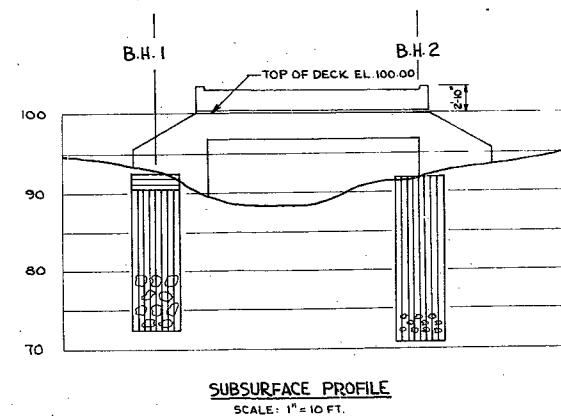
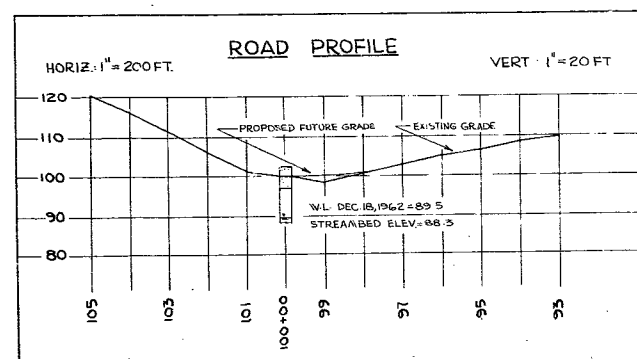
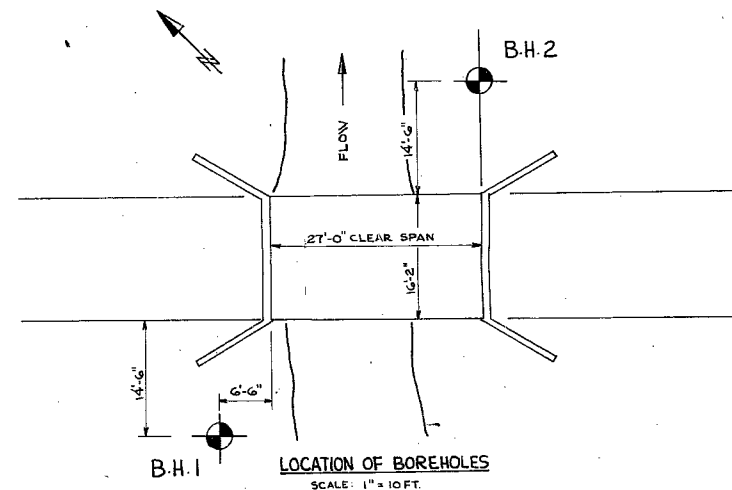
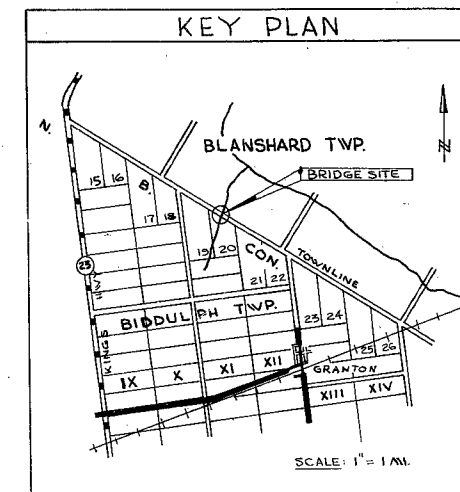
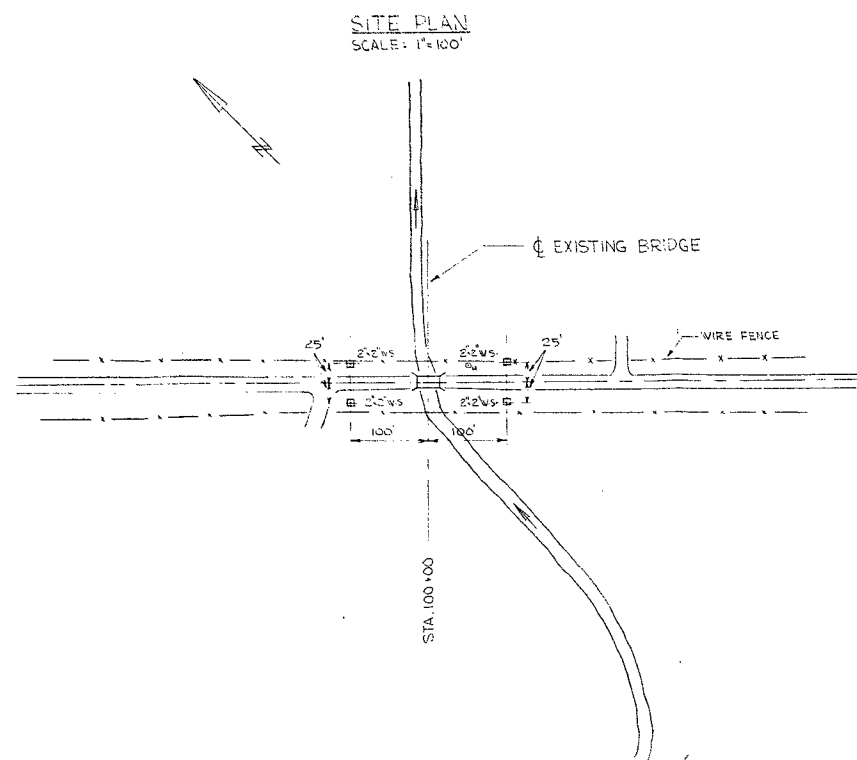


