. For this reason a rigid frame structure will be quite suitable.

V CONSTRUCTION

The proposed footing grade level lies within the gravel and sand stratum so that the excavation will encounter a flow of artesian water. Although the strata are very dense, there is a danger that such a flow rising vertically through the footing grade will cause disturbance. To avoid this condition it is recommended that sumps or trenches should be dug adjacent to the footing excavation, and to a slightly lower elevation, from which water can be pumped to depress the water table.

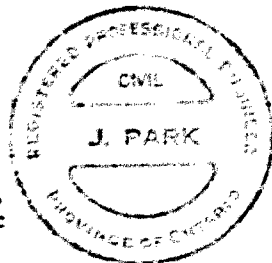
VI SUMMARY

1. The strata consist of 6 to 7 feet of very stiff to hard clayey silt, and below this level a very dense gravel and sand layer mixed with clay and silt seams.
2. Footings should be located in the gravel and sand layer at E1 82 or 83. A gross soil pressure of 6000 p.s.f. is recommended for the design of footings and under this pressure only a negligible amount of settlement is anticipated.
3. Precautions should be taken to prevent a flow of artesian water rising vertically through the footing grade.

VII REFERENCES

1. The Physiography of Southern Ontario by L.J. Chapman and D.F. Putman of the Ontario Research Foundation, University of Toronto Press, 1951.

2. Procedures for Testing Soils, ASTM, April 1958, pp. 186 to 198, (Unified Soil Classification System, by A.A. Wagner) London.
3. Proceedings of the 4th International Conference on Soil Mechanics and Foundation Engineering (Research on Determining the Density of Sands by Spoon Penetration Testing, by H.J. Gibbs and M.G. Holtz of the United States Bureau of Reclamation.)
4. Terzaghi and Peck: Soil Mechanics in Engineering Practice, John Wiley and Sons, New York, 1948.



Encl.
JP/mc

DOMINION SOIL INVESTIGATION LIMITED

James Park

James Park, M.Sc., P.Eng.

LIST OF SYMBOLS, ABBREVIATIONS AND NOMENCLATURE.

SOIL COMPONENTS AND ROUND WATER CONDITIONS.

BOULDER	COBBLE	GRAVEL		SAND			SILT	CLAY	ORGANICS	BEDROCK	GROUND WATER LEVEL	DEPTH OF CAVE-IN
10	> 8"	3"	3/4"	4.76mm	2.0	0.42	0.074	0.002	>	NO SIZE LIMIT		
U.S. Standard Sieve Size		No. 4		No. 10	No. 40	No. 200						

SAMPLE TYPES.

AS Auger sample	RC Rock core	TP Piston, thin walled tube sample
CS Sample from casing	% Recovery	TW Open, thin walled tube sample
ChS Chunk sample	SS Split spoon sample	WS Wash sample
SAMPLER ADVANCED BY	static weight - w	OBSERVATIONS MADE WHILE CORING
	pressure - p	Steady pressure
	tapping - t	No pressure
		Intermittent pressure
		Washwater returns
		Washwater lost

PENETRATION RESISTANCES.

DYNAMIC PENETRATION RESISTANCE : to drive a 2" dia, 60° cone attached to the end of the drilling rods into the ground, expressed in blows per foot.

STANDARD PENETRATION RESISTANCE, -N- : to drive a 2" outside dia, split spoon sampler 1 foot into the ground, expressed in blows per foot.

EXTRAPOLATED -N- VALUE

The energy for the penetration resistances is supplied by a 140 lb. hammer falling 30 inches.

SYMBOL



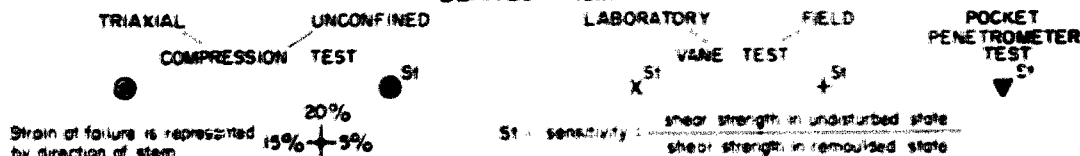
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SOIL PROPERTIES.

W % Water content	γ Natural bulk density (unit weight)	k Coeff. of permeability
LL % Liquid limit	e Void ratio	τ Shear strength in terms of
PL % Plastic limit	RD Relative density	Angle of internal friction - total stress
PI % Plasticity index	C_v Coeff. of consolidation	C Cohesion in terms of
LI Liquidity index	m_v Coeff. of volume compressibility	Angle of internal friction - effective stress

UNDRAINED SHEAR STRENGTH.

- DERIVED FROM -



SOIL DESCRIPTION.

COHESIONLESS SOILS	RD	COHESIVE SOILS	C lbs./sq. ft.
Very loose	0 - 15 %	Very soft	less than 250
Loose	15 - 35 %	Soft	250 - 500
Compact	35 - 65 %	Firm	500 - 1000
Dense	65 - 85 %	Stiff	1000 - 2000
Very dense	85 - 100 %	Very stiff	2000 - 4000
		Hard	over 4000

JOB NO. 2-11-L4
PREP. BY M.C.

