

G.I.-30 SEPT. 1976

REMARKS: _____

MEMORANDUM

31 M-13

To: Mr. B. R. Davis,
Bridge Engineer,
Bridge Office,
Admin. Bldg.

FROM: Foundation Section,
Materials & Testing Office,
Room 107, Lab. Bldg.

ATTENTION: Mr. S. McCombie

DATE: August 19, 1970

OUR FILE REF.

IN REPLY TO **AUG 25 1970**

SUBJECT:

FOUNDATION INVESTIGATION REPORT
At The
Site of the Bailey Bridge
Site 47-213
In the Township of Harley
District No. 14 (New Liskeard)
W.O. 70-11056 -- W.P. (Nil)

P.O. M. 166815

Attached, we are forwarding to you our detailed foundation investigation report on the subsoil conditions existing at the above structure site.

We believe that the factual data and recommendations contained therein, will prove adequate for your design requirements. Should additional information be required, please do not hesitate to contact our Office.

AGS/MdeF
Attach.

cc: Messrs. B. R. Davis
K. L. Kleinsteinber
H. A. Tregaskes
D. W. Farren
H. McArthur
T. A. Sharpe
E. R. Saint
J. C. McAllister (2)
B. A. Singh
Foundations Files
Gen. Files

A. G. Stermac
A. G. Stermac
PRINCIPAL FOUNDATION ENGINEER

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FOUNDATION INVESTIGATION REPORT
at the site of the Bailey Bridge
in the Twp. of Harley Site 47-213
District #14 New Liskeard
W.O. 70-11056 W.P. (Nil)

1. INTRODUCTION:

In a memo dated June 8, 1970, Mr. E. R. Saint, Regional Material Engineer, Northern Region, requested a foundation investigation at the Bailey Bridge site in the Township of Harley. As mentioned in the above memo the existing Bailey structure has been classified unsafe, consequently it is proposed to replace it with a nine ft. diameter culvert.

The subsequent field investigation was carried out under the supervision of this section, the results of which are presented in this report, together with recommendations concerning foundations, embankment stability and predicted settlements.

2. DESCRIPTION OF THE SITE:

At the site the creek flows through a valley of about 140 ft. width and 25 ft. depth. Some local failures of the banks are noticable particularly the one at some 100 ft. upstream of the existing bridge. The area east of the bridge is grass covered, west of it is occupied by trees and shrubs.

Geologically the site lies within the region known as the Little Clay Belt. The characteristic soil type forming the overburden in this region is varved and laminated clay. These stratified clays were deposited during the retreat of the last glacials in the glacial lakes, namely in Lake BARLOW-OJIBWAY.

3. FIELD AND LABORATORY INVESTIGATIONS:

Two sampled boreholes were carried out during the field investigation by means of a conventional diamond drill, adapted for soil sampling purposes. Borehole #1 was located some 40 ft. east of the road, on the slope of the creek valley. Borehole #2 was lowered from the deck of the existing Baley Bridge and placed right beside the creek. The locations and elevations of the boreholes are marked on Drawing #70-11056A accompanying this report.

Soil samples were taken by means of thin walled Shelby tubes at regular intervals. In between the samples field vane tests were performed to measure the undrained and remolded shear strength of the layers. Laboratory tests consisted of Atterberg limits, moisture contents, unconfined, quick triaxial and laboratory vane shear, and a few consolidation tests. The results of field and laboratory tests are plotted on the attached borelog sheets.

4. SOIL CONDITIONS:

Soil conditions were found to be quite similar in both boreholes. In borehole #1, situated on the slope of the creek valley, the upper 8 ft. layer or so was found to be yellowish brown clay, with pieces of wood and other organic substances. Right below this layer the varved clay was observed to have inclined varves within a depth of a few ft. These findings would indicate

-3-

4. SOIL CONDITIONS: (cont'd.)...

that the upper approx 10 ft. material of the valley is remoulded and disturbed, most probably by previous slip failures and slides.

Below the disturbed soils in BH #1 and from ground elevation down in BH #2 the overburden was found to be varved clay, extending to the end of the holes, to some 43-53 ft. depths. The varved clays of the Little Clay Belt area have been quite thoroughly studied during recent years and several publications are available concerning these materials. It is felt that a detailed discussion of the soils would be repetitious, instead a selected bibliography is given at the end of the report for further reference.

Some brief notes of the varved clays, found in the boreholes are given as follows:

The varves were found to be approx. $\frac{1}{2}$ - 1" thick, the light (summer varve) clayey silts being somewhat thinner than the dark (winter) silty clays. Undrained shear strengths, determined by laboratory unconfined and quick triaxial compression tests yielded values less than half of the ones obtained by performing field vane tests. (See Fig. #1) Since the strain at failure of the laboratory tests did not indicate a great deal of disturbance of the samples, the strength values of these tests can not be ruled out.

