



Public Works
Canada

Travaux publics
Canada

Western Region

Région de l'Ouest



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B-2865

MACKENZIE HIGHWAY, N.W.T.
MILE 497.9 TO MILE 506.2
ALIGNMENT & GEOTECH REPORT
JULY, 1974



Government
of Canada

Gouvernement
du Canada

MEMORANDUM

NOTE DE SERVICE

TO
A

Mr. W. R. Binks
Program Manager (Civil)
Design & Construction
OTTAWA, Ontario

FROM
DE

F. E. Kimball
Project Manager NWT Roads
Western Region

SECURITY - CLASSIFICATION - DE SÉCURITÉ

000047

OUR FILE -- N/RÉFÉRENCE

9305-52-300

YOUR FILE -- V/RÉFÉRENCE

DATE

July 24, 1974

SUBJECT
OBJET

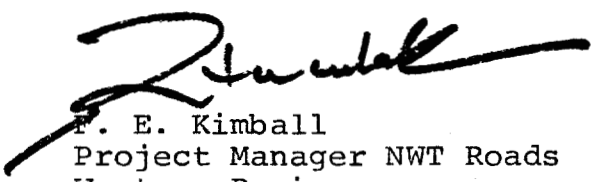
Alternates to Mile 498.6 Stream Crossing
MacKenzie Highway, N.W.T.

Attached are 24 copies of the report titled: "Mackenzie Highway N.W.T.- Mile 497.9 to Mile 506.2 - Alignment and Geotech Report- July 1974."

This report contains our conclusions regarding route selection in this area and is a follow-up of the report "Presentation of Possible Alternatives to Mile 498.6 Stream Crossing, February, 1974.

Five copies are being sent to C. Amos, DINA, Yellowknife; one copy to R. Barton, DINA, Edmonton; one copy each to DOE, Edmonton, DOE, Winnipeg and EMR, Calgary.

Attach


F. E. Kimball
Project Manager NWT Roads
Western Region

MACKENZIE HIGHWAY, N.W.T.
MILE 497.9 TO MILE 506.2
ALIGNMENT AND GEOTECH REPORT

JULY, 1974

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Appendix B - Test Hole Locations		
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INTRODUCTION

PRESENT ALIGNMENT

The initial crossing site, selected for the stream at mile 498.6 traversed an area where eight to sixteen feet of muskeg was found. A bridge structure and approach fills were proposed at the crossing, and in order to avoid excessive settlement and possible shear failure previous geotechnical investigation recommended complete removal of the organic material and replacement with stable granular material, along with other alternatives such as partial removal of the organic material, longer bridge span and relocation. As complete removal of the organic material is costly, alternative route locations were proposed as outlined in "Presentation of Possible Alternatives to mile 498.6 Stream Crossing", February, 1974.

PROPOSED ALTERNATIVES

Three alternatives A, B, and C were examined. All three alignments are shown on the 1":1000' mosaic in Appendix A. Alternatives 'A1' and 'A2' involved minor realignment on either side of the initial route location where there is a possible reduction in the thickness of organic material.

Alternate "B" involved substantial realignment to the east of the melt water channel from Mile 498 to Mile 506.4. However, numerous deep gullies would have to be transversed between

Mile 502 and Mile 505, and little advantage would have been gained, hence field study was not warranted.

Alternate "C" involved moving the alignment to the east of the melt water channel and rejoining the present alignment at about Mile 501. In order to fully evaluate the proposed alternatives, test drilling was carried out.

Description of Investigation Procedures

Preliminary geotechnical exploration to determine the feasibility of alternatives "A" and "C" was included as part of the geotechnical investigation program Mile 500 to Mile 550 MacKenzie Highway, N.W.T. in March to April, 1974.

A total of nineteen holes were drilled. The locations of the test holes are shown on the 1":1000' mosaic in Appendix "B". Fifteen holes were drilled on March 13 - 14, while four more holes, 500E1, 500E2, 500E6 and 500E7 were drilled on April 4. Borehole logs for all holes are included in Appendix C. Nine holes were drilled on the proposed alternate "A". From air photograph interpretation, it was impossible to determine where there was a significant reduction in organic cover, hence a series of evenly spaced holes were drilled both upstream and downstream of the original alignment to search for the most feasible crossing. It was intended that additional holes would be drilled across the channel to fully investigate the soil conditions if thin organic cover was encountered.

