

62-F-292 M

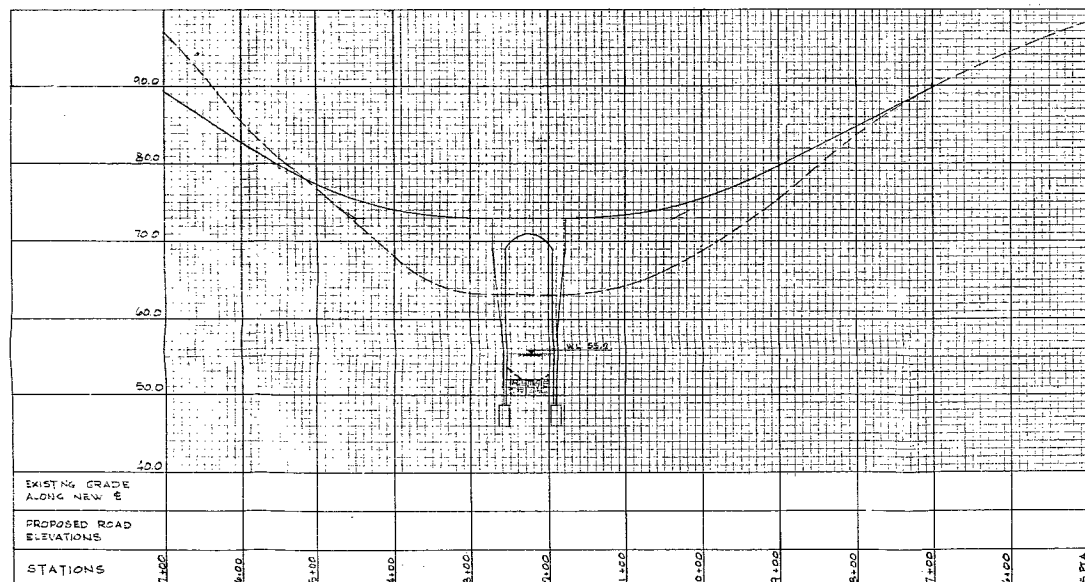
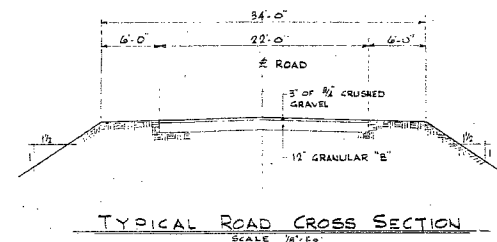
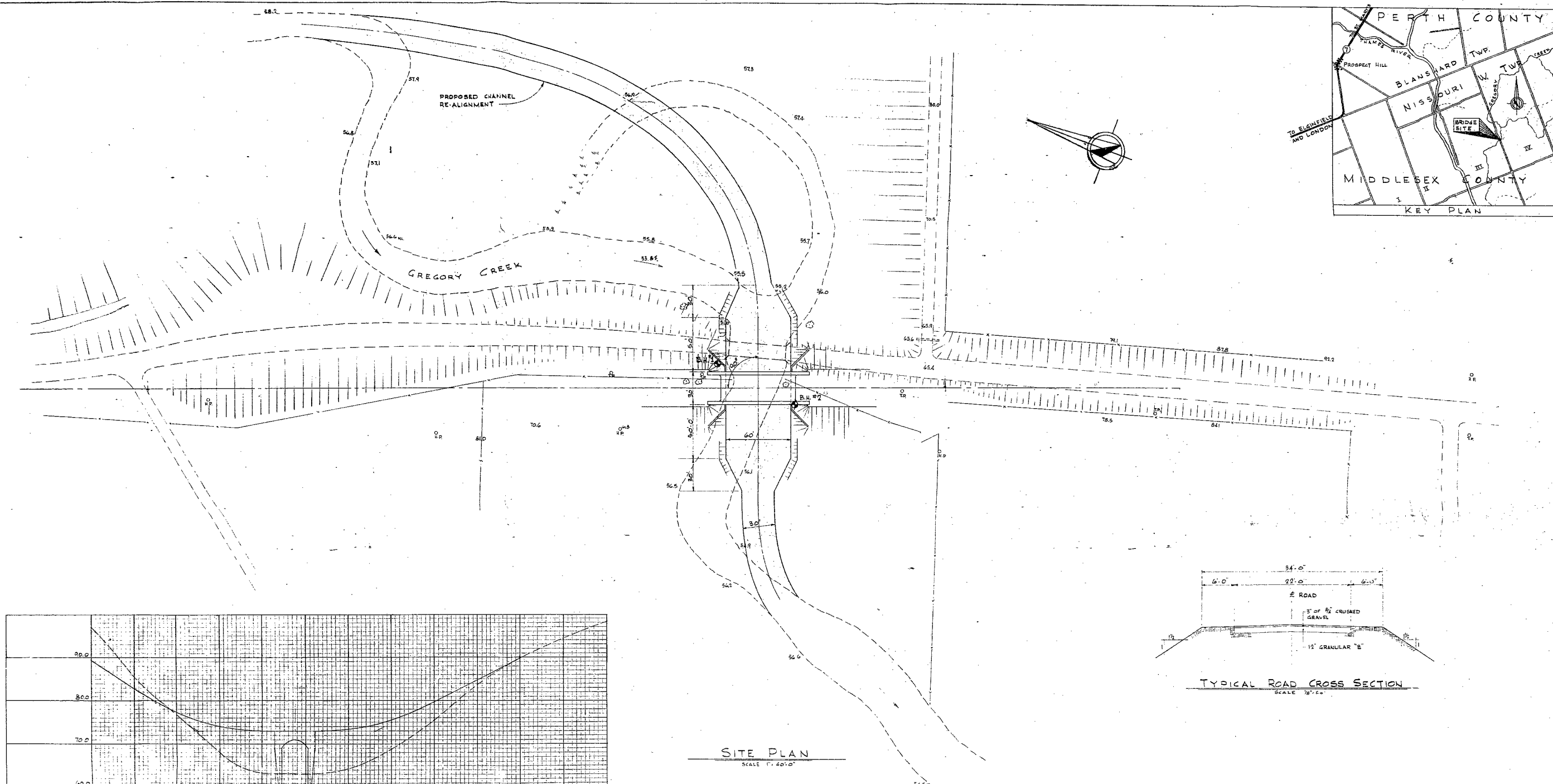
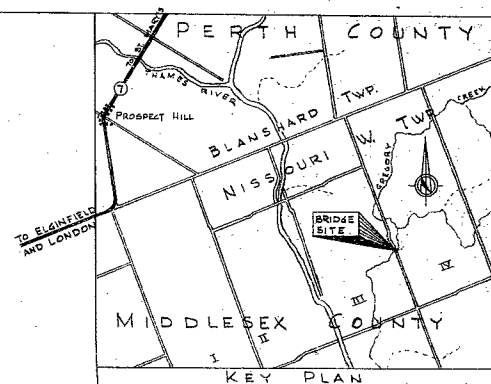
BALLANTYNE

