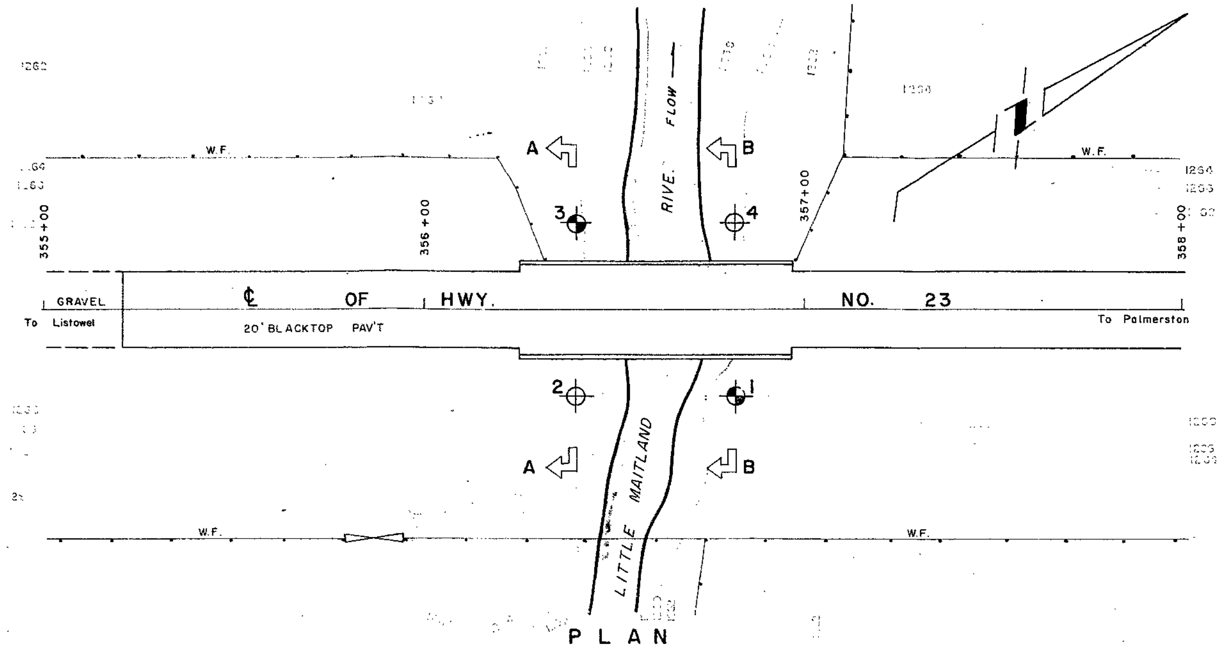
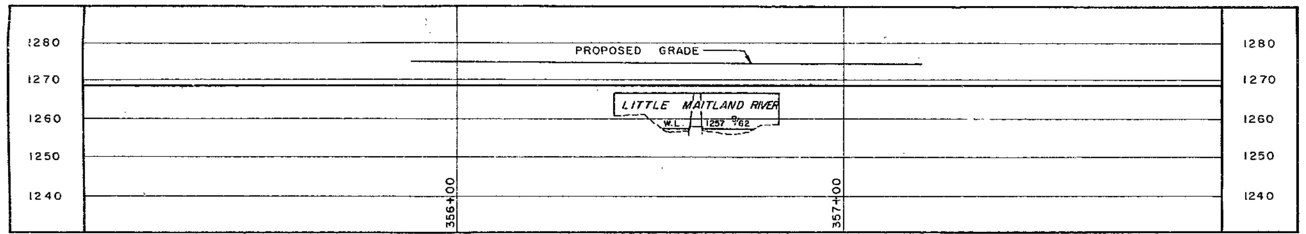
#62-F-109
W.P. #227-61
Hwy. #23
CROSSING
LITTLE MAITLAND
RIVER



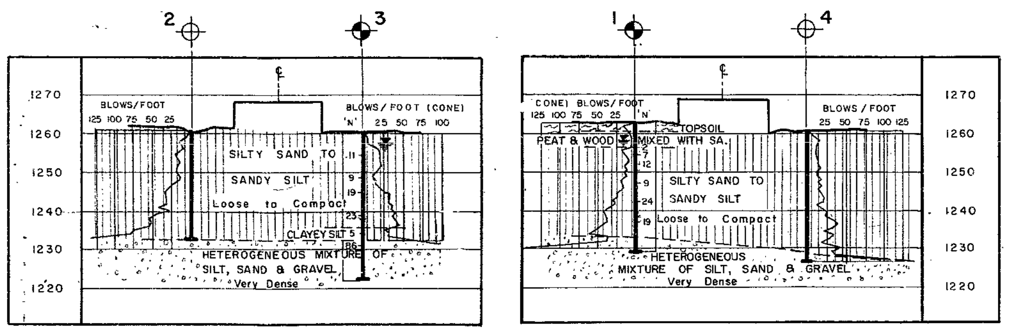
PLAN

SCALE IN FEET



℄ PROFILE

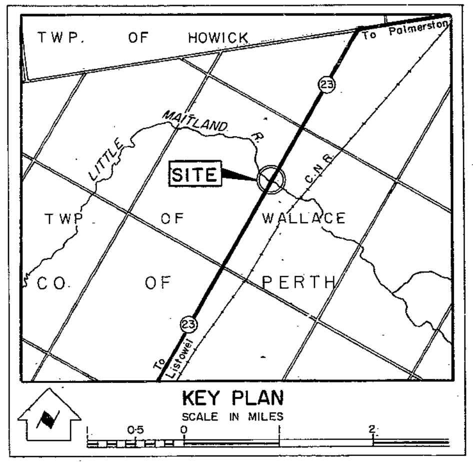
SCALE IN FEET



A-A

B-B

SCALE IN FEET



KEY PLAN

SCALE IN MILES

LEGEND

- Bore Hole
- Cone Penetration Hole
- Bore & Cone Penetration Hole
- Water Levels established at time of field investigation - Sept. 1962
- 'N' Standard Penetration Resistance

