

#67-F-63

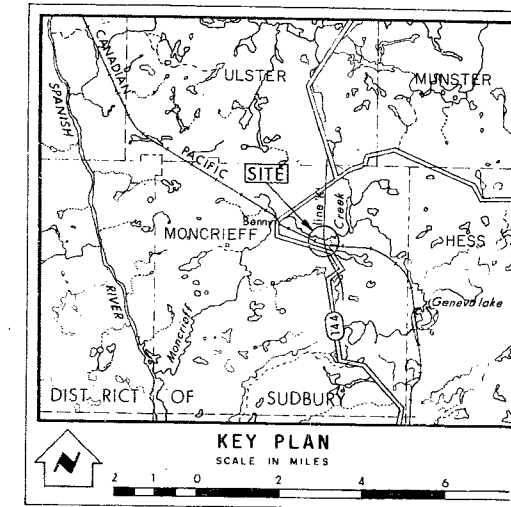
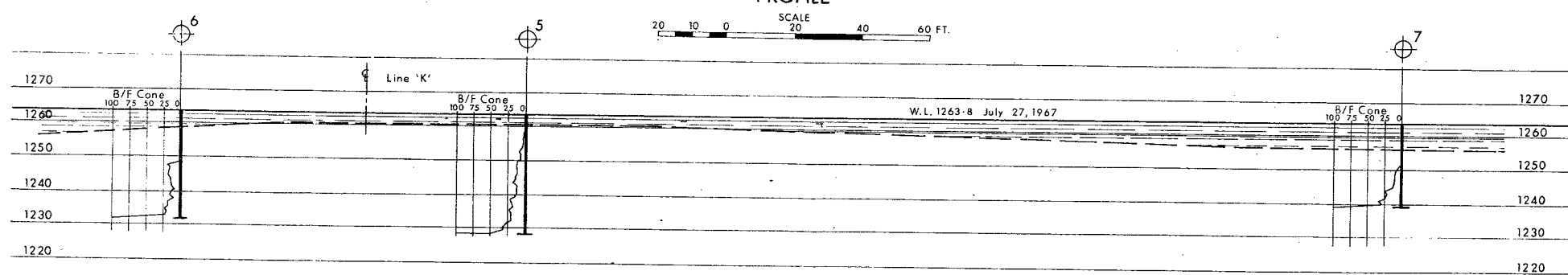