BRIDGE

LOT 22, CON III/IV

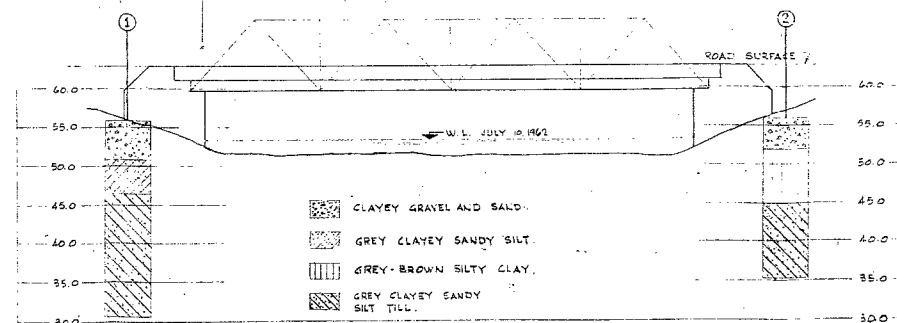
W. MISSOURI

TWP.

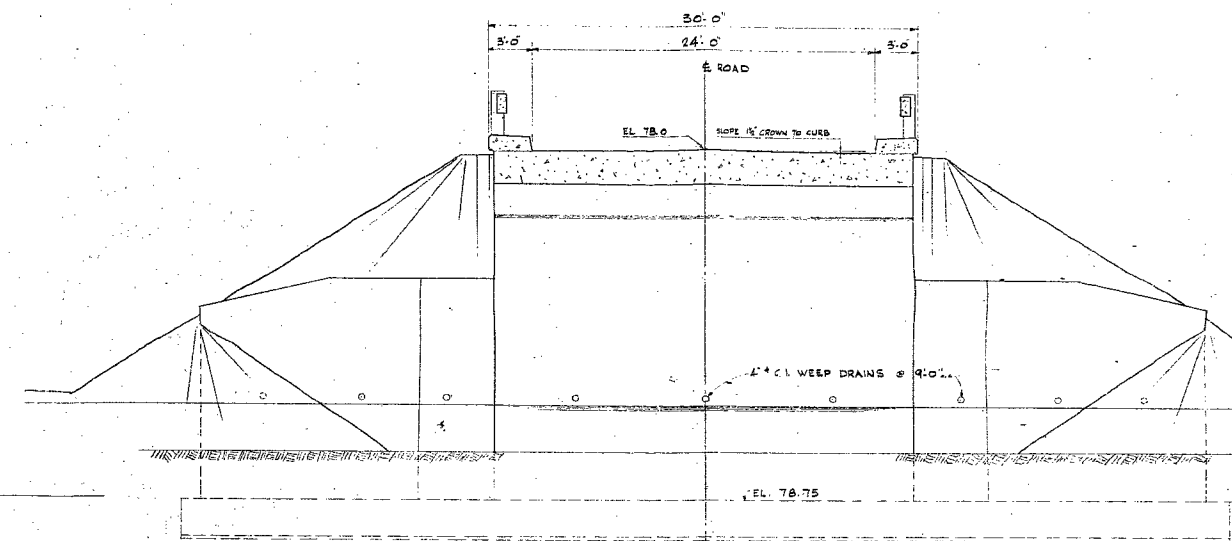
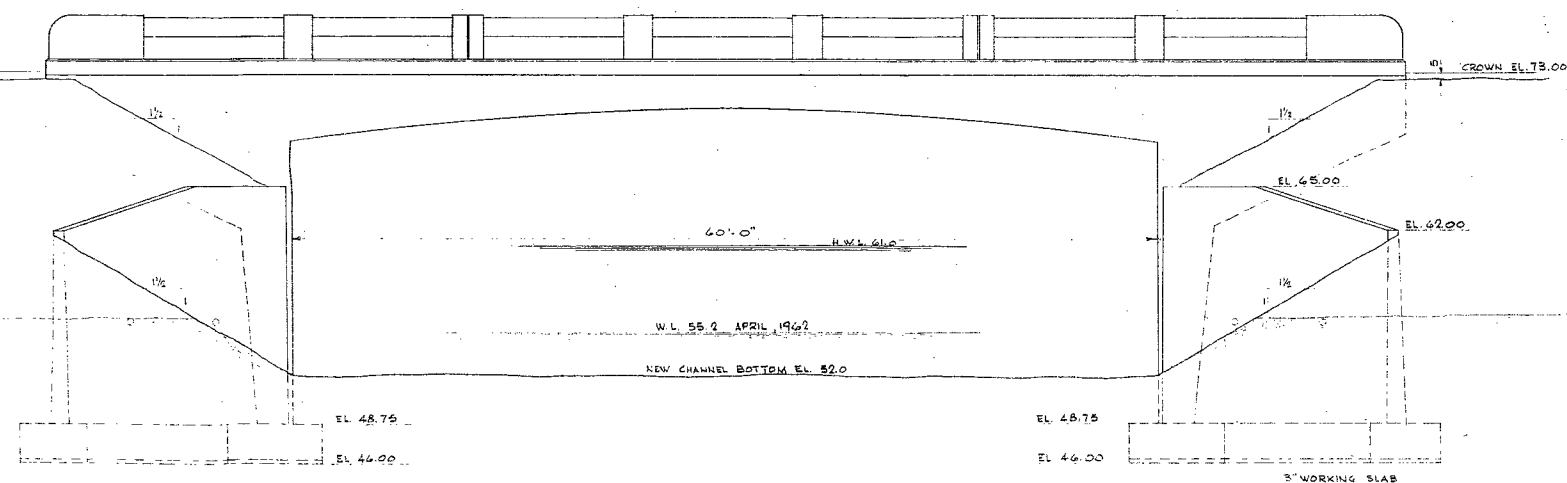
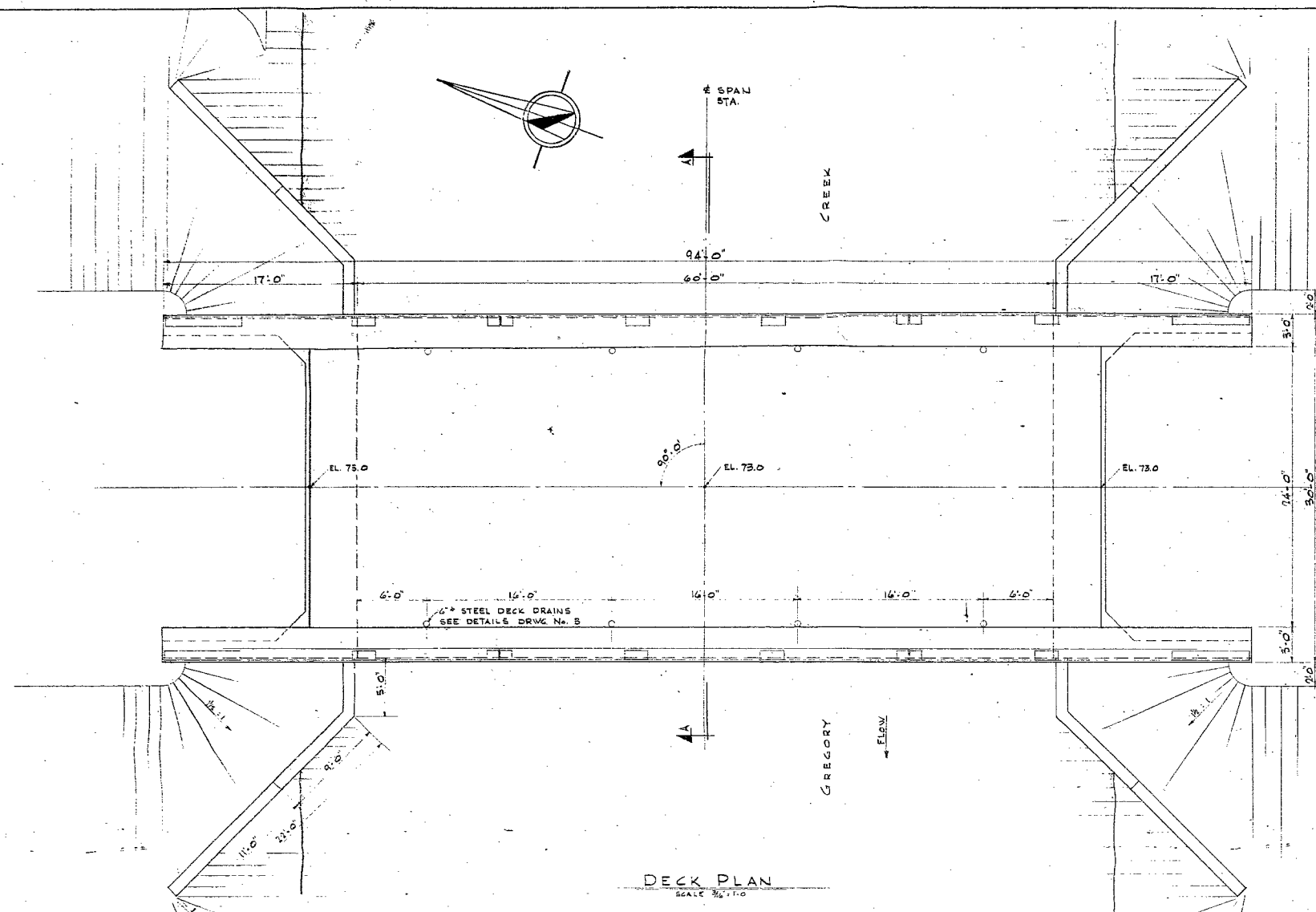


