

* 64-F-289 m

BRIDGE

REPLACEMENT
OVER
THAMES RIVER

LOT 25 & 26

CON XV

EAST ZORRA

1850 Jane Street
Weston, Ontario
241-4644

William A. Trow

BA1997



Associates Ltd.

Project: J1483

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

Ure and Smith,
Engineers and Surveyors,
35 Springbank Avenue,
Woodstock, Ontario

August 4, 1964

64-E-289M

Attention: Mr. R. Smith, P.Eng.

Re: Foundation Conditions - Proposed Township Bridge over Thames River
Between Lots 25 and 26, Conc. XV - East Zorra

Dear Sirs:

In conformance with your verbal authorization, given early in June, we have performed a foundation investigation for the proposed replacement to the existing bridge structure at the above noted site.

The field work consisted of two borings taken to a maximum of 30 feet below the ground surface, or 26 feet below stream level. This work was carried out on June 5th and 8th of this year.

Our observations and recommendations arising out of this study are considered under the sections that follow.

SITE

The site lies immediately to the west of Cassel Street at the location noted above. The surrounding farm land is relatively flat and the river flow is very slow. The water level at the time of the field work was 9 feet below bridge deck level and the river was 2 feet deep. Some large stones were present in the river and probings indicated the existence of loose sandy alluvium for 2 feet below the river bed. Photographs of the site are included with the report.

SUBSOIL

The subsoil is described in detail in the borehole logs and in more general form in the stratigraphy of Dwg. 1. It is seen that the upper levels of soil consist of silty clay till to a depth of about 13 feet or about $6\frac{1}{2}$ feet or more below stream bed level. According to laboratory strength tests, the clay is stiff with an undrained shear strength in the order of 1600 psf. Fine to coarse gravelly sand underlies this clay till and it, in turn, is underlain below about 19 feet by very dense sandy silt till. There was a slight temporary artesian pressure in the sand or silt till.

FOUNDATIONS

Two foundation alternatives appear to exist for this bridge replacement structure. One involves the support of the bridge on the silty clay till at a depth of about 2 feet below stream bed level or El 88 feet. The other incorporates the use of cylindrical piles end-bearing in the dense silt till below a depth of about 19 feet.

In the former scheme, the safe net bearing pressure to apply to the footing is estimated to be 3500 psf. This estimate is based upon the strength measurements presented on Dwg. 4. The settlement resulting from this loading will be well within tolerable limits for the single span structure proposed. Steel sheet piling should be driven along the water face of the abutments to protect against erosion. Alternatively, heavy rip-rap, underlain by well graded gravel, could be used. With an excavation only about 2 feet below stream bed level, no water difficulties are expected. Surface seepage from the river can be directed to sumps for disposal.

The permissible loading of cylindrical piles driven to refusal in the silt till below 20 feet should equal their safe structural capacity when considered as a short column.

The abutments should have about 5 to 6 feet of granular fill behind them. The pressure exerted against the back of the wall at any depth, h , below the road surface can be determined from the expression:

$$p = 0.35 \gamma h$$

where: $\gamma = 125$ pcf is the estimated unit weight of granular fill placed behind the abutment
0.35 is the earth pressure coefficient considered to be applicable for the condition of loose backfill and rigid walls.

No allowance for pressure on the back of the wall below stream level has been computed since it will be resisted by the passive resistance of the sheeting driven in front of the abutment. It is assumed the rip-rap will be placed in front of the steel sheeting up to river surface level.

This pressure will be resisted by the sliding resistance generated along the base of the abutments. For an undrained shear strength of 1600 psf, the sliding resistance is equal to $1.6 B$ klf, where B is the footing width. This sliding resistance should be made equal to at least twice the active pressure.

This pressure plus the impact effect of traffic can be accommodated by batter piles if a pile foundation is to be used.

No embankment stability problem is envisaged as a result of the widening of the approach fill.

