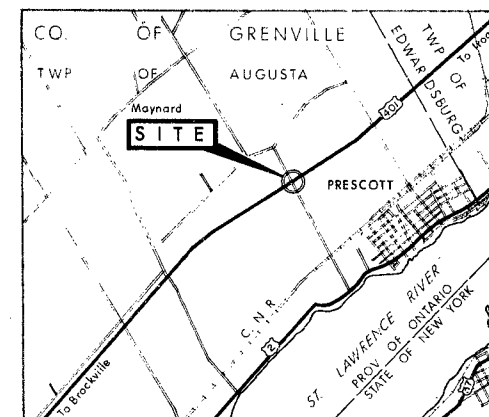
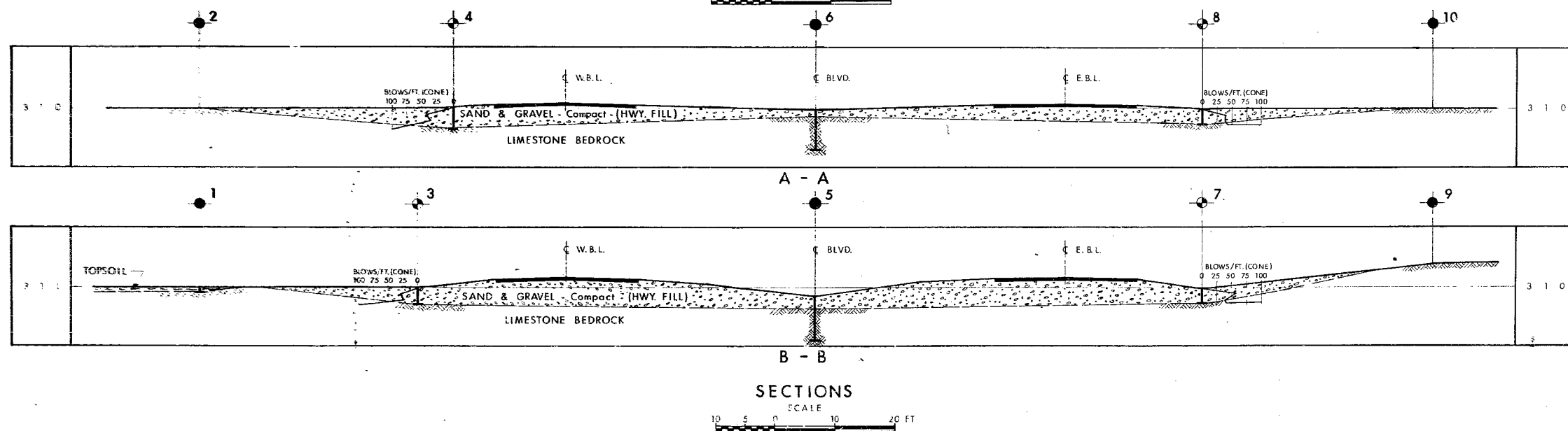
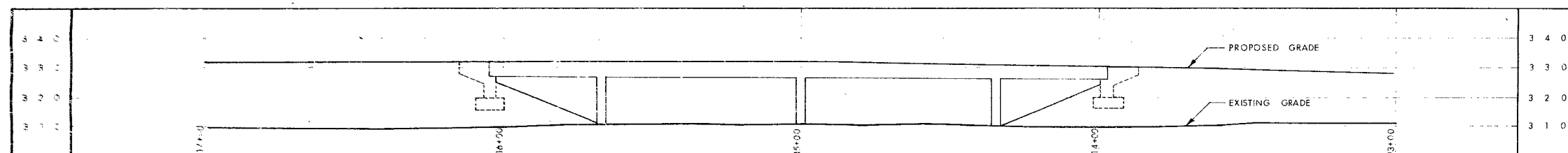
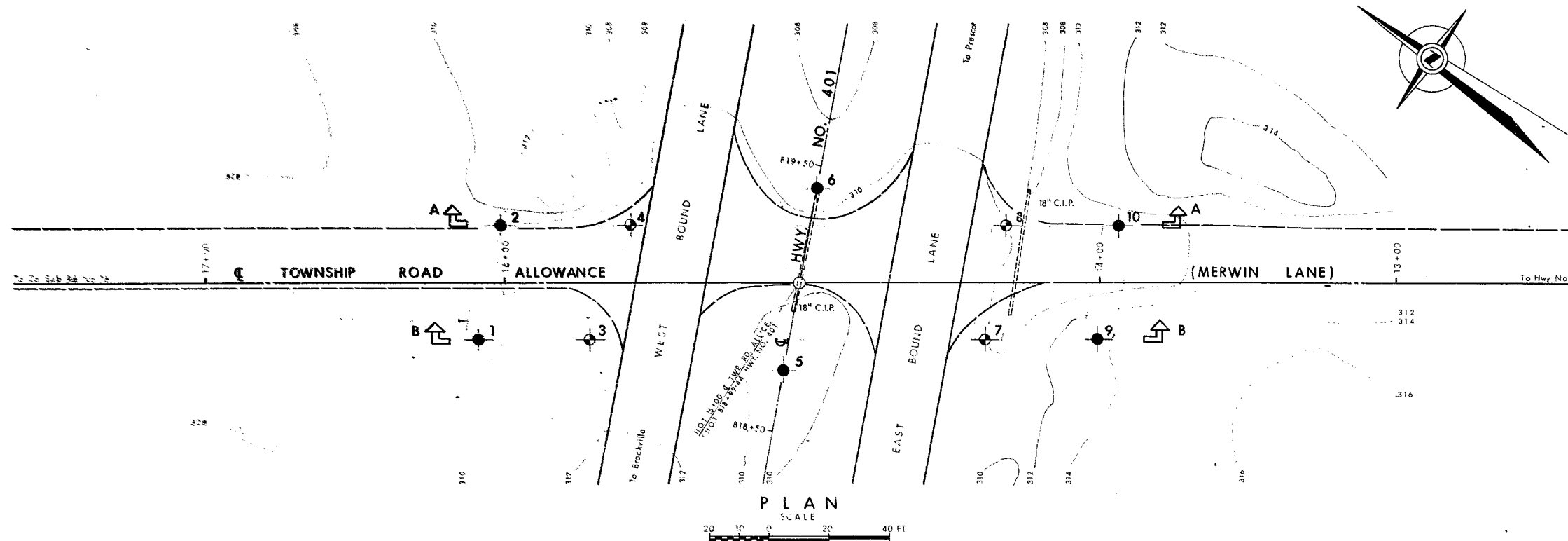