Atterberg limit and natural moisture content tests were carried out on individual silt and clay seams. The liquid limits of the clays averaged about 50% with a plasticity index

-4-

4. SOIL CONDITIONS: (cont'd.)...

of 25%. The corresponding values of the silt seams were 28% liquid limit and plasticity index of 8.5%. The moisture contents of the samples were found to be above the liquid limits with average liquidity indices of the clay as high as $I_L = 1.6-1.8$, and that of the silt $I_L = 1.3$. These values are higher than the typical ones within this region, rendering the soils to behave as viscous liquids when remoulded, without any appreciable shear strength. (Sensitivity of the varved clays ranged from $S=5$ to $S=22$).

Almost all of the laboratory unconfined and quick triaxial samples failed by the silt seams bulging out and the clay developing vertical tension cracks, proving that migration of water from the clay to the silt takes place during the application of external loads and during shear. The groundwater level was established to be some 2-3 ft. below ground surface following the natural ground down to the creek water level.

5. DISCUSSION AND RECOMMENDATIONS:5.1) General:

It is proposed to replace the existing Baley structure with a 9 ft. diameter culvert. The new grade above the culvert will be some 4.5 ft. lower than the existing one necessitating an embankment of some 12-13 ft. height. According to the supplied plan and profile the width of the embankment is designed to be

5. DISCUSSION AND RECOMMENDATIONS: (cont'd.)...

5.1) General: (cont'd.)...

28 ft. (20 ft. travelled surface 2 x 4 ft. shoulders) with 2 horizontal to 1 vertical slopes.

Subsoils consist of soft to stiff sensitive varved clays, extending to a considerable depth.

5.2) Placing of the Culvert:

No problems are foreseen with the placing of the 9 ft. diameter culvert. The proposed 2 ft. thick granular bedding appears to be adequate beneath the culvert. It is recommended that the creek bed at both, the upstream and downstream end be protected by rip-rap. The size of the area to be covered by rip-rap should be determined by the hydrology section. The lack of such protective measures might cause serious wash outs of the granular bedding, which in turn would endanger the stability of the embankment.

5.3) Embankment Stability:

The stability of the proposed appr. 13 ft. high embankment has been checked in the lateral direction.

Stability analyses were carried out by means of an electronic computer assuming that failure occurs along a circular arc, immediately after construction. Such computations are based on shear stress parameters in terms of total stresses. Subsoils have been divided arbitrarily into 10-20 ft. thick layers and each layer assigned shear strength values, obtained

5. DISCUSSION AND RECOMMENDATIONS: (cont'd.)...

5.3) Embankment Stability: (cont'd.)...

(a) by laboratory and (b) by field shear tests. The used parameters are tabulated below:

Elevation	Undrained shear strength (PSF)		Bulk Density (PCF)
	Laboratory Tests	Field Tests	
70 - 60	300	700	105
60 - 50	480	960	107
50 - 40	500	1200	108
40 - 20	500	1200	108

The laboratory shear parameters were probably somewhat lower than the true field values, but it was believed that analyses using such values should still result in a safety factor of $FS = 1.0$. Computations showed that the proposed 13 ft. high fill will be stable with 2 horizontal to 1 vertical slopes without employing counterbalancing berms. All surficial organic material should be replaced by acceptable one beneath the fill, prior to construction.

5.4) Settlements:

Computation of settlements were performed using laboratory consolidation curves. Stresses induced by the embankment

5. DISCUSSION AND RECOMMENDATIONS: (cont'd.)...

5.4) Settlements:

were calculated by the BOUSSINESQ theory. Previous experiences with embankments in the New Liskeard area indicated that over and above the consolidation settlements, considerable subsidences occur due to lateral displacement (shear) of the underlying varved clays, especially when the fill is built with small safety factors. The displacement usually is a slow process in the form of creep.

Accordingly the calculated consolidation settlements were increased, so that the total settlement beneath the middle of the embankment can be assumed to reach 16"-18". It is suggested therefore that an apprx. 2 ft. camber be provided at the middle of the culvert.

6. MISCELLANEOUS:

The field investigation, carried out during the period July 2-5, 1970 was supervised by Mr. A. Prakash, Project Foundation Engineer. The equipment used was owned and operated by Dominion Soil Inv. Ltd. This report was written by Mr. A. K. Barsvary, Senior Foundation Engineer, and reviewed by Mr. K. G. Selby, Supervising Foundation Engineer.

AUGUST 1970

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APPENDIX I.

DEPARTMENT OF HIGHWAYS- ONTARIO
MATERIALS & TESTING OFFICE

RECORD OF BOREHOLE No. 1

FOUNDATION SECTION

JOB 70-11056

LOCATION As shown on drawing

ORIGINATED BY A.P.

W.P.

