

#65-F-288 M

LASS BRIDGE

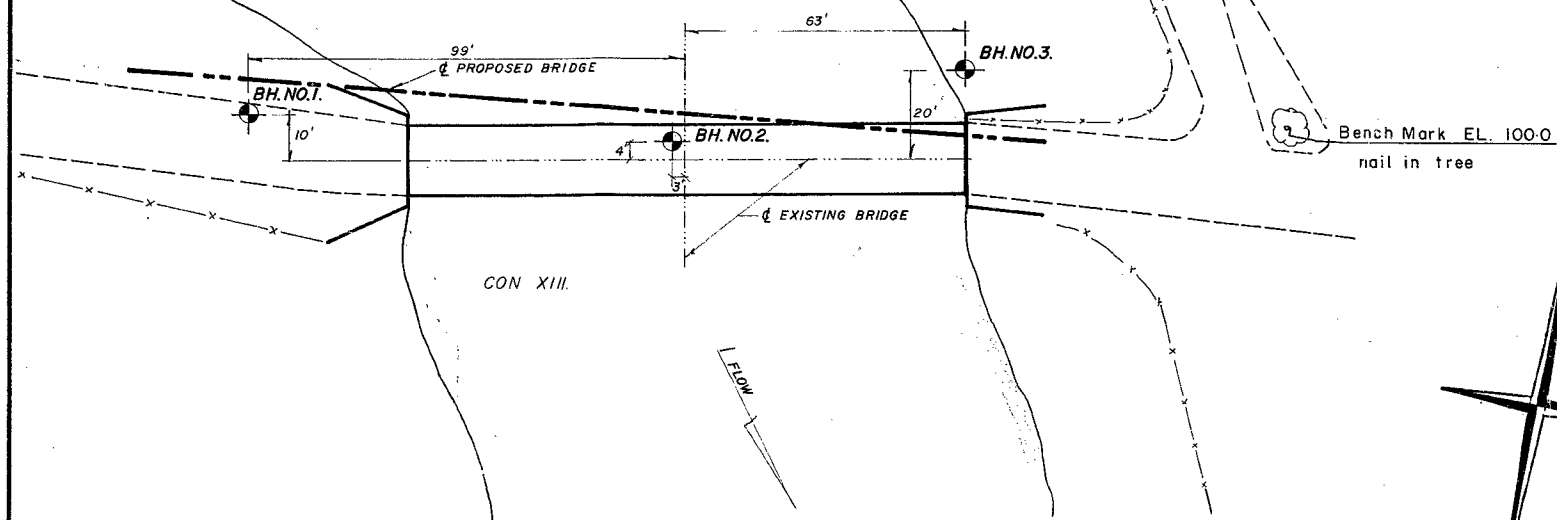
LOT 21, CON. XIII/XIV

BLENHEIM TWP.