Ten holes were drilled on the proposed alternate "C". Test holes 501E1, 501E2, 501E3 were drilled to check the soil conditions in the general area where alternate "C" rejoins the present alignment. Test holes 500E3, 500E4 and 500E5 were drilled in areas where some water flow and thick peat cover were expected from air photo interpretation. Test holes 500E1 and 500E2 were drilled in areas where thick organic material was expected. 500E6 was drilled where possible granular material was expected. Test hole 500E7 was drilled close to the west bank of the stream crossed by the proposed alternate "C".

Engineering Analysis of Data and Field Observations

Alternate "A"

With the exception of test hole 498E1N, all the test holes showed thick organic deposits varying from 9' to at least 21'. Test hole 498E1N encountered only 6' of organic but test hole 498E1S which was about 300 feet south, showed peat down to at least 21'. No area with any significant reduction in organic material was found, hence alternates A1 and A2 are not recommended.

Alternate "C"

Test holes showed generally that the organic cover was much less than that found in the test holes at Mile 498.6. The depth of the organic material was about three to five feet. Good granular material was found in test hole 500E6 and test

hole 500E7 showed a relatively stable stream bank condition with silty clay at a moisture content of about 27%. Field observations revealed that there was no definite channel existing and no evidence of any large volume of flow around test holes 500E3, 500E4, and 500E5. Field observations also showed that the stream near test hole 500E7 is more defined than the stream at Mile 498.6.

Recommendations

Alternate "A" is not recommended as no thin organic cover was found in the investigation, hence alternate "A" offers little improvement over the present alignment.

At Alternate "C", there is a significant reduction in the thickness of organic cover and as little evidence of large volume of flow was observed in the field, it is unlikely that any major drainage structure would be required across the melt water channel. With only three to six feet of organic cover, settlement would not be a major problem. With the granular materials underneath the organic cover, offering a stable base, Alternate "C" is recommended.

The Alternate should rejoin the present alignment as proposed on the mosaic in Appendix "A" - i.e. No advantage would be gained by shifting the alternate to the area of holes 501-E1, E2, and E3. Test Hole 500-E7 on the west bank of the stream

crossing indicates relatively stable subsoil conditions with depth, however high ice concentrations near the surface were encountered and it is desirable to avoid cuts in this area. However, if cut is necessary for design purposes, cut is possible if protective measures are taken. Alignment, profile and drawing data will be obtained along Alternate "C" by the Department later this summer.

APPENDIX A
ALTERNATES A, B, C

APPENDIX B
TEST HOLE LOCATIONS

APPENDIX C
DRILL HOLE REPORTS

DEPARTMENT OF PUBLIC WORKS, CANADA MACKENZIE HIGHWAY

DRILL HOLE REPORT

SITE:

FIELD ENG. T. WINGROVE

DATE DRILLED. 13/3/74

AIRPHOTO NO.

CHAINAGE.

OFFSET. 0

TECH. B M

RIG. AUGER

SURFACE DRAINAGE. POOR

VEGETATION. WILLOW - 6'

ELEV.

TEST
HOLE

E1N

MILE

498

REMARKS

DEPTH (FEET)	SAMPLE NUMBER	SAMPLE TYPE	% RECOVERY	PENETRATION RESISTANCE	UNIFIED SOIL SYMBOL	SOIL DESCRIPTION	LIMITS OF FROZEN GROUND	ICE DESCRIPTION	DEPTH (FEET)	DR' DENSITY (lbs./ft. ³)		WATER CONTENT (% of dry weight)		ICE CONTENT (% of sample volume)		GRAIN-SIZE ANALYSIS				RELATIVE THAWED MOISTURE CONTENT
										PLASTIC LIMIT	LIQUID LIMIT			CLAY	SILT	SAND	GRAVEL			
2					Pt	ORGANIC	F		2											
4									4											
6									6											
8					GP	GRAVEL	UF		8											
10									10											
12						END OF HOLE @ 11'			12											
14									14											
16									16											
18									18											
20									20											
22									22											
24									24											
26									26											
28									28											

SITE:

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ELEV.