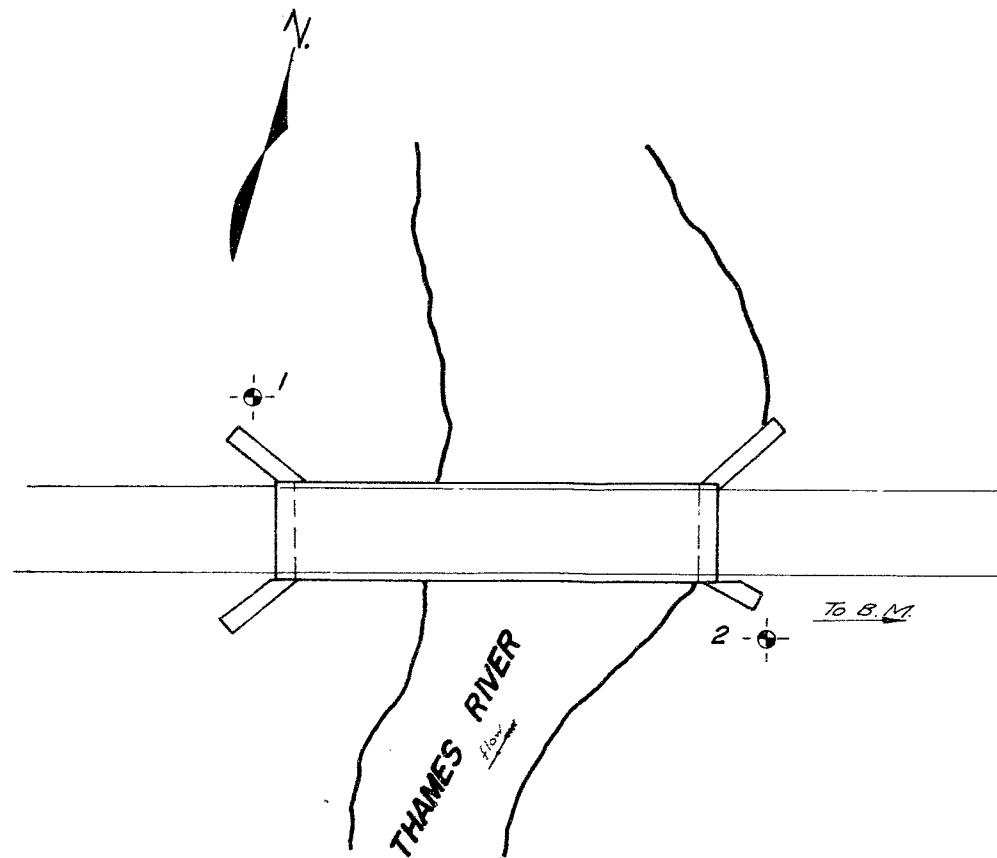
If you have any queries regarding the foregoing, we shall be pleased to discuss them with you.

Yours very truly,

W Trow

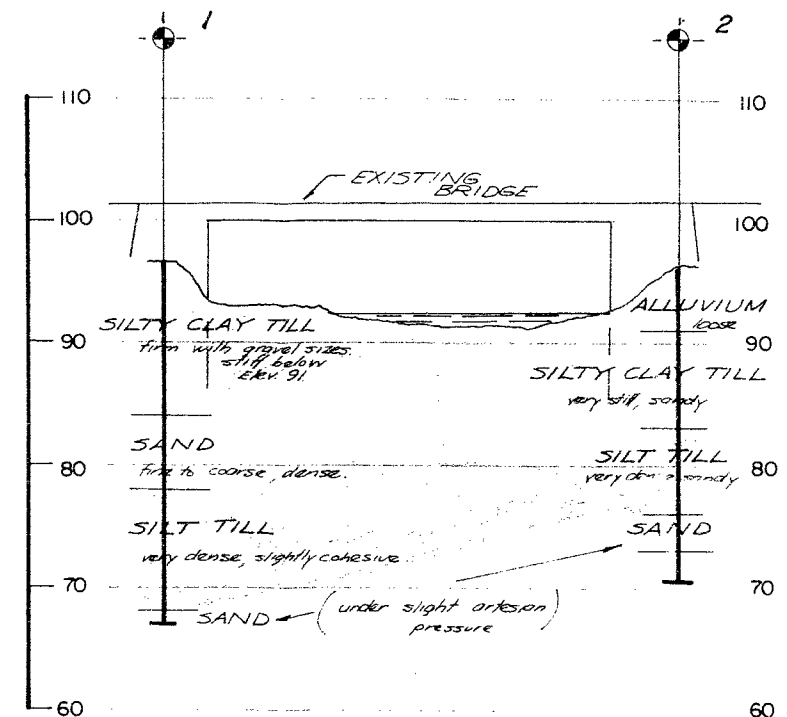
WAT/gc
Encls.

