

MEMORANDUM

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

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

Attention: Mr. S. McCombie

DATE: March 19, 1968

OUR FILE REF.

IN REPLY TO

APR - 5 1968

SUBJECT:

FOUNDATION INVESTIGATION REPORT
For
Proposed New Structure at Crossing
Of
Brudenell Creek and Hwy. #512
District #10 (Bancroft)
W.J. 68-P-6 -- W.P. 155-66-02

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 feel free to contact our Office.

AGS/MdeF
Attach.

cc: Messrs. B. R. Davis (2)
H. A. Tregaskes
D. W. Farren
S. J. Markiewicz
J. E. Callaghan
G. Scott
J. E. Gruspier
B. A. Singh

Foundations Office
Gen. Files

A. G. Sternac
A. G. Sternac
PRINCIPAL FOUNDATION ENGINEER

TABLE OF CONTENTS

1. INTRODUCTION.
 2. DESCRIPTION OF SITE.
 3. FIELD WORK.
 4. LABORATORY TESTING.
 5. SOIL TYPES AND SOIL CONDITIONS:
 - 5.1) General.
 - 5.2) Sand - Some Gravel.
 - 5.3) Sandy Silt to Silty Sand.
 - 5.4) Bedrock.
 6. GROUNDWATER.
 7. DISCUSSION AND RECOMMENDATIONS.
 8. SUMMARY.
 9. MISCELLANEOUS.
-

FOUNDATION INVESTIGATION REPORT
For
Proposed New Structure at Crossing
Of
Brudenell Creek and Hwy. #512
District #10 (Bancroft)
W.J. 68-F-6 -- W.P. 155-66-02

1. INTRODUCTION:

The Foundation Section was requested to carry out a foundation investigation at the above site. The request was contained in a memorandum dated January 9, 1968, from Mr. G. Scott, Regional Bridge Location Engineer.

A field investigation was subsequently carried out by this Section to determine the subsoil conditions existing at the site of the proposed crossing.

Presented in this report are the results of our field and laboratory investigations, together with our recommendations pertaining to the foundations of the new structure.

2. DESCRIPTION OF SITE:

The site is located about two miles south of Killaloe on secondary Hwy. #512. The new structure will be located immediately north of the existing structure. Some houses are located in the surrounding area. The existing bridge is a rigid frame slab concrete structure with a 35.8 ft. clear span. The creek flows in a northerly direction and is relatively shallow at the site. No creek diversion will be necessary. The topography is rolling with rock outcrops appearing on the southern side of the highway.

Physiographically, the site is located in the region referred to as the 'Precambrian Shield'.

cont'd. /2 ...

3. FIELD WORK:

A total of nine sampled boreholes was carried out during the course of the field work. Drilling equipment consisted of a conventional diamond drill adapted for soil sampling purposes. 'Disturbed' samples were recovered at required depths by means of a split-spoon driven into the soil with a 140-lb. hammer imparting an energy of 350 ft.-lbs. per blow according to the specifications of the 'Standard Penetration' test. All samples were visually examined in the field before being transported to the laboratory.

The locations and elevations of all the boreholes were surveyed by personnel from the Kingston Region Engineering Surveys Section, and are shown on Drawing 68-F-6A, together with the estimated stratigraphical profiles in the Appendix of this report.

4. LABORATORY TESTING:

All samples were subjected to a careful visual inspection in the laboratory. Laboratory tests were then taken on selected representative samples to determine:

- i) Natural Water Content
- ii) Grain-Size Distribution

The results of these tests are summarized and plotted on the Record of Borelog sheets contained in the Appendix of this report.

5. SOIL TYPES AND SOIL CONDITIONS:

5.1) General:

Subsoil conditions over the site area were found to be generally uniform. Two soil types were encountered, namely, sand with some gravel, and sandy silt to silty sand.

cont'd. /3 ...

5. SOIL TYPES AND SOIL CONDITIONS: (cont'd.) ...

5.2) Sand - Some Gravel:

This deposit consisted of sand with some gravel and traces of silt and clay. The deposit was encountered in all nine boreholes. The thickness of the layer varies from 3.6 feet to 13.4 feet. 'N' values ranged from 12 to 85 blows per foot, indicating a compact to very dense relative density. The moisture content varied from 8.2% to 15.5%. Grain-size distribution curves are included in the Appendix of this report.

5.3) Sandy Silt to Silty Sand:

This deposit was encountered in boreholes 4 and 5. The thickness of this layer varied from 4.5 feet to 5.8 feet. 'N' values obtained from Standard Penetration tests ranged between 14 to 19 blows per foot. The moisture content varied from 11.2% to 26.6%. Grain-size distribution curves are included in the Appendix of this report.

5.4) Bedrock:

The bedrock was proven in three boreholes, namely, boreholes 1, 4 and 6. The recovery was about 90%. The rock type is sound granite gneiss. The elevations of the bedrock surface were quite irregular, but they tended to be deeper to the north. The boreholes were located by measuring from the existing bridge. The elevations ranged from 604.3 to 612.0 on the west abutment, while they varied between 606.1 and 614.1 on the east abutment.

6. GROUNDWATER:

All nine borings were carried out on top of the ice so the recorded water level is the top of ice, namely, elevation 622.0.

cont'd. /4 ...

7. DISCUSSION AND RECOMMENDATIONS:

It is proposed to construct a new structure approximately 140 feet long immediately to the north of the existing bridge. The proposed profile grade is about 22 ft. above the existing creek bed.

Subsoil at the site consists of 4 to 15 ft. of very loose to very dense granular type material, underlain by granite gneiss bedrock.

Three alternatives for the new structure are being considered:

1) The entire structure may be supported on spread footing type foundations placed within the sound bedrock. A key of minimum depth 12 inches is recommended. Safe bearing pressures up to 20 T.S.F. may be used for design purposes. This alternative, however, would require up to 15 ft. of overburden excavation.

Due to the granular nature of the subsoil and groundwater conditions, it will be necessary to employ a dewatering scheme to ensure that the footings are poured in the dry. Dewatering can be achieved by:

- a) Wellpoints
- b) Protective Sheet piling
- c) Overexcavating

It should be pointed out that driving of steel sheet piling through the overburden will be very difficult; therefore, heavy sections should be used.

2) The new structure may be supported on spread footings placed within compacted rock fill approach embankments, with sufficient cover for frost protection. If this alternative is followed, all surface organic deposits must be removed prior to placing the rock fill which should be constructed to full height.

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

2) The new structure may be supported on spread footings placed within compacted rock fill approach embankments, with sufficient cover for frost protection. If this alternative is followed, all surface organic deposits must be removed prior to placing the rock fill which should be constructed to full height, then re-excavated for the bridge footings. A safe load of 2.0 T.S.F. may be assumed for design purposes. This scheme has the main advantage that no dewatering is required. The structure, however, will be slightly longer than for scheme (1) and should be simply supported. It is an essential requirement of this scheme that the new fill and stream bed be protected completely against scour or other eroding agencies. The rock fill should extend behind the new footings for a minimum distance of 30 ft. and may be constructed with side and forward slopes of 1-1/2 horizontal to 1 vertical. If this scheme is considered, any proposals should be reviewed by the Hydrology Section.

3) As the third alternative, the proposed structure may consist of concrete (twin) box type culverts or flexible pipe arch culverts. Both of these structures should be supported on a granular pad of minimum thickness 2.0 ft., and should be constructed according to the pertinent D.H.O. Standards. In order to properly compact the culvert bed, it is necessary to carry out this work in the dry. To accomplish this, a dewatering scheme will be required. Three methods are suggested, as in Case (1):

- a) Wellpoints
- b) Protective Sheeting
- c) Overexcavating

Certain difficulties may be expected for driving the sheet piles through the overburden; therefore, heavy sections should be employed.