BORINGS INDICATED ARE TO BE USED AS A GUIDE ONLY, THE ACCURACY OF WHICH IS NOT GUARANTEED BY THE OWNER.

FOR FULL DETAILS SEE SOIL REPORT No. 2-T-13, DOMINION SOIL INVESTIGATION LIMITED, DATED JULY, 1962.



STRUCTURE SITE No. 20-80	
TOWNSHIP OF WEST NISSOURI	
R. C. DUNN & ASSOCIATES, LTD.	
CONSULTING ENGINEERS	
250 COMMUNION RD. LONDON	GE 3-4079 ONTARIO
BALLANTYNE BRIDGE	
ON ROAD ALLOWANCE BETWEEN CONS III AND IV AT LOT 32, TOWNSHIP OF WEST WILLIAMS.	
SCALE AS NOTED	DATE JUL 1962
DRAWN C. LOCKHART	CHECKED D. I.
SITE PLAN AND PROFILE	



SECTION A-A
SCALE 3/4" = 1'-0"

GENERAL NOTES

1. BRIDGE DESIGNED FOR W20 - 516 LOADING.
2. STRUCTURE TO BE BUILT IN ACCORDANCE WITH D.H.D. FORM 9, REVISED 1960 AND TOWNSHIP OF WEST MISSOURI SUPPLEMENTAL SPECIFICATIONS.
3. FOOTING DEPTH SUBJECT TO REVISION BY THE ENGINEER.
4. EXCAVATIONS FOR FOOTINGS IN EARTH TO BE FINISHED BY HAND TO THE NEAT DIMENSIONS, AND THE CONCRETE SHALL BE PLACED AGAINST UNDISTURBED SOIL ON BOTH FRONT AND BACK FACES.
5. FOOTINGS ARE DESIGNED FOR AN ALLOWABLE SOIL PRESSURE OF 4,000 P.S.I.
6. REINFORCED CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3,000 P.S.I. AT 28 DAYS - MAXIMUM SLUMP 3". ADD 1/2 LB HIGHWAY POZZOLITH PER BAG OF CEMENT (60% ENTRAINED AIR) OR APPROVED EQUAL.
7. MAXIMUM SIZE AGGREGATE:
3/4" IN DECK, CURBS AND GUARDRAILS.
1 1/2" IN FOOTINGS
1" ELSEWHERE
8. CONCRETE COVER:
5" IN CONTACT WITH EARTH AND WATER.
1 1/2" IN BOTTOM OF DECK
2" ELSEWHERE.
9. DECK FALSEWORK SHALL NOT BE STRUCK UNTIL ALL BACKFILL HAS BEEN PLACED AND COMPACTED BEHIND ABUTMENTS TO THE SATISFACTION OF THE ENGINEER.
10. CONSTRUCTION JOINT IN DECK, IF REQUIRED, SHALL BE VERTICAL AND PARALLEL TO & ROAD. KEY IN JOINT TO BE 5" x 3" AND LOCATED AT MID-DEPTH OF DECK. PARA-PLASTIC WATERSTOP TO RUN FULL LENGTH OF CONSTRUCTION JOINT. SEE DETAIL DRWG NO.
11. ALL EXPOSED CONCRETE EDGES SHALL HAVE 3/4" CHAMFER UNLESS OTHERWISE NOTED.
12. CONTRACTOR WILL SUPPLY AND INSTALL DATE FORMS (1963) ON INSIDE FACE OF NORTH WEST AND SOUTH EAST END POSTS.
13. DRAIN PIPES AND JOINT MATERIAL TO BE SUPPLIED BY THIS CONTRACTOR.
14. DECK TO BE BROOM FINISHED.
15. CURBS TO BE POURED IN 2 SECTIONS AFTER FALSEWORK IS REMOVED.

