GR-05-030
Drawer #24

FIELD REPORT T-552

DEMPSTER HIGHWAY

BORROW PITS AND RIVER CROSSINGS
MILE 250 - 310

REQ'D.

① TOPO MAPPING FOR SELECTED WHALEBACK AREAS.

② PHOTOS. & OEE. STUDIES.

③ WHICH WHALEBACKS COULD SERVE FOR FUTURE MAINTENANCE PITS.

④ RIP. OR. BLAST ? & ACCESS

FIELD REPORT

DEMPSTER HIGHWAY

BORROW PITS AND RIVER CROSSINGS MILE 250 - 310

Enclosed:

A. Introduction
B. Objectives
C. Methods
D. Results/Recommendations
E. Accompanying maps/pictures

October 1972

Dept. of I.A.N.D.
Technical Services Branch
Northern Roads & Airport Group
Ottawa, Ontario.

A. INTRODUCTION

An environmental impact study of the Dempster Highway has been completed by Schultz International Limited of Vancouver. They presented the final plan to the Department of Public Works on Sept. 15, 1972. Their report assigned ecological values found along the existing and proposed highway route with specific recommendations as to how to minimize the adverse effect on these values.

B. OBJECTIVES

Responsible officers from the Departments of Public Works and Indian Affairs and Northern Development decided to act immediately on two of the Schultz's concerns as follows:

1. The "whalebacks" found between miles 250 to 310 have been defined in terms of having an "extremely high visual quality". See Appendix 2. From the Engineering standpoint, however, these features plus stream beds are the only sources for granular material for this section.

2. The North/South Cornwall and Rock River crossings are extremely sensitive in terms of continuous permafrost and the associated erosion potential. All three crossings have extremely high visual value in terms of scenic qualities and unique vegetation. These factors require the proposed culvert method to be reviewed in terms of modification and/or alternate types of structures.

KEY TO MAP SHEET LOCATION

DEMPSTER HIGHWAY

PROJECT No : CG170-002	DWG No : 814	SCALE : 1 inch = 40 miles	DATE : September, 1972

DEPARTMENT OF PUBLIC WORKS

C. METHODS

1. Borrow Sites

a. On Sept. 17, 18, 19 a construction materials engineer and a landscape architect visited the site between mile 250 and 290.

b. Potential pit sites were visited. Granular material calculations were made to determine borrow quantities required for this section. 60,000 cu. yds. per mile will be required.

A visual analysis of the whalebacks that may be required for borrow pits was acquired by taking pictures from the planned road surface elevations up to the whalebacks. They indicate the view as seen by the motorist.

c. On September 20, 21 and 22 discussions were held with D.P.W. Design and Construction engineers: Mr. S. Baker, Mr. R.K. Coates, Mr. Jim Quong, Mr. J. Hudson, Mr. B. Thompson (Edmonton), and Mr. L. Brandon (Regional Manager W/L & Forest). Fishery input was not available. Their advice will, however, be solicited by D.P.W. and included in the overall recommendation.

d. Methods of borrow operations were discussed in terms of:

- Location/types of borrow pit and access roads.
- Location/economic feasibility of whaleback borrow rehabilitation methods.
- Location/feasibilities of borrow pits and access roads required for maintenance reasons.

- Location/feasibility of borrow pits and access roads retained for overlook or resting stops.
- Location/feasibility of borrow pits and access roads behind whalebacks on talus slopes or Richardson Mountains.

2. River Crossings

a. On Sept. 17, 18 and 19 a construction materials engineer and landscape architect visited the north/south Cornwall and Rock River sites.

b. Alternate bridge/culvert locations were visited and assessed.

c. Discussions were held with D.P.W. Design and Construction Engineers, Mr. Jim Quony, Mr. S. Baker, Mr. J. Hudson, and Mr. B. Thompson (Edmonton).

d. The following technical factors were discussed:

1. Location/types of culvert crossings as related to proposed highway profiles.
2. Location/economic feasibility of bridge versus culverts.
3. Structural, aesthetic, economic considerations for bridge construction.

D. RESULTS/RECOMMENDATIONS

1. Borrow Pit

a. The whalebacks are the best source for borrow material along this 40 mile zone. Other sources such as talus material or a quarry operation are not economically justifiable due to ice, length of access, and blasting. Small quantities of additional

borrow material will be required from the stream beds at miles 280, 276 and 270.

Using 60,000 cu. yds. as a basis for borrow we have identified 14 of the 55 whalebacks for borrow sources. A 10 feet average depth would have to be taken off the top of each formation for the quantity of gravel required.

Typical sections and method of contour grading required to reshape each whaleback should be included in the contract. If grading is done carefully any adverse visual effects should be minimized.

Whaleback rehabilitation can be included in the contract as an equipment rental item. It is estimated shaping the top of the 14 whalebacks to a natural shape will cost approximately $14,000. This includes grading the borrow pit access roads to natural grade line after completion. All borrow pit access roads will be designed by the resident engineer. Revegetation does not seem advisable or practical since there is little or no vegetation on the existing whaleback areas required for borrow.

b. Each borrow pit for this zone should be designed and submitted for approval along with contract documents. If this is not possible they should be designed and submitted for approval following tender but prior to excavation.

c. Retention of five borrow pits in this zone will be required for maintenance. Therefore, one access road to a borrow pit every six miles will be necessary along this 40 mile zone.

d. The possibility of retaining one or two of these pits as a rest stop and overlook will be analysed after the road is built. The idea of having one rest stop every 20-30 minute along this road should be considered in the total planning. A selected rest stop along this 40 mile zone is certainly feasible.