For the proposed approaches, no stability problems are anticipated, provided that the embankments are constructed with 2:1 standard slopes, or as outlined in scheme (2).

8. SUMMARY:

A foundation investigation at the crossing of the proposed Revision Line 'F', Sec. Hwy. #512 and Brudenell Creek is reported.

Subsoil at the site investigated was found to consist of sand with some gravel and fines, silty sand to sandy silt with traces of gravel and clay, followed by sound granite gneiss bedrock. Three alternatives have been considered:

- 1) Single-span bridge supported on spread footings placed within the sound bedrock. A safe design load up to 20 T.S.F. may be assumed.
- 2) Single-span bridge supported on spread footings placed within rock fill approach embankments. A safe design load of 2.0 T.S.F. may be assumed for design purposes.
- 3) Culverts: a) Concrete (Twin) Box
b) Flexible Pipe Arch or Arches

The culverts should be supported on a minimum 2.0 ft. thick, well compacted granular pad.

A proper dewatering scheme will be required for the first and the third alternatives.

No stability problems are anticipated for the proposed approach embankments.

Details are given in the foregoing section: "Discussion and Recommendations".

cont'd. /7 ...

9. MISCELLANEOUS:

The field work was carried out during the period January 30 to February 5, 1968. The equipment used was owned and operated by Canadian Longyear Ltd.

The supervision of the field work, and the preparation of this report, was carried out by Mr. A. M. Seppala, Project Foundation Engineer, under the general supervision of Mr. K. G. Selby, Supervising Foundation Engineer.

March, 1968.

APPENDIX I

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 1

FOUNDATION SECTION

JOB 68-F-6 LOCATION Sta. 363 + 47 @ 20' o/s Rt.

ORIGINATED BY AMS

W P 155-66-02 BORING DATE Jan. 30, 1968

COMPILED BY AMS

DATUM Geodetic BOREHOLE TYPE NX Casing & AXT Rock Core

CHECKED BY AMS

SOIL PROFILE			SAMPLES			ELEV SCALE	DYNAMIC PENETRATION RESISTANCE		LIQUID LIMIT — WL		BULK DENSITY	REMARKS
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT	SHEAR STRENGTH P S F	PLASTIC LIMIT — WP	WATER CONTENT — W		
622.0	Water Level											
0.0												
618.5	Ground Level					620						
3.5	Sand, some gravel, traces of silt & clay.		1	SS	12							
614.5	Compact											
7.5	Granite Gneiss		2	AXT RC	95%	610						
605.8	Bedrock		3	AXT RC	95%							
16.2	End of Borehole											

Gr.Sa.Si.C

18 68 (14)

CHECKED BY

SOIL PROFILE		SAMPLES	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT	LIQUID LIMIT ——— % L	PLASTIC LIMIT ——— % P	WATER CONTENT ——— % W	BULK DENSITY	REMARKS
ELEV DEPTH	DESCRIPTION	NUMBER TYPE BLOWS / FOOT	SHEAR STRENGTH P S F			 WATER CONTENT % 10 20 30	P C F	
621.8	Water Level							Gr.Sa.Sl.Cl.
619.3	Ground Level							
2.5	Sand, Some gravel, traces of silt & clay. Compact							
616.3		1 SS 19						O 6 8h 10
5.5	Sandy silt with traces of clay. Compact.							
611.8		2 SS 19						18 46 31 5
10.0	Sand, Some gravel, traces of silt & clay.							
606.1	Compact.	3 SS Bouncing						
15.7	Probable Bedrock End of Borehole							

MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 6

FOUNDATION SECTION

JOB 68-F-6

LOCATION Sta. 364 + 28 @ 8' o/s Rt.

ORIGINATED BY **AMS**

W P 155-66-02

BORING DATE Jan. 31, 1968

COMPILED BY AMS

DATUM Geodetic

BOREHOLE TYPE NX Casing and AXT Rock Core

CHECKED BY _____

SOIL PROFILE		SAMPLES	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT	Liquid Limit _____ WL Plastic Limit _____ WP Water Content _____ Wp	Bulk Density	REMARKS
ELEV DEPTH	DESCRIPTION	NUMBER TYPE BLOWS / FOOT	ELEV SCALE			
621.3	Water Level					
619.3	Ground Level		620			
2.0	Sand, some gravel, traces of silt & clay	1 SS 26				
	Very loose to compact.	2 SS 18				
608.6		3 SS 3	610			
12.7	Granite Gneiss	AXT Rec.				
603.3	Bedrock	RC 100%				
18.0	End of Borehole					

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

JOB 68-F-6

LOCATION Sta. 363 + 88 @ 28' o/s Rt.

ORIGINATED BY AMS

W P 155-66-02

BORING DATE Feb. 1, 1968

COMPILED BY AMS

DATUM Geodetic

BOREHOLE TYPE NX Casing & Wash Bore

CHECKED BY

SOIL PROFILE		SAMPLES			ELEV SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT	SHEAR STRENGTH P S F	LIQUID LIMIT ——— W _L PLASTIC LIMIT ——— W _P WATER CONTENT ——— W W _P ——— W _L WATER CONTENT % 10 20 30	BULK DENSITY P C F	REMARKS
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE						
622.5	Water Level									
0.0										
618.7	Ground Level					620				
3.8	Sand, some gravel, traces of silt & clay.		1	SS	36					
614.1	Dense									
8.4	Probable Bedrock End of Borehole					610				

DEPARTMENT OF HIGHWAYS - ONTARIO

RECORD OF BOREHOLE NO. 8

FOUNDATION SECTION

MATERIALS & TESTING DIVISION

JOB 68-F-6

LOCATION Sta. 262 + 61 & 7' o/s Rt.

ORIGINATED BY AMS

W p 155-66-02

BORING DATE Feb. 5, 1968

COMPILED BY _____ AMS

DATUM Geodetic

BOREHOLE TYPE NX Casing and Wash Bore

CHECKED BY

SOIL PROFILE		SAMPLES			DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT	LIQUID LIMIT ——— % PLASTIC LIMIT ——— % WATER CONTENT ——— %	BULK DENSITY P C F	REMARKS
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	BLOWS / FOOT	SHEAR STRENGTH P S F	WATER CONTENT % 10 20 30	
622.0	Water Level							
0.0								
618.2	Ground Level							
3.8	Sand, some gravel & some silt, trace of clay.		1	SS	41		○	14 64 (22)
612.0	Dense.							
10.0	Probable Bedrock							
	End of Borehole							

DEPARTMENT OF HIGHWAYS - ONTARIO

MATERIALS & TESTING DIVISION

JOB 68-F-6

LOCATION Sta. 364 + 08 @ 17' o/s to Rt.

ORIGINATED BY AMS.