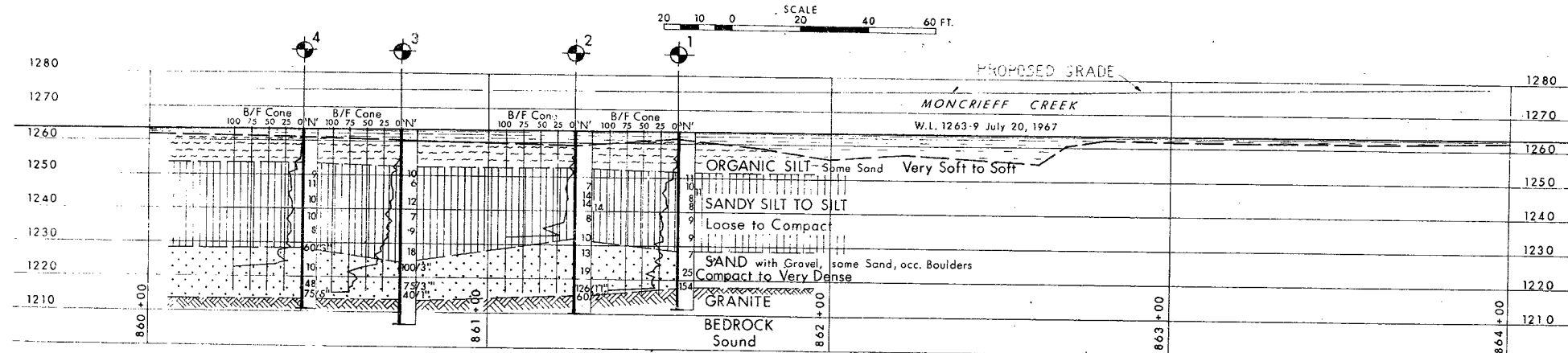
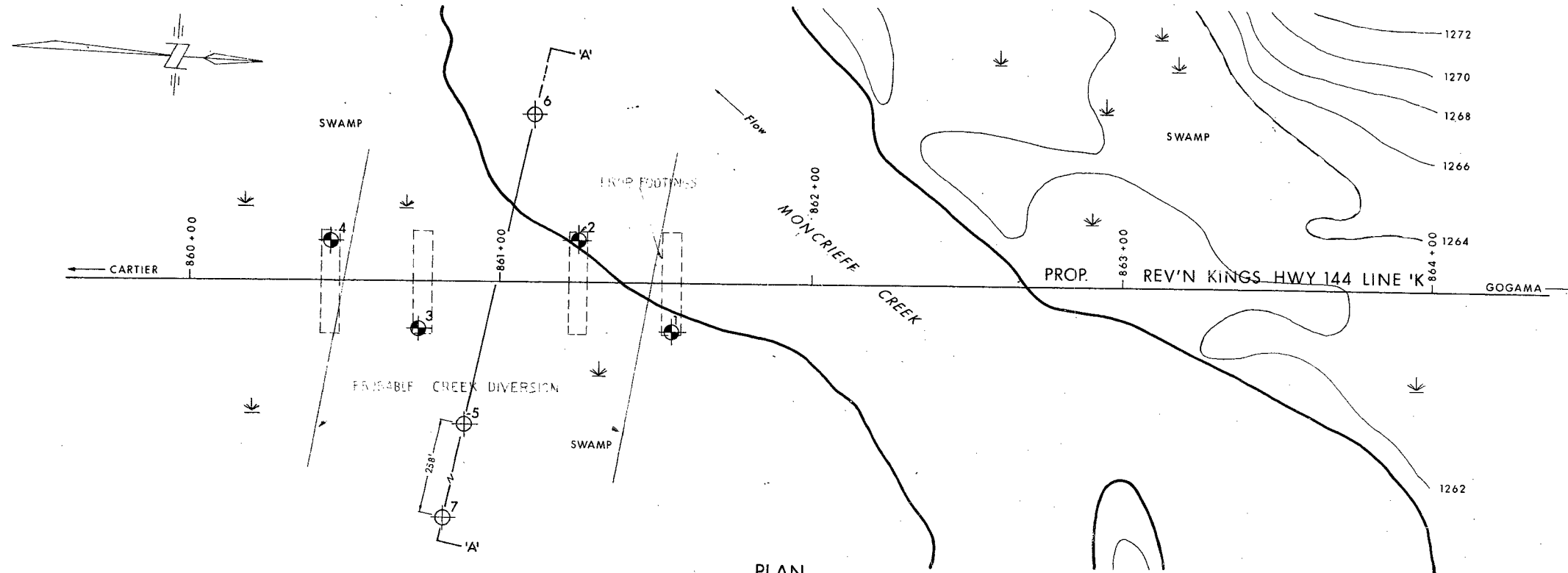
W.P.#273-64