William A. Trow, P.Eng.



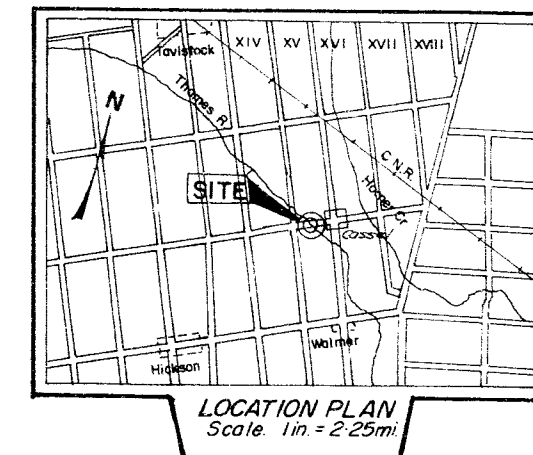
PLAN

SCALE: 1 IN. = 20 FT.



INTERPRETED SUBSOIL STATIGRAPHY

SCALE: HOR. 1 IN. = 20 FT.
VERT. 1 IN. = 10 FT.



NOTE:

B.M. Bolt with washer driven in N.W. root of Elm tree situated ~ 430' Eas- of BH-2. Elev. Top of bolt assumed 100.00 ft.

WILLIAM A. TROW AND ASSOCIATES LIMITED

FOUNDATION INVESTIGATION

PROPOSED BRIDGE REPLACEMENT

THAMES RIVER CROSSING

TWP. EAST ZORRA

ONTARIO

PROJ. 1483

DATE JULY 1964

DWG. No 1

WILLIAM A. TROW & ASSOCIATES LTD.




SITE INVESTIGATIONS - SOIL MECHANICS CONSULTATION

LEGEND




DRAWING No. 2
PROJECT No. J1483

BOREHOLE No. 1
PROJECT Proposed Bridge Replacement - Thames River
LOCATION Road Between Lots 25 & 26, Conc. XV - East Zorra
HOLE LOCATION See Dwg. 1.
HOLE ELEVATION 96.7 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) 