ENCLOSURE 2

NORTH

B.H. 1

15'0"

FLOW

51'0"

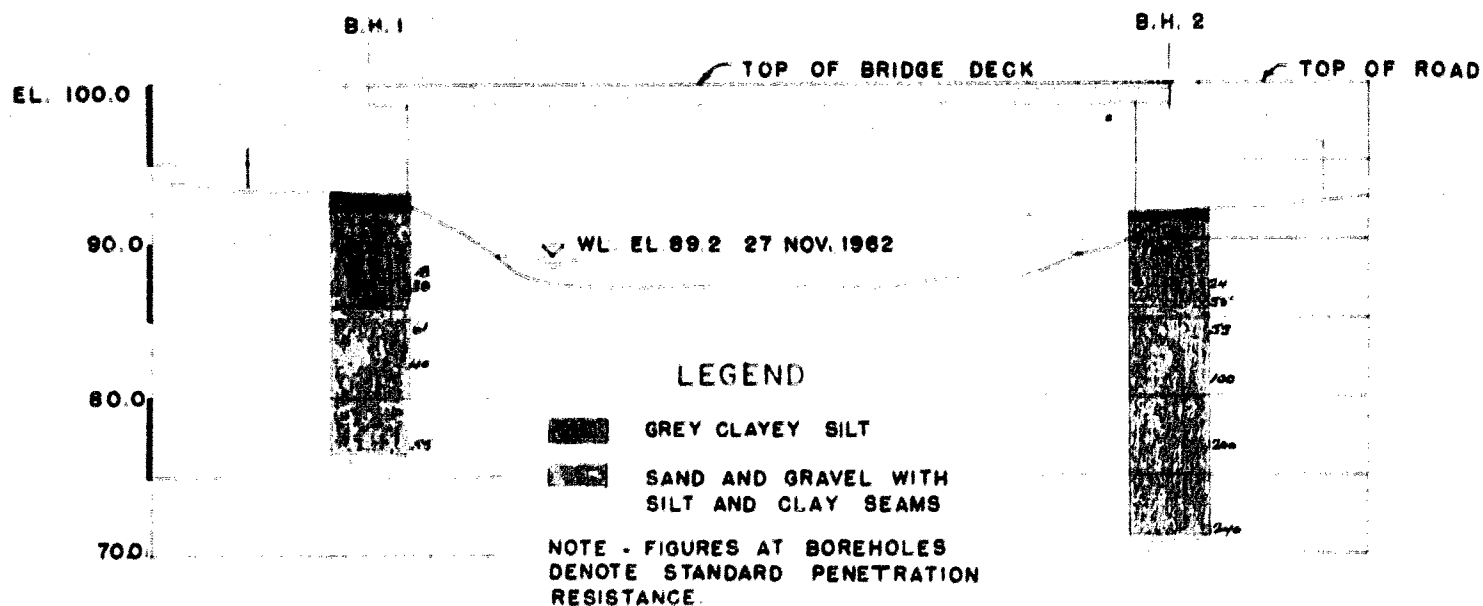
B.M. TOP OF
BRIDGE DECK
EL. 100.0 FEET
(ASSUMED)

16'0"

15'6"

B.H. 2

LOCATION OF BOREHOLES
SCALE - 1 INCH TO 10 FEET



SUBSURFACE PROFILE (LOOKING WEST)
SCALE - 1 INCH TO 10 FEET

DOMINION SOIL INVESTIGATION LIMITED

GEOTECHNICAL DATA SHEET FOR BOREHOLE 1 AND 2

OUR REFERENCE NO. 2-11-14

CLIENT: County of Middlesex
PROJECT: County Road Bridge
LOCATION: See enclosure 2
DATUM ELEVATION:

METHOD OF BORING: Washboring
DIAMETER OF BOREHOLE: 8x (2-7/8")
DATE: 26 and 27 Nov 62

ENCLOSURE NO. 3

ELEVATION F	DEPTH F	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE		CONSISTENCY Water content % PL W LL	REMARKS
				NUMBER	TYPE	TEST	BLANK	LENGTH		
93.1	0	Ground surface								
		Topsoil								
	5	Very stiff to hard grey clayey silt		1	SS	18				Borehole 1 Artesian water encountered at El. 85 feet, rising to El. 95 feet.
				2	SS	38				
86.1				3	SS	61				
	10	Very dense fine medium and coarse sand and gravel with silt and clay seams		4	SS	40				
				5	SS					
	15			6	SS	52				
76.0		End of borehole								
	20									
91.8	0	Ground surface								
		Topsoil								
	5	Very stiff to hard grey clayey silt		1	SS	24				Borehole 2 Artesian water encountered at El. 83.2 feet, rising to El. 95 feet.
				2	SS	55				
85.6				3	SS	55				
	10	Very dense fine medium and coarse sand and gravel with silt and clay seams		4	SS	100				
				5	SS	1200				
	15			6	SS					
	20			7	SS	1240				
70.0		End of borehole								