E1-S

498

REMARKS

25-14-5-74 b

DEPARTMENT OF PUBLIC WORKS, CANADA
MACKENZIE HIGHWAY

DRILL HOLE REPORT

SITE:

FIELD ENG. T. WINGROVE

DATE DRILLED. 13/3/74

AIRPHOTO NO.

CHAMBER.

OFFSET.

2

TECH. B M

RIG. AUGER

SURFACE DRAINAGE. NONE - CREEK

VEGETATION. NONE

ELEV.

TEST
HOLE

E2

MILE

498

REMARKS

DEPTH (FEET)	SAMPLE NUMBER	SAMPLE TYPE	% RECOVERY	PENETRATION RESISTANCE	UNIFIED SOIL SYMBOL	SOIL DESCRIPTION	LIMITS OF FROZEN GROUND	ICE DESCRIPTION	DEPTH (FEET)	DRY DENSITY (lbs./ft. ³)		WATER CONTENT (% of dry weight)		ICE CONTENT (% of sample volume)		GRAIN-SIZE ANALYSIS				RELATIVE THAWED MOISTURE CONTENT	
										PLASTIC LIMIT	LIQUID LIMIT	CLAY	SILT	SAND	GRAVEL						
2						8" FREE WATER	F		2												
4					Pt	ORGANIC	UF		4												
6									6												
8									8												
10									10												
12									12												
14					GP	GRAVEL			14												
16					GC	TILL			16												
18						END OF HOLE @ 17'			18												
20									20												
22									22												
24									24												
26									26												
28									28												

DEPARTMENT OF PUBLIC WORKS, CANADA MACKENZIE HIGHWAY										DRILL HOLE REPORT										SITE:						
FIELD ENG. T. WINGROVE					DATE DRILLED. 13/3/74					AIRPHOTO NO.					CHAINAGE.					OFFSET. 2					TEST HOLE E-3	
TECH. B M					RIG. AUGER					SURFACE DRAINAGE. NONE - CREEK					VEGETATION. NONE					ELEV.						
DEPTH (FEET)	SAMPLE NUMBER	SAMPLE TYPE	% RECOVERY	PENETRATION RESISTANCE	UNIFIED SOIL SYMBOL	SOIL DESCRIPTION	LIMITS OF FROZEN GROUND	ICE DESCRIPTION	DEPTH (FEET)	▲ DRY DENSITY (lbs./ft. ³) ⊙ WATER CONTENT (% of dry weight) △ ICE CONTENT (% of sample volume) PLASTIC LIMIT ————— LIQUID LIMIT						GRAIN-SIZE ANALYSIS				RELATIVE THAWED MOISTURE CONTENT	REMARKS					
										CLAY	SILT	SAND	GRAVEL	%	%	%	%									
2							F		2																	
4									4																	
6									6																	
8						ORGANIC			8																	
10					Pt				10																	
12							UF		12																	
14									14																	
16									16																	
18									18																	
20									20																	
22						END OF HOLE @ 21'			22																	
24									24																	
26									26																	
28									28																	

SITE:

OFFSET.	d
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ELEV.

E 4

498

REMARKS

DS-14.5.74

DEPARTMENT OF PUBLIC WORKS, CANADA MACKENZIE HIGHWAY

DRILL HOLE REPORT

SITE:

FIELD ENG. T. WINGROVE

DATE DRILLED. 13/3/74

AIRPHOTO NO.

CHARTAGE.

OFFSET. 0

TECH. B M

RIG. AUGER

SURFACE DRAINAGE. NONE - CREEK

VEGETATION. NONE

ELEV.