W. P. 155-66-02

BORING DATE Feb. 5, 1968

COMPILED BY AMS

DATUM Geodetic

BOREHOLE TYPE NX Casing & Washbore

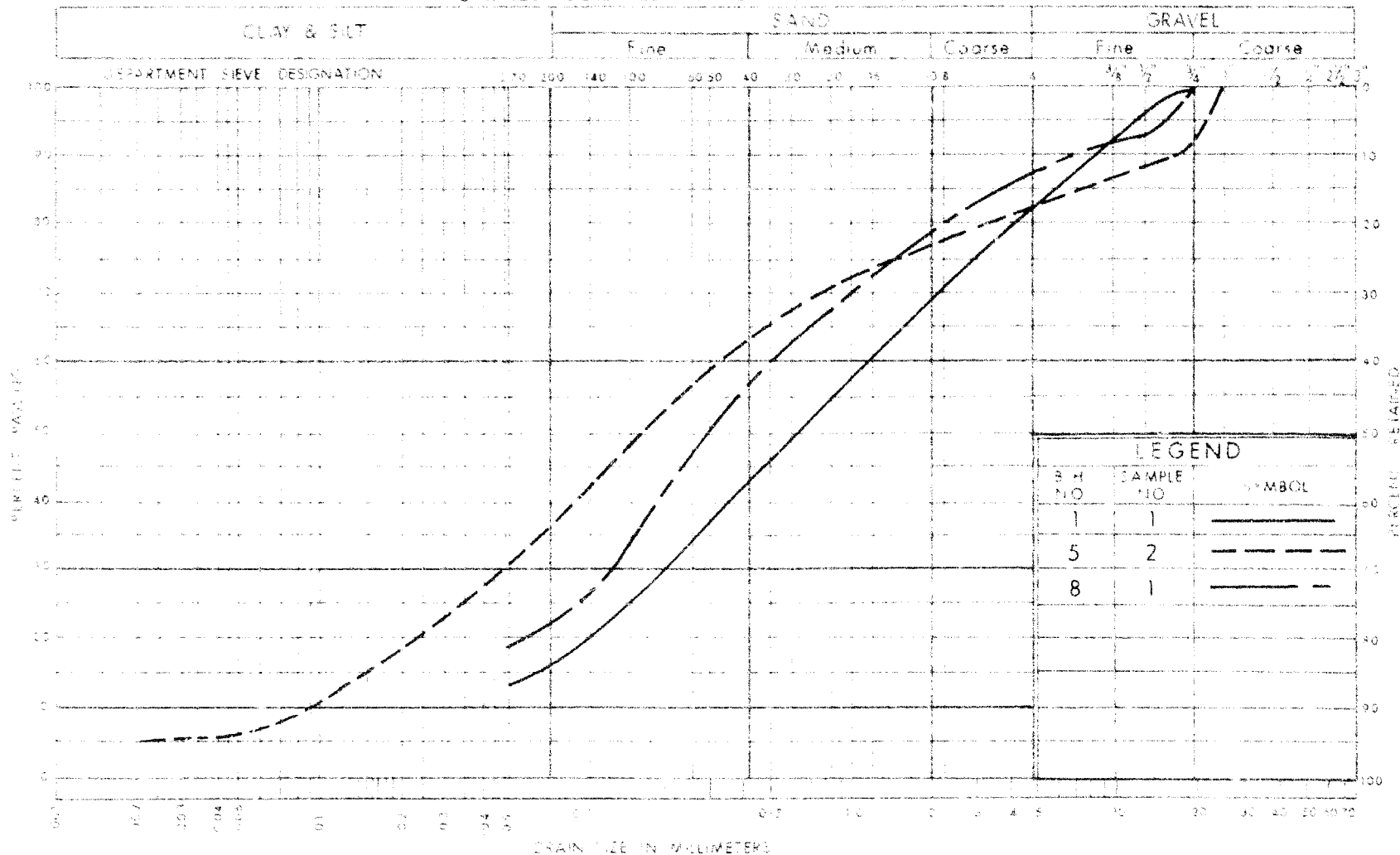
CHECKED BY

RECORD OF BOREHOLE NO. 9

FOUNDATION SECTION

[illegible]

UNIFIED SOIL CLASSIFICATION SYSTEM



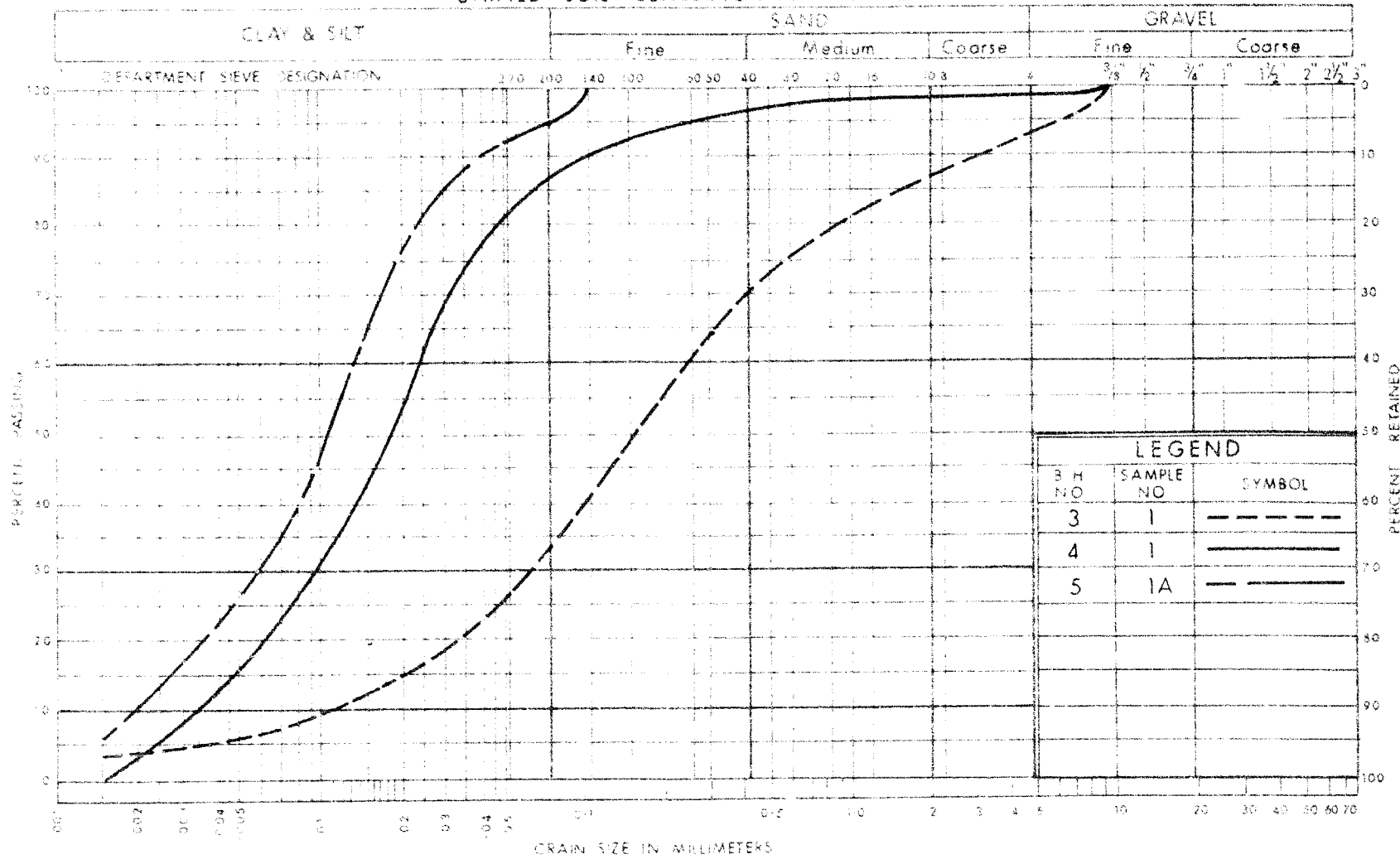
DEPARTMENT OF HIGHWAYS
MATERIALS and
TESTING
DIVISION

GRAIN SIZE DISTRIBUTION SAND

WP No. 155-66-02

JOB No. 68-F-6

UNIFIED SOIL CLASSIFICATION SYSTEM



DEPARTMENT OF HIGHWAYS
MATERIALS and
TESTING
DIVISION

GRAIN SIZE DISTRIBUTION
SILTY SAND TO SANDY SILT

W.P. No. 155-66-02
JOB No. 68-F-6

ABBREVIATIONS USED IN THIS REPORT

PENETRATION RES STANCE

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

Q _u	UNCONFINED COMPRESSION	L.V	LABORATORY VANE
Q	UNDRAINED TRIAXIAL	F.V	FIELD VANE
Q _{cu}	CONSOLIDATED UNDRAINED TRIAXIAL	C	CONSOLIDATION
Q _d	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
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	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

MEMORANDUM

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

From: C.S. Grebski,
Bridge Office

Attention:

Date: June 5, 1969

Our File Ref.