COUNTY OF OXFORD TOWNSHIP OF BLENHEIM

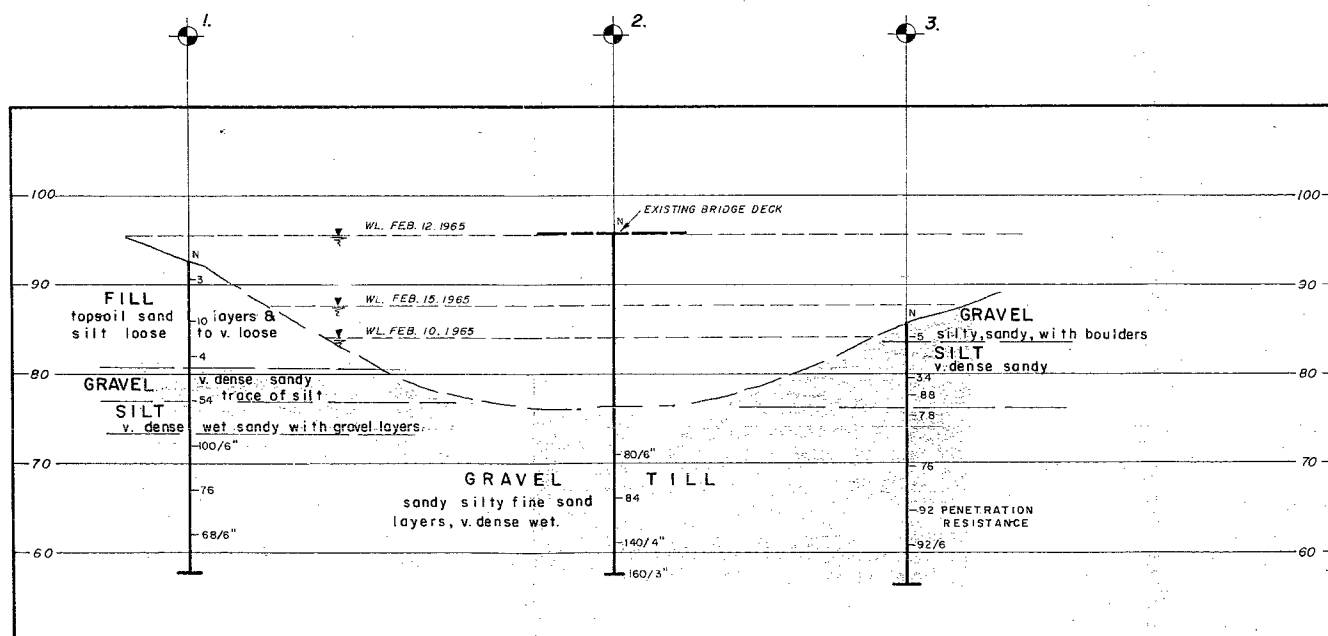
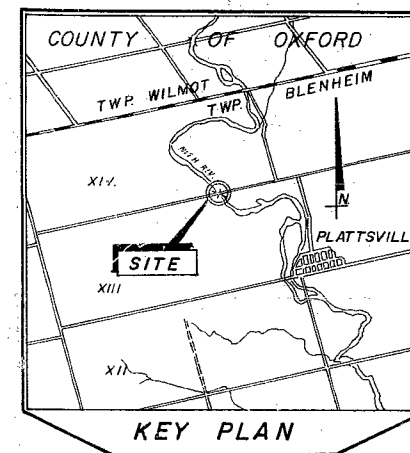
NITH RIVER

CON. XIV.



BORE HOLE LOCATION PLAN

SCALE 1" = 20'



PROFILE

SCALE HORIZ 1" = 20' VERT 1" = 10'

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

WILLIAM A. TROW AND ASSOCIATES, LIMITED
FOUNDATION INVESTIGATION

BRIDGE OVER NITH RIVER

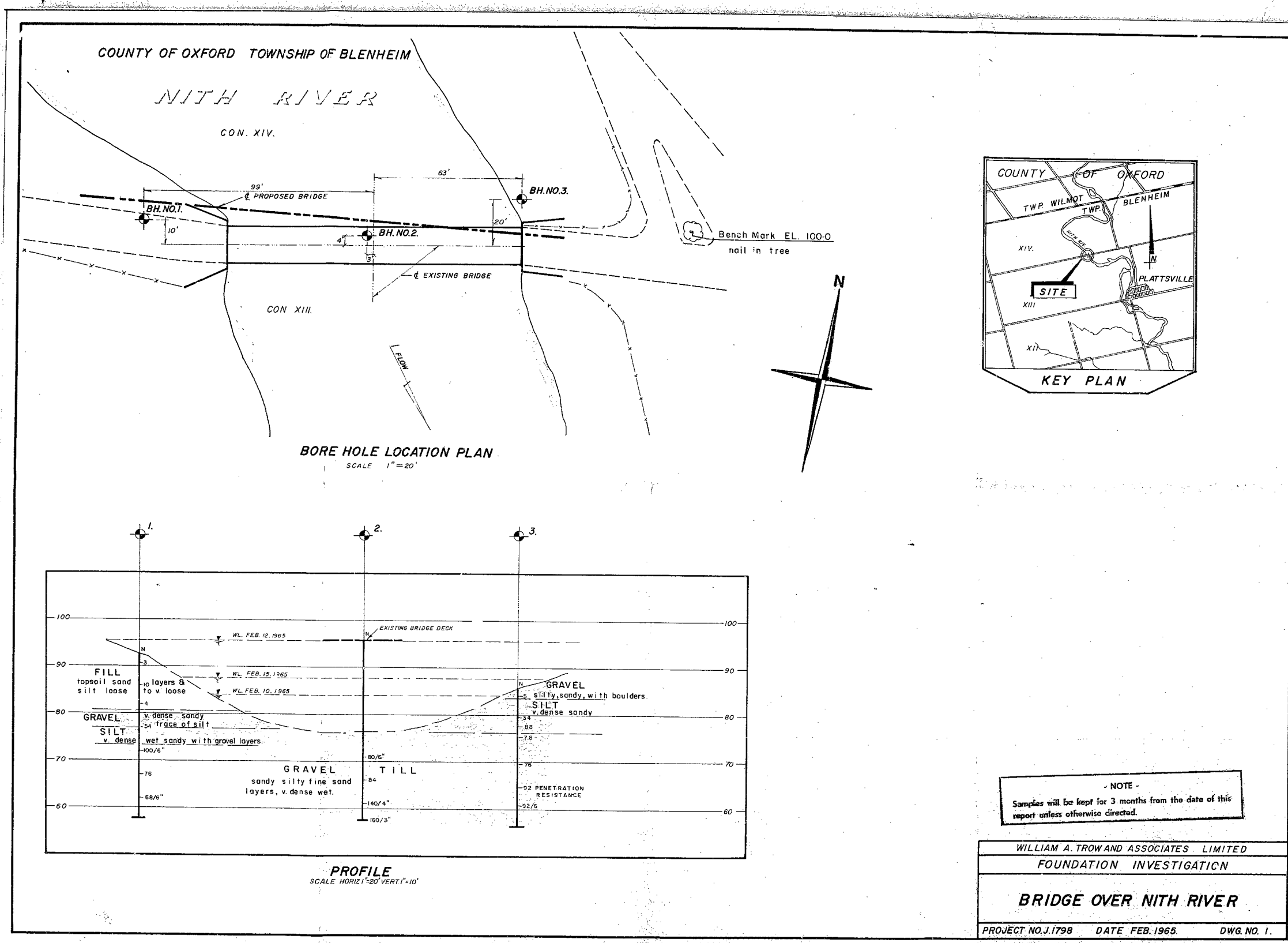
PROJECT NO. J.1798 DATE FEB. 1965 DWG. NO. 1.