62-F-282 m
BRYANT'S
BRIDGE ON
BOUNDARY ROAD
BIDDULPH
BLANSHARD
TWP



ORGANIC CLAYEY SILT

GRAVELLY CLAYEY SILT TILL

DATA

1. SPECIAL FEATURES: - SURROUNDING TERRAIN IS RELATIVELY FLAT; STREAMBED IS A SHALLOW VALLEY.

2. UPSTREAM STRUCTURES: - NONE

DOWNSTREAM STRUCTURES: - NONE; STREAM ENTERS THE FISH CREEK, APPROX. 0.75 MI. DOWNSTREAM.

EXISTING STRUCTURE: - 27' CLEAR SPAN REINFORCED CONCRETE.
- HEIGHT OF DECK ABOVE H.W. = 4 FT.
- NET CROSS-SECTIONAL AREA AT H.W. = 205 SQ. FT.
- NO EVIDENCE OF EROSION AT STRUCTURE.

3. Reasons why these bridges are fair indications of size of proposed bridge: -

ACCORDING TO LOCAL RESIDENTS, THE H.W. ELEV. SHOWN BELOW IS A MAXIMUM; NO FLOODING HAS OCCURRED OVER THE ROAD. PROPOSED BRIDGE = 28' x 8' = 224 SQ. FT.