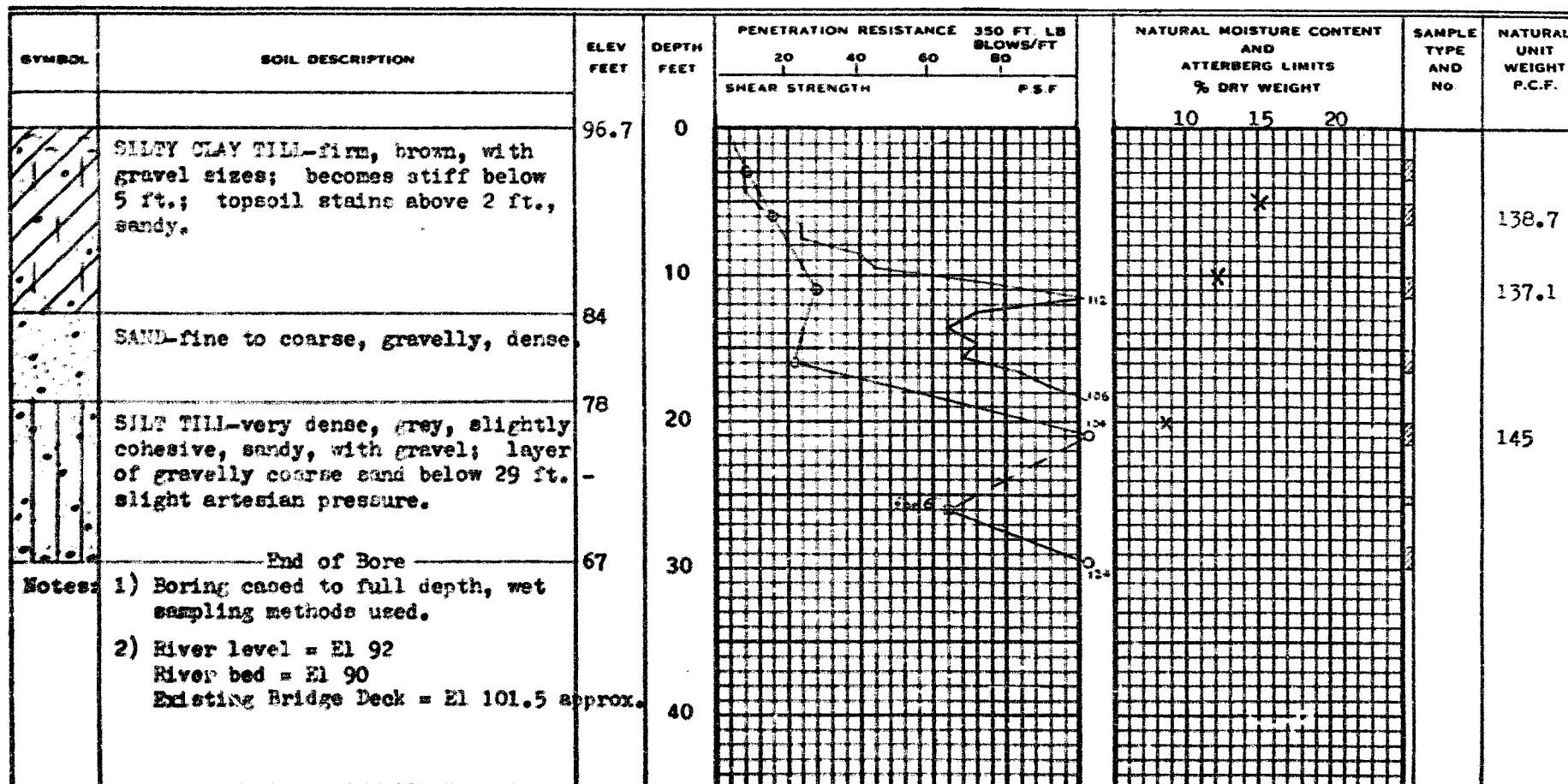
NATURAL MOISTURE CONTENT
AND LIQUIDITY INDEX 

ATTERBERG LIMITS

LIQUID LIMIT 
PLASTIC LIMIT 

SAMPLE TYPE

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



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SITE INVESTIGATIONS - SOIL MECHANICS CONSULTATION

DRAWING No. 3

PROJECT No. J1483

LEGEND

PENETRATION RESISTANCE

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