Hwy.#144

MONCRIEFF

CREEK

CROSSING



LEGEND

- Bore Hole
- ⊕ Cone Penetration Hole
- ⊗ Bore & Cone Penetration Hole
- ≡ Water Levels established at time of field investigation.

NO.	ELEVATION	STATION	OFFSET
1	1263.9	861+55	18' RT
2	1263.9	861+25	14.5' LT
3	1263.8	860+74	14.5' RT
4	1263.8	850+45	14' LT
5	1263.8	860+89	45' RT
6	1263.8	861+10.5	55' LT
7	1263.8	860+39	29.8' 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.

REVISIONS

NO.	DATE	BY	DESCRIPTION

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

MONCRIEFF CREEK

KING'S HIGHWAY NO. 144 LINE 'K' DIST. NO. 17
 60- DIST. SUDBURY
 TWP. MONCRIEFF LOT CON.

BORE HOLE LOCATIONS & SOIL STRATA

SUB'D. R.R.T. CHECKED <input checked="" type="checkbox"/>	W.P. NO. 273-64	M.B.T. DRAWING NO.
DRAWN S.V. CHECKED <input checked="" type="checkbox"/>	JOB NO. 67-F-63	67-F-63 A
DATE 18 SEPT. 1967	SITE NO.	BRIDGE DRAWING NO.
APPROVED <i>[Signature]</i>	CONT. NO.	

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: September 13, 1967

OUR FILE REF.

IN REPLY TO

SEP 20 1967

SUBJECT:

FOUNDATION INVESTIGATION REPORT
For
The Proposed Crossing of Moncrieff
Creek by the Realigned Hwy. 144
District 17 (Sudbury)
W.J. 67-F-63 -- W.P. 273-64

Attached, we are forwarding to you, our detailed foundation investigation report 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 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
H. McArthur
T. A. Sharpe
J. B. Curtis
E. R. Saint
B. A. Singh

Foundations Files
Gen. Files

A. G. Stermac

A. G. Stermac

PRINCIPAL FOUNDATION ENGINEER

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FOUNDATION INVESTIGATION REPORT
For
The Proposed Crossing of Moncrieff
Creek by the Realigned Hwy. 144
District 17 (Sudbury)
W.J. 67-F-63 -- W.P. 273-64

1. INTRODUCTION:

A request, dated June 28, 1967, to conduct a foundation investigation at the proposed crossing of Moncrieff Creek and the realigned Hwy. 144, was received from the Bridge Planning Section (Mr. J. B. Curtis, Regional Bridge Location Engineer).

The existing Hwy. 144 is to be realigned and will require a bridge crossing of a diversion of Moncrieff Creek.

Subsequently, a foundation investigation was conducted at the proposed site to determine the subsoil conditions. Field and laboratory test results, together with discussion and recommendations for the structure foundations, are reported herein.

2. TOPOGRAPHY AND GEOLOGY:

The site is located in the area generally known as the Laurentian Shield which is typified by low hills, numerous rock outcrops and swamps. Bedrock in the area is Precambrian.

The original river valley, cut into the Precambrian Rocks, subsequently has been filled with fluvial deposits to create the existing wide flat floodplain.

At the proposed crossing, Moncrieff Creek flows northward in a channel cut into an 800-foot wide floodplain bounded by tree-covered outcrops. Numerous ox-bow lakes indicate that in the past, the stream has meandered considerably. Along the south side of the valley is a single track railway line (C.P.R.).

cont'd. /2 ...

3. FIELD AND LABORATORY WORK:

Using conventional diamond drilling equipment adapted for soil sampling purposes and mounted on a raft, 4 sampled boreholes and adjacent dynamic cone penetration tests, together with 3 additional dynamic cone penetration tests, were carried out at the site. A driving energy of 350 ft.-lb. per blow was used for the dynamic cone penetration tests. The three additional cone tests were along the centre-line of the proposed creek diversion.

In cohesive materials, 2-inch I.D. Shelby tube samples were obtained by manually pushing the tubes into the soil. Otherwise, samples were obtained using either a 2-inch O.D. split-spoon sampler driven according to the specifications of the Standard Penetration Test, or a 2-inch O.D. slotted-tube sampler.

AXT-size rock core samples were obtained from all boreholes to prove bedrock.

4. SUBSOIL CONDITIONS:

4.1) General:

In general, 2 to 5 feet of water covers a surface deposit of organic silt with sand which is underlain by deposits of sandy silt to silt and then sand with gravel down to bedrock. The deposits, from the surface downwards, are described in detail below.