NO.	ELEVATION	STATION	OFFSET
1	1262·0	356+84	23'RT.
2	1260·0	356+42	23'RT.
3	1260·0	356+42	23'LT.
4	1260·0	356+84	23'LT.

40 P15W
E. 510150
N. 4849250
Z. 17

– 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.

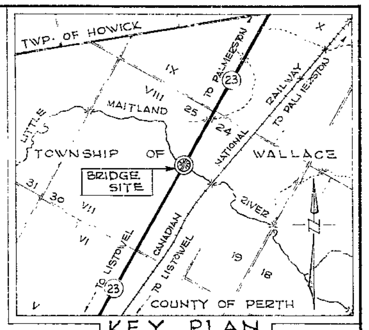
DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & RESEARCH SECTION

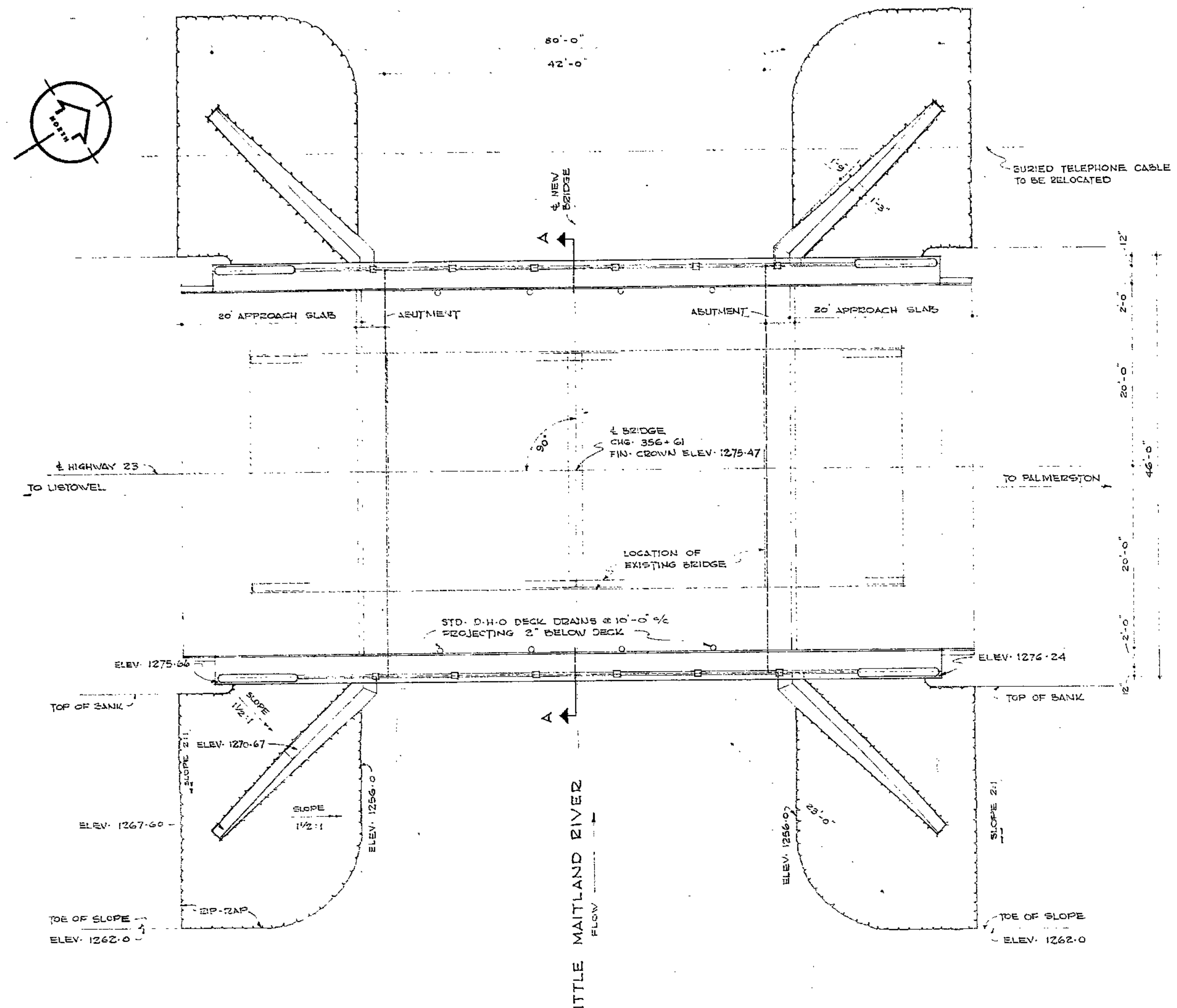
LITTLE MAITLAND RIVER AND HIGHWAY NO. 23