TEST HOLE

E 5

MILE

498

REMARKS

DEPTH (FEET)	SAMPLE NUMBER	SAMPLE TYPE	% RECOVERY	PENETRATION RESISTANCE	UNIFIED SOIL SYMBOL	SOIL DESCRIPTION	LIMITS OF FROZEN GROUND	ICE DESCRIPTION	DEPTH (FEET)	DRY DENSITY (lbs./ft. ³)		WATER CONTENT (% of dry weight)		ICE CONTENT (% of sample volume)		GRAIN-SIZE ANALYSIS				RELATIVE THAWED MOISTURE CONTENT
										PLASTIC LIMIT	LIQUID LIMIT	PLASTIC LIMIT	LIQUID LIMIT	CLAY	SILT	SAND	GRAVEL			
2					Pt	ORGANIC	F		2											
4									4											
6									6											
8							UF		8											
10									10											
12									12											
14						CL			14											
16						CLAY & WATER			16											
18									18											
20									20											
22									22											
24						END OF HOLE @ 22'			24											
26									26											
28									28											

DEPARTMENT OF PUBLIC WORKS, CANADA MACKENZIE HIGHWAY

DRILL HOLE REPORT

SITE:

FIELD ENG. T. WINGROVE

DATE DRILLED. 13/3/74

AIRPHOTO NO.

CHAINAGE.

OFFSET. 2

TECH. B M

RIG. AUGER

SURFACE DRAINAGE. NONE CREEK

VEGETATION. NONE

ELEV.

TEST HOLE

E 6

DEPTH (FEET)	SAMPLE NUMBER	SAMPLE TYPE	% RECOVERY	PENETRATION RESISTANCE	UNIFIED SOIL SYMBOL	SOIL DESCRIPTION	LIMITS OF FROZEN GROUND	ICE DESCRIPTION	DEPTH (FEET)	GRAIN-SIZE ANALYSIS				RELATIVE THAWED MOISTURE CONTENT	REMARKS
										CLAY	SILT	SAND	GRAVEL		
										%	%	%	%		
2					Pt	ORGANIC			2						
4									4						
6							UF		6						
8									8						
10									10						
12						CL			12						
14						CLAY & WATER			14						
16									16						
18						GC			18						
20						CLAY TILL Dark Brown Color Clay Has Med/High Plasticity			20						
22						END OF HOLE @ 22'			22						
24									24						
26									26						
28									28						

DEPARTMENT OF PUBLIC WORKS, CANADA MACKENZIE HIGHWAY										DRILL HOLE REPORT										SITE:					
FIELD ENG. T. WINGROVE					DATE DRILLED. 13/3/74					AIRPHOTO NO.					CHARTAGE.					OFFSET. 2				TEST HOLE E 7	
TECH. B M					RIG. AUGER					SURFACE DRAINAGE. NONE CREEK					VEGETATION. NONE					ELEV.					
DEPTH (FEET)	SAMPLE NUMBER	SAMPLE TYPE	% RECOVERY	PENETRATION RESISTANCE	UNIFIED SOIL SYMBOL	SOIL DESCRIPTION	LIMITS OF FROZEN GROUND	ICE DESCRIPTION	DEPTH (FEET)	▲ DRY DENSITY (lb./ft. ³) ⊙ WATER CONTENT (% of dry weight) △ ICE CONTENT (% of sample volume) PLASTIC LIMIT ——— LIQUID LIMIT						GRAIN-SIZE ANALYSIS				RELATIVE THAWED MOISTURE CONTENT	MILE	REMARKS			
										CLAY	SILT	SAND	GRAVEL	%	%	%	%								
2					Pt	ORGANIC	F		2																
4									4																
6							UF		6																
8									8																
10						CL CLAY & WATER			10																
12									12																
14									14																
16						GC CLAY TILL			16																
18									18																
20									20																
22						END OF HOLE @ 22'			22																
24									24																
26									26																
28									28																

SITE:

OFFSET.	2
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E 8

498

REMARKS

DS-14-5-74 b

DEPARTMENT OF PUBLIC WORKS, CANADA MACKENZIE HIGHWAY										DRILL HOLE REPORT										SITE:						
FIELD ENG. T. WINGROVE					DATE DRILLED. 4/4/74					AIRPHOTO NO.					CHAMBER.					OFFSET. Corner of Line					TEST HOLE E 1	
TECH. T S					RIG. HELI - DRILL					SURFACE DRAINAGE. POOR to FAIR					VEGETATION. Wet Area - Edge of 10' Conifers..					ELEV.						
DEPTH (FEET)	SAMPLE NUMBER	SAMPLE TYPE	% RECOVERY	PENETRATION RESISTANCE	UNIFIED SOIL SYMBOL	SOIL DESCRIPTION	LIMITS OF FROZEN GROUND	ICE DESCRIPTION	DEPTH (FEET)	DRY DENSITY (lbs./ft.)		WATER CONTENT (% of dry weight)		ICE CONTENT (% of sample volume)		GRAIN-SIZE ANALYSIS				RELATIVE THAWED MOISTURE CONTENT	REMARKS					
										PLASTIC LIMIT	LIQUID LIMIT					CLAY	SILT	SAND	GRAVEL							
						Area Appears as Boggy											%	%	%	%						
2					Pt	ORGANIC 0-3 Peat & Silt Clay Trace		1/4" Layers of Ice Crystals Seasonal Vx	2																	
4					CI	GREY CLAY 3-8' Med. Plastic Very Wet & Silty Coal Traces	F		4																	
6									6																	
8									8																	
10					CI	BROWNISH GREY 8-13' as Above but Wetter • Bit Sample at 11'	UF		10																	
12									12																	
14									14																	
16									16																	
18									18																	
20									20																	
22									22																	
24									24																	
26									26																	
28									28																	

DEPARTMENT OF PUBLIC WORKS, CANADA MACKENZIE HIGHWAY										DRILL HOLE REPORT										SITE:							
FIELD ENG. T. WINGROVE					DATE DRILLED. 4/4/74					AIRPHOTO NO.					CHAINAGE.					OFFSET. 100' SW of LAKE					TEST HOLE E 2		
TECH. T S					RIG. AUGER					SURFACE DRAINAGE. FAIR N. LAKE					VEGETATION. 5-10' Conifers					ELEV.							
DEPTH (FEET)	SAMPLE NUMBER	SAMPLE TYPE	% RECOVERY	PENETRATION RESISTANCE	UNIFIED SOIL SYMBOL	SOIL DESCRIPTION	LIMITS OF FROZEN GROUND	ICE DESCRIPTION	DEPTH (FEET)	DRY DENSITY (lb./ft. ³)				WATER CONTENT (% of dry weight)				ICE CONTENT (% of sample volume)				GRAIN-SIZE ANALYSIS				RELATIVE THAWED MOISTURE CONTENT	REMARKS
										TO POOR				PLASTIC LIMIT				LIQUID LIMIT				CLAY	SILT	SAND	GRAVEL		
2					PT	ORGANIC Woody Fibrous Light in Weight Ice Crystals ¼"	F	Layers of ¼ to ½"	2																		
4							F	Ice Crystals	4																		
6							F	Vx	6																		
8					BL	ROCK 9-10			8																		
10							UF		10																		
12						COURSE SANDY GRAVEL With Cobbles			12																		
14						Trace of Clay	UF		14																		
16					GW	10-17.5			16																		
18									18																		
20									20																		
22									22																		
24									24																		
26									26																		
28									28																		

DEPARTMENT OF PUBLIC WORKS, CANADA MACKENZIE HIGHWAY										DRILL HOLE REPORT										SITE:						
FIELD ENG. T. WINGROVE					DATE DRILLED. 14/3/74					AIRPHOTO NO.					CHAINAGE.					OFFSET. 3						
TECH. B M					RIG. AUGER					SURFACE DRAINAGE. POOR					VEGETATION. SPRUCE 6'					ELEV.					TEST HOLE	
																									E 3	
																									MILE	
																									500	
																									REMARKS	
DEPTH (FEET)	SAMPLE NUMBER	SAMPLE TYPE	% RECOVERY	PENETRATION RESISTANCE	UNIFIED SOIL SYMBOL	SOIL DESCRIPTION	LIMITS OF FROZEN GROUND	ICE DESCRIPTION	DEPTH (FEET)	▲ DRY DENSITY (lb./ft. ³) ⊙ WATER CONTENT (% of dry weight) △ ICE CONTENT (% of sample volume) PLASTIC LIMIT ——— LIQUID LIMIT										GRAIN-SIZE ANALYSIS				RELATIVE THAWED MOISTURE CONTENT		
										CLAY	SILT	SAND	GRAVEL	%	%	%	%									
2					Pt	ORGANIC Amorphous Granular Black in Color	F		2																	
4									4																	
6					GC	GRAVEL TILL Poorly - Graded Larger Rocks - 2"φ			6																	
8									8																	
10						END OF HOLE @ 8'	UF		10																	
12									12																	
14									14																	
16									16																	
18									18																	
20									20																	
22									22																	
24									24																	
26									26																	
28									28																	