4.2) Organic Silt with Sand:

This deposit constituted the river bed and extended to a depth of 7 to 9.5 feet below the river bottom. Shear strength generally varied from 200 psf to about 500 psf, indicating a very soft to soft consistency. With depth the deposit became more granular in nature and some sand was encountered. The organic content varied from 1.5% to 23.2% (by dry weight).

cont'd. /3 ...

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

4.3) Sandy Silt to Silt:

This deposit varied in thickness from 21 to 28.5 feet (i.e., to a depth of 32 to 39.5 feet below the water level, Elev. 1263.8). 'N' values varied from 7 to 18 blows per foot, indicating a loose to compact relative density.

In general, the deposit was sandy silt to silt; however, in borehole 4, some sand was encountered. Borehole 3 was predominantly silt with sand. Grain-size distribution tests indicated about 6 % to 34% sand sizes, 91% to 64% silt sizes, respectively, and the remainder clay-sized particles. The sand in borehole 4 was 81% to 99% sand sizes.

4.4) Sand with Gravel:

This deposit was encountered beneath the sandy silt to silt stratum and varied in thickness from about 11.0 to 16.5 feet. 'N' values varied from 7 to much in excess of 100 blows per foot; however, a number of the higher values were obtained when boulders were encountered. In general, the deposit may be described as loose to compact with some dense or very dense zones.

The deposit was sand with gravel, some silt, and occasional boulders. Grain-size distribution tests indicated 16% to 42% gravel sizes, 83% to 42% sand sizes, and the remainder silt and clay sizes.

4.5) Bedrock:

Bedrock was proven in all boreholes by drilling AXT-size cores. The elevation of the bedrock increased from south to north, varying from Elev. 1213.3 in the south to Elev. 1217.8 in the north.

The rock encountered was sound grey granite, and core recovery was excellent.

cont'd. /4 ...

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

4.6) Water Level:

The water level over the site was about Elev. 1263.8 during the period of the investigation; however, on the concluding day of the investigation, the water level dropped to Elev. 1256.1, presumably because of upstream water control.

5. DISCUSSION AND RECOMMENDATIONS:

5.1) General:

The subsoil at the site consists, in general, of a surface deposit of organic silt with some sand, underlain by deposits of sandy silt to silt and then sand with gravel and occasional boulders down to bedrock. Two to five feet of water covered the site at the time of the investigation.

It is proposed to realign Hwy. 144. The new alignment will require a crossing of Moncrieff Creek at which point the proposed grade will be about 18 feet above the existing ground level. The proposed structure is a 2-lane, 3-span bridge (30'-50'-30'). A diversion of the creek to coincide with the structure location is proposed.

5.2) Foundations:

The surface deposits are not suitable for the economical use of a spread footing-type of foundation; therefore, a pile-type of foundation is recommended for the piers and abutments. End-bearing piles with reinforced driving tips should be driven to practical refusal and may be designed for the maximum allowable load for the pile section chosen. For estimating purposes, it should be assumed that all piles will penetrate to the bedrock at Elev. 1213.0 to Elev. 1218.0.

If excavations for the pile caps must be made below the water level, a dewatering scheme will be required.

cont'd. /5 ...

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

5.3) Embankments:

The proposed embankment height is 18 feet above existing ground level in the vicinity of the proposed structure. Considerable settlement and some stability problems could be anticipated if the embankment was founded on the organic silt deposit. To avoid such problems, it is recommended that all organic material should be subexcavated beneath the proposed embankments according to D.H.O. Standard DD 406, and should be replaced with suitable granular material below the water level (other acceptable material may be used above the water table). The full extent of the organic material should be determined by the Regional Materials & Testing Section. The embankment then may be constructed without danger of base failure provided that 2:1 slopes are constructed.

Care should be taken that no bouldery fill is used in the vicinity where piles are to be driven.