In Reply To

Subject: W.F. 155-66-02, Site 29-63
Brudenell Creek Structure
1½ Miles South of Killaloe Station
Highway 512, District No. 10

68-1-6

Attached herewith we are submitting the final bridge drawings which show the foundation design for this structure.

Kindly give us your comments at your earliest convenience.

CSG:rd

Attach.

c.c. Foundation Section

W. Grebski
for C.S. Grebski,
Bridge Design Engineer

RECEIVED
JUN 10 1969
CSG

MEMORANDUM

TO: Mr. T.C. Kingsland,
Structural Planning Engineer,
Structural Planning Office,
Kingston Regional Office.

FROM: Structural Office,
West Building,
Downsview, Ontario.

DATE: October 28, 1974.

ATTENTION:

IN REPLY TO

OUR FILE REF.

SUBJECT:


Brudenell Creek Structure
Site 29-63, W.P. 155-66-02
Hwy. #512, District #10, Bancroft

Enclosed herewith are four prints of the revised preliminary plan 29-63-1P for the above-noted structure.

Please note that the 27'-3"x18'-5" multiplate pipe used on the original design has been replaced by 2-14' diameter structural plate pipes. The reason for the change is that the shape of the 27'-3"x18'-5" multiplate pipe is very sensitive and is no longer considered to be suitable for this site.

This project is scheduled to be advertised on December 11, 1974, and we have promised to have all the drawings, quantities and special provisions ready by November 13, 1974. We would, therefore, appreciate receiving comments from all concerned as soon as possible.

A copy of the preliminary plan is being sent to the District, Soil Mechanics and Hydrology Section with a copy of this memo.


K.G. Bassi,
Regional Structural Design Eng.

KGB/ac

Enclosure.

c.c. D. White
J. Harris
K. Selby



FOUNDATIONS OFFICE

REVIEW OF DESIGN DRAWINGS:

W.P. 155-66-02
W.O. 68-F-6

Foundations Report by: J. H. Seneca
Review of Design Drawings by: J. Selby & J. H. Seneca
Design Drawing No.'s:
.....

1. Does footing design comply with our report or subsequent memos?
2. If answer to 1. is 'No'; is present design acceptable?
3. Has sufficient field work been done?
4. Are estimated pile lengths shown on Drawings correct?
If not, make a new list.
5. If excavation of unstuitable soil is recommended,
is this shown on drawings?
6. Are approaches designed in accordance with our report?
Check slopes and berm lengths.
7. Do you anticipate any construction problems?
i.e. dewatering, stability of temporary slopes
or excavations.
8. Summarize your comments; on separate sheet is
necessary.

*Spoke with Mr. S.H. Brown (Oct. 21/74). He has
discussed this job with Mr. Selby and did
not require any answer to his memo dated
Oct. 23. (see attached memo against.)*
J.H. Seneca

Drawings Received 19⁷⁴
Reviewed 19⁷⁴

Signed J.H. Seneca



XX 2400 NOV 1/74 2:30

FROM: K G BASSI, REGIONAL STRUCTURAL DESIGNER, STRUCTURAL OFFICE
KING: T C KINGSLAND, STRUCTURAL PLANNING ENG

CORRESP TO: J - CIVIL ENGINEERING SERVICES BRANCH, HYDROLOGY SECTION
WEST BLDG. DOWNSVIEW
K SELBY ENGINEERING SERVICES BRANCH, SOILS MECHANICS
SECTION, WEST BLDG. DOWNSVIEW

RE: BRUDENELL CREEK STRUCTURE

SITE 29-63, W.P. 155-66-02

HWY. 512, DISTRICT 10, BANCROFT

68-F-006

1001 NOV 74

File - MT
Nov 25/74

IN REPLY TO YOUR MEMO TO T C KINGSLAND DATED OCT 29/74.

THE DISTRICT HAS NO OBJECTION TO CHANGING THE DESIGN OF THE
ABOVE STRUCTURE FROM A 27'-3" X 15'-5" MULTIPLATE PIPE TO
2-14' DIAMETER STRUCTURAL PLATE PIPE.

F L DELVEA FOR D A C WHITE DIST ENG

JS

This proposal has been discussed
and agreed on by OS - no essential change
from the original report - Drawings have been
revised also by Head Office about a month ago.

Ken:

Do you anticipate any new
recommendations from us a result of
the above change? If so, please
provide them in writing to K. Bassi (memo
or Teletype).

Answer - No! K.G. Bassi

T
E
L
E
T
Y
P
E

T
E
L
E
T
Y
P
E

T
E
L
E
T
Y
P
E

T
E
L
E
T
Y
P
E

OVERSIZES DRAWINGS

~~RECORD OF BOREHOLE #.~~

General Layout.

DOCUMENT MICROFILMING IDENTIFICATION

GEOCRES No. 31F-36

DIST. 10 REGION EASTERN

W.P. No. 155-66-02

CONT. No. 74-159

W. O. No. 68-F-6

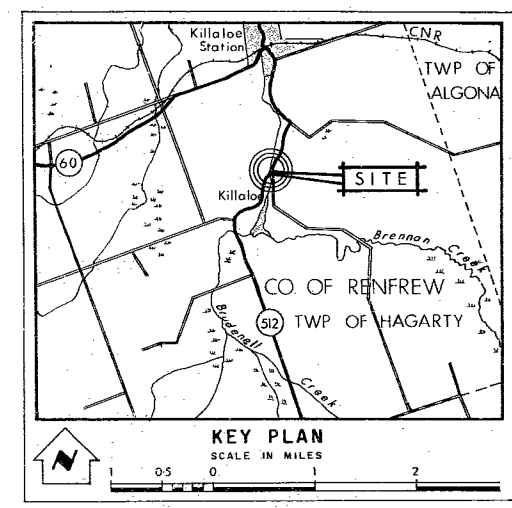
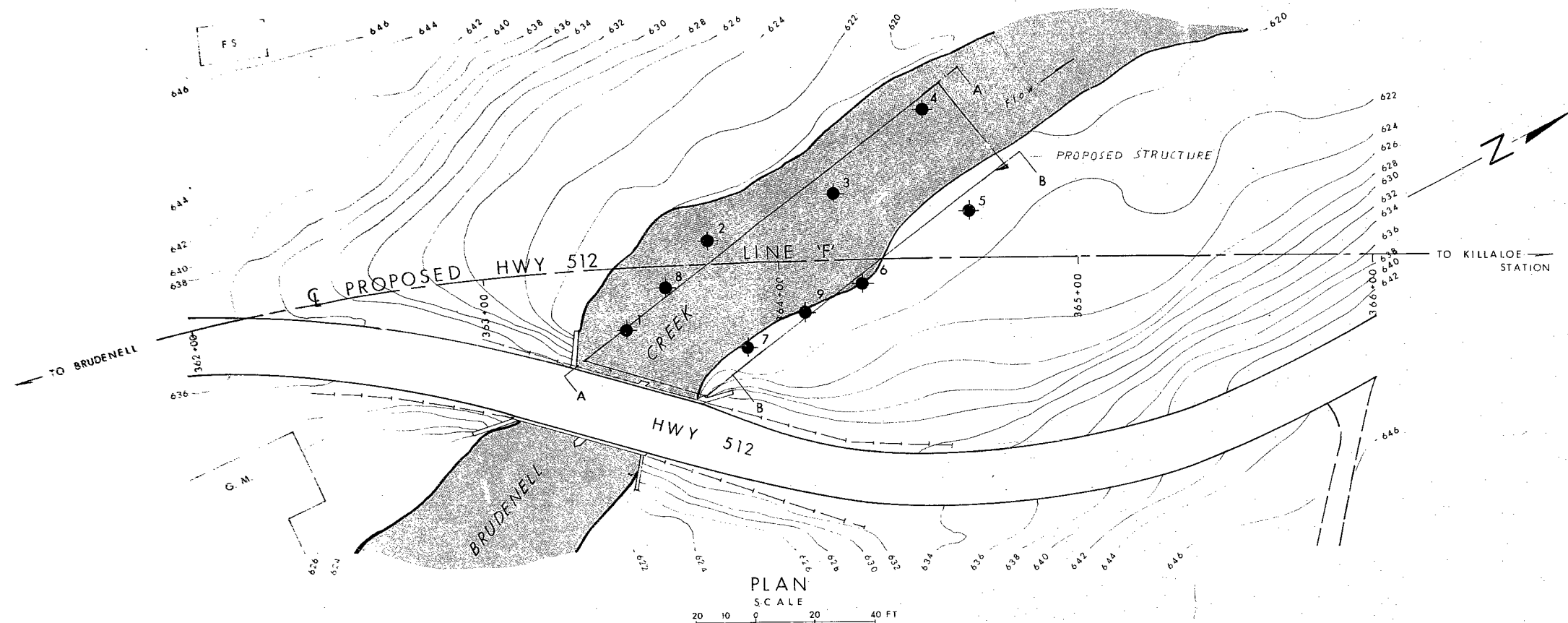
STR. SITE No. 29-63