#65-F-288 M

LASS BRIDGE

LOT 21, CON. XIII/XIV

BLENHEIM TWP.



1850 Jane Street
Weston, Ontario
241-4644

William A. Trow
B.A. 2032
23-48
↓
Associates Ltd.

Project: J1798

Soil Mechanics
Consultants
W. A. Trow
MSc. MEIC. P. Eng.
K. Peaker
PhD. MEIC. P. Eng.
D. H. Shields
PhD. MEIC. P. Eng.

C. C. Parker & Associates Ltd.,
795 Main Street West,
Hamilton, Ontario.

February 24, 1965

Attention: Mr. D. Cramm, P. Eng.

Foundation Investigation
Proposed Replacement, Lass Bridge
Nith River, Blenheim Twp., Co. Oxford

Dear Sirs:

65-F-288M

Our comments related to the foundations and subsoil conditions at the above site follow. This work has been completed in accordance with your authorization dated January 13th, 1965.

SUMMARY:

- 1) The subsoil at this site consists of a dense gravel till
- 2) Foundations for the proposed structure can be spread foundations designed for a safe bearing pressure of 5 tsf, or piled as outlined in the text. Scour protection must be provided as discussed.
- 3) No problems associated with approach stability or spread foundation construction are envisaged at this site.

THE SITE

The proposed bridge replacement is located just north of the village of Plattsville, Ontario. A single lane through-truss structure presently occupies the site. During the site investigation, a sudden thaw resulted in a rise of the river to elevation 95.5 inundating the immediate area. A river rise of 8' in 25 minutes was reported by the field crew. This flooding increased the time necessary to complete the field work.

C. C. PARKER AND ASSOCIATES LIMITED	
REC'D	<i>FULLER</i>
READ BY	
COPY TO	
FOR'D BY	
DATE	
ROUTING	

FIELD WORK AND SUBSOIL STRATIGRAPHY

The field work at this site consisted of three sampled boreholes located as shown on Dwg. 1. The original proposal was to place the borings at the proposed abutment and pier locations. However the extremely dense, and uniform nature of the subsoil enabled the field work to be reduced to three borings. Boreholes were advanced using standard diamond drill soil sampling equipment. Samples of the subsoil were obtained using split spoon type samplers.

Detailed information as to the subsoil encountered in the borings has been included in the borehole logs, Dwgs. 2 to 4 and in summary form on the estimated subsoil stratigraphy Dwg. 1. Borehole elevations have been referenced to the bench mark as shown on Dwg. 1.

The subsoil at the site consists of a gravel till. This till exists in a very dense state. The upper portion of the till is essentially a gravel containing little fine material. No sediments were evident on the bottom of the river.