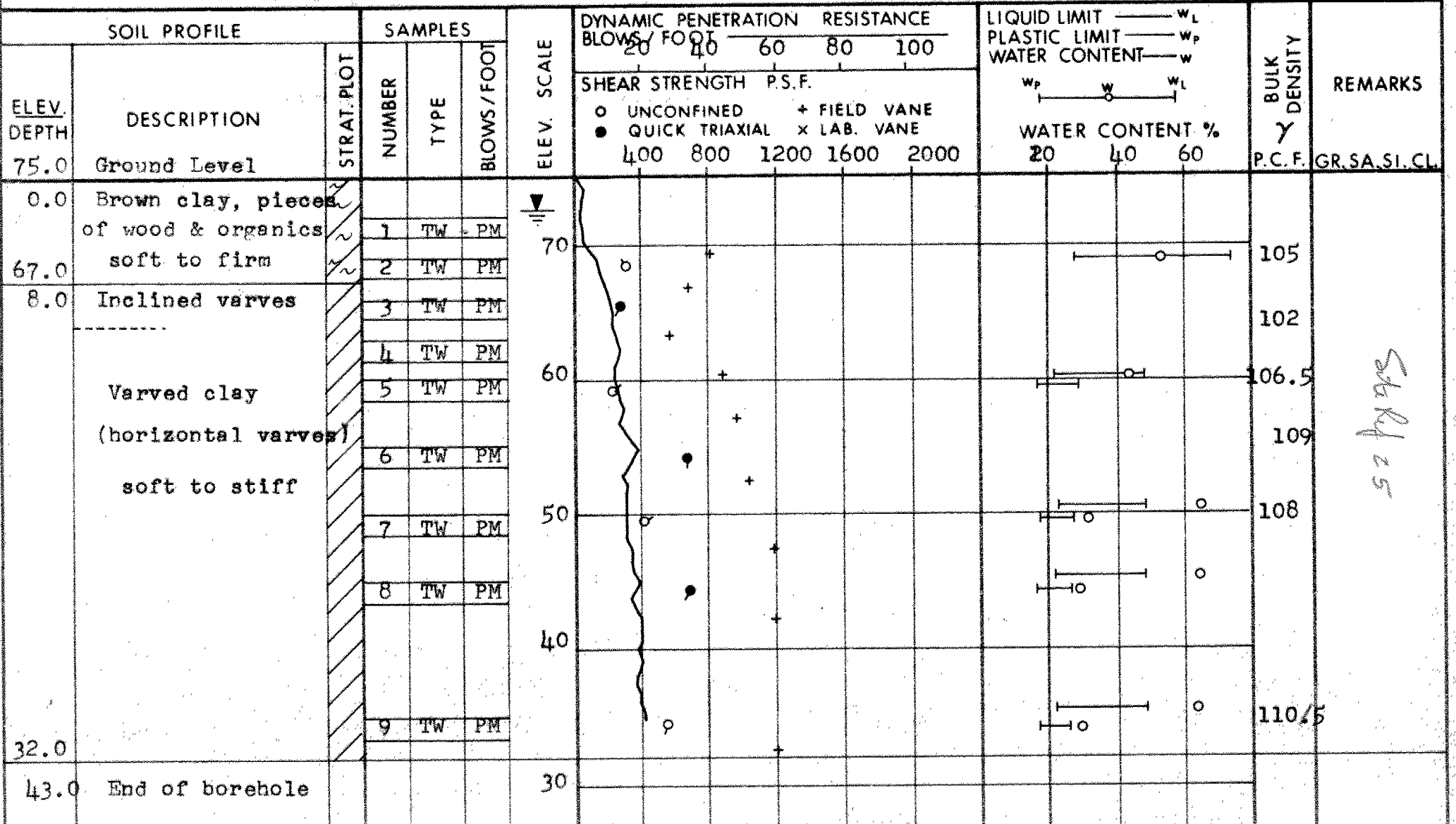
BORING DATE July 2-3, 1970

COMPILED BY A.K.B.

