

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

MEMORANDUM

NOTE DE SERVICE

Mr. W. R. Binks Program Manager (Civil)	SECURITY - CLASSIFICATION — DE SÉCURITÉ OUR FILE — N/RÉFÉRENCE
Design & Construction OTTAWA, Ontario	9305-52-300 YOUR FILE V/REFÉRENCE
F. E. Kimball Project Manager NWT Roads Western Region	July 24, 1974

SUBJECT OBJET

FROM DE

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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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 'Al' 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 498ElN, all the test holes showed thick organic deposits varying from 9' to at least 21'. Test hole 498ElN encountered only 6' of organic but test hole 498ElS 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 Al 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-El, 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

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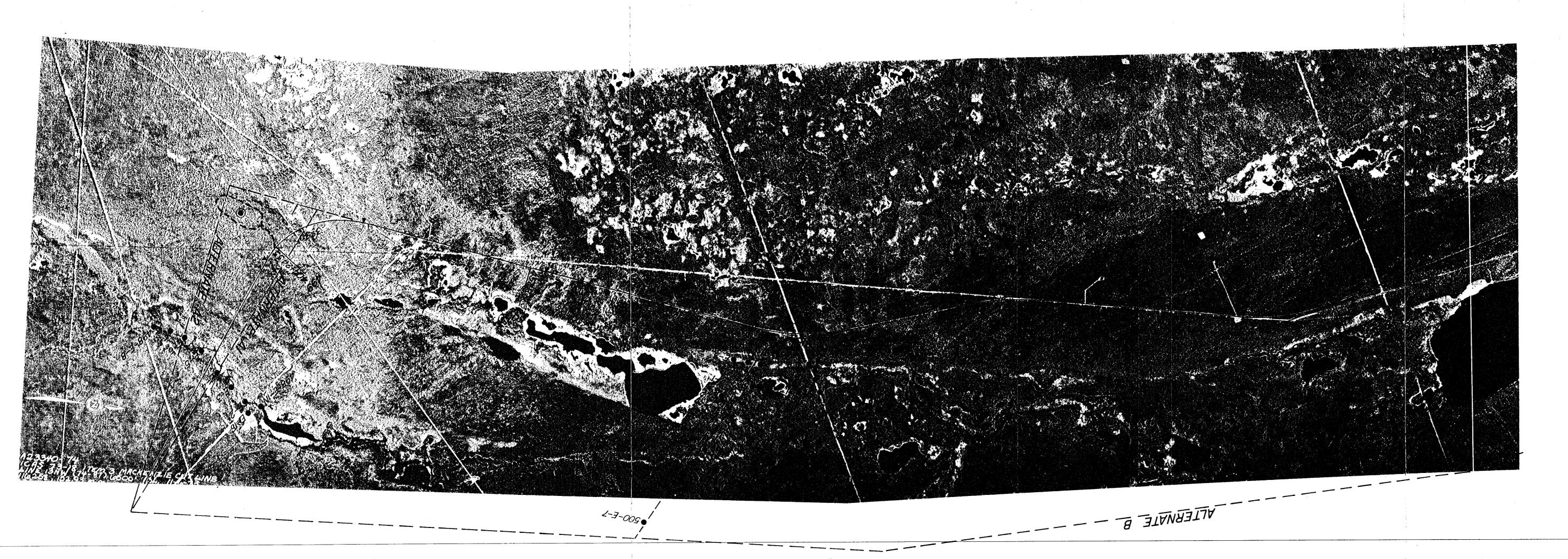
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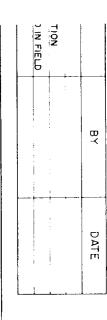
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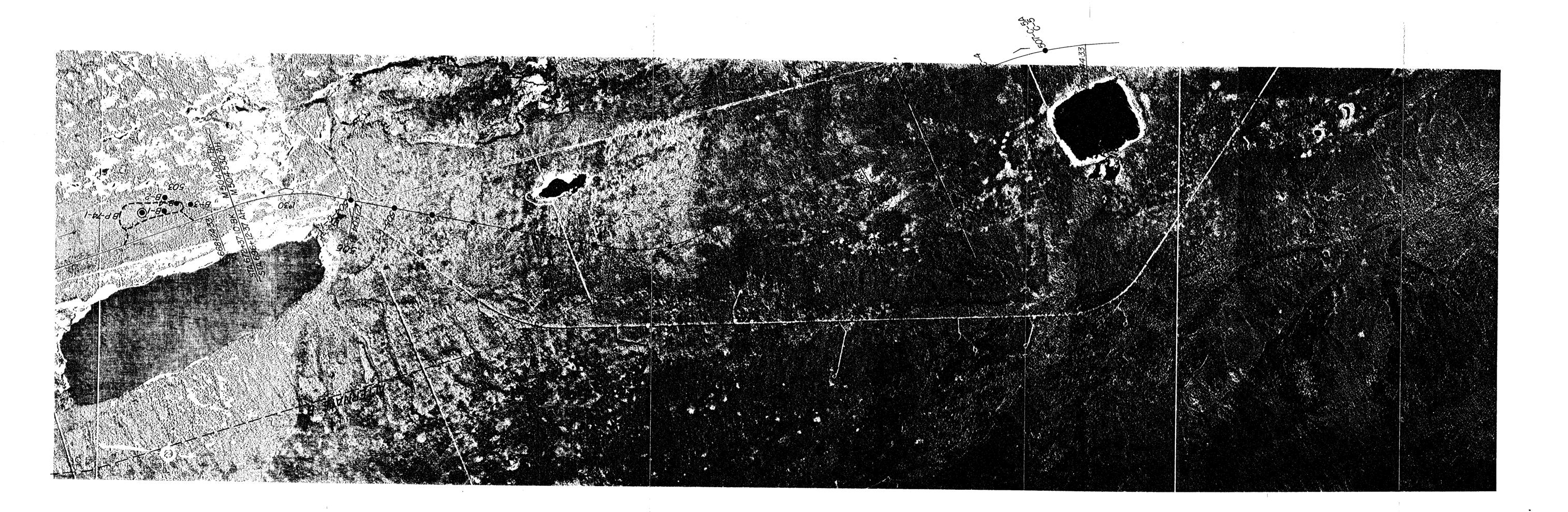
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