HWY. No. 512

LOCATION HWY. 512 BRUDENELL
CREEK

OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT. 1

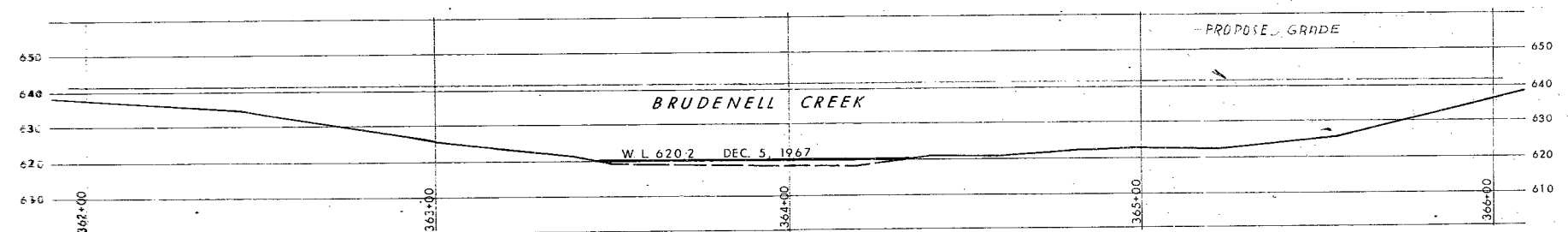
REMARKS: TO BE ADDED TO ALREADY
EXISTING MICROFILME
DOCUMENT TO BE UNFOLDED
BEFORE MICROFILMED



LEGEND

- Bore Hole
- Cone Penetration Hole
- Bore & Cone Penetration Hole
- Water Levels established at time of field investigation, FEB. 1968

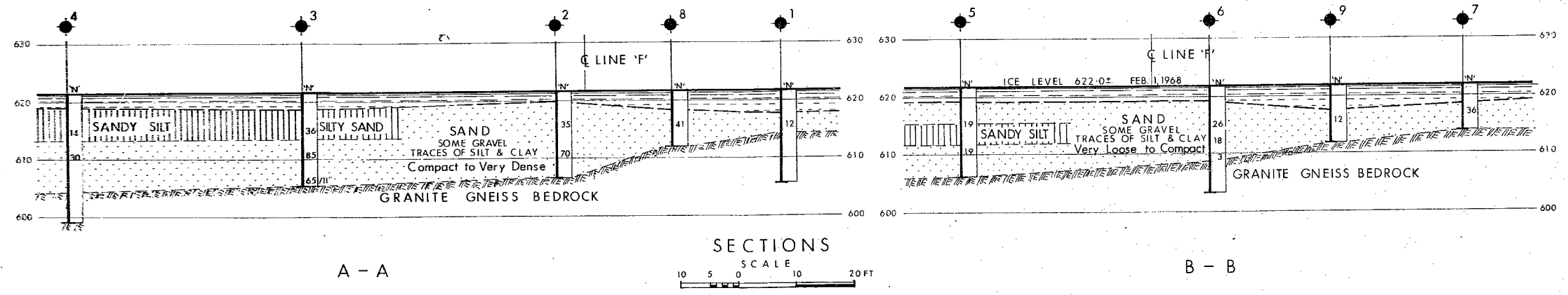
NO.	ELEVATION	STATION	OFFSET
1	622.0	363+47	20' RT
2	622.0	363+76	8' L
3	621.7	364+18	22'
4	621.3	364+49	50'
5	621.8	364+64	16' Li
6	621.3	364+28	8' RT
7	622.5	363+88	28' RT
8	622.0	363+61	7' RT
9	627.0	364+08	17' RT



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.