FOUNDATIONS

The subsoil at this site is ideal for the support of spread footings; however because of construction preferences, the use of piles is discussed.

a) Spread Footings: Foundations, consisting of simple spread footings may be used to support bridge piers or abutments. These spread footings may be founded in the gravel till and designed for a safe net bearing pressure of 5 tsf. The bearing value of 5 tsf is a very conservative estimate of the safe capacity of the subsoil based on an empirical relationship between the permissible bearing pressure and the penetration resistance of the soil. Spread footings should not be placed on the fill material of the present approach fills.

The elevation of spread footings will be controlled by the possible depth of scour. Field work indicates that this scour has removed the fines from the gravel layer and that the depth of scour has extended to elevation ± 78 in the vicinity of the abutments. All spread footings for abutments should be placed below this possible scour depth or be protected by steel sheet piling driven below elevation 78. Scour protection of piers must be obtained by placing the footings a minimum depth of 4 feet below river bed level or by driving the steel sheeting beyond this depth.

It should be emphasized that some difficulty will be encountered when attempting to drive steel sheeting to the recommended depths, and that at some locations it may not be possible to drive the sheeting. It is therefore suggested that the abutments be placed at elevation 77 by excavating through the overburden to this depth. Excavation can be completed and dewatered below river level by utilizing a cofferdam to keep out the river. The dense silt base will remain stable provided shallow perimeter ditches are placed at the base of the excavation and pumping takes place from sumps placed in this perimeter ditch. Piers may be provided with the required scour protection by excavating to the required depth under water inside a steel cofferdam. A concrete base can then be tremied into place acting as the pier foundation.

Rip rap protection must be provided near each abutment regardless of whether the steel sheeting or deep excavation is utilized.

b) Piled Foundation: Because of construction problems in the river, a piled foundation may be considered.

Piling for the abutments in the form of steel concrete-fill & tube piles 12 inches in diameter must be driven through the existing fill to a minimum elevation 75. These piles can be designed as short columns or can utilize a minimum carrying capacity of 50 tons/pile. The ability to drive this type of pile to this elevation is questionable. Steel H piles will penetrate to an unknown depth and can only be used if a test pile is driven and statically loaded to confirm the design load.

Pier foundations may utilize piles driven to refusal in the gravel till and extending upward to the bridge deck. These piles will be similar to the Monotube pile with extension, and will be designed as long columns. If it is not possible to drive these piles beyond elevation 70, it will be necessary to provide scour protection by using a drilled-in caisson or to socket the suggested type by driving a steel H section inside the steel tube. The H section acts as a socket and should continue to a minimum elevation of 65.

SETTLEMENT

Settlement of either spread footings or piled foundations will consist of a negligible elastic compression of the subsoil. This settlement will not exceed $\frac{1}{2}$ inch.

APPROACH FILLS

Because of the dense nature of the subsoil, no problems associated with the stability of the approach fills are present at this location, however the 2-4 feet of organic alluvium near the river banks should be removed prior to placing the embankment. The approaches should incorporate 2:1 side slopes and standard construction procedures.

EARTH PRESSURES

For retaining type abutments, horizontal earth pressures must be considered. It is suggested, for the simply supported structure, that the earth pressure coefficient to be used in calculations equal 0.25. This value assumes a slight yield of the abutment if compaction is such that the earth pressure tends to approach the 'at rest' condition. With adequate drainage facilities the earth pressure p at any given depth h can be determined from the expression:-

$$p = 0.25 \gamma h + 0.25q$$

where γ = 130 pcf the estimated unit weight
of backfill material

q = the value of any surcharge (in psf)
acting near the abutment

It is hoped that these comments will assist in the design of the foundations for the structure. If we can be of further assistance, please do not hesitate to contact this office.

Yours very truly,



K. Peaker, P. Eng.

KP/chm
enclosures

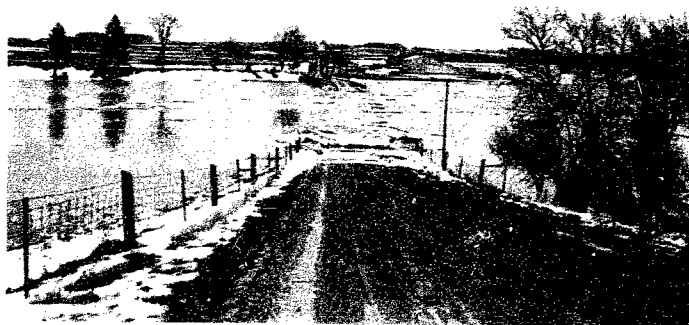


Bridge Looking East



Road Going To Site Looking West

SUPER IMPOSED DOCUMENT MAY
APPEAR AS MULTI-FEED ON FILM.