5.4) Creek Diversion:

Three dynamic cone penetration tests were conducted along the centre-line of the proposed creek diversion to determine whether bedrock might be intersected by the proposed channel. These tests were conducted 55 ft. west and 45 ft. and 298 ft. east of the centre-line of realigned Hwy. 144. Refusal for the penetration tests was at about Elev. 1229.0 to Elev. 1231.0, which is considerably below any anticipated channel bottom. Accordingly, no intersection with the bedrock is anticipated for the proposed diversion.

6. SUMMARY:

A foundation investigation at the site of the proposed crossing of Moncrieff Creek by the realigned Hwy. 144, is reported.

cont'd. /6 ...

6. SUMMARY: (cont'd.) ...

Subsoil at the site was overlain by 2 to 5 feet of water at the time of the investigation, and consists of a deposit of organic silt with some sand underlain by deposits of sandy silt to silt, and then sand with gravel down to bedrock.

Pile-type foundations are recommended for the abutments and piers. For the embankments, subexcavation of the organic material is recommended, and replacement of the subexcavated material with a suitable granular fill below the water table is required. Embankments may then be constructed with standard 2:1 side slopes.

No bouldery fill should be used in the vicinity where piles are to be driven.

If excavation is required for the pile caps below the existing water table, a dewatering scheme will be required.

Bedrock is not anticipated to be intersected by the proposed creek channel diversion within the limits of the investigation.

7. MISCELLANEOUS:

The field work was completed in the period from July 20 to July 28, 1967, inclusive, under the direction of Mr. R. Turton, employing a drilling machine and raft owned and operated by Johnston Drilling Co. Ltd.

The report was prepared by Mr. L. Palmer, Project Foundation Engineer.

The entire project was under the general supervision of Mr. M. Devata, Supervising Foundation Engineer, who also reviewed this report.

September 1967

[illegible]

FOUNDATION SECTION

CHECKED BY AK

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT	SHEAR STRENGTH P.S.F.	LIQUID LIMIT ——— WL	PLASTIC LIMIT ——— WP	WATER CONTENT ——— W	BULK DENSITY	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT			o - Unconfined Compression • - Quick Triaxial	WP ———— WL	WATER CONTENT %			
										20 40 60			
1263.9	Water Level											P.C.F.	Gr. Sa. Si. Cl.
1259.9						1260						84.5	27 64 .9
4.0	Organic silt, some sand.		1	TW	PM							84.0	Org. 5.6
			2	TW	PM							99.0	95 (5) Org. 4.3
1252.9	Very soft to soft		4	TW	PM								97 (3) Or. 6.7
11.0	Sandy silt to silt.			TW	-	1250							
	Loose to compact.		5	ST	-								
			6	SS	7								
			7	SS	14								
			8	SS	14								
			9	SS	14								
			10	SS	8	1240							
1231.6			11	SS	10								
32.8	Sand with gravel, some silt, occasional boulders.		12	RC	100%	1230							
			13	ST	13								
			14	ST	19								
	Compact					1220							
1215.0			15	SS	126/11"								
			16	SS	60/2"								
48.9	Bedrock - sound granite		17	RC	Rec.								
1210.1				AXT	95%								
53.8	End of Borehole					1210							

DATUM Geodetic

RRT

BOREHOLE TYPE Washboring, AXT Core

COMPILED BY RRT

CHECKED BY

CHECKED BY

[illegible]

DEPARTMENT OF HIGHWAYS - ONTARIO
MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 5

FOUNDATION SECTION

JOB 67-F-63 LOCATION Station 860 + 89 Line K; o/s Rt. 45' ORIGINATED BY RRT
W.P. 273-64 BORING DATE July 27, 1967 COMPILED BY RRT
DATUM Geodetic BOREHOLE TYPE Dynamic Cone Penetration Test CHECKED BY SLR