DATUM Assumed

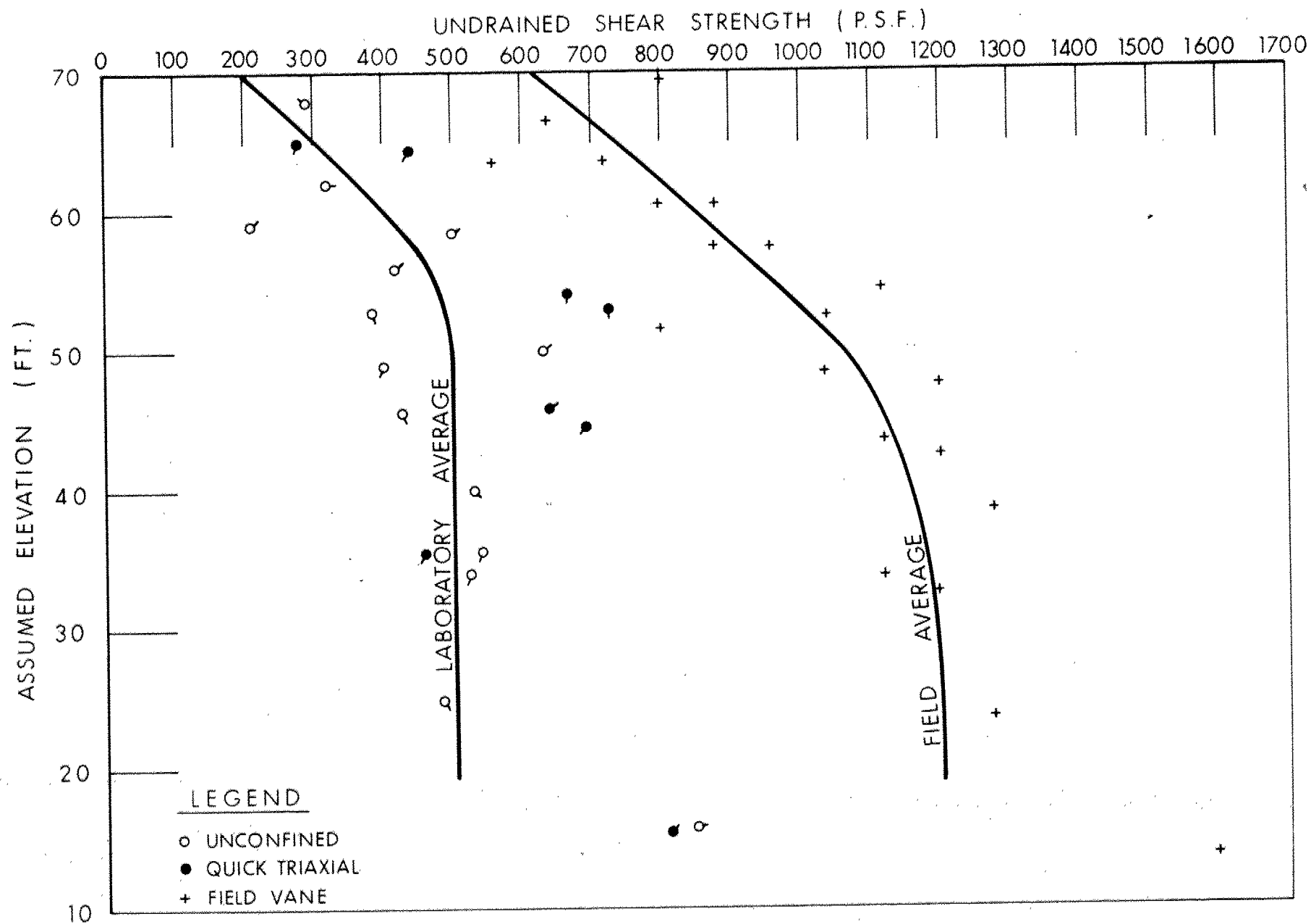
BOREHOLE TYPE Washboring, NX casing

CHECKED BY



DEPARTMENT OF HIGHWAYS- ONTARIO MATERIALS & TESTING OFFICE		RECORD OF BOREHOLE No. 2		FOUNDATION SECTION	
JOB <u>70-11056</u>	LOCATION <u>As shown on drawing</u>	ORIGINATED BY <u>AP</u>			
W.P. _____	BORING DATE <u>July 3-4, 1970</u>	COMPILED BY <u>AKB</u>			
DATUM <u>Assumed</u>	BOREHOLE TYPE <u>Washboring, NX casing</u>	CHECKED BY <u>[Signature]</u>			

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT ——— w_L PLASTIC LIMIT ——— w_p WATER CONTENT ——— w			BULK DENSITY γ P.C.F.	REMARKS	
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS/FOOT		SHEAR STRENGTH P.S.F.					WATER CONTENT %					
							σ UNCONFINED	\bullet QUICK TRIAXIAL	$+$ FIELD VANE	\times LAB. VANE	w_p	w	w_L				
66.0	Ground Level						400	800	1200	1600	2000	20	40	60		GR. SA. SI. CL.	
0.0	Varved Clay (Horizontal varves) soft to stiff		1	TW	PM	\times SI \bullet \times CL $+$									103	Site Ref 25	
			2	TW	PM	σ $+$											106
			3	TW	PM	σ $+$											105
			4	TW	PM	σ $+$											102
			5	TW	PM	σ \bullet $+$											111
			6	TW	PM	σ $+$											108
			7	TW	PM	σ \bullet $+$											106
			8	TW	PM	σ $+$											108
			9	TW	PM	σ \bullet $+$											111
																	108
			10	TW	PM	σ $+$											111
13.0			11	TW	PM	σ \bullet $+$								111			
														106			
53.0	End of borehole																



LABORATORY & FIELD UNDRAINED SHEAR STRENGTH RESULTS VS ELEVATION

FIG. 1

70-11056

ABBREVIATIONS USED IN THIS REPORT

PENETRATION RESISTANCE

STANDARD PENETRATION RESISTANCE 'N' - THE NUMBER OF BLOWS REQUIRED TO ADVANCE A STANDARD SPLIT SPOON SAMPLER 12 INCHES INTO THE SUBSOIL, DRIVEN BY MEANS OF A 140 POUND HAMMER FALLING FREELY A DISTANCE OF 30 INCHES.

DYNAMIC PENETRATION RESISTANCE - THE NUMBER OF BLOWS REQUIRED TO ADVANCE A 2 INCH, 60 DEGREE CONE, FITTED TO THE END OF DRILL RODS, 12 INCHES INTO THE SUBSOIL, THE DRIVING ENERGY BEING 350 FOOT POUNDS PER BLOW.