DEPARTMENT OF PUBLIC WORKS, CANADA MACKENZIE HIGHWAY

DRILL HOLE REPORT

SITE:

FIELD ENG. T. WINGROVE

DATE DRILLED. 14/3/74

AIRPHOTO NO.

CHAINAGE.

OFFSET. 2

TECH. B M

RIG. AUGER

SURFACE DRAINAGE. NONE

VEGETATION. SPRUCE 8'

ELEV.

TEST
HOLE

E 4

MILE

500

REMARKS

DEPTH (FEET)	SAMPLE NUMBER	SAMPLE TYPE	% RECOVERY	PENETRATION RESISTANCE	UNIFIED SOIL SYMBOL	SOIL DESCRIPTION	LIMITS OF FROZEN GROUND	ICE DESCRIPTION	DEPTH (FEET)	GRAIN-SIZE ANALYSIS				RELATIVE THAWED MOISTURE CONTENT		
										CLAY %	SILT %	SAND %	GRAVEL %			
2					Pt	ORGANIC Amorphous Granular	F		2							
4					GC	GRAVEL TILL 3/4" Ø & Down A Few Larger Stones Rounded.			4							
6									6							
8									8							
10						END OF HOLE Ø 8'	UF		10							
12									12							
14									14							
16									16							
18									18							
20									20							
22									22							
24									24							
26									26							
28									28							

DEPARTMENT OF PUBLIC WORKS, CANADA MACKENZIE HIGHWAY

DRILL HOLE REPORT

SITE:

FIELD ENG. T. WINGROVE

DATE DRILLED. 14/3/74

AIRPHOTO NO.

CHAINAGE.

OFFSET. 2

TECH. B M

RIG. AUGER

SURFACE DRAINAGE. POOR

VEGETATION. SPRUCE 5'

ELEV.

TEST HOLE

E 5

DEPTH (FEET)
SAMPLE NUMBER
SAMPLE TYPE
% RECOVERY
PENETRATION RESISTANCE
UNIFIED SOIL SYMBOL

SOIL DESCRIPTION

LIMITS OF FROZEN GROUND

ICE DESCRIPTION

DEPTH (FEET)

▲ DRY DENSITY (lbs./ft.³)

⊙ WATER CONTENT (% of dry weight)