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE					LIQUID LIMIT — WL PLASTIC LIMIT — WP WATER CONTENT — W				BULK DENSITY P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		BLOWS / FOOT	SHEAR STRENGTH P.S.F.				Wp — W — WL WATER CONTENT %					
1263.8	Water Level																
1261.0																	
2.8						1260											
						1250											
						1240											
						1230											
1228.7																	
35.1	End of Borehole					1220											

50/1"

MATERIALS & TESTING DIVISION

RECORD OF BOREHOLE NO. 6

FOUNDATION SECTION

JOB 67-F-63

LOCATION Station 861 + 10.5 Line K; o/s Lt. 55'

ORIGINATED BY RRT

W.P. 273-64

BORING DATE July 27, 1967

COMPILED BY RRT

DATUM Geodetic

BOREHOLE TYPE Dynamic Cone Penetration Test

CHECKED BY AK

[illegible]

MATERIALS & TESTING DIVISION

FOUNDATION SECTION

JOB	<u>67-F-63</u>	LOCATION	<u>Station 860 + 39 Line K; o/s Rt. 298'</u>	ORIGINATED BY	<u>RRT</u>
W.P.	<u>273-64</u>	BORING DATE	<u>July 28, 1967</u>	COMPILED BY	<u>RRT</u>
DATUM	<u>Geodetic</u>	BOREHOLE TYPE	<u>Dynamic Cone Penetration Test</u>	CHECKED BY	<u>J.R.</u>

SOIL PROFILE			SAMPLES			ELEV. SCALE	DYNAMIC PENETRATION RESISTANCE BLOWS / FOOT _____	LIQUID LIMIT ——— WL PLASTIC LIMIT ——— WP WATER CONTENT ——— W				BULK DENSITY γ P.C.F.	REMARKS
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	BLOWS / FOOT		SHEAR STRENGTH P.S.F.	wp w wl WATER CONTENT %					
1263.8													
1256.1						1260							
7.7						1250							
1239.1						1240							
24.7	End of Borehole					1230							

401 & Keele St.
Downsview, Ontario

July 20, 1967

Johnston Drilling Co. Ltd.
377 Munster Ave.
Toronto, Ontario

Dear Sirs:

This is to confirm our request of July 14, 1967 for the supply of a Diamond Drill and Raft together with all necessary equipment, as specified under the terms of our Contract Agreement, at Benny, Ontario (D.H.O. Camp Benny) on July 18, 1967.

This project bears Job Number 67-P-63.

Yours truly,

MD:mt

M. Devata
M. Devata
Supervising Foundation Engineer
for: A. G. Sternac
Principal Foundation Engineer

cc: H. Aonings
Foundation Files ✓ 110
General File

MEMORANDUM

To:

Mr. A. G. Stermac
Principal Foundation Engineer
Lab. Building, Downsview

From:

Bridge Planning Section
Northern Region

Date:

June 28, 1967

Our File Ref.

IN REPLY TO

Subject:

Moncrieff Creek, Hwy 144, 67-F-63
WP 273-64, BS 46S-256
District 17, Sudbury

Would you kindly arrange to have a foundation investigation carried out at the above site in order to enable us to design the new structure. Enclosed are two drawings indicating the probable footing locations of the proposed structure. Due to the movement of the meander it is suspected that we shall construct a stream diversion at the location indicated. It is likely that at this stage we shall have a three span structure spanning over the probable creek diversion, which would be approximately 100 ft across. The skew angle will be in the order of $0 - 10^{\circ}$. Accommodation will be available at the Cartier Hotel at Cartier, which is about 6 miles south of the above site. The phone number there is Cartier 60.

The site is accessible via the river from a crossing some 1.5 miles upstream. Fast water would likely be encountered if an attempt were made to gain access from downstream at Benny. Alternatively, access could be gained via approx a half mile of very rough dense bush. The CPR have a line which runs to within 600 feet of the proposed crossing, however, the closest unloading facilities would be at Benny.