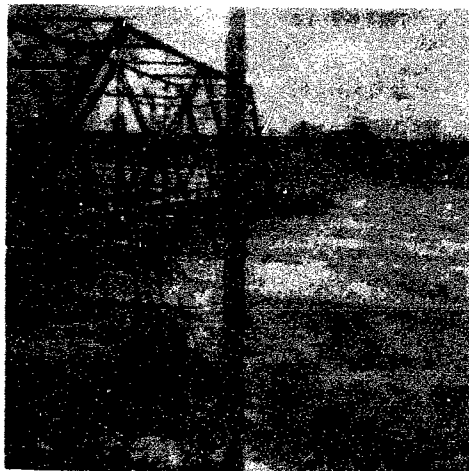


Bridge Looking East



Road Going To Site Looking West

SUPER IMPOSED DOCUMENT MAY
APPEAR AS MULTI-FEED ON FILM.



Drill on Borehole One

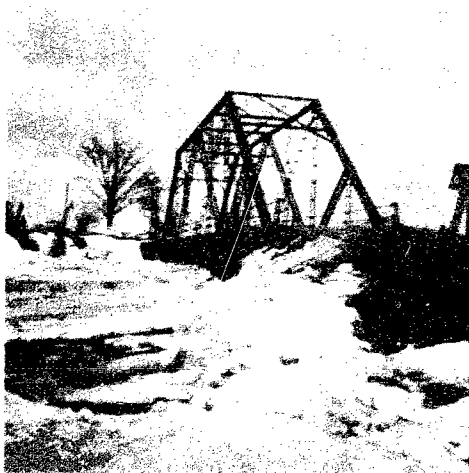


Looking East
Flood

SUPER IMPOSED DOCUMENT MAY
APPEAR AS MULTI-FEED ON FILM.



Drill on Borehole One



Looking East
Flood

WILLIAM A. TROW & ASSOCIATES LTD.

SITE INVESTIGATIONS · SOIL MECHANICS CONSULTATION

DRAWING NO. 2.

PROJECT NO. J1798.

LEGEND

BOREHOLE NO. 1.
 PROJECT Proposed Replacement, Nith River Bridge.
 LOCATION Co. Oxford, Twp. Blenheim, Conc. XIII-XIV.
 HOLE LOCATION See Dwg. 1.
 HOLE ELEVATION 92.7 ft.
 DATUM 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