SHEAR STRENGTH

UNDRAINED TRIAXIAL AT OVERBURDEN PRESSURE ⊗
UNCONFINED COMPRESSION ⊙
VANE TEST AND SENSITIVITY (S) †

NATURAL MOISTURE CONTENT AND LIQUIDITY INDEX

X^{LI}

ATTERBERG LIMITS

LIQUID LIMIT —○—
PLASTIC LIMIT ———

SAMPLE TYPE

2" O.D. SPLIT TUBE ⊡
2" I.D. SHELBY TUBE ⊢
3" O.D. SHELBY TUBE ⊣

BORING NO. 12

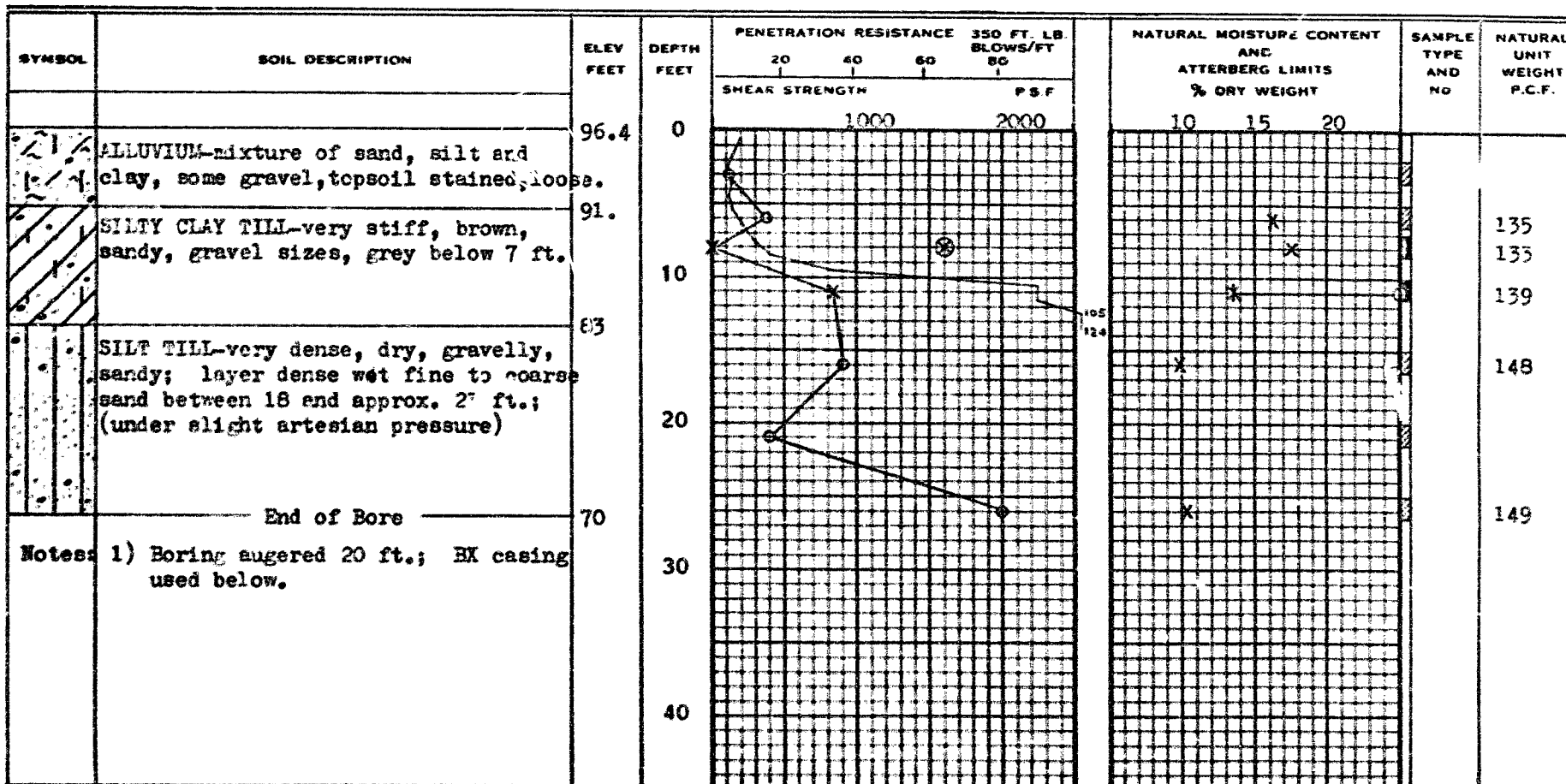
PROJECT Proposed Bridge Replacement - Thames River