4. Is the stream gradient liable to be lowered? NO

5. Navigation clearance required, if any: - N.A.

6. Railway clearance required, if any: - N.A.

7. Is a temporary detour required? YES

Who will build it? CONTRACTOR

Who will maintain it? CONTRACTOR

8. Information on water level according to local residents: -
H.W. ELEV. = 96.0
L.W. ELEV. = 88.5

9. Road Design Information: -
ESTIMATED A.D.T. = 100

STRUCTURAL DATA

1. Net span and type of bridge: - 28' RIGID FRAME

2. Roadway width on bridge: - 28 FT.

3. Number and width of sidewalks: - NONE

4. Skew Angle: - NONE

5. Approximate Volume of Concrete: _____

6. Approximate Weight of Reinforcing Steel: _____

7. Drainage Area: - 3.6 SQ. MI.

STRUCTURE SITE No. 20-22

Field Investigation Made By
J. P. McIntyre DEC. 18, 1962



PAGE 1 OF

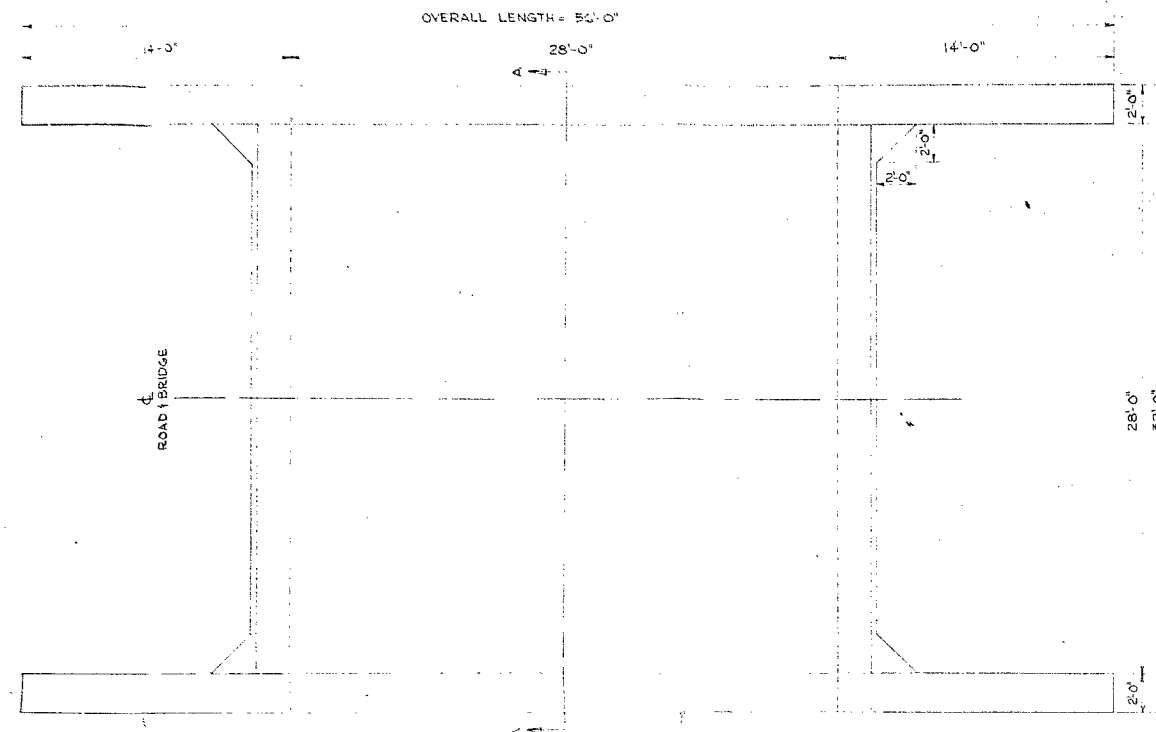
COUNTY OF MIDDLESEX

PROPOSED
BRIDGE

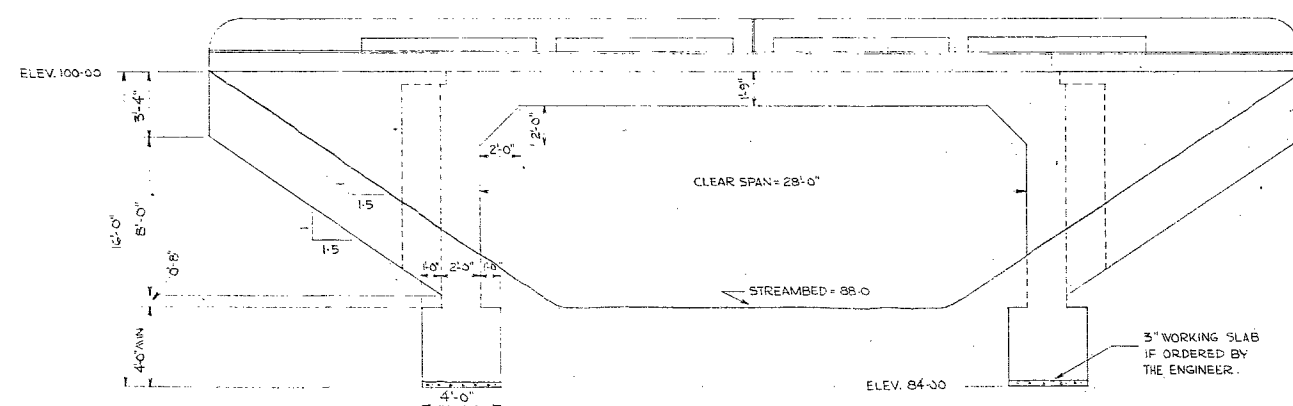
LOT 20, N.B. CON.; BIDDULPH TWP.
LOT 20, CON. XII; BLANSHARD TWP.