ORIGINATED G. Mierzynski	DISTRICT NO. 3	DATE Oct. 5, 1962
DRAWN F. Clark	W.P. NO. 227-61	JOB NO. 62-F-109A
CHECKED [signature]	CONT. NO.	DRAWING NO. 62-F-109A
APPROVED M. Devata		

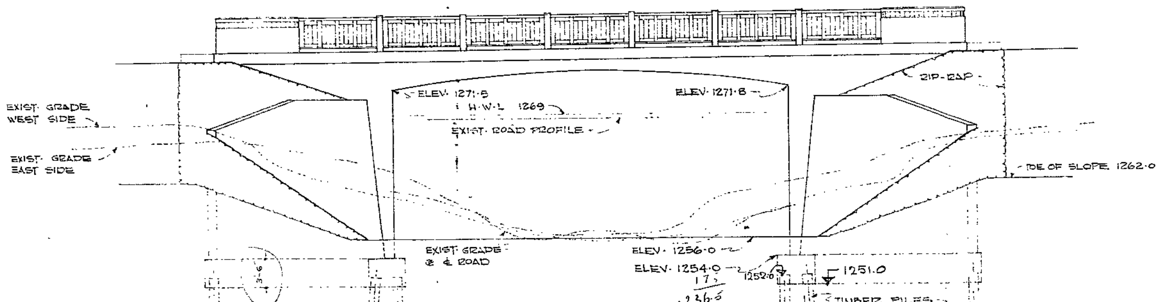
REF. NO. E-4054-1



KEY PLAN
SCALE - 1 IN. = 0.8 MI.

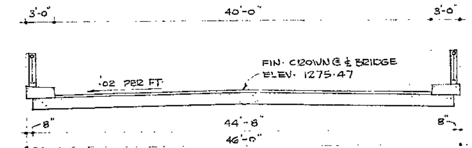


PLAN
SCALE 1/8" = 1'-0"

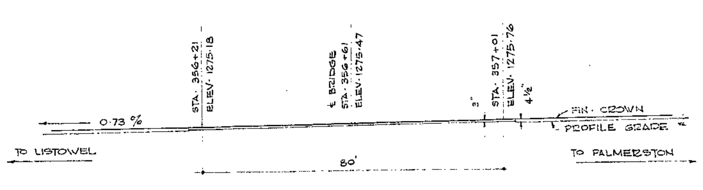


EAST ELEVATION
SCALE 1/8" = 1'-0"

1252.0
14.0
1238.0



SECTION A-A
SCALE 1/8" = 1'-0"



PROFILE AT CROWN OF FIN. PAVEMENT - HWY. 23
SCALE { HORIZONTAL 1" = 20' VERTICAL 1" = 10' }

INDEX OF DRAWINGS

DWG. NO.	TITLE

PRINT RECORD

No.	FOR	DATE

REVISIONS

DATE	BY	DESCRIPTION

MARGISON AND KEITH
ENGINEERS AND ARCHITECT

DEPARTMENT OF HIGHWAYS ONTARIO
BRIDGE DIVISION

LITTLE MAITLAND RIVER BRIDGE

3 MILES SOUTH OF PALMERSTON

KING'S HIGHWAY No. 23 DIST. No. 3
CO. PERTH
TWP. WALLACE LOT 25/24 CON. VIII

GENERAL LAYOUT

APPROVED _ BRIDGE ENGINEER				SITE No. 26-15	W.P. No. 227-61
DESIGN	D.L.B.H	CHECK		CONTRACT Nos.	
DRAWING	R.B.J	CHECK			
DATE	15/4/63	LOADING	H20-S16	DRAWING No.	D-5197-1

636-625
3415

[redacted]

BA 1520 23-64-118

Mr. A. M. Toye,
Bridge Engineer,
Bridge Division.

Attention: Mr. S. McCombie.

Mr. A. G. Stermac,
Principal Foundation Engr.,
Foundation Section,
Materials & Research Division.
September 24, 1962.

Re: D.H.O. FOUNDATION INVESTIGATION REPORT -
Prop. Crossing at Little Maitland River &
Hwy. #23 - 3.1 Mi. South-West of Palmerston,
W.J. 62-F-109 - District #3. - W.P. 227-61

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

We believe you will find the factual data and recommendations contained therein, self-explanatory. However, should further information be desired, please feel free to contact our Office.

KYL/MdeF
Attach.

K. Y. Lo,
SUPERVISING FOUNDATION ENGR.
For:

A. G. Stermac,
PRINCIPAL FOUNDATION ENGR.

cc: Messrs. A. M. Toye (2)
H. A. Tregaskes
H. D. McMillan
A. Gater
L. D. Barrett
J. Roy
T. J. Kovich
J. E. Gruspier
E. R. Saint
F. Norman
A. Watt
Foundations Office
Gen. Files.

TABLE OF CONTENTS

FOUNDATION INVESTIGATION

For

Proposed Crossing at Little Maitland River and Hwy. #23 - 3.1 Miles South-west of Palmerston, District #3, Stratford.

W.J. 62-F-109 -- W.P. 227-61

1. INTRODUCTION:

A memo, dated August 24, 1962, requesting a subsoil investigation at the site of the proposed new bridge over the Little Maitland River on Highway #23, was received from the Bridge Location Section on August 24, 1962.