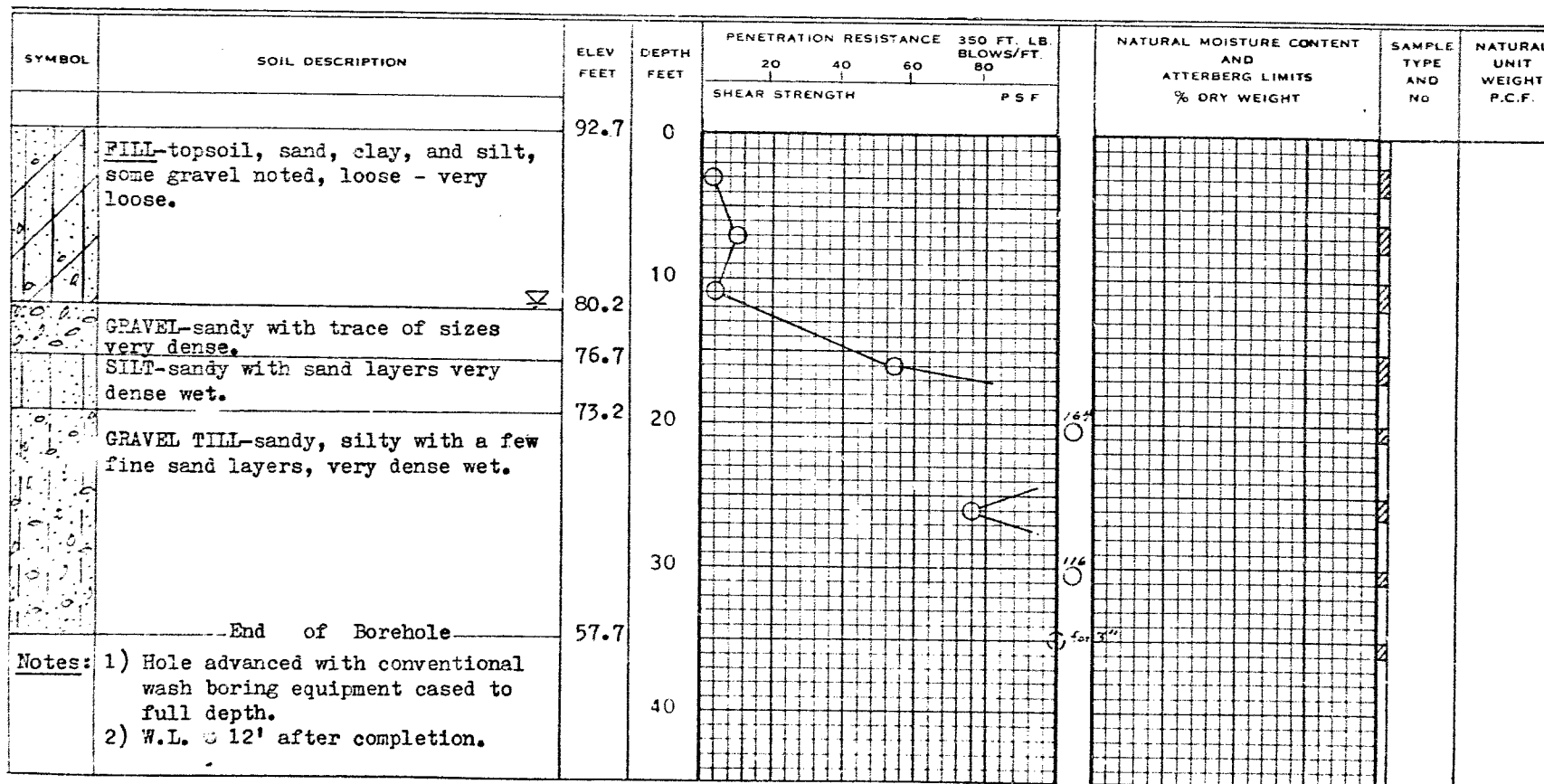
ATTERBERG LIMITS

LIQUID LIMIT —○—

PLASTIC LIMIT ———

SAMPLE TYPE




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



SITE INVESTIGATIONS · SOIL MECHANICS CONSULTATION

DRAWING NO 3.
PROJECT NO J1798.

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 _____

BOREHOLE NO. 2.
 PROJECT Proposed Replacement, Nith River Bridge.
 LOCATION Co. Oxford, Twp. Blenheim, Conc. XIII-XIV.
 HOLE LOCATION See Dwg. 1.
 HOLE ELEVATION 95.85 ft.
 DATUM See Dwg. 1.

SYMBOL	SOIL DESCRIPTION	ELEV FEET	DEPTH FEET	PENETRATION RESISTANCE 350 FT. LB BLOWS/FT				NATURAL MOISTURE CONTENT AND ATTERBERG LIMITS % DRY WEIGHT	SAMPLE TYPE AND NO	NATURAL UNIT WEIGHT P.C.F.
				20	40	60	80			
				SHEAR STRENGTH				PSF		
	Bridge Deck. 4" Concrete	95.85	0							
	River surface Feb. 13/65.	87.85								
	Water		10							
		76.15	20							
	GRAVEL TILL-sandy, silty, with fine sand layers.									
	Very dense.		30							
		57.75	40							
	End of Borehole									
Notes:	1) Hole advanced with conventional wash boring equipment cased to full depth.									

SITE INVESTIGATIONS · SOIL MECHANICS CONSULTATION

PROJECT NO J1798.

LEGEND

HOLE LOCATION See Dwg. 1.

HCLE ELEVATION 85.6 ft.

DATUM..... See Dwg. 1.

2" O.D. SPLIT TUBE

2" I.D. SHELBY TUBE ~~1~~ ~~2~~ ~~3~~

2" DIA. CONE

SHEAR STRENGTH

UNDRAINED TRIAXIAL

AT OVERBURDEN PRESSURE

UNCONFINED COMPRESSION

VANE TEST AND SENSITIVITY (S) 4

ATTERBERG LIMITS

LIQUID LIMIT

PLASTIC LIMIT

2" O.D. SPLIT TUBE_____

2" I.D. SHELBY TUBE _____

3.5 O.D. SHELBY TUBE

[illegible]