We have also enclosed an enlargement of an aerial photograph on which we have indicated the probable stream diversion. If you anticipate we might encounter bedrock in this diversion we would like to know as soon as possible - preferably while you are still in the field.



J. B. Curtis
Regional Bridge Location Engineer

cc: Mr. R. Forrest
Mr. A. Crowley

dy/gm

MEMORANDUM

TO: Mr. A. G. Stermac
Principal Foundations Engineer
Materials & Testing, Downsview

FROM: Bridge Planning Section
Northern Region

DATE: December 21, 1967

OUR FILE REF.

IN REPLY TO

SUBJECT:

Moncrieff Creek Bridge - Highway 144
District 17; WP 273-64
Foundation Report No. WJ 67-F-63

Enclosed find a partial print of profile No. C 1237-3 indicating a revised profile grade in the vicinity of the above crossing. Would you kindly review your report in the light of the new grade and advise whether this will require any additional precautions etc.

Would you kindly return the profile when you have finished with it.

A handwritten signature in dark ink, appearing to read 'J. B. Curtis', is written over a large, faint circular stamp or watermark.

J. B. Curtis
Regional Bridge Location Engineer

Mr. J. E. Curtis,
Regional Bridge Location Engr.,
Regional Office,
NORTH BAY.

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

January 3, 1968

Proposed Crossing of Monerleff Creek
By the Realigned Hwy. 144
District No. 17 (Sudbury)
W.P. 273-64 -- W.J. 67-P-63

We have reviewed our recommendations contained in our Foundation Report W.J. 67-P-63, taking into account the revised grade as outlined in your memo dated December 21, 1967, and submit the following comments:

The grade has been increased approximately 4 feet above the original grade and the new approach fills will be in the order of 18 feet above the existing ground surface. This grade revision will not affect the stability of the approach fills provided the surficial organic silt is excavated and backfilled with granular material as outlined in our foundation report.

If you require further information pertaining to this project, please feel free to contact this Office.

AD/mef

cc: Messrs. S. McCombie
C. S. Grebski
H. McArthur
E. R. Saint

M. Devata
M. Devata,
SUPERVISING FOUNDATION ENGINEER
For:
A. G. Sterns,
PRINCIPAL FOUNDATION ENGINEER

Foundations Files
Gen. Files

P.S. -- Your plan returned herewith.

Department of Highways Ontario

Copy for the information of

Mr. A. Stermac

~~Mr. J. Curtis,~~
Reg. Bridge Location Engineer,
North Bay Regional Office,
North Bay, Ontario.

Bridge Division,
Downsview, Ontario.

March 26, 1968.

Monorieff Creek Bridge
East of Benny
W.P. 273-64, Site 468-256
Hwy. 144, Dist. 17

67-F-63

Attached herewith are prints of the Preliminary Bridge
Plan Drawing D-6363-P1 for the above-mentioned structure.

The estimated cost of the proposed structure is \$80,000.
This cost includes tender, materials, engineering and sundry
construction.

Any comments or revisions you may have should be submitted
within three weeks.

CSG:ts
Attach.

C.S. Grebaki,
Bridge Design Engineer.

c.c. S. McCombie
A. Stermac (2)
J. Anderson

WP

Mr. C. S. Grebski,
Bridge Design Engineer,
Bridge Division,
Admin. Bldg.

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

April 3, 1963

Honorieff Creek Bridge, East of Penny,
W.R. 273-64, Site 46S-256, W.J. 67-7-63,
Hwy. 144, District No. 17 (Sudbury).

We have reviewed the Preliminary Bridge Plan
Drawing D 6363-21 for the above mentioned structure and
submit the following comments:

The extent of sub-excavation of organic material
at the approach fill locations is shown on the design drawing,
but not the type of backfill material. We would like to bring
to your attention, that the sub-excavated area should be
replaced with suitable granular material below the water table,
and any acceptable material above the water table.