SCALE: AS SHOWN
DRAWN BY: J. P. M.
DRWG. NO. 20-22-1
DATE: Jan 7/63

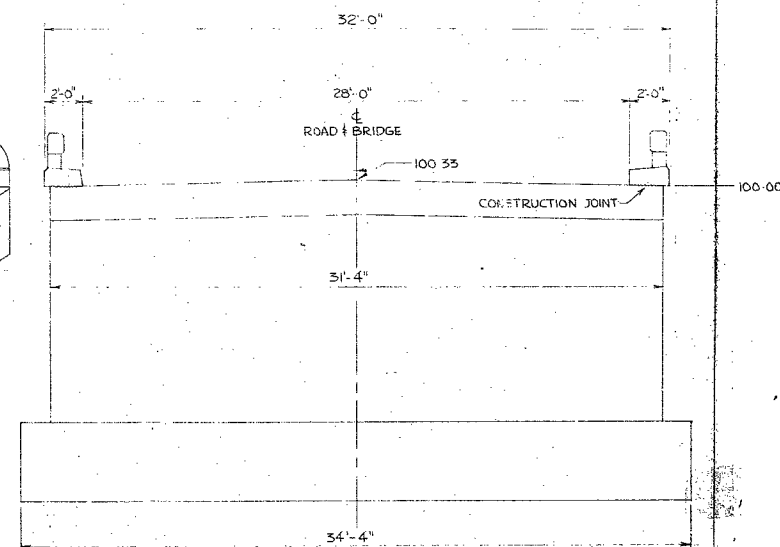
7/62 J. P. M.
ENGINEER



DECK PLAN



NORTH & SOUTH ELEVATION



SECTION A-A

GENERAL NOTES

- Structure to be built in accordance with D.H.O. Specs. Form 9, revised October 1959 and County of Middlesex supplemental specifications.
- Excavation for footing to be finished by hand to the neat dimensions and the concrete shall be placed on undisturbed material on front, back, and bottom faces.
- Excavation for footing shall be made as near as possible but in any case shall be filled completely with footing concrete.
- Footing depth is subject to revision by the Engineer.
- Footings are designed for an allowable soil pressure of 2.0 k/sq. ft.
- 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.
- 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 Penoloth shall be added per bag of cement.
- Maximum Size Aggregate:
 - 2" in deck slabs, curb, and guard rails
 - 1 1/2" in footing
 - 1" elsewhere
- Concrete Cover (main reinforcing)
 - 3" in contact with earth and water
 - 3" in top deck
 - 1 1/2" in bottom of deck
 - 2" elsewhere
- Deck falsework shall not be struck until all backfill has been placed and compacted behind the abutments to the satisfaction of the Engineer.
- All exposed concrete edges to have 2" chamfer unless otherwise noted.
- Drain pipes and joint materials shall be supplied by the Contractor.
- Construction year to appear on two diagonally opposite corners. Templates to be supplied by the County.
- Design Loading: H 20 - S 16
- Estimated Concrete: _____
- Estimated Reinforcing Steel: _____