The requested foundation investigation was subsequently carried out by this Section, and presented in this report, are all the field and laboratory results, their interpretation and discussion, as well as the necessary recommendations for the foundations of the proposed new structure.

2. DESCRIPTION OF SITE:

The proposed new bridge is located in flat terrain consisting primarily of cultivated farmland and pasture areas.

The Little Maitland River is a shallow but fast-flowing stream with considerable evidence of erosion along its banks. Rock fill has been placed along the river banks close to the present structure, as erosion protection. The existing structure is founded on wooden piles.

cont'd. /2 ...

3. FIELD AND LABORATORY INVESTIGATION:

A total of 4 dynamic cone penetration tests and two sampled boreholes was carried out at the site, utilizing a conventional diamond drill rig. Samples were recovered using a 2-inch O.D. split-spoon sampler, driven into the soil with an energy of 350 ft.-lbs. per blow.

Each sample of the subsoil was visually classified in the field, before transportation to the laboratory, where a further classification was performed.

In addition, moisture content, grain size distribution analyses, and where possible, Atterberg limit determinations were performed on certain representative samples.

The results of these tests, together with the dynamic cone results, are plotted on the attached borehole logs contained in the Appendix of this report.

The locations and elevations of all boreholes are shown on the attached Plan No. 62-F-109A. All elevations are referred to a G.B.M. located on the handrail of the existing structure.

4. SUBSOIL CONDITIONS:

4.1) General:

Subsoil conditions at the site were found to be generally uniform. From ground level downwards, the various soil types encountered, were as follows:

cont'd. /3 ...

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

4.2) Silty-Sand to Sandy-Silt:

A grey to brown deposit of silty-sand to sandy-silt was found over the entire site from ground level in all boreholes with the exception of borehole #1, where topsoil and black organic peat extends from the surface of the ground to 6 feet below ground level.

This deposit averages 28 feet in thickness and terminates at elevation 1232. It is a loose to compact stratum, with standard penetration values ranging from 7 to 24 blows per foot, with an average value of 15.

Grain size distribution tests showed that this deposit consists of the following particle sizes: sand 51%, silt 45%, and clay 4%. However, the deposit becomes more silty with depth, and a pocket of slightly plastic clayey-silt was found in borehole #3. This pocket was made up of 15% and 80% clay and silt size particles, respectively.

The moisture content also decreases with depth from 20% to 10%, with an average value of 15%.

4.3) Heterogeneous Mixture of Silt, Sand & Gravel:

At elevation 1232 in the first three boreholes, and at elevation 1230 in borehole #4, a very dense, heterogeneous mixture of silt, sand and gravel was encountered. In all instances, the dynamic cone met refusal in this stratum at the above elevations.

cont'd. /4 ...

4. <u>SUBSOIL CONDITIONS</u>: (cont'd.) ...

4.3) <u>Heterogeneous Mixture of Silt, Sand & Gravel</u>: (cont'd.) ...

This deposit extends at least to 38 feet below ground level (elev. 1222); it is brown in color, relatively impermeable and very dense, with standard penetration values generally in excess of 100 blows per foot.

5. <u>GROUND WATER CONDITIONS</u>:

Water level observations were carried out for a period of 3 days at each borehole, and the water table was found to coincide with the level of the river at elevation 1257.0. No fluctuation of water levels or artesian conditions were encountered.

6. <u>DISCUSSION & RECOMMENDATIONS</u>:

A new, 42 ft. span bridge is proposed at the site, to carry Highway #23 over the Little Maitland River, approximately 3 miles south-west of Palmerston.

The subsoil at the proposed location, consists of loose to compact silty-sand to sandy-silt, followed by a very dense mixture of silt, sand and gravel with occasional boulders.

Adequate bearing capacity for a spread footing foundation cannot be found in the upper stratum, whereas the very dense deposit is located at too great a depth; hence, a foundation based on piles is recommended.

Both timber Class 'A' piles, and steel tubular piles, driven into the very dense silt, sand and gravel layer, may be used.

cont'd. /5 ...

6. DISCUSSION & RECOMMENDATIONS: (cont'd.) ...

For 12" Ø timber piles (treated if not completely below the lowest established water level), a safe design load of 25 tons per pile, may be used, provided the piles are driven to an estimated elev. 1240.0.

If steel piles are used, 12¾" outside diameter tubular piles are recommended. Assuming a pile tip elevation of 1230, or below, a safe load of 60 tons may be placed on each pile.

Regardless of which type of pile is used in the final design, pile driving should be controlled in the field by the Hiley Formula, as per D.H.O. Standards DD 1218 and DD 1219.

A dewatering scheme will be necessary as excavations will be carried out below river or water table levels.

Protection against scour will be necessary for the abutment footings. If sheeting is used, it is recommended that it be driven for a distance below the excavation bottom equal to the height of the water above it.

No stability problems with regard to the approach fills can be expected.

7. SUMMARY:

Subsoil at the site consists of silty-sand to sandy-silt followed by a very dense, silt sand and gravel stratum.

Because of the loose to compact nature of the upper layer, piled footings are recommended for the structure.

cont'd. /6 ...

7. <u>SUMMARY</u>: (cont'd.) ...