RD/adeF

cc: Messrs. S. McJombie
J. B. Curtis
E. R. Saint

B. Devata

B. Devata,
SUPERVISING FOUNDATION ENGR.
For:
A. G. Sternac,
PRINCIPAL FOUNDATION ENGR.

Foundations Files
Gen. Files

Department of Highways Ontario

Copy for the information of

Mr. M. Devata, Supervising Foundation Engineer, Materials & Testing
Division, Room 107, Lab. Bldg.

Mr. C. Grebski,
Bridge Design Engineer,
Admin. Bldg.

Bridge Division,
Downsview, Ontario,

Attention: Mr. A. Radkowski.

August 27, 1968.

Moncrieff Creek East of Benny,
Hwy. 144, District 17,
Bridge Site 46-25, W.P. 273-64, BW 1574.

463-256

67-F-63

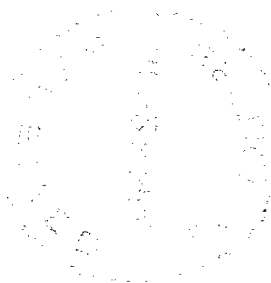
I understand from Mr. Devata of the Foundation
Section that scour must be avoided at this crossing in
order to ensure stability of the approach fill.

The simplest way of eliminating scour would be to
use rock fill to replace the top stratum of organic
material which is to be removed, and I recommend that
this be done for the width of the new channel bottom.
The thickness of rock fill will be approximately 3 ft.,
and the finished bed elevation should be 1255 as shown
on the drawing.

JDH/im

J. D. Harris,
Bridge Hydrology Engineer.

cc. M. Devata
J. B. Curtis
J. McAllister



Mr. C. S. Grebski,
Bridge Design Engineer,
Bridge Division,
Admin. Bldg.

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

April 8, 1968

Moncrieff Creek Bridge, East of Benny,
W.F. 273-64, Site 468-256, W.J. 67-F-63,
Hwy. 144, District No. 17 (Sudbury).

We have reviewed the Preliminary Bridge Plan
Drawing D 6363-r1 for the above mentioned structure and
submit the following comments:

The extent of sub-excavation of organic material
at the approach fill locations is shown on the design drawing,
but not the type of backfill material. We would like to bring
to your attention, that the sub-excavated area should be
replaced with suitable granular material below the water table,
and any acceptable material above the water table.

RD/ndof

cc: Messrs. S. McCombie
J. B. Curtis
E. R. Saint

Foundations Files
Gen. Files ✓

M. Davata

M. Davata,
SUPERVISING FOUNDATION ENGR.
For:
A. G. Sternac,
PRINCIPAL FOUNDATION ENGR.

62

67-69-30

Mr. J. B. Curtis,
Regional Bridge Location Engr.,
Regional Office,
NORTH BAY.

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

January 3, 1968

Proposed Crossing of Monarleff Creek
By the Realigned Hwy. 144
District No. 17 (Sudbury)
J.R. 273-64 -- W.J. 67-P-63

We have reviewed our recommendations contained in our Foundation Report W.J. 67-P-63, taking into account the revised grade as outlined in your memo dated December 21, 1967, and submit the following comments:

The grade has been increased approximately 4 feet above the original grade and the new approach fills will be in the order of 18 feet above the existing ground surface. This grade revision will not affect the stability of the approach fills provided the surficial organic silt is excavated and backfilled with granular material as outlined in our foundation report.

If you require further information pertaining to this project, please feel free to contact this Office.

cc/alep

cc: Messrs. S. McCombie
C. S. Grebski
H. McArthur
E. R. Saint

M. Devate
M. Devate,
SUPERVISING FOUNDATION ENGINEER
For:
A. G. Stermac,
PRINCIPAL FOUNDATION ENGINEER

Foundations Files
Gen. Files

P.S. -- Your plan returned herewith.

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