PAGE 2 OF

COUNTY OF MIDDLESEX	
PROPOSED	
BRIDGE	
LOT 20, N.B. CON., BIDDULPH TWP.	
LOT 23, CON. XII, BLANSHARD TWP.	
SCALE: 1/2" = 1'	DATE: Jan 2/62
DRAWN BY: J.P.M.	ENGINEER
DRWG. NO. 2/62/57	

MEMORANDUM

TO: Mr. A. Stermac
Principal Foundation Engineer,
Materials & Research Section,
Lab. Bldg.,

FROM: G.C.E. Burkhardt,
Bridge Division,
DATE: January 22, 1963.

OUR FILE REF. BA1571


IN REPLY TO

SUBJECT: County of Middlesex,
Bryant's Bridge on Boundary Road,
Lot 20, N.B.C. Biddulph Twp.,
Lot 10, Con XII, Blanshard Twp.,
Structure Site #20-22,

Attached please find one copy of the Foundation Report,
by Dominion Soil Investigation Limited, and one copy of the
Preliminary Plans for your comments.

We intend to approve the preliminary design before
February 8, 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 Engineer.

No comment

Advised by phone

rs/h

23/1/63

BA 1571
MR. F.B.D. ARNOLD
COUNTY ENGINEER
COUNTY OF MIDDLESEX
COUNTY BUILDINGS
LONDON ONTARIO

Report on
SOIL INVESTIGATION

for

62-F-282 M

ROAD BRIDGE

BOUNDARY ROAD BETWEEN

MIDDLESEX AND PERTH COUNTIES

LOT 20, N.B.C., BIDDULPH TOWNSHIP

by

DOMINION SOIL INVESTIGATION LIMITED
363 Queens Avenue
LONDON ONTARIO

Reference No. 2-10(11)-L5
November
1962

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II FIELD WORK	2
III SUBSURFACE CONDITIONS	2
IV FOUNDATIONS	3
V CONSTRUCTION	3
VI SUMMARY	3
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ENCLOSURES

	<u>No.</u>
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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 Boundary Road between Middlesex and Perth Counties in the north of Biddulph Township, 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 sub-surface conditions and to determine the necessary soil properties for the design and construction of foundations.

I DESCRIPTION OF SITE AND GEOLOGY

The site is located on a gravel road marking the Middlesex-Perth County boundary, 2 to 3 miles northwest of Granton. The stream flows northward through a shallow valley to join Fish Creek, a tributary stream of the North Branch of the River Thames. The region is part of the Stratford Till Plain which covers large areas in Perth, Middlesex and Huron Counties. This is a relatively flat till plain, occasionally broken by terminal moraines of modest elevation. The soils are typically heavily preconsolidated glacial clays.

II FIELD WORK

Field work was carried out on the 29th and 30th of November 1962, and consisted of 2 boreholes at the locations shown on enclosure 2. The holes were advanced by washboring and lined with Bx casing, except below depths of 13 feet in borehole 1 and 18 feet in borehole 2. Here it was necessary to diamond drill using a Bxt core barrel to penetrate layers of boulders or cobbles. Standard Penetration tests were made at frequent intervals. These 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.

Below a thin layer of organic material in both boreholes the soil is a grey-brown gravelly clayey silt till. The gravel content is approximately 15% and the particle size (at least in the upper layers) generally less than 1 inch. The consistency of the material is very stiff to hard.

Below 13 feet in borehole 1 and below 18 feet in borehole 2, particles of cobble (3" to 8") and boulder (more than 8") size were encountered between seams of clayey till. A high

percentage of core was recovered from this deposit in borehole 1, indicating that particles of the order of 2 feet in diameter are present.

No free groundwater was encountered in either borehole, apparently as a result of the low permeability of the soil and the absence of water-bearing seams within the depth of exploration.