PRINT RECORD

NO.	FOR	DATE



NO.	DATE	BY	DESCRIPTION

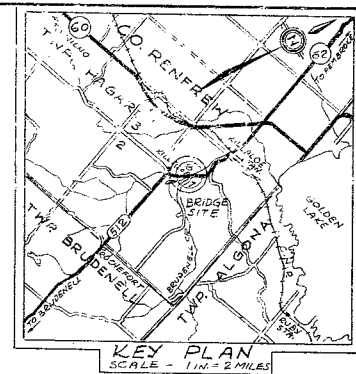
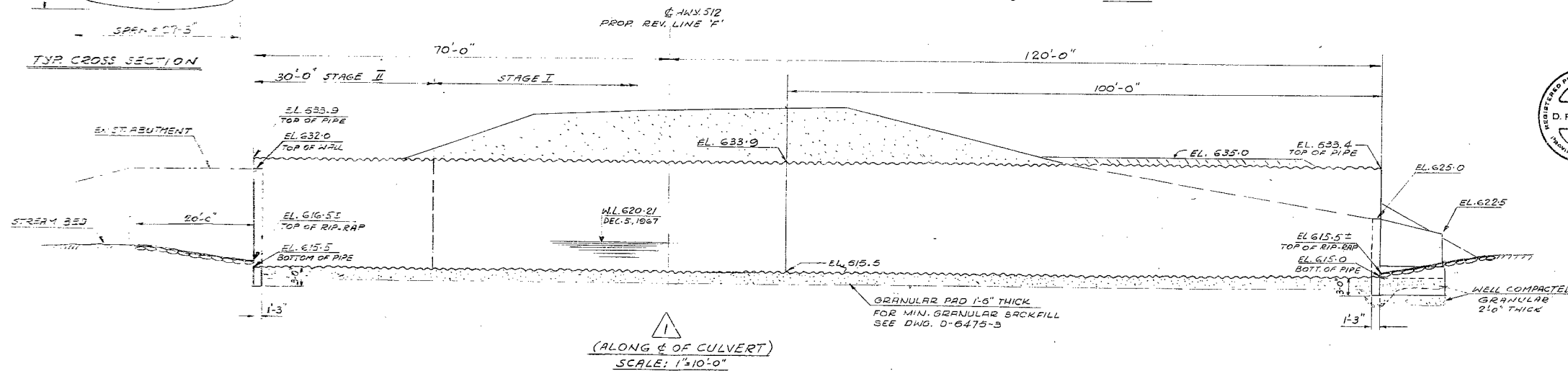
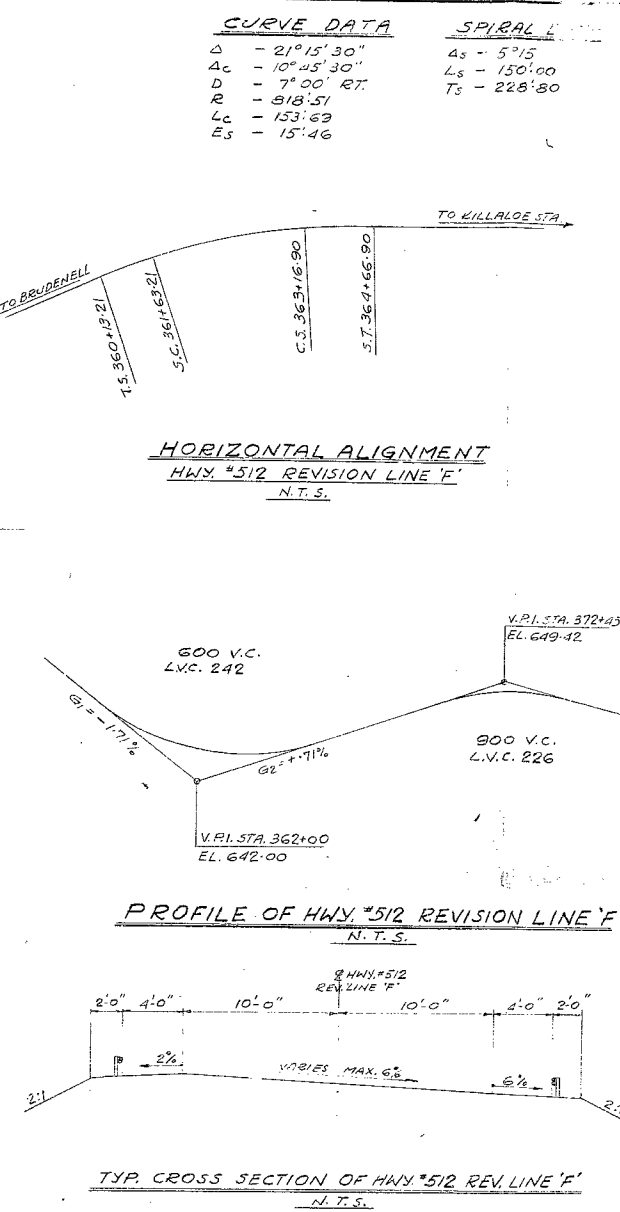
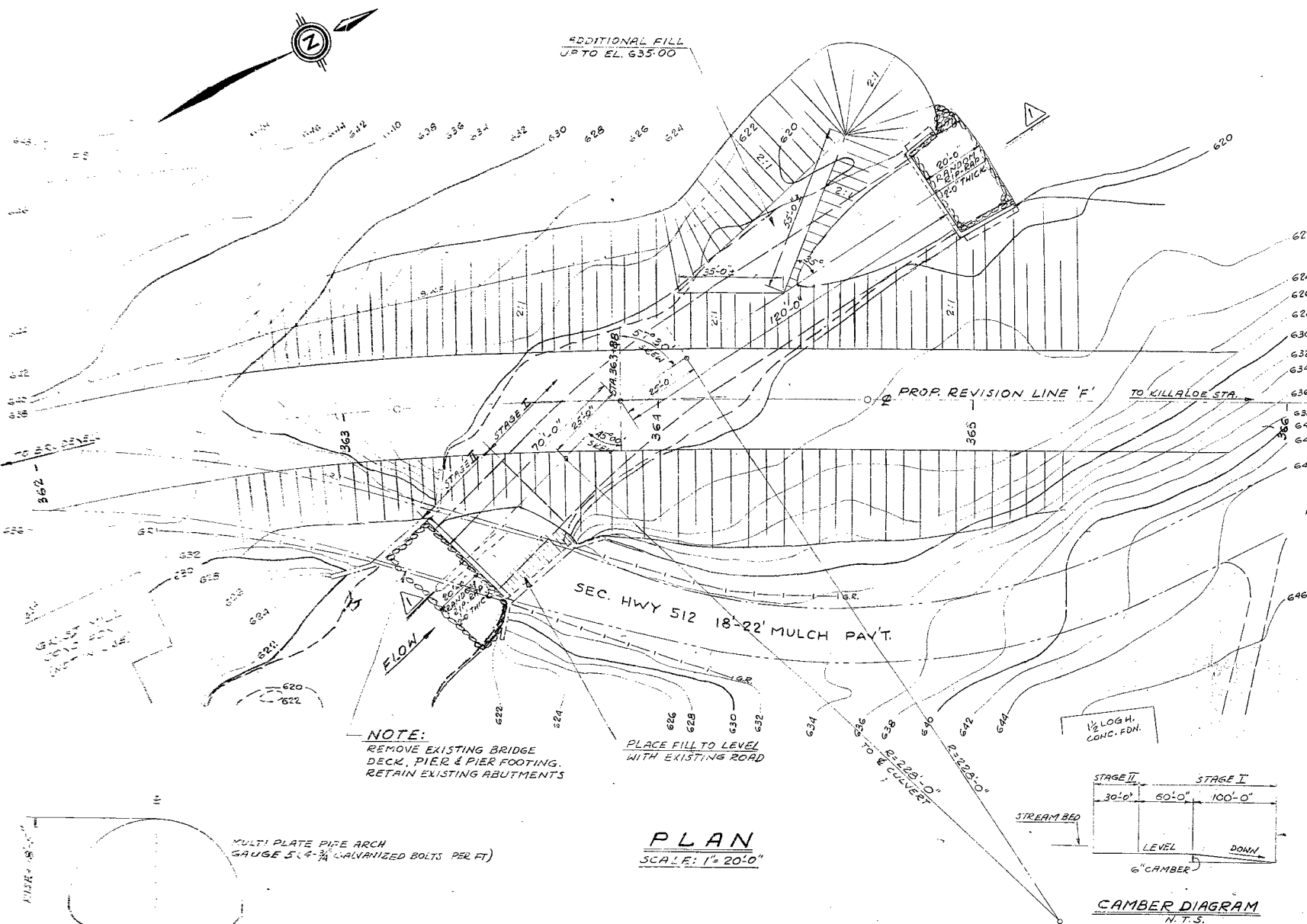
DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING DIVISION - FOUNDATION SECTION

BRUDENELL CREEK

KING'S HIGHWAY NO. 512 LINE 'F' DIST. NO. 10
CO. RENFREW
TWP. HAGARTY LOT 7 & 8 CON. III

BORE HOLE LOCATIONS & SOIL STRATA

SUBM'D. A.S.	CHECKED <input checked="" type="checkbox"/>	W.P. NO. 155-66-02	M.B.T. DRAWING NO.
DRAWN A.B.	CHECKED <input checked="" type="checkbox"/>	JOB NO. 68-F-6	68-F-6A
DATE MARCH 18, 1968	SITE NO.	BRIDGE DRAWING NO.	
APPROVED <i>A. Thomas</i>	SENT NO.		



NOTES:

CLASS OF CONCRETE ~ 3000 P.S.I.