△ ICE CONTENT (% of sample volume)
PLASTIC LIMIT ——— LIQUID LIMIT

GRAIN-SIZE ANALYSIS

CLAY SILT SAND GRAVEL
% % % %

RELATIVE THAWED MOISTURE CONTENT

MILE

500

REMARKS

2-
4-
6-
8-
10-
12-
14-
16-
18-
20-
22-
24-
26-
28-

Pt ORGANIC Amorphous Granular

5' GRAVEL TILL Rounded Shale

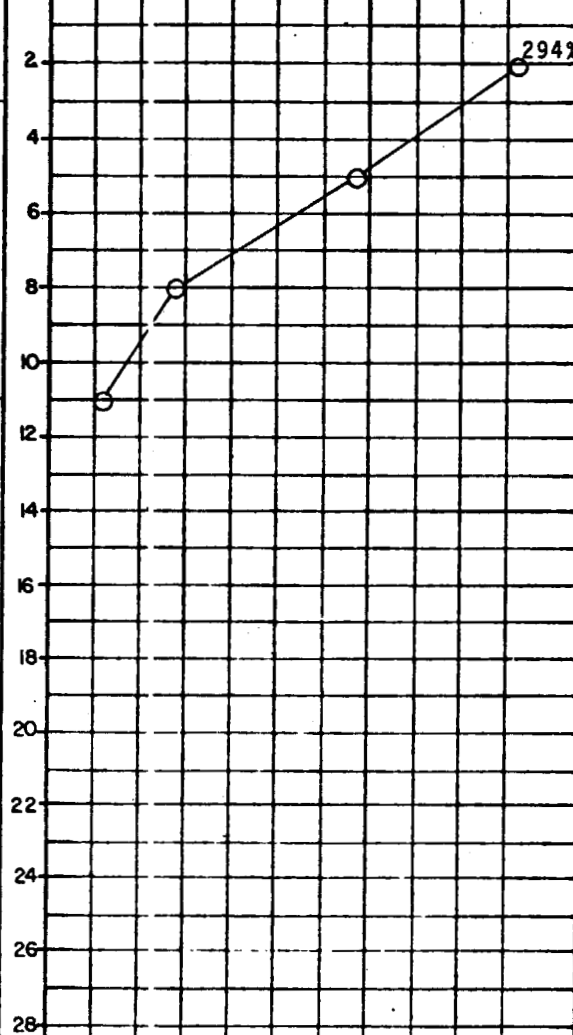
GC GRAVEL TILL Occasional Cobble Dark Brown to Black

GC WET

11' END OF HOLE @ 11'

F

UF



DEPARTMENT OF PUBLIC WORKS, CANADA MACKENZIE HIGHWAY

DRILL HOLE REPORT

SITE:

FIELD ENG. T. WINGROVE

DATE DRILLED: 4/4/74

AIRPHOTO NO.

CHAIN AGE.

OFFSET. 2

TECH. T S

RIG. HELI - DRILL

SURFACE DRAINAGE. FAIR TO POOR

VEGETATION. 10' SPRUCE 100' E of ELEV.

TEST HOLE

E 6

MILE

500

REMARKS

DEPTH (FEET)	SAMPLE NUMBER	SAMPLE TYPE	% RECOVERY	PENETRATION RESISTANCE	UNIFIED SOIL SYMBOL	SOIL DESCRIPTION	LIMITS OF FROZEN GROUND	ICE DESCRIPTION	DEPTH (FEET)	GRAIN-SIZE ANALYSIS				RELATIVE THAWED MOISTURE CONTENT		
										CLAY	SILT	SAND	GRAVEL			
										%	%	%	%			
2					CL	SILTY CLAY Frozen Ice Crystals Visible Coal Traces	F	1/2" Ice Crystals Visible Vx	2							
4							F		4							
6									6							
8					GW	COURSE GRAVEL With Sand Max. Size 1" Some Clay 11'-Less Clay (Trace)	UF		8							
10							UF		10							
12									12							
14									14							
16					GW	RUSTY COARSE GRAVEL With Coarse Sand Trace of Silt	UF		16							
18							UF		18							
20									20							
22									22							
24									24							
26									26							
28									28							

DEPARTMENT OF PUBLIC WORKS, CANADA MACKENZIE HIGHWAY										DRILL HOLE REPORT										SITE:			
FIELD ENG. T. WINGROVE				DATE DRILLED. 4/4/74				AIRPHOTO NO.				CHAINAGE.				OFFSET.				TEST HOLE E 7			
TECH. T S				RIG. HELI - DRILL				SURFACE DRAINAGE. FAIR to POOR				VEGETATION. 10'-20' Spruce				ELEV.							
DEPTH (FEET)	SAMPLE NUMBER	SAMPLE TYPE	% RECOVERY	PENETRATION RESISTANCE	UNIFIED SOIL SYMBOL	SOIL DESCRIPTION	LIMITS OF FROZEN GROUND	ICE DESCRIPTION	DEPTH (FEET)	GRAIN-SIZE ANALYSIS				RELATIVE THAWED MOISTURE CONTENT	REMARKS								
										CLAY	SILT	SAND	GRAVEL										
										DRY DENSITY (lb./ft. ³) WATER CONTENT (% of dry weight) ICE CONTENT (% of sample volume) PLASTIC LIMIT ——— LIQUID LIMIT													
2						SILT 0-2 Trace of Clay	F	Vx	2														
4					CL	SILTY CLAY 2-9' Heavy Ice Layer 2-3 Coal Trace 5' - Some Organic	F	Ice Visible 1/4" Ice Crystals	4														
6							F		6														
8							F	0' to 6'	8														
10						SILTY CLAY 9-15'	UF		10														
12					CL		UF		12														
14									14														
16						DRIER SILTY CLAY 15-18'	UF		16														
18						END OF HOLE @ 18'			18														
20									20														
22									22														
24									24														
26									26														
28									28														