#64-F-58

W.P. #195-59

Hwy. #401

MERWIN LANE



LEGEND				
●	Bore Hole			
○	Curve Intersection			
⊙	Bore Hole (Water Level Station)			
▽	Water Level Station and Elevation of Field Level Station			

NO.	ELEVATION	STATION	OFFSET
1	310.0	16+09	19' LT.
2	310.0	16+01	19' RT.
3	310.0	15+71	19' LT.
4	310.0	15+58	19' RT.
5	308.5	15+06	30' LT.
6	309.8	14+95	31' RT.
7	310.0	14+38	19' LT.
8	310.0	14+31	19' RT.
9	314.0	14+01	19' LT.
10	310.0	13+93	19' RT.

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.

DATE	BY	REVISIONS

DEPARTMENT OF HIGHWAYS - ONTARIO			
MATERIALS RESEARCH			
MERWIN LANE			
KING'S HIGHWAY NO. 401		D.P.T. NO. 8	
CO. GRENVILLE		LOT 6 & 7	
TWP. AUGUSTA		CON. 1	
BORE HOLE LOCATIONS & SOIL STRATA			
DESIGNED BY W.K.	CHECKED BY	DATE	159-59
DRAWN BY D.M.	CHECKED BY	DATE	64-F-58
DATE AUG. 5, 1964		BY	
APPROVED BY		DATE	

REF. NO. E-4265-1

28-65-161.