DESCRIPTION OF SOIL

THE CONSISTENCY OF COHESIVE SOILS AND THE RELATIVE DENSITY OR DENSENESS OF COHESIONLESS SOILS ARE DESCRIBED IN THE FOLLOWING TERMS:-

<u>CONSISTENCY</u>	<u>'N' BLOWS / FT.</u>	<u>c LB. / SQ. FT.</u>	<u>DENSENESS</u>	<u>'N' BLOWS / FT.</u>
VERY SOFT	0 - 2	0 - 250	VERY LOOSE	0 - 4
SOFT	2 - 4	250 - 500	LOOSE	4 - 10
FIRM	4 - 8	500 - 1000	COMPACT	10 - 30
STIFF	8 - 15	1000 - 2000	DENSE	30 - 50
VERY STIFF	15 - 30	2000 - 4000	VERY DENSE	> 50
HARD	> 30	> 4000		

TYPE OF SAMPLE

S.S.	SPLIT SPOON	T.W.	THINWALL OPEN
W.S.	WASHED SAMPLE	T.P.	THINWALL PISTON
S.B.	SCRAPER BUCKET SAMPLE	O.S.	OESTERBERG SAMPLE
A.S.	AUGER SAMPLE	F.S.	FOIL SAMPLE
C.S.	CHUNK SAMPLE	R.C.	ROCK CORE
S.T.	SLOTTED TUBE SAMPLE		
	P.H. SAMPLE ADVANCED HYDRAULICALLY		
	P.M. SAMPLE ADVANCED MANUALLY		

SOIL TESTS

Qu	UNCONFINED COMPRESSION	L.V.	LABORATORY VANE
Q	UNDRAINED TRIAXIAL	F.V.	FIELD VANE
Qcu	CONSOLIDATED UNDRAINED TRIAXIAL	C	CONSOLIDATION
Qd	DRAINED TRIAXIAL	S	SENSITIVITY

ABBREVIATIONS USED IN THIS REPORT

SOIL PROPERTIES

γ	UNIT WEIGHT OF SOIL (BULK DENSITY)
γ_s	UNIT WEIGHT OF SOLID PARTICLES
γ_w	UNIT WEIGHT OF WATER
γ_d	UNIT DRY WEIGHT OF SOIL (DRY DENSITY)
γ'	UNIT WEIGHT OF SUBMERGED SOIL
G	SPECIFIC GRAVITY OF SOLID PARTICLES $G = \frac{\gamma_s}{\gamma_w}$
e	VOID RATIO
n	POROSITY
w	WATER CONTENT
S_r	DEGREE OF SATURATION
w_L	LIQUID LIMIT
w_p	PLASTIC LIMIT
I_p	PLASTICITY INDEX
s	SHRINKAGE LIMIT
I_L	LIQUIDITY INDEX = $\frac{w - w_p}{I_p}$
I_c	CONSISTENCY INDEX = $\frac{w_L - w}{I_p}$
e_{max}	VOID RATIO IN LOOSEST STATE
e_{min}	VOID RATIO IN DENSEST STATE
I_D	DENSITY INDEX = $\frac{e_{max} - e}{e_{max} - e_{min}}$
	RELATIVE DENSITY D_r IS ALSO USED
h	HYDRAULIC HEAD OR POTENTIAL
q	RATE OF DISCHARGE
v	VELOCITY OF FLOW
i	HYDRAULIC GRADIENT
k	COEFFICIENT OF PERMEABILITY
j	SEEPAGE FORCE PER UNIT VOLUME
m_v	COEFFICIENT OF VOLUME CHANGE = $\frac{-\Delta e}{(1+e)\Delta\sigma}$
c_v	COEFFICIENT OF CONSOLIDATION
C_c	COMPRESSION INDEX = $\frac{\Delta e}{\Delta \log_{10} \sigma}$
T_v	TIME FACTOR = $\frac{c_v t}{d^2}$ (d, DRAINAGE PATH)
U	DEGREE OF CONSOLIDATION
τ_f	SHEAR STRENGTH
c'	EFFECTIVE COHESION
ϕ'	EFFECTIVE ANGLE OF SHEARING RESISTANCE, OR FRICTION
c_u	APPARENT COHESION
ϕ_u	APPARENT ANGLE OF SHEARING RESISTANCE, OR FRICTION
μ	COEFFICIENT OF FRICTION
S_t	SENSITIVITY

GENERAL

π	= 3.1416
e	BASE OF NATURAL LOGARITHMS 2.7183
$\log_e a$ OR $\ln a$	NATURAL LOGARITHM OF a
$\log_{10} a$ OR $\log a$	LOGARITHM OF a TO BASE 10
t	TIME
g	ACCELERATION DUE TO GRAVITY
V	VOLUME
W	WEIGHT
M	MOMENT
F	FACTOR OF SAFETY

STRESS AND STRAIN

u	PORE PRESSURE
σ	NORMAL STRESS
σ'	NORMAL EFFECTIVE STRESS ($\bar{\sigma}$ IS ALSO USED)
τ	SHEAR STRESS
ϵ	LINEAR STRAIN
γ	SHEAR STRAIN
ν	POISSON'S RATIO (μ IS ALSO USED)
E	MODULUS OF LINEAR DEFORMATION (YOUNG'S MODULUS)
G	MODULUS OF SHEAR DEFORMATION
K	MODULUS OF COMPRESSIBILITY
η	COEFFICIENT OF VISCOSITY