WEST MISSOURI TOWNSHIP		
R. C. DUNN & ASSOCIATES, LTD.		
CONSULTING ENGINEERS		
25% COMMISSIONERS RD. LONDON		SE 1-A779 ONTARIO
<u>BALLANTYNE BRIDGE</u>		
SCALE AS NOTED	DECK PLAN AND ELEVATION	DATE
DRAWN		JOB NO. 62-110
C. LOCKHART		DWG. NO. P-2
CHECKED		

- BRIDGE SURVEY DATA -

- 1- SPECIAL FEATURES: Waterfalls, Dams, Exceptional Floods, Ice, Driftwood, Sliding Banks, etc.
ROLLING AGRICULTURAL LAND
- 2- (A) Upstream & Downstream Bridges Give location, length, height above N.H.W.L., Net Cross Sectional Area at High Water & Estimated Age: UPSTREAM - 1959 - 30' x 5' CONCRETE RIGID FRAME AND PROPOSED 50' x 8' RIGID FRAME GIVING A TOTAL 150 SQ. FT.
DOWNSTREAM 190' BRIDGE - 48' x 10'
TRUSS BRIDGE - 480 SQ. FT.
- (B) Reasons Why These Bridges Are, or Are Not, Fair Indication of Size of Proposed Bridge: THEY ARE FAIR. DOWNSTREAM BRIDGE SLIGHTLY UNDERSIZE RELATIVE TO NEW BRIDGES.
- 3- Reasons for Changes in Height or Length from that of Old Bridge: INCREASED HEIGHT TO SUIT NEW ROAD GRADE
WIDTH INCREASED ALONG WITH IMPROVED CHANNEL ALIGNMENT TO REDUCE SCOUR.
- 4- Is Ditch, Stream, or River Gradient Liable to be Lowered?
NO.
- 5- Navigation Clearances Required, if any.
- 6- Railway Clearance Required, if any.
- 7- If structure is Over or Under a Railway, has approval been obtained?
(A) from Railway Co.
(B) from Board of Transport Commissioners S. L.
- 8- Has Approval been obtained under Navigable Waters Protection Act?
NO.
- 9- Is a Temporary Detour Required?
YES. TO
Who will build it? CORPORATION
Who will maintain it? COUNCIL
- 10- Information and Evidence of Extreme Flooding was obtained from LOCAL RESIDENTS and Reflects Highest Water Elevation in the Area of this Construction to be 55.8 and the lowest Water Elevation to be 55.2
- 11- Road Design Information:
Estimated A.D.T. _____
Design Speed _____
Stopping Sight Distance _____

- BRIDGE STRUCTURE DATA -

- 1- Net Span length and Type of Bridge: 60' REINFORCED CONCRETE RIGID FRAME BRIDGE
- 2- Roadway Width on Bridge: 24' - 0"
- 3- Number and Width of Sidewalks: NONE
- 4- Skew Angle: 0°
- 5- Total length & Type of Filling _____
- 6- Approx. Volume of Concrete: 750 cu yds.
- 7- Approx. Weight of Stir Steel: _____ tons
- 8- Approx. Weight of Reinforcement: 44 _____ tons
- 9- Approx. Volume of Approach Fill 100 ft Each Side of Structure: _____ cu yds.
- 10- Drainage Area: 20.4 SQ. MI. Sq mi.