CLEAR COVER ON REINFORCING STEEL

FOOTINGS, CURTAIN WALLS & APRONS - 3"
RETAINING WALLS BACK FACE - 3"
RETAINING WALLS FRONT FACE - 2"

LIST OF DRAWINGS

D-6475-1 GENERAL DRAWING
-2 BORE HOLE LOCATIONS & SOIL STRATA
-3 DETAILS

B.M. 634.40
GEODETIC DATUM
N. & W. IN W. ROOT OF 1' SPR.
180' 0 RT. OF 362+52

REVISIONS			
	DATE	BY	DESCRIPTION

DEPARTMENT OF HIGHWAYS ONTARIO
BRIDGE DIVISION

BRIDGE DIVISION

BRUDENELL CREEK STRUCTURE
(1 1/2 MILES SOUTH OF KILLALOE STATION)

KING'S HIGHWAY No. 512 DIST. No. 10

DIST. No. 10

CO. RENFREW

TWP. HAGARTY

LC

CON. 111

GENERAL DRAWING

APPROVED

SITE No. 29-63

W.P. No. 155-66-92

DESIGN	5
--------	---

BRIDGE ENGINEER

CONTRACT

DRAWING	C
DATE	1/1

CHECK	✓
CHECK	✓

Nos.	Particulars	Debit	Credit
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98
99
100

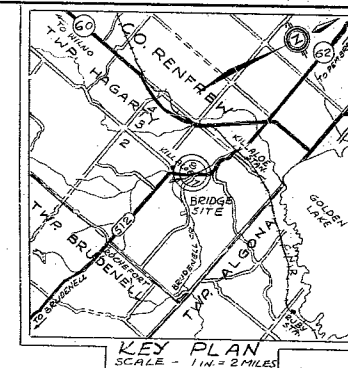
DRAWING
No.

D-6475-1

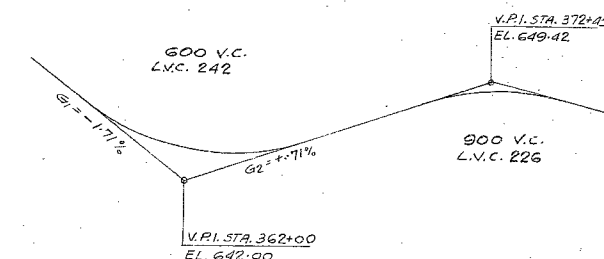
Abstract

ADDITIONAL FILL
UP TO FL 635.00

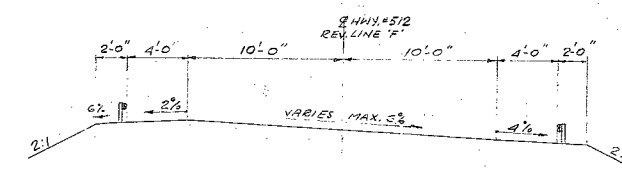
<u>CURVE DATA</u>	<u>SPIRAL DATA</u>
$\Delta = 21^{\circ}15'30''$	$4s = 5^{\circ}15'$
$A_c = 10^{\circ}45'30''$	$L_s = 150^{\circ}00'$
$D = 7^{\circ}00' \text{ RT.}$	$T_s = 228^{\circ}80'$
$R = 818^{\circ}51'$	
$L_c = 153^{\circ}69'$	
$E_s = 15^{\circ}46'$	



HORIZONTAL ALIGNMENT
HWY. #512 REVISION LINE 'F'
N.T.S.



PROFILE OF HWY. #512 REVISION LINE 'F'
N. T. S.



TYP. CROSS SECTION OF HWY. #512 REV. LINE 'F'
N. T. S.

BM. 634.40
GEODETIC DATUM
N. & W. IN W. ROOT OF 1' SPR.
180.0 RT. OF 362+52

[illegible]

DEPARTMENT OF HIGHWAYS ONTARIO
BRIDGE DIVISION

- 68-F-6

BRUDENELL CREEK STRUCTURE
(1 1/2 MILES SOUTH OF KILLALOE STATION)

KING'S HIGHWAY No. 512 DIST. No. 10
CO. RENFREW
TWP. HAGARTY LOT 8 CON. III

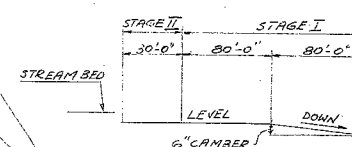
PRELIMINARY

APPROVED _____			SITE No. 29-63		W.P. No. 155-66-02	
			CONTRACT No.			
BRIDGE ENGINEER						
DESIGN		CHECK				
DRAWING	G.P.	CHECK				
DATE	MARCH 1962	LOADING	W20-44			
			DRAWING No.		D-6475-P1	

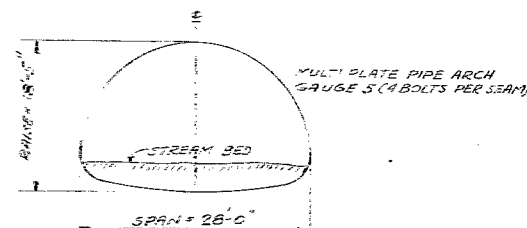
NOTE:
REMOVE EXISTING BRIDGE
DECK & PIER.
RETAIN EXISTING ABUTMENTS

PLACE FILL TO LEVEL
WITH EXISTING ROAD

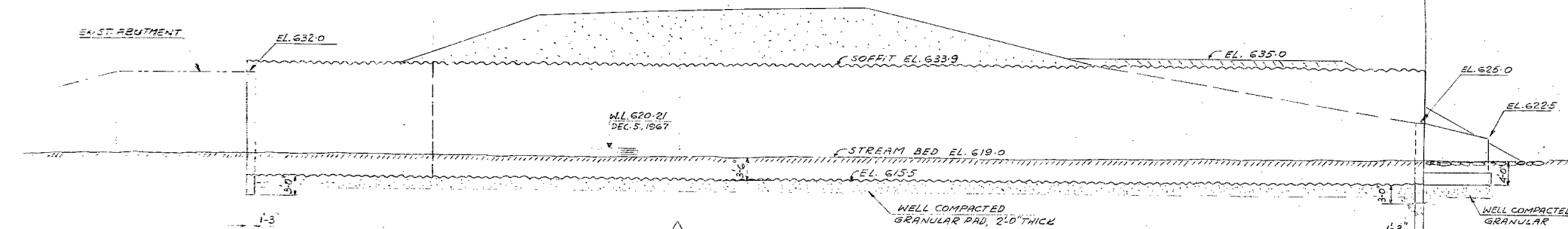
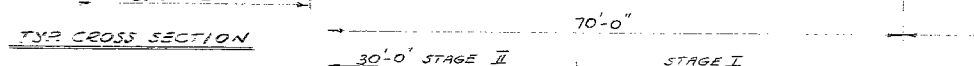
PLAN
SCALE: 1" = 20'-0"



CAMBER DIAGRAM
N. T. S.