DEPARTMENT OF HIGHWAYS ONTARIO

MEMORANDUM

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

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

Attention: Mr. S. McCombie

DATE: August 27, 1964

OUR FILE REF.

IN REPLY TO

SUBJECT:

FOUNDATION INVESTIGATION REPORT

For

Prop. New Underpass of Township Rd.
(Merwin Lane) & Hwy. #401, Line 'B',
County of Grenville, Township of
Augusta, Concession I, Lots 6 & 7,
District #8

W.J. 64-F-58

--

W.P. 195-59

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

We believe that you will find the factual data and recommendations contained therein, adequate for your future design work. Should further information be required, please do not hesitate to contact our Office.

AGS/MdeF
Attach.

cc: Messrs. A. M. Toye (2)
H. A. Tregaskes
H. D. McMillan
J. Ford
E. A. Cash
J. E. Gruspier
A. Watt

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

Foundation Section
Gen. Files /

TABLE OF CONTENTS

1. INTRODUCTION.
 2. DESCRIPTION OF SITE.
 3. FIELD AND LABORATORY WORK.
 4. SUBSOIL CONDITIONS:
 - 4.1) General.
 - 4.2) Compact Hwy. Fill.
 - 4.3) Limestone Bedrock.
 5. GROUND WATER CONDITIONS.
 6. DISCUSSION AND RECOMMENDATIONS.
 7. SUMMARY.
 8. MISCELLANEOUS.
-

FOUNDATION INVESTIGATION REPORT

For

Prop. New Underpass of Township Rd.
(Merwin Lane) & Hwy. #401, Line 'B',
County of Grenville, Township of
Augusta, Concession I, Lots 6 & 7,
District #8

W.J. 64-F-58

--

W.P. 195-59

1. INTRODUCTION:

A request to carry out a foundation investigation at the existing crossing of Township Rd. (Merwin Lane) and Hwy. #401, Line 'B', was received from the Regional Bridge Location Engineer, Mr. A. P. Watt, dated July 3, 1964.

It is proposed to erect a new bridge to carry the Township Rd. (Merwin Lane) over Hwy. #401. The site of the proposed bridge is located approx. 0.5 miles south-west of the Town of Prescott, County of Grenville, Twp. of Augusta. At this location, the chainage of the Township Rd. (Merwin Lane) is from 13+95 to 16+05, and that of Hwy. #401 is 818+99.

In order to determine the soil properties and decide on the type of foundation, an investigation was carried out by this Section. Results and the discussion of the field and laboratory investigations, as well as conclusions and recommendations for the future design work, are contained in the following paragraphs of this report.

2. DESCRIPTION OF SITE:

The site of the proposed underpass is located approximately 0.5 miles south-west of the Town of Prescott. The surrounding area is generally flat terrain.

Physiographically, the site is located in the so-called Iroquois Plain.

cont'd. /2 ...

3. FIELD AND LABORATORY WORK:

In order to obtain sufficient information on the type and properties of the subsoil, ten boreholes, and four penetration tests, were carried out at this site.

Because the bedrock was found very close to the ground surface, no samples were taken and no laboratory tests performed.

4. SUBSOIL CONDITIONS:

4.1) General:

The stratigraphy of the soil at the site was found to be generally uniform. Soil types encountered during the investigation are shown on Dwg. No. 64-F-58A, and briefly described in subsequent paragraphs.

4.2) Compact Hwy. Fill:

As can be seen from Dwg. No. 64-F-58A, 3 to 4 feet of sand and gravel fill was spread over the bedrock to achieve the desired Hwy. grade.

4.3) Limestone Bedrock:

Immediately below the topsoil, on Hwy. fill, is bedrock. The bedrock encountered at the site consists of limestone in layers of 2 to 6 inches thick. The upper 8 to 12 inches are in a loose and weathered state, and if found necessary, should be removed prior to placing of footings. An allowable net pressure of 10 tons/sq.ft. may be used for design purposes.