Field Investigation Made APRIL 19, 52

By: *Bill J. ...*
Survey Engineer

TOTAL ESTIMATED COST OF PROJECT 855,000.00

MEMORANDUM

TO: Mr. A. Stermac,
Principal Foundation Engineer,
Room 107, Lab. Building,
DOWNSVIEW, Ontario.

FROM: G. C. E. Burkhardt

DATE: September 5, 1962

OUR FILE REF.


IN REPLY TO

SUBJECT: Twp. of West Missouri, Ballantyne
Bridge, County of Middlesex, Lot 32
Con. III/IV, Our File #BA 1493.

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

We would like to approve the preliminary design before the end of this month and would appreciate it very much if we could have your comments within the next three weeks.

GCEB/rt


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

MESSRS. R.C. DUNN AND ASSOCIATES LIMITED
250 Commissioners Road,
LONDON ONTARIO

Job No. 62-110

Report on
SOIL INVESTIGATION
for
BALLANTYNE BRIDGE
CONCESSIONS III/IV LOT 32
TOWNSHIP OF WEST NISSOURI

by
DOMINION SOIL INVESTIGATION LIMITED
363 Queens Avenue
LONDON ONTARIO

Reference No. 2-7-L3

July 1962

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LOCATION OF BOREHOLES AND SUBSURFACE PROFILE	2
GEOTECHNICAL DATA SHEETS	3 & 4

INTRODUCTION

In accordance with a letter of authorization from Messrs. R.C. Dunn and Associates Limited dated July 4, 1962, a soil investigation has been carried out at a site in the Township of West Nissouri where it is proposed to replace an existing road bridge with a new structure. A site plan showing the positions of the existing and proposed new bridges was supplied by Messrs. R.C. Dunn and Associates Limited (Job No. 62-110, Dwg. No. P1) and the requirements of the work were discussed with Mr. N.M. Warner. It was indicated that the new bridge would be of single-span located 30 to 40 feet west of 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 at the crossing of a gravel township road over Coleman Creek which flows westward to join the North Branch of the River Thames. The creek meanders through a wide, shallow, V-shaped valley which has been cut through the Stratford Till Plain apparently by a larger stream than the present one. The rather stony till encountered on the site is typical of the area.

II FIELD WORK

Field work was carried out during the period 9th to 11th July 1962, and consisted of two boreholes at the locations shown on enclosure 2. The holes were wash-bored and lined with Bx casing. Standard Penetration tests were made at frequent intervals and dynamic cone penetration tests were made adjacent to each borehole. The former test provided disturbed samples of the strata and a measure of relative density or stiffness, while the latter test gave a continuous record of soil density in the upper layers.

One insitu vane shear test was performed in a clay stratum in borehole 2, using a 2-inch diameter 4-bladed vane.

Axt core was recovered from a boulder at a depth of 17 to 18 feet in borehole 1.

The results of the field tests are recorded on geotechnical data sheets comprising enclosures 3 and 4. Elevations have been referred to a local benchmark (nail on tree 80 feet north of bridge, El. 63.76) shown on the site plan.

III SUBSURFACE CONDITIONS

Details of the stratification at each borehole appear on the data sheets and a general picture is given in the form of a subsurface profile shown on enclosure 2. The principal strata are as follows:

- (a) A layer of weathered clayey gravel and sand containing some depth of organic matter extends to 4 to 5 feet from surface.

- (b) In borehole 1 only, a grey clayey sandy silt extends to a total depth of 9'6". The layer becomes increasingly stiff with depth and the material is predominantly cohesive.
- (c) In borehole 2 only, a stiff to very stiff grey-brown silty clay extends to a total depth of 11'0". This layer contains many fine silt seams and traces of fine granular particles.
- (d) Both boreholes were terminated in a very dense clayey, sandy silt till. All sizes of rounded and angular material up to 2 or more inches in diameter, are present in varying proportions, and a limestone boulder was encountered in borehole 1. The clayey sandy silt matrix is relatively impervious, but the presence of many fine sand seams will allow water to flow through the material, in greater or lesser quantity, depending on local conditions. The cave-in levels are an indication of variability, i.e., whereas borehole 1 caved in near the top of the till layer, borehole 2 remained open for a considerable depth.

For the purpose of excavation this stratum should be considered to be firm and dense, but pervious.

IV BEARING CAPACITY AND SETTLEMENT

The lowest elevation found on the bed of the creek was 51.4 feet, so that allowing approximately 5 feet for scour, a footing elevation of 46.0 feet is proposed. The following gross soil pressures are recommended for the design of spread footings at this or lower elevations.

Borehole	Elevation (feet)	Soil Pressure (p.s.f.)
1 (north side)	46 to 35	10,000
2 (south side)	46 to 44	6,400
	44 to 40	10,000

Providing the footings are poured on an undisturbed grade, the settlement associated with the above figures is not expected to exceed one inch. The deflection will occur immediately as the loads are applied.