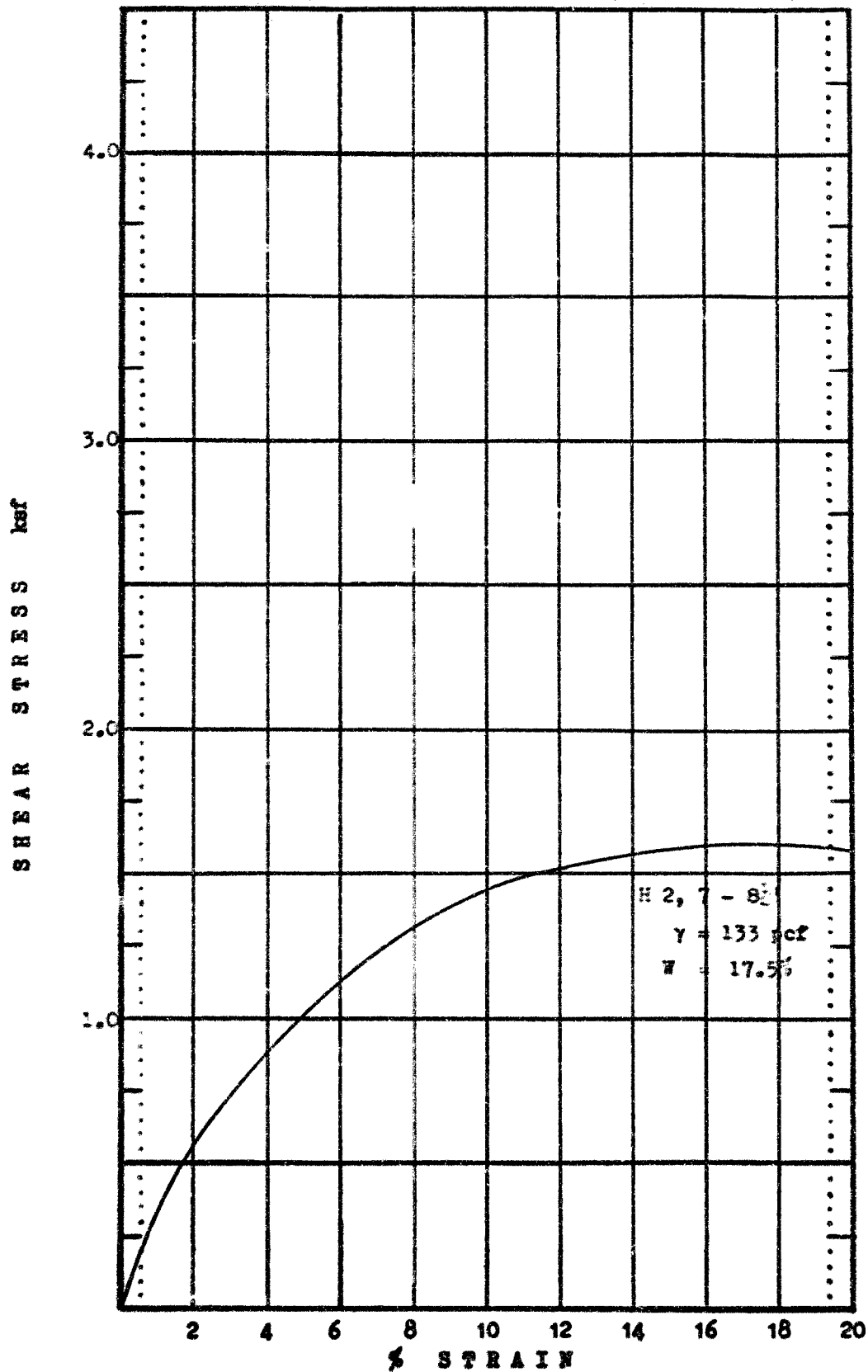
LOCATION Road Between Lots 25 & 26, Conc. XV - East Zorra

WELL LOCATION See Dwg. 1.