5. GROUND WATER CONDITIONS:

No ground water was encountered during the time of the investigation.

cont'd. /3 ...

6. DISCUSSION AND RECOMMENDATIONS:

The investigation has revealed that the bedrock is very close to the existing surface. It is therefore recommended that the footings should be placed directly on bedrock. A net allowable pressure of 10 tons/sq.ft. may be assumed for design purposes. All loose and weathered bedrock, should be removed prior to placing of footings. If perched abutments are used, they may be supported on H-piles, driven to bedrock and an allowable load of 50 - 70 T/pile can be used, depending on the pile section.

No stability problems for the approach fill are anticipated.

7. SUMMARY:

A foundation investigation at the site of the proposed Township Rd. (Merwin Lane) and Hwy. #401, Line 'B', is reported.

Subsoil was found to consist of compact gravel and sand (Hwy. fill), underlain by limestone bedrock.

An allowable net pressure of 10 tons/sq.ft. is recommended for footings placed directly on bedrock. If perched abutments are used, they should be supported on H-piles, driven down to bedrock.

No dewatering problems are anticipated.

No stability problems for the approach fills are anticipated.

contd. /4 ...

8. MISCELLANEOUS:

The field work, performed during July 21, 1964, together with the preparation of this report, was undertaken by Mr. W. W. Kulmatickas, Project Foundation Engineer. The investigation was carried out under the general supervision of Mr. K. G. Selby, Senior Foundation Engineer, who reviewed this report.

August 1964

APPENDIX I.

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_t	SHEAR STRENGTH
c'	EFFECTIVE COHESION INTERCEPT
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

00141

K

KIND DOWN 5 JULY 17/64 10.35 A VR

E A CAH DIST ENGR

ATTN H ORLANDO MTCE ENGR

FOR YOUR INFORM

ATION FOUNDATION SECTION WILL COMMENCE FIELD
WORK FOR PROPOSED STRUCTURES W P ¹⁹⁵ 159-59 AND 25-59 NEAR
PRESCOTT ONTARIO ON JULY 20/64

K G SELBY SR FOUND ENGR FOR

A G STERMAC PRINC FOUND ENGR

MATS AND TEST DIV

G

1964 JUL 17 AM 10:45

DEPARTMENT OF HIGHWAYS ONTARIO

MEMORANDUM

To: Mr. A. G. Stermac,
Principal Foundation Engineer,
Room 107, Lab. Bldg.

From: Bridge Division,
Downsview, Ontario.

Date: July 3, 1964.

Our File Ref.

IN REPLY TO

SUBJECT: W.P. 195-59
County Road Underpass
0.4 Miles West of Prescott
Hwy. 401 - Dist. 8

Would you kindly arrange to have a foundation investigation conducted at the above location. I have enclosed one copy of the site plan number E-4265-1 with the probable footing locations marked in red.

Bedrock will likely be at or near the surface in a majority of the holes.

A. P. Watt

APW/sp A. P. Watt,
cc. M.D. Smith Regional Bridge Location Engineer.
R. Fitzgibbon

BROCK HOTEL

PRESCOTT

PHONE: DI-8-3328

MON. JULY 20 -

MEMORANDUM

File: 41.1.2.1

To: Mr. A. G. Stermac,
Principal Foundation Engineer,
Lab. Bldg., Room 107

FROM: Bridge Division,
Downsview, Ontario.

DATE: November 18, 1964.

OUR FILE REF.

IN REPLY TO

SUBJECT: W.P. 195-59
Site 16-166
County Road Underpass
0.4 Miles West of Prescott
Hwy. 401 - Dist. 8

64-T-51

Enclosed please find one copy of the preliminary plan D-5557-P1 for the above noted structure.

Would you kindly review the bridge foundations proposed and inform me if they are satisfactory.

A. P. Watt

APW/sp

A. P. Watt,
Regional Bridge Location Engineer.

O.K.
Nov 22, 1964
[Signature]

[Handwritten notes]
H. Watt
phone
Nov 23, 64
K. 1.1.1.1