IV FOUNDATIONS

The dense strata offer adequate bearing capacity to support spread footings. The elevation of the bed of the creek is 88.3 feet, so that allowing 4 to 5 feet for scour the elevation of footings should be at or near 84.0 feet. At this level a soil pressure of 6000 p.s.f. is recommended for the design of footings. This is the gross value which should include 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 not expected to exceed *one inch* and will probably be substantially less. For this reason a rigid-frame structure will be suitable.

V CONSTRUCTION

In view of the low permeability and stiff consistency of the soil at and above the proposed footing level, no unusual construction problems are anticipated. Once the surface water has been diverted away from the area, it will be possible to make a clean dry excavation without the use of special bracing or dewatering procedures.

The footing grade should be checked for local weaknesses and if pockets of faulty soil are encountered they should be removed and replaced with lean concrete. The soil is not suitable for recompaction in isolated areas.

A thin layer of lean concrete spread over the footing grade once it has been exposed and examined will help to prevent disturbance by construction equipment or personnel.

VI SUMMARY

1. The soil is a clayey silt till in a very stiff to hard

condition containing approximately 15% of gravel particles. Boulders and cobbles were encountered in both boreholes below the recommended level of construction.

2. A gross soil pressure of 6000 p.s.f. is recommended for the design of spread footings at or below El. 34 feet.
3. No unusual construction problems are anticipated.

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. Terzaghi and Peck: Soil Mechanics in Engineering Practice, John Wiley and Sons, New York, 1948.

DOMINION SOIL INVESTIGATION LIMITED

Encl.
JP/mc



A handwritten signature in cursive script, appearing to read "James Park".

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

LIST OF SYMBOLS, ABBREVIATIONS AND NOMENCLATURE.

SOIL COMPONENTS AND GROUND WATER CONDITIONS.

BOULDER	COBBLE	GRAVEL		SAND			SILT	CLAY	ORGANICS	BEDROCK	GROUND WATER LEVEL	DEPTH OF CAVE-IN
\emptyset	> 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
"	pressure : p	MADE WHILE
"	tapping : t	CORING

	Steady pressure
	No pressure
	Intermittent pressure

	Washwater returns
	Washwater lost

PENETRATION RESISTANCES.

DYNAMIC PENETRATION RESISTANCE : to drive a 2" ϕ , 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 :



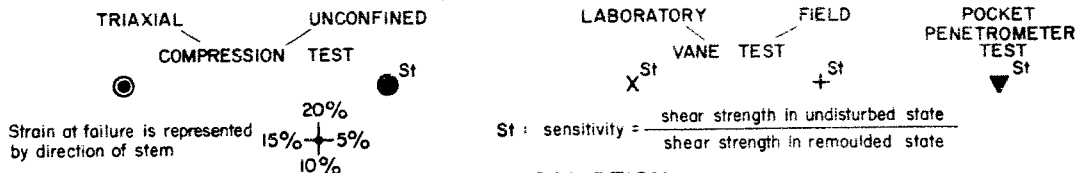
322

SOIL PROPERTIES.

W %	Water content	γ	Natural bulk density (unit weight)	k	Coeff. of permeability
LL %	Liquid limit	e	Void ratio	C	Shear strength
PL %	Plastic limit	RD	Relative density	ϕ	Angle of int. friction
PI %	Plasticity index	C _v	Coeff. of consolidation	C'	Cohesion
LI	Liquidity index	m _v	Coeff. of volume compressibility	ϕ'	Angle of int. friction

UNDRAINED SHEAR STRENGTH.