V CONSTRUCTION

It is possible that the footing grades on both the north and south abutments will be partly or entirely in the till stratum. This material is very dense and will not be unduly susceptible to mechanical disturbance, but some difficulty may be encountered in dewatering the excavation, depending to what extent water-bearing seams are encountered. An upward flow of water through the grade must be avoided because this will cause disturbance.

The use of vacuum well-points is proposed as the most satisfactory method of lowering the water table below the level of the footing grade. Some difficulty may be experienced in installing the well-points in the dense till, and it will probably be necessary to pre-bore the holes. As an alternative procedure the water table can be lowered by pumping from sumps or trenches dug on two or more sides of the excavation to a depth below the footing grade level.

VI SUMMARY

1. The strata consist of 4 to 5 feet of granular material overlying a further 5 to 6 feet of cohesive silt and clay. Finally there is a dense silt till which varies in permeability, depending on the proportion of granular material present in a given location.
2. Footings should be located at or below El. 46.0 feet, which is near the surface of the till layer, in accordance with the soil pressures tabulated on page 3.
3. Care must be taken to avoid an upward flow of groundwater through the footing grade, via the sand seams which are present in the till. Vacuum well-points are proposed as the most satisfactory method of lowering the water table.

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



JP/mc

DOMINION SOIL INVESTIGATION LIMITED

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
0	> 8"	3"	3/4"	4 7/16 mm	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	Steady pressure
" pressure p		No pressure
" tapping t		Intermittent pressure

Washwater returns
Washwater lost

PENETRATION RESISTANCES.

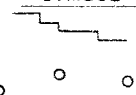
DYNAMIC PENETRATION RESISTANCE : to drive a 2" ϕ , 60° cone attached to the end of the drilling rods into the ground, expressed in blows per foot

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 :



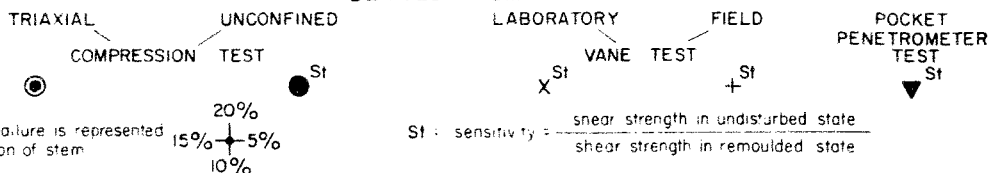
322

SOIL PROPERTIES.

W % Water content	γ Natural bulk density (unit weight)	k Coeff. of permeability
LL % Liquid limit	e Void ratio	C Shear strength in terms of total stress
PL % Plastic limit	RD Relative density	ϕ Angle of int. friction in terms of effective stress
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 -