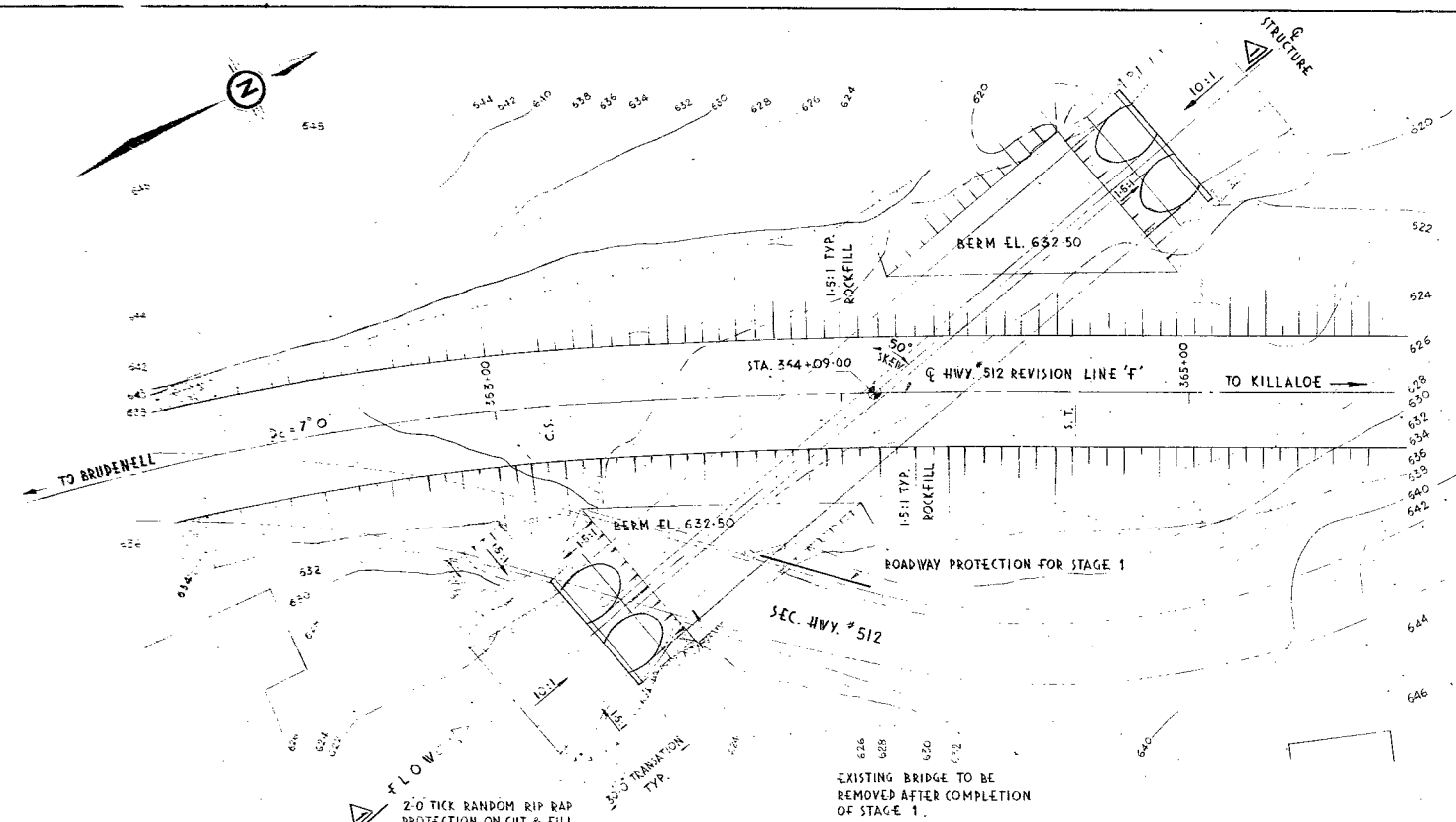


TYPE CROSS SECTION



(ALONG & OF CULVERT)
SCALE: 1"=10'-0"

[illegible]

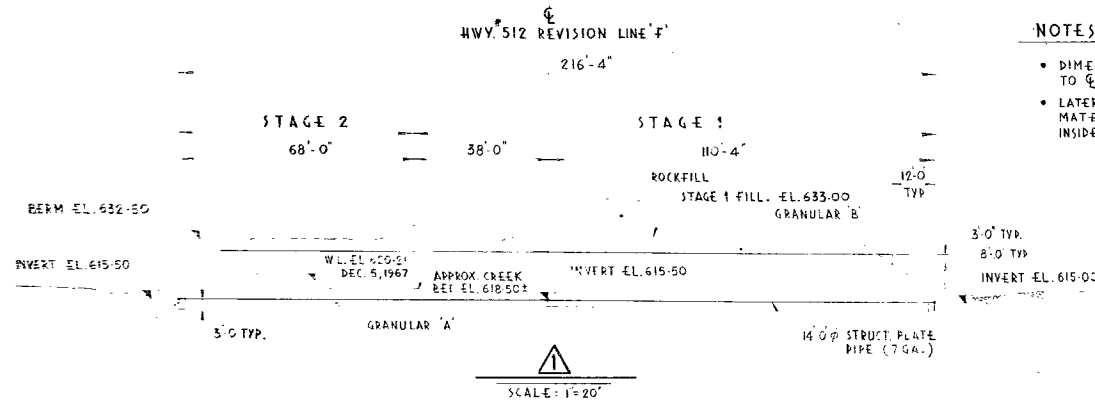


CONSTRUCTION SEQUENCE

- 1 - INSTALL ROADWAY PROTECTION AT N.E. CORNER OF EXIST. BRIDGE.
- 2 - CONSTRUCT STAGE 1
- 3 - DETOUR TRAFFIC ONTO STAGE 1
- 4 - REMOVE EXISTING BRIDGE
- 5 - CONSTRUCT STAGE 2 AND COMPLETE STRUCTURE.

PLAN

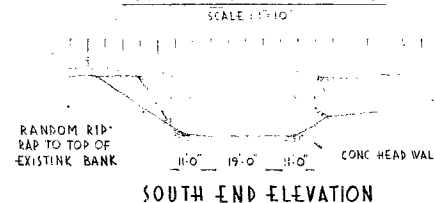
SCALE: 1"=20'



NOTES

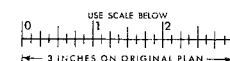
- DIMENSIONS PERPENDICULAR TO C STRUCTURE.
- LATERAL LIMITS OF BACKFILL MATERIAL - INSIDE FACE TO INSIDE FACE OF CONC. HEAD WALLS

GRANULAR BACKFILL DETAILS



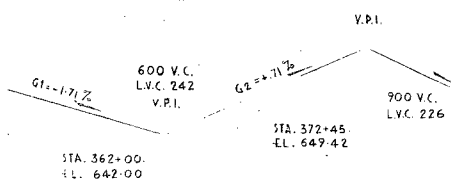
SOUTH END ELEVATION

FOR REDUCED PLAN

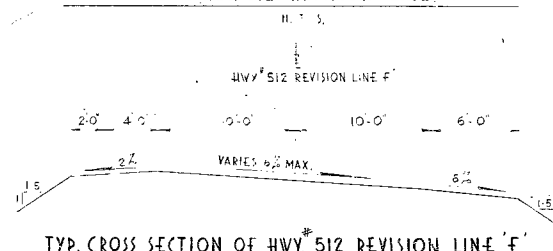


HORIZONTAL ALIGNMENT HWY. 512 REVISION LINE 'F'

CURVE DATA	SPIRAL DATA
$\Delta = 21^{\circ} 15' 30''$	$\Delta S = 5^{\circ} 15' 00''$
$\Delta C = 10^{\circ} 45' 30''$	$LS = 150.00 \text{ FT.}$
$D_c = 7^{\circ} 0' 00''$	$TS = 228.80 \text{ FT.}$
$R_c = 818.51 \text{ FT.}$	
$LC = 153.69 \text{ FT.}$	
$ES = 15.46 \text{ FT.}$	



PROFILE OF HWY. 512 REVISION LINE 'F'



TYP. CROSS SECTION OF HWY. 512 REVISION LINE 'F'

GENERAL NOTES

- CLASS OF CONCRETE 3000 P.S.I.
- CLEAR COVER ON REIN. STEEL 3"

B. M. 634-40

GEODETIC DATUM - N.W. IN W. ROOT OF 1" SPR. 180' RT. OF 362+52

REVISIONS	DATE	BY	DESCRIPTION

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS
ONTARIO

BRUDENELL CREEK STRUCTURE

(1 1/2 MILES SOUTH OF KILLALOE STATION)

KING'S HIGHWAY No. 512 DIST. No. 10
CO. R E N F R E W
TWP. H A G A R T Y LOT 8 CON. III

GENERAL LAYOUT

APPROVED	CONTRACT No.	W.P. No.	155-66-02
DESIGN	CHECK	DATE	10-74
DRAWING	CHECK	DATE	10-74
DATE	10-74	LOADING	

SITE No. 29-63 SHEET 1