EARTH PRESSURE

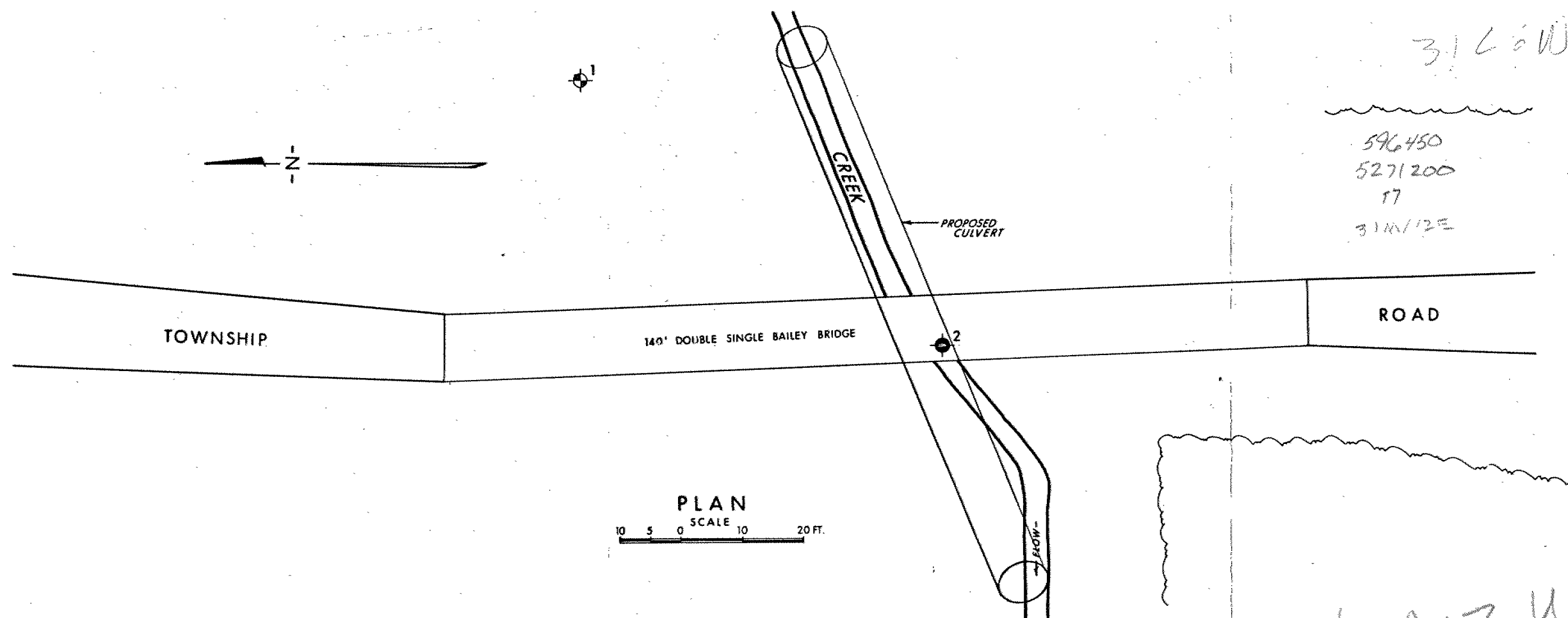
d	DISTANCE FROM TOP OF WALL TO POINT OF APPLICATION OF PRESSURE
δ	ANGLE OF WALL FRICTION
K	DIMENSIONLESS COEFFICIENT TO BE USED WITH VARIOUS SUFFIXES IN EXPRESSIONS REFERRING TO NORMAL STRESS ON WALLS
K_0	COEFFICIENT OF EARTH PRESSURE AT REST