- DERIVED FROM -

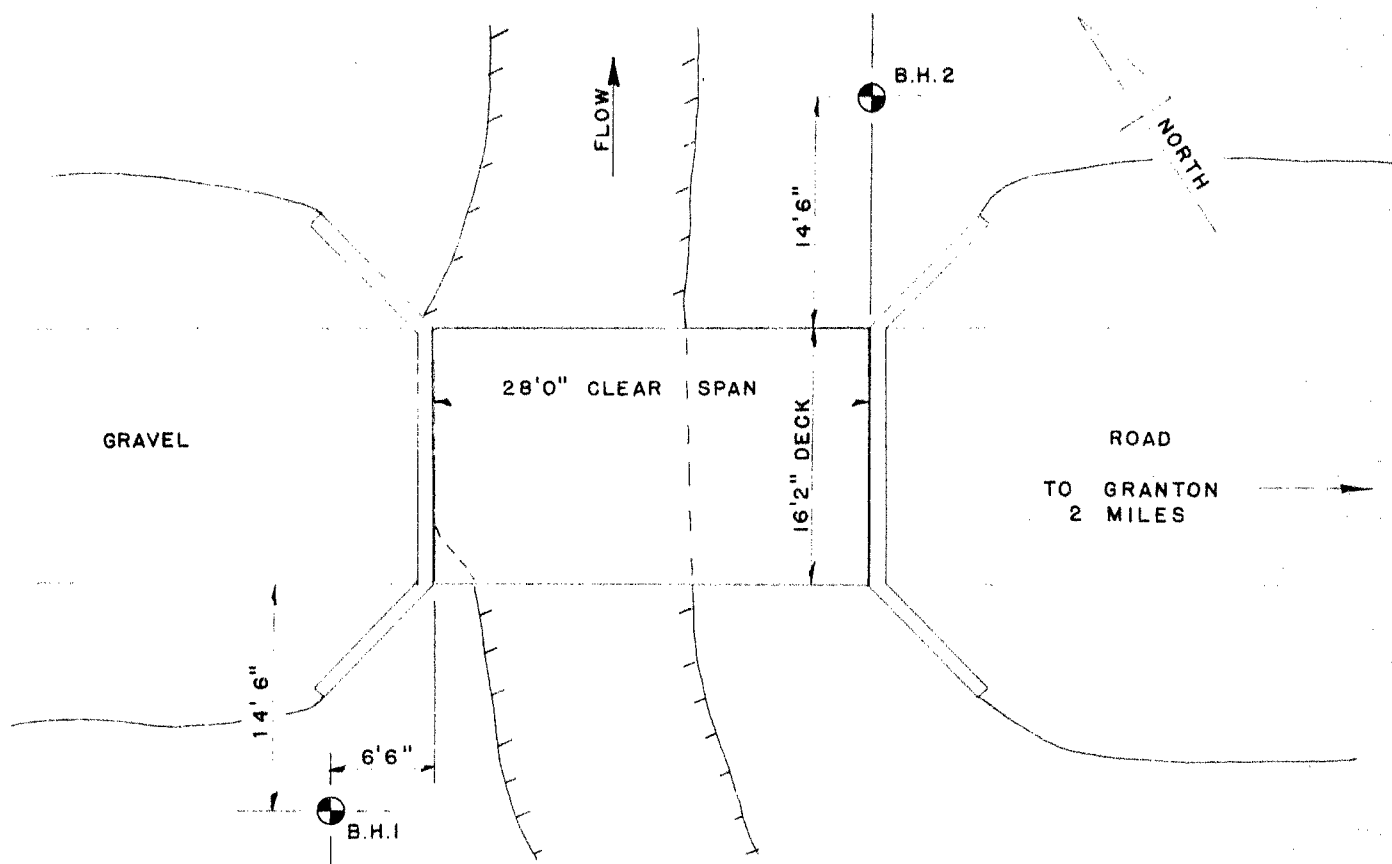


SOIL DESCRIPTION.