For 12" Ø timber piles driven to an estimated elev. 1240.0, a safe load of 25 tons per pile may be used. For steel piles, tubular 12¾" diameter tubes driven into the very dense stratum, a design load of 60 tons per pile may be used.

Pile driving should be controlled in the field by the Hiley Formula as per D.H.O. Standards.

A dewatering scheme will be necessary as excavations will be carried out below river or ground water levels.

If sheeting is used for scour protection, it may be incorporated into a scheme for dewatering.

No embankment stability problems are anticipated.

8. <u>MISCELLANEOUS</u>:

The field work was carried out during the period of September 6 - 10, 1962, and together with the preparation of this report, was performed by Mr. G. Mierzynski under the general supervision of Mr. M̆. Devata of the Foundation Section.

Equipment was owned and operated by the Johnston Drilling Co. of Ottawa.

September 1962.

APPENDIX I.

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & RESEARCH DIVISION

RECORD OF BOREHOLE NO. 1

FOUNDATION SECTION

JOB 62-F-109 LOCATION 23' Rt. of Station 356/84 ORIGINATED BY G.M.

W.P. 227-61 BORING DATE Sept. 6/62 COMPILED BY B.K.

DATUM G.B.M. BOREHOLE TYPE Washboring - BX Casing. CHECKED BY G.M.

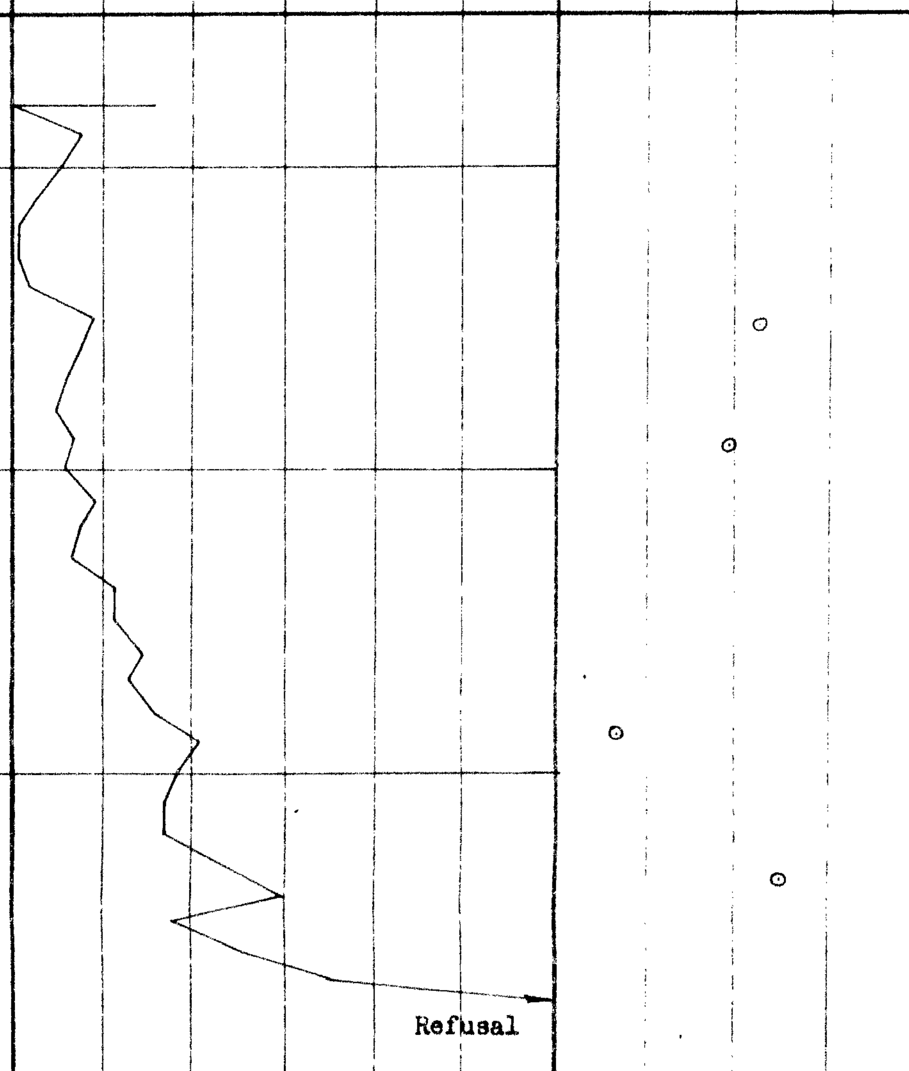
ELEV. / DEPTH	DESCRIPTION	NUMBER	TYPE	BLOWS / FOOT	REMARKS
1262.0	Groundlevel				W.L. from observations in borehole
0.0 / 1260.0	Topsoil				
2.0	Peat & chunks of wood mixed with sand	1	SS	2	▽ 1257.0 / 5.0
1256.0		2	SS	2	
6.0	Sand to silty-fine sand Loose to compact Grey-brown after 16.0'	3	SS	7	
		4	SS	12	Gravel =6% Sand =81% Silt =13% Clay = 2%
		5	SS	9	
		6	SS	24	
		7	SS	19	
1232.0 / 30.0	Heterogeneous mixture of silt, sand & gravel Very dense-brown	8	SS	>56	
1227.5		9	SS	>100	
34.5	End of borehole.				