WELL ELEVATION 96.4 ft.

DATUM See Dwg. 1.

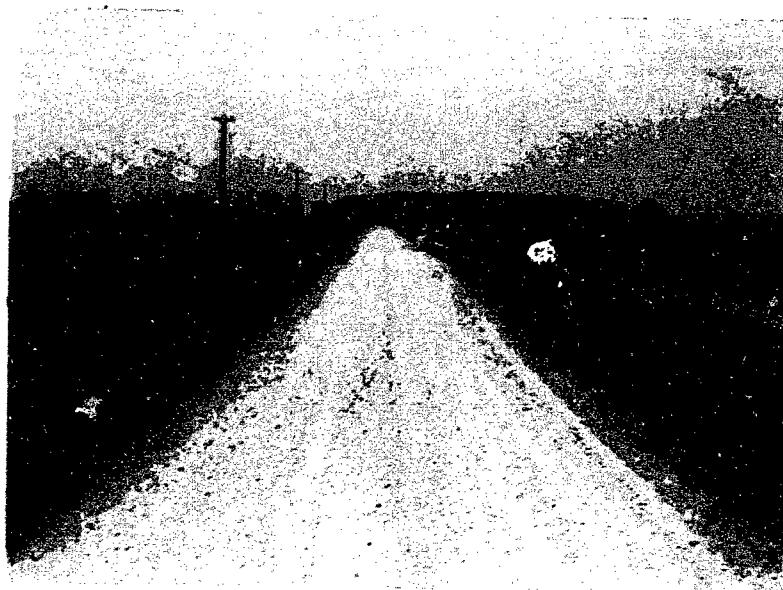




UNCONFINED COMPRESSION TEST ON SILTY CLAY TILL

Hole 2 - 8 Ft.

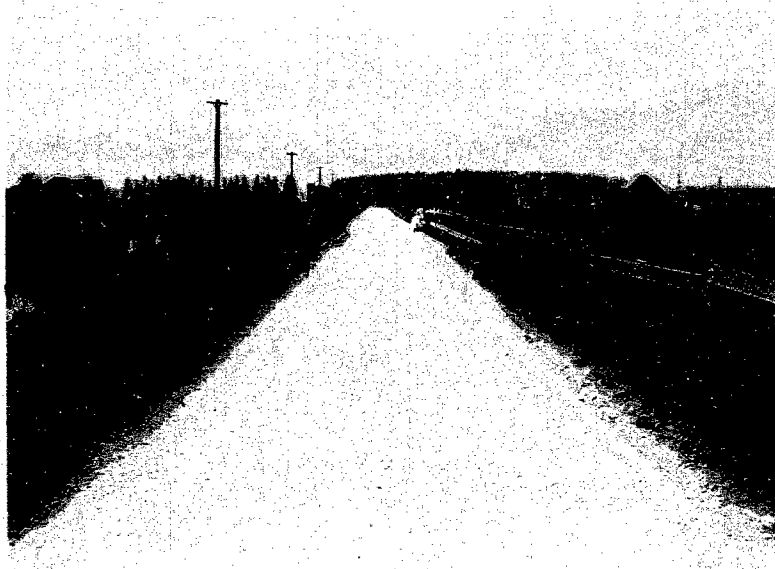
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Bridge Looking West