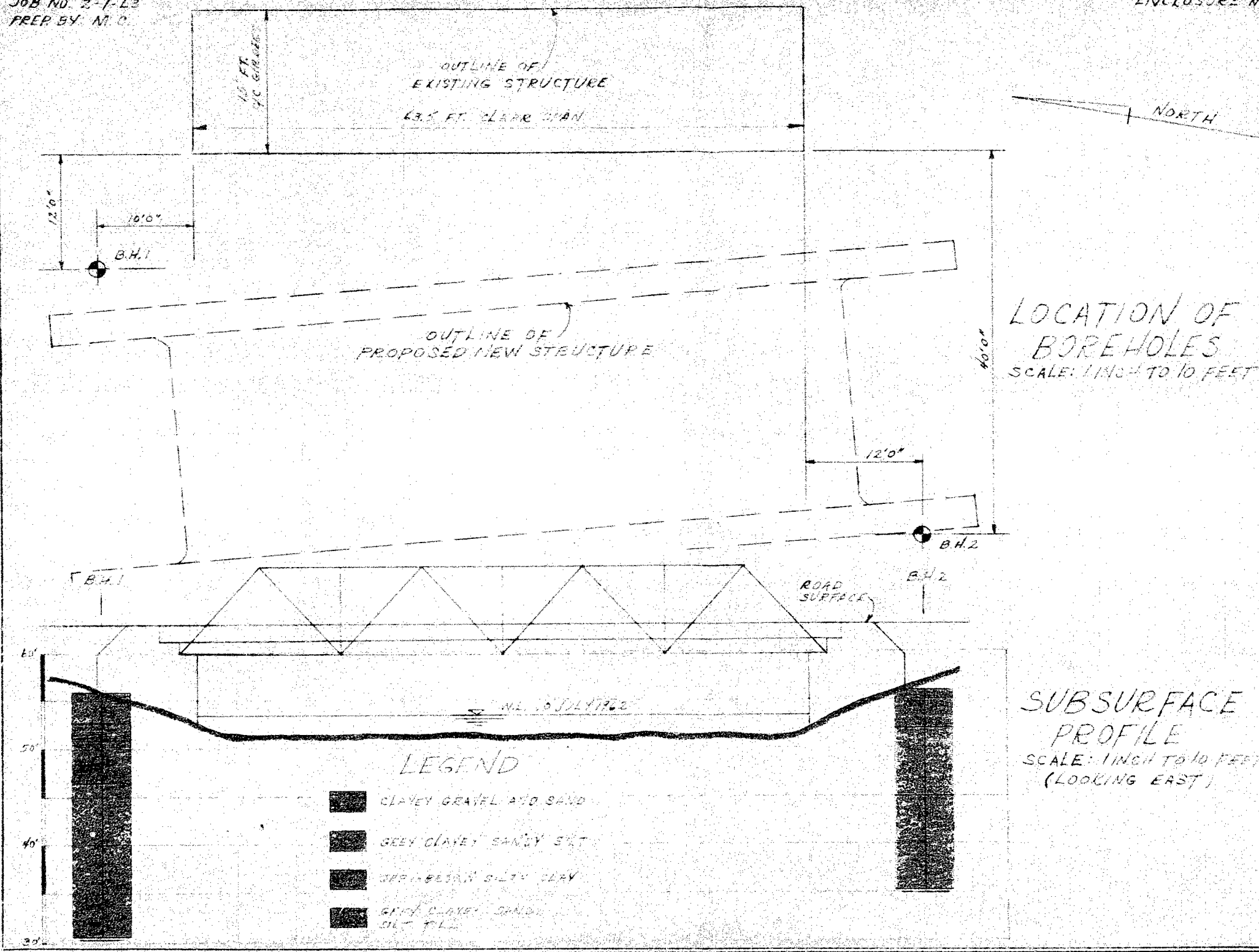


SOIL DESCRIPTION.

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. 2-7-13
PREP BY: M.C.

ENCLOSURE No. 2



GEOTECHNICAL DATA SHEET FOR BOREHOLE ... 1 ...

OUR REFERENCE NO: 2-7-13

CLIENT: Messrs. R.C. Dunn & Associates Ltd.
 PROJECT: Ballantyne Bridge
 LOCATION: Township of West Nisouri
 DATUM ELEVATION: See enclosure 2

METHOD OF BORING: Washboring
 DIAMETER OF BOREHOLE: Bx (2-7/8 ins.) ENCLOSURE NO. 3
 DATE: 9 July 1962 and
 10 July 1962

ELEVATION ft.	DEPTH ft.	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE					CONSISTENCY			REMARKS
				NUMBER	TYPE	N ₆₀ or Adjusted S ₆₀	20	40	60	80	100	PL	W	LI	
55.9	0	Organic topsoil													
		Grey clayey sand and organics		1	SS	27									
52.7		Brown weathered clayey gravel and sand													
50.9	5	Grey clayey sandy silt		2	SS	12									
				3	SS	26									
46.4	10			4	SS	53									
		13 July													
	15	Grey clayey sandy silt til seams of fine sand and traces of coarse gravel		5	SS	1246									
37.9		boulder		6	Axt	62%									
	20			7	SS	158									
	25			8	SS	1240									
30.5		End of borehole													
	30														

VERTICAL SCALE: 1 IN. TO 5 FT.

DOMINION SOIL INVESTIGATION LIMITED

MADE: MC CHD: JP

GEOTECHNICAL DATA SHEET FOR BOREHOLE ...2...

OUR REFERENCE NO. 2-7-13

CLIENT: Messrs. R.C. Dunn & Associates Ltd.

METHOD OF BORING: Washboring

PROJECT: Ballantyne Bridge

DIAMETER OF BOREHOLE: Bx (2-7/8 ins.)

ENCLOSURE NO. 4

LOCATION: Township of West Nissouri

DATE: 10 & 11th July 1962

DATUM ELEVATION: See enclosure 2

ELEVATION ft	DEPTH ft	STRATIFICATION DESCRIPTION	STRATIFICATION SYMBOL	SAMPLES			PENETRATION RESISTANCE blows per foot					CONSISTENCY water content %			REMARKS
				NUMBER	TYPE	Adjustment of Sample	20	40	60	80	100	PL	W	LI	
							SHEAR STRENGTH lbs/sq ft								
							1000	2000	3000	4000	5000				
56.0	0	Organic topsoil													
		Grey clayey gravel and sand		1	SS	29									
52.0	5	Grey-brown silty clay with many fine seams of silt		2	SS	21									
				3	SS	12									
	10				vane										
45.0				4	SS	26									
	15	Grey clayey sandy silt till seams of fine sand and traces of coarse gravel		5	SS	133									
	20	13 July		6	SS	150									
35.3		End of borehole													
	25														

VERTICAL SCALE: 1 IN. TO 5 FT.

DOMINION SOIL INVESTIGATION LIMITED

MADE: NYC CH'D: JH