ELEV. SCALE: 1260, 1250, 1240, 1230

DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT 20 40 60 80 100
SHEAR STRENGTH P.S.F.

LIQUID LIMIT — w_L
PLASTIC LIMIT — w_P
WATER CONTENT — w
WATER CONTENT % 10 20 30

BULK DENSITY γ P.C.F.



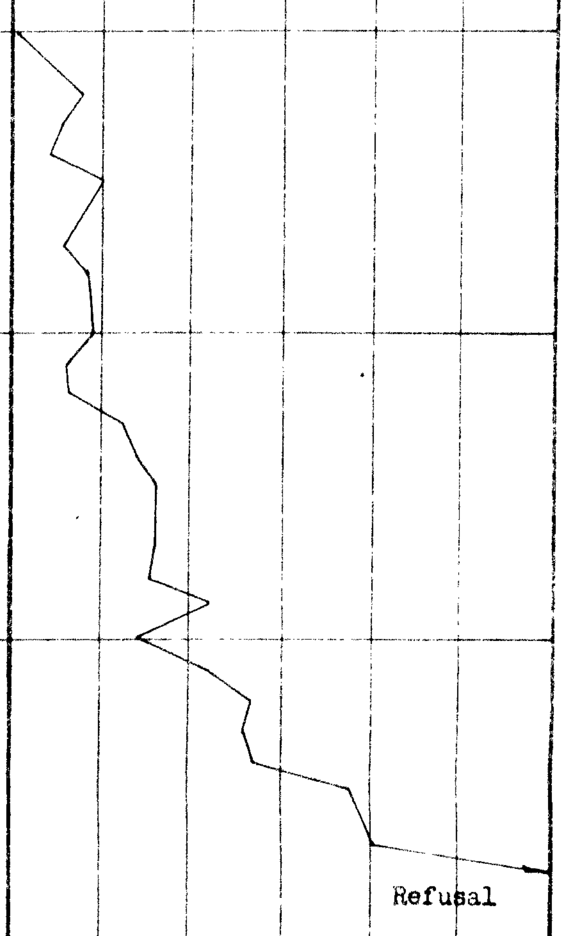
DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & RESEARCH DIVISION

RECORD OF BOREHOLE NO. 2

FOUNDATION SECTION

JOB 62-F-109	LOCATION 23' Rt. of Sta. 356+42	ORIGINATED BY G.M.
W.P. 227-61	BORING DATE Sept. 6/62.	COMPILED BY B.K.
DATUM G.B.M.	BOREHOLE TYPE Dynamic Cone Penetration Test.	CHECKED BY G.M.

ELEV. / DEPTH	SOIL PROFILE – DESCRIPTION	STRAT PLOT	SAMPLES – NUMBER	TYPE	BLOWS / FOOT	ELEV SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT (20, 40, 60, 80, 100); SHEAR STRENGTH P.S.F.	LIQUID LIMIT w_L, PLASTIC LIMIT w_P, WATER CONTENT w — WATER CONTENT %	BULK DENSITY γ P.C.F.	REMARKS
1260.0 / 0.0	Groundlevel					1260				
	Probably silty-sand to sandy-silt. Loose to compact.					1250				
						1240				
1232.0 / 28.0	End of Penetration. Probably mixture of silt, sand and gravel very dense.					1230	Refusal			



DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & RESEARCH DIVISION

RECORD OF BOREHOLE NO. 3

FOUNDATION SECTION

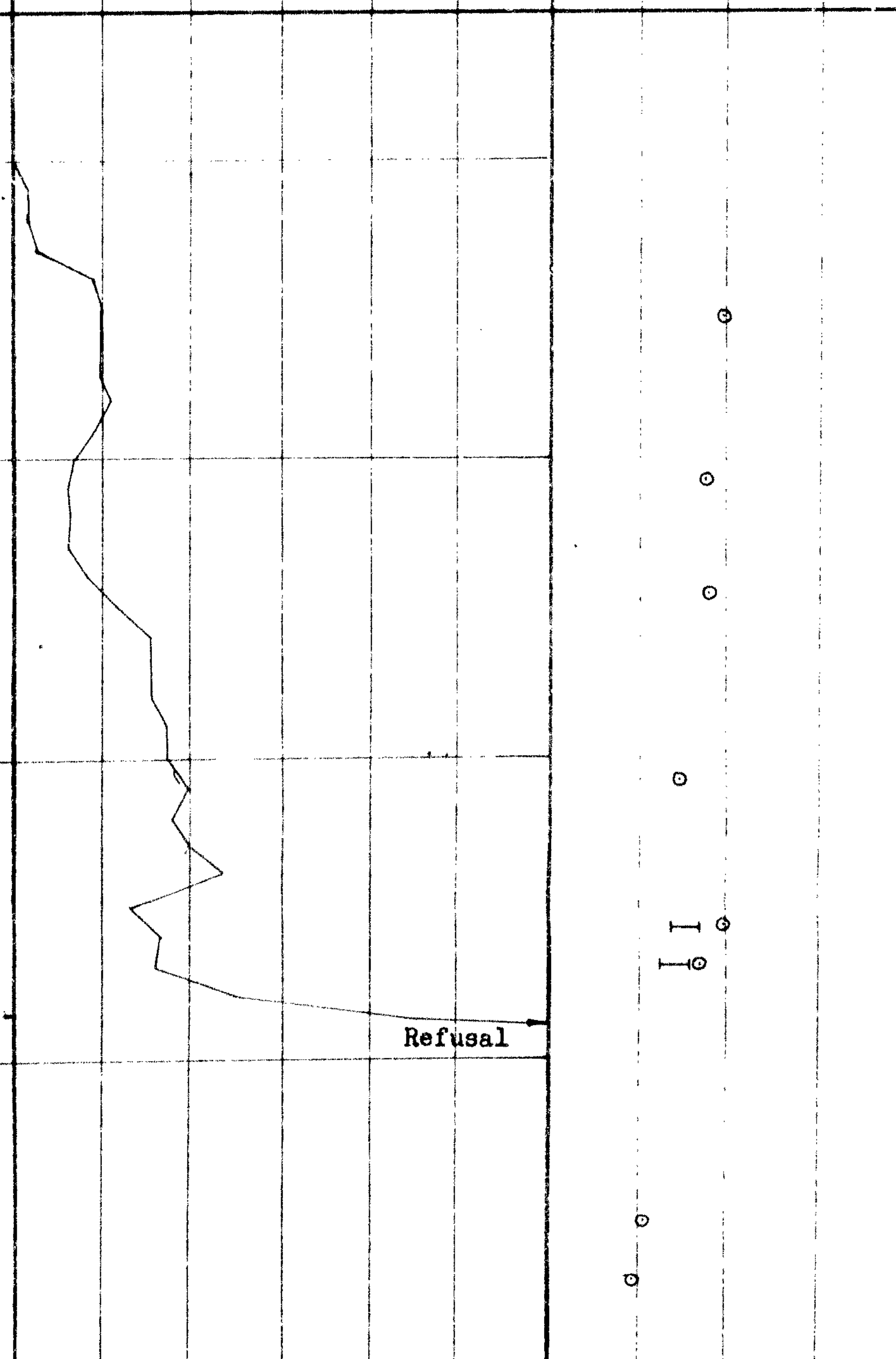
JOB 62-F-109	LOCATION 23' Lt. of Sta. 356+42	ORIGINATED BY G.M.
W.P. 227-61	BORING DATE Sept. 7 & 10, 1962.	COMPILED BY B.K.
DATUM G.B.M.	BOREHOLE TYPE Washboring - BX Casing.	CHECKED BY G.M.

ELEV. / DEPTH	SOIL PROFILE – DESCRIPTION	STRAT. PLOT	SAMPLES – NUMBER	SAMPLES – TYPE	SAMPLES – BLOWS / FOOT	ELEV SCALE	REMARKS
							W.L. from observations in borehole. 1257.0 / 3.0
1260.0 / 0.0	Groundlevel					1260	
	Silty-sand to sandy-silt. Loose to compact. Grey-Brown after 18.0'		1	SS	11		Gravel =8% Sand =67% Silt =19% Clay = 6%
			2	SS	9	1250	
			3	SS	19		Sand =40% Silt =58% Clay = 2%
			4	SS	23	1240	Sand = 47% Silt = 50% Clay = 3%
	Pocket of clayey-silt.		5	SS	5		Sand = 5% Silt = 80% Clay = 15%
			6	SS	9		
1232.0 / 28.0	Heterogeneous mixture of silt, sand and gravel. Very dense-Brown.		7	SS	86	1230	
			8	SS	>100		
			8-A	SS	>100		
1222.0 / 38.0	End of borehole.					1220	

DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT 20 40 60 80 100
SHEAR STRENGTH P.S.F.

LIQUID LIMIT — w_L
PLASTIC LIMIT — w_P
WATER CONTENT — w
WATER CONTENT % 10 20 30

BULK DENSITY γ P.C.F.



DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & RESEARCH DIVISION

RECORD OF BOREHOLE NO. 4

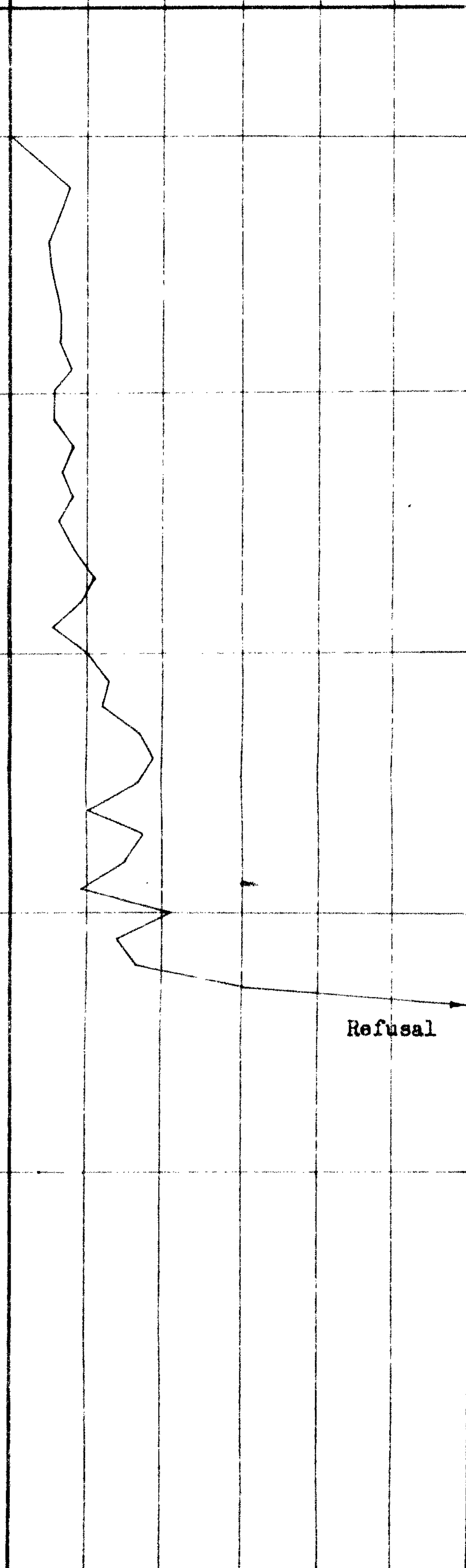
FOUNDATION SECTION

JOB 62-F-109
W.P. 227-61
DATUM G.B.M.

LOCATION 23' Lt. of Sta. 356/84
BORING DATE Sept. 10, 1962.
BOREHOLE TYPE Dynamic Cone Penetration Test.

ORIGINATED BY G.M.
COMPILED BY B.K.
CHECKED BY G.M.

SOIL PROFILE			SAMPLES				DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT 20 40 60 80 100 / SHEAR STRENGTH P.S.F.	LIQUID LIMIT — w_L / PLASTIC LIMIT — w_P / WATER CONTENT — w / WATER CONTENT %	BULK DENSITY γ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT	ELEV. SCALE				
1260.0	Groundlevel					1260				
0.0	Probably silty-sand to sandy-silt. Loose to compact.					1250 / 1240				W.L. 1257.0 3.0
1230.0 / 30.0	Probably mixture of silt, sand and gravel.					1230				
1226.0	Very dense.						Refusal			
34.0	End of Penetration.					1220				



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 :-

CONSISTENCY	'N' BLOWS / FT.	c LB. / SQ. FT.
VERY SOFT	0 - 2	0 - 250
SOFT	2 - 4	250 - 500
FIRM	4 - 8	500 - 1000
STIFF	8 - 15	1000 - 2000
VERY STIFF	15 - 30	2000 - 4000
HARD	> 30	> 4000

DENSENESS	'N' BLOWS / FT.
VERY LOOSE	0 - 4
LOOSE	4 - 10
COMPACT	10 - 30
DENSE	30 - 50
VERY DENSE	> 50

TYPE OF SAMPLE

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

P. H. SAMPLE ADVANCED HYDRAULICALLY

P. M. SAMPLE ADVANCED MANUALLY

SOIL TESTS

Qu	UNCONFINED COMPRESSION
Q	UNDRAINED TRIAXIAL
Qcu	CONSOLIDATED UNDRAINED TRIAXIAL
Qd	DRAINED TRIAXIAL
L.V	LABORATORY VANE
F.V.	FIELD VANE
C	CONSOLIDATION
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 INTERCEPT
ϕ'	EFFECTIVE ANGLE OF SHEARING RESISTANCE, OR FRICTION
	(c' and ϕ') IN TERMS OF EFFECTIVE STRESS $\tau_f = c' + \sigma' \tan \phi'$
c_u	APPARENT COHESION
ϕ_u	APPARENT ANGLE OF SHEARING RESISTANCE, OR FRICTION
	(c_u and ϕ_u) IN TERMS OF TOTAL STRESS $\tau_f = c_u + \sigma \tan \phi$
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 (YOUNGS 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_o	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

cc: Foundations Office (Rm. 110)

Mr. S. McCombie,
Bridge Planning Engr.,
Bridge Division.

Attention: Mr. Gavin Scott

Mr. A. G. Stermac,
Principal Foundation Engr.,
Foundation Section,
Materials & Research Division.

May 13, 1963

Re: Little Maitland River Bridge,
Hwy. 23, District No. 3,
W.P. 227-61.

We have reviewed Drawing No. D-5197-1 for the above-mentioned structure, and herewith, submit our comments for your consideration:

The subsoil where the footings will be placed, consists of silty sand to sandy silt. The water table, at the time of the investigation, was recorded at elev. 1257.0 which is some five feet above the proposed bottom footing elevation. It will, therefore, be necessary to apply a convenient dewatering scheme for the construction of the footing. Because we believe that some provision for scour protection is also necessary, it might be economical to combine the two into one.

As far as Drawing D-5247-P for the Kirkland Creek Structure No. 1 is concerned (W.P. 39-62), we have no comments.

AGS/MdeF

A. G. Stermac,
PRINCIPAL FOUNDATION ENGINEER

cc: Foundations Office
Gen. Files

CALCULATIONS SHOW ADEQUATE BEARING (25T) ACHIEVED AT 1240.0 SO ~~D~~

~~NOTE: DRAWING D-5197-1 REFUSAL TO PILE DRIVING IS EXPECTED AT OR ABOVE ELEV. 1228.0 AND LENGTH OF PILES SHOULD BE DETERMINED ACCORDINGLY.~~

BY PHONE TED HEWISON
JUNE 24, 1963

A. G. Stermac

BOILING MAY OR MAY NOT OCCUR - BORDERLINE CASE
NOT OF CRUCIAL IMPORTANCE SINCE PILES END BEARING