DEPARTMENT OF PUBLIC WORKS, CANADA MACKENZIE HIGHWAY

DRILL HOLE REPORT

SITE:

FIELD ENG. T. WINGROVE				DATE DRILLED. 14/3/74		AERPHOTO NO.		CHAINAGE.		OFFSET.		TEST HOLE	E 1		
TECH. B M				RIG. AUGER		SURFACE DRAINAGE. POOR		VEGETATION. SPRUCE 15'		ELEV.				MILE	501
DEPTH (FEET)	SAMPLE NUMBER	SAMPLE TYPE	% RECOVERY	PENETRATION RESISTANCE	UNIFIED SOIL SYMBOL	SOIL DESCRIPTION	LIMITS OF FROZEN GROUND	ICE DESCRIPTION	DEPTH (FEET)	GRAIN-SIZE ANALYSIS					
										CLAY	SILT	SAND	GRAVEL		
2					Pt	ORGANIC Amorphous Granular	F		2						
4					Pt				4						
6					SM	SANDY SILT & ICE Dark Brown in Color	UF		6						
8									8						
10					GC	GRAVEL TILL* Poorly Graded Subangular Shaped			10						
12									12						
14					CL	SANDY CLAY TILL Very Wet			14						
16						END OF HOLE @ 16'			16						
18									18						
20									20						
22									22						
24									24						
26									26						
28									28						

DEPARTMENT OF PUBLIC WORKS, CANADA MACKENZIE HIGHWAY										DRILL HOLE REPORT										SITE:						
FIELD ENG. T. WINGROVE					DATE DRILLED. 13/3/74					AERIAL PHOTO NO.					CHAINAGE.					OFFSET. 2					TEST HOLE E 2	
TECH. B H					RIG. AUGER					SURFACE DRAINAGE. GOOD					VEGETATION. SPRUCE 15'					ELEV.						
DEPTH (FEET)	SAMPLE NUMBER	SAMPLE TYPE	% RECOVERY	PENETRATION RESISTANCE	UNIFIED SOIL SYMBOL	SOIL DESCRIPTION	LIMITS OF FROZEN GROUND	ICE DESCRIPTION	DEPTH (FEET)	▲ DRY DENSITY (lb./ft. ³) ⊙ WATER CONTENT (% of dry weight) △ ICE CONTENT (% of sample volume)		GRAIN-SIZE ANALYSIS				RELATIVE THAWED MOISTURE CONTENT	REMARKS									
										PLASTIC LIMIT	LIQUID LIMIT	CLAY %	SILT %	SAND %	GRAVEL %											
2					Pt	ORGANIC & SILT			2																	
4					CL	CLAY-Greyish-Brown Color - Low Plasticity	F	Nbn	4																	
6									6																	
8					GC	GRAVEL TILL		Vx	8																	
						END OF HOLE @ 8'																#3 Ice Crystals Visible				
10									10																	
12									12																	
14									14																	
16									16																	
18									18																	
20									20																	
22									22																	
24									24																	
26									26																	
28									28																	

SITE:

OFFSET. 7

ELEV.

E 3

HOLE	
MILE	501

REMARKS

PLAN	SURVEYED	DATE	PLOTTED	DATE	CHECKED	DATE
ALIGNMENT						
TOPOGR. NOTES						
DRAINAGE						
BORROW AREAS						
STRUCTURES NOTED						

	BY	DATE
IN FIELD		