FOUNDATIONS

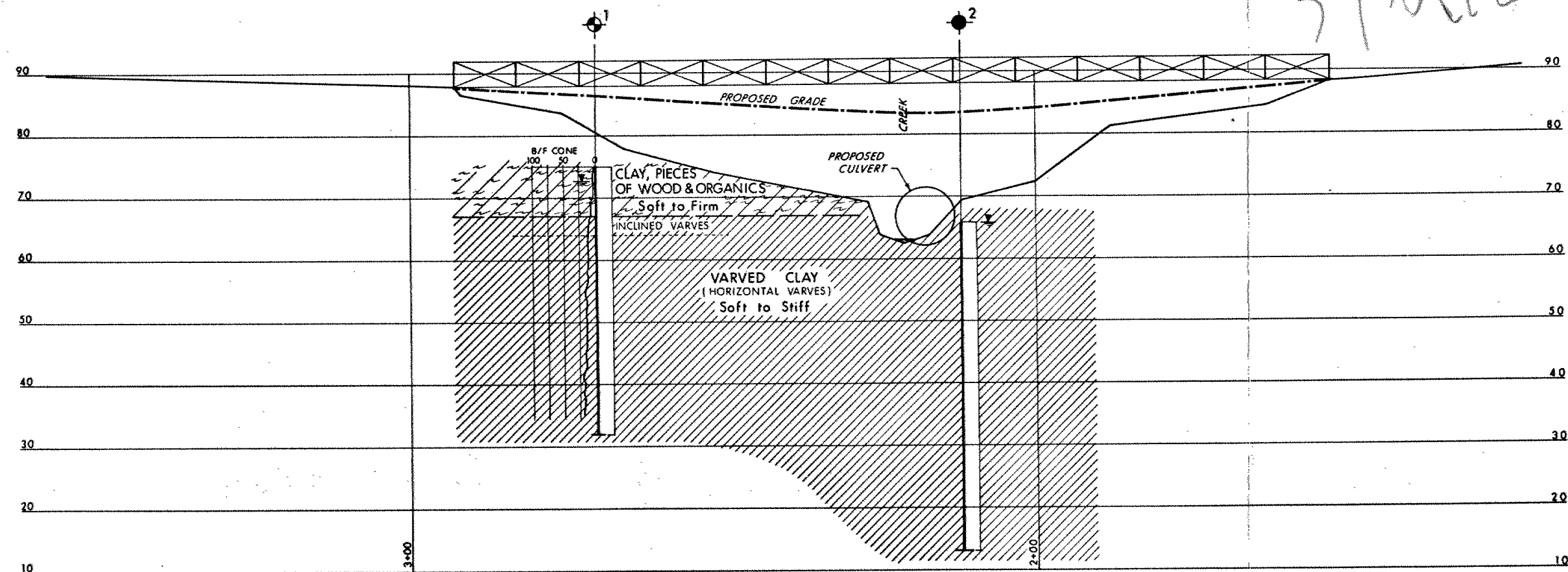
B	BREADTH OF FOUNDATION
L	LENGTH OF FOUNDATION
D	DEPTH OF FOUNDATION BENEATH GROUND
N	DIMENSIONLESS COEFFICIENT USED WITH A SUFFIX APPLYING TO SPECIFIC GRAVITY, DEPTH AND COHESION ETC. IN THE FORMULA FOR BEARING CAPACITY
k_s	MODULUS OF SUBGRADE REACTION

SLOPES

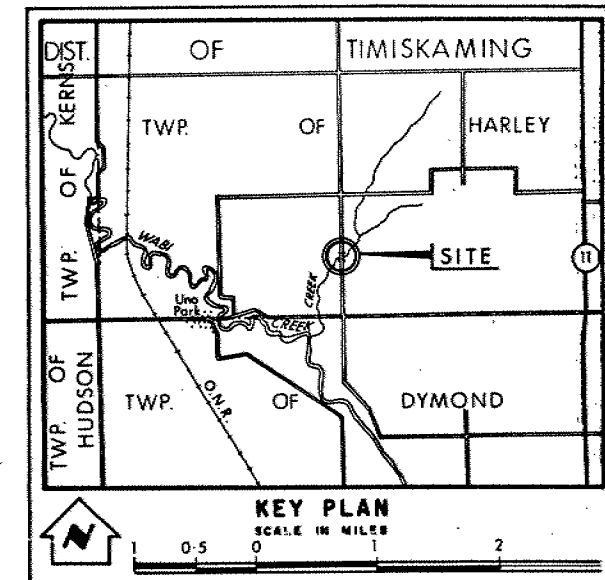
H	VERTICAL HEIGHT OF SLOPE
D	DEPTH BELOW TOE OF SLOPE TO HARD STRATUM
β	ANGLE OF SLOPE TO HORIZONTAL



PLAN
SCALE
10 5 0 10 20 FT.



PROFILE
SCALE
10 5 0 10 20 FT.



LEGEND			
	Bore Hole		
	Cone Penetration Hole		
	Bore & Cone Penetration Hole		
	Water Levels established at time of field investigation. JULY 1970		
NO.	ELEVATION	STATION	OFFSET
1	75.0	AS SHOWN ON DRAWING	
2	66.0		

- NOTE -
The boundaries between soil strata have been established only at Bore Hole locations. Between Bore Holes the boundaries are assumed from geological evidence and may be subject to considerable error.

REVISIONS	DATE	BY	DESCRIPTION

DEPARTMENT OF HIGHWAYS - ONTARIO			
MATERIALS & TESTING OFFICE - FOUNDATION SECTION			
BAILEY BRIDGE (TOWNSHIP OF HARLEY)			
KING'S HIGHWAY NO. <u>TOWNSHIP ROAD</u>		DIST. NO. <u>14</u>	
DIST. OF <u>TIMISKAMING</u>			
TWP. <u>HARLEY</u>		LOT <u>4 & 5</u>	CON. <u>1</u>
BORE HOLE LOCATIONS & SOIL STRATA			
SUBM'D. A.P.	CHECKED <u> </u>	W.P. NO. <u> </u>	M.B.T. DRAWING NO. <u>70-11056A</u>
DRAWN S.O.	CHECKED <u> </u>	JOB NO. <u>70-11056</u>	BRIDGE DRAWING NO. <u> </u>
DATE <u>18 AUG. 1970</u>	SITE NO. <u> </u>		
APPROVED <u> </u>	CONT. NO. <u> </u>		

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NBAR LISK 2, MAY 26/70 9:25 AM PRIORITY
E R SAINT REG MAT AND TESTING
RE: TWP OF HARLEY

140' D.S. BAILEY, SITE 47-213
LOTS 4/5 CONC. 1.