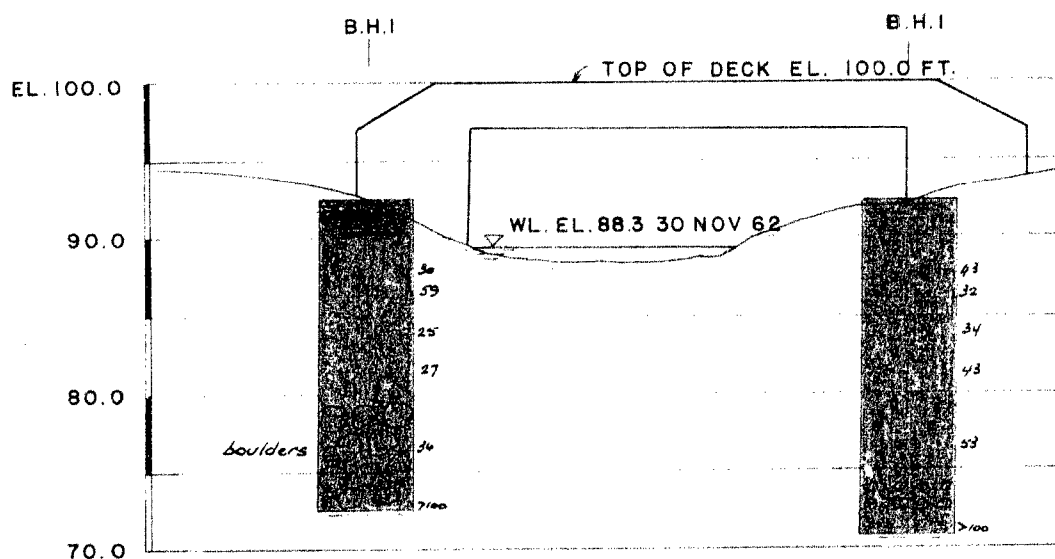
COHESIONLESS SOILS :	RD :	COHESIVE SOILS :	C lbs/sq ft
Very loose	0 - 15 %	Very soft	less than 250
Loose	15 - 35 %	Soft	250 - 500
Compact	35 - 65 %	Firm	500 - 1000
Dense	65 - 85 %	Stiff	1000 - 2000
Very dense	85 - 100 %	Very stiff	2000 - 4000
		Hard	over 4000

JOB NO. 2-10(II)-L5
PREP. BY M.C.

ENCLOSURE 2



LOCATION OF BOREHOLES
SCALE - 1 INCH TO 10 FEET



LEGEND

- ORGANIC CLAYEY SILT
- GRAVELLY CLAYEY SILT TILL

NOTE - FIGURES AT BOREHOLES DENOTE STANDARD PENETRATION RESISTANCE.

SUBSURFACE PROFILE
SCALE - 1 INCH TO 10 FEET

DEFECTS IN NEGATIVE DUE TO
CONDITION OF ORIGINAL DOCUMENT

GEOTECHNICAL DATA SHEET FOR BOREHOLE 1 and 2

OUR REFERENCE NO. 2-10(11)-L5

CLIENT: County of Middlesex
PROJECT: County Road Bridge
LOCATION: See enclosure 2
DATUM ELEVATION: Top of existing bridge deck 100.0 ft.

METHOD OF BORING: See remarks
DIAMETER OF BOREHOLE: Bx (3 inch)

ENCLOSURE NO. 3

DATE: Borehole 1 - 29 Nov 62
Borehole 2 - 30 Nov 62

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot					CONSISTENCY water content %			REMARKS
				NUMBER	TYPE	N- or Advance of Sampler	20	40	60	80	100	PL	W	LI	
92.2	0	Ground surface													Borehole 1 Washboring to 13 feet Diamond drilling 13 to 20 feet
		Organic topsoil													
		Organic clayey silt													
90.7		Grey-brown gravelly clayey silt till (very stiff to hard)		1	SS	30									
	5			2	SS	59									
				3	SS	25									
10				4	SS	27									
79.7		S O P L P P S		4A	PC Bx	53%									
	15			5	SS	36									
				5A	PC Bx	52%									
	20	End of borehole													
92.2	0	Ground surface													
		Organic topsoil													Borehole 2 Washboring to 18 feet Diamond drilling 18 to 20 feet
		brown grey		1	SS	43									
	5			2	SS	32									
				3	SS	34									
10				4	SS	43									
		Gravelly clayey silt till (hard)													
15				5	SS	53									
		cobble or large gravel particles		5a	PC Bx	15%									
74.2	20			6	SS	232									
70.9		End of borehole													