Bridge Looking East, BM on Right Side of Large Tree



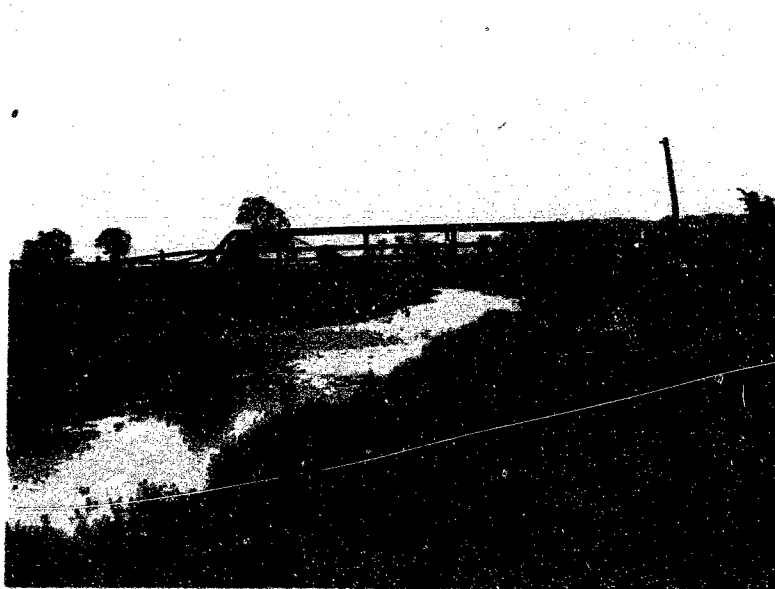
Bridge Looking West



Bridge Looking East, BM on Right Side of Large Tree

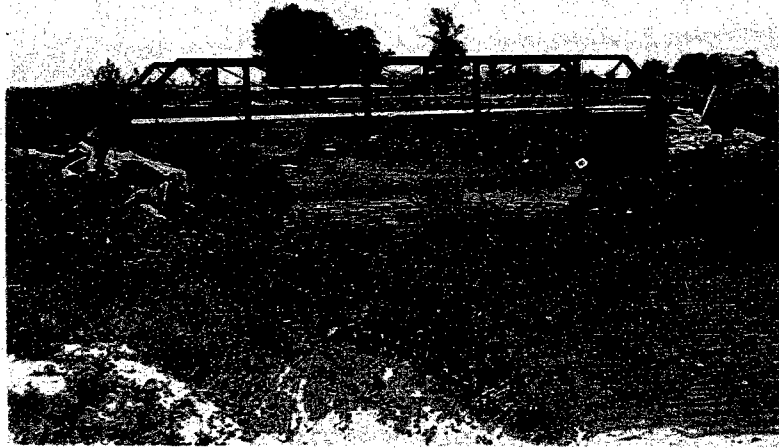


Bridge Looking North

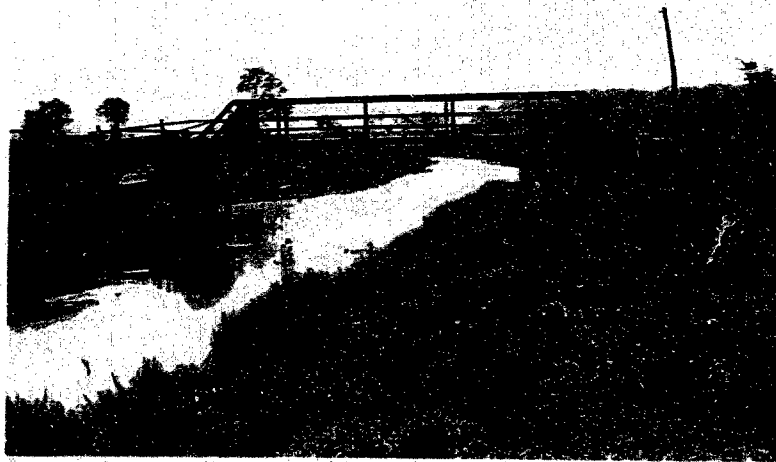


Bridge Looking South

SUPER IMPOSED DOCUMENT MAY
APPEAR AS MULTIFIELD ON FILM.



Bridge Looking North



Bridge Looking South