PLEASE BE ADVISED THAT A PLAN AND PROFILE OF OUR CULVERT PROPOSAL IS
BEING FORWARDED TODAY AND SHOULD PROVIDE THE INFORMATION REQUIRED IN
YOUR TELETYPE OF MAY 25/70.

YOUR ESTIMATE OF AN 18-20 FOOT FILL IS CORRECT FOR A MEASUREMENT TAKEN
FROM THE STREAM BED WHEREAS THE MAX. FILL DEPTH OVER THE STREAM BANK
IS 14 FEET.

IF AFTER REVIEWING OUR PLAN AND PROFILE YOU STILL CONSIDER A FOUNDATION
INVESTIGATION NECESSARY WE WOULD APPRECIATE YOUR ARRANGING WITH THE
FOUNDATION SECTION TO DO THE WORK.

J T KERNAGHAN DIST MUN ENG
TC

70-11056

NBAR LISK 1, MAY 25/70 10:15 AM PRIORITY
E R SAINT REG MAT AND TESTING
RE: TOWNSHIP OF HARLEY
STRUCTURE AT LOC 4/5 CONC 1
SITE 47-213

RECENTLY THE DS 140' BAILEY AT THE ABOVE SITE WAS INSPECTED BY THE BRIDGE MAINTENANCE SECTION AND WE WERE ADVISED THE BAILEY WAS UNSAFE AND SHOULD BE REPLACED IMMEDIATELY, ALTHOUGH A NEW BAILEY IS AVAILABLE TO US, WE FEEL THAT A MULTI-PLATE CULVERT WOULD SERVE THE PURPOSE AND BE MUCH CHEAPER.

SOME TIME AGO, OUR OFFICE HAD PROPOSED TO REPLACE THE BAILEY WITH A 9' DIAM. 102' LONG CULVERT WHICH WAS APPROVED IN PRINCIPLE BY MR. KLEINSTEIBER SUBJECT TO A SOILS INVESTIGATION BEING CARRIED OUT.

AT THAT TIME THE BAILEY WAS CONSIDERED SAFE AND AS A RESULT THE PROJECT WAS SHELVED.

IN VIEW OF THE PRESENT UNSAFE CONDITION OF THE BRIDGE, WE WISH TO REQUEST IF YOUR SECTION WOULD BE ABLE TO CARRY OUT A FOUNDATION INVESTIGATION. IF NOT, COULD YOU PLEASE SUGGEST AN ALTERNATIVE AND WHETHER ANY FOUNDATION CONSULTANTS ARE WORKING IN THIS AREA.

A FOUNDATION INVESTIGATION CARRIED OUT IN 1968 BY DOMINION SOIL AT THE UNO PARK SITE, ABOUT 1 MILE FURTHER WEST, REVEALED ABOUT 50-54 FEET OF SOFT GREY VARVED CLAY OVERLYING ABOUT 90' OF STIFF CALY MATERIAL AND SINCE THE ENTIRE AREA IS CONSIDERED TO HAVE SIMILAR SOILS CHARACTERISTICS, YOU MAY FEEL THAT A SITE INSPECTION ONLY RATHER THAN A FULL INVESTIGATION WOULD BE NECESSARY TO MAKE RECOMMENDATIONS ATN OUR CULVERT DESIGN.

YOUR COMMENTS AND EARLY REPLY WOULD BE VERY MUCH APPRECIATED.
J T KERNAGHAN DIST MUN ENG
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70-11056

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LISK NBAR 2 MAY 25 1970 415 PM
T A SHARPE DIST ENG
ATTENTION J T KERNAGHAN P R I O R I T Y
RE: TOWNSHIP OF HARLEY STRUCTURE
I HAVE REVIEWED THE AGRICULTURAL SOILS MAP FOR THE APPROXIMATE
AREA IN QUESTION. HOWEVER WITHOUT A SKETCH I CANNOT TIE THE
LOCATION DOWN AS WE DO NOT HAVE A MUNICIPAL STRUCTURE SITE LOG.
THE MATERIAL IN THE GENERAL AREA IS A VARBED CLAY WHICH IS HIGHLY
COMPRESSIBLE. YOU DID NOT INDICATE THE FILL HEIGHT BUT FROM THE CULVERT
LENGTH IT WOULD APPEAR TO BE IN THE ORDER OF 18 TO 20 FEET. MOST
EARTHFILLS IN THE NEW LISKEARD AREA OVER 12 TO 13 FEET ARE
UNSTABLE AND REQUIRE BERMS. BASED ON THIS I FEEL A FOUNDATION
CHECK WOULD BE REQUIRED. THIS OFFICE DOES NOT CARRY OUT FOUNDATION
INVESTIGATIONS BUT I CAN CONTACT THE FOUNDATION SECTION IN DOWNSVIEW
WHEN ALL PERTINENT INFORMATION IS AVAILABLE TO SEE IF THEY CAN HANDLE
IT. PLEASE FILL US IN CONCERNING DETAILS OF THE SITE LOCATION
AND FILL CROSS-SECTION
E R SAINT R M E