2. River Crossings

a. The proposed as well as alternate culvert and bridge locations are attached for the north/south Cornwall and Rock crossings. In summary the present method of using large diameter corrugated steel pipe capable of allowing ice and floating debris to readily pass through is the most economical ($500,000). The impact of this method on the natural site systems is however far more significant than a bridge structure would be. The problems of substantial cut and fill in permafrost, erosion, siltation, stream diversion, and fish passage must be considered very carefully.

b. All three sites were investigated in terms of bridge crossing versus culverts. Preliminary estimates reveal that a high level bridge for each of the three in question would be approximately $2.5 million per structure. This is prohibitive in terms of current and future budget allocations.

Of the three crossings the Rock River would appear to benefit most from a bridge structure in terms of preserving unique vegetation and minimal impact to the stream regime.

For any future bridge designs a type of rusting steel should be considered in lieu of the standard galvanized steel presently used.

c. The following techniques are recommended for standard culvert crossings:

1. [1]Approach cuts through permafrost should be as near vertical as possible to minimize thermal degradation. Adequate drainage must be provided by means of a "V" ditch at the toe of cut with ditch checks to minimize velocity and siltation.

2. Fill embankments should have much flatter slopes, the ratio depending on the height of fill. Where erosion is a potential they should be stabilized with rip-rap or if possible vegetation.

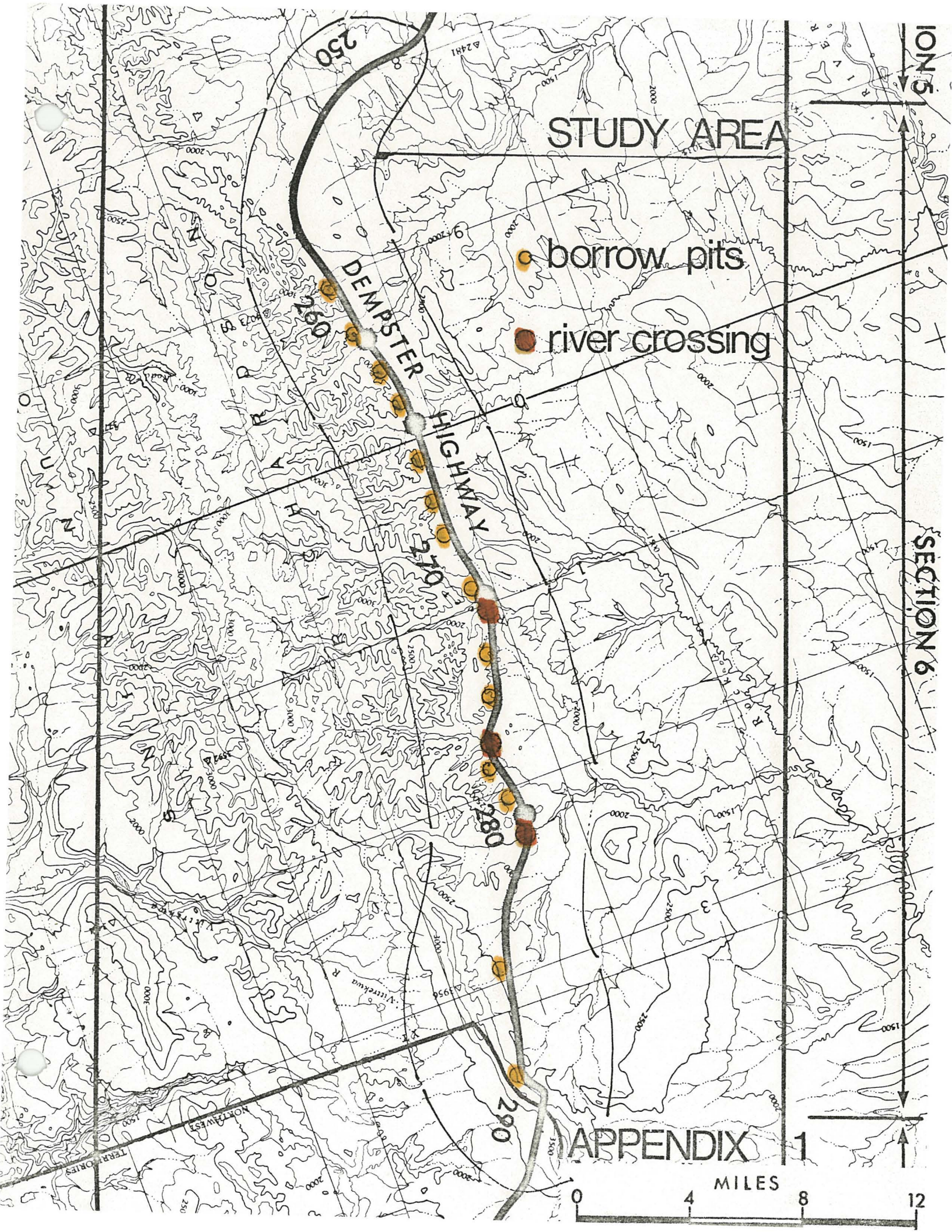
3. The stream volume and velocity must be assessed very carefully to provide for the passage of fish. As well as the potential capacity for heavy spring run-offs. This may require more than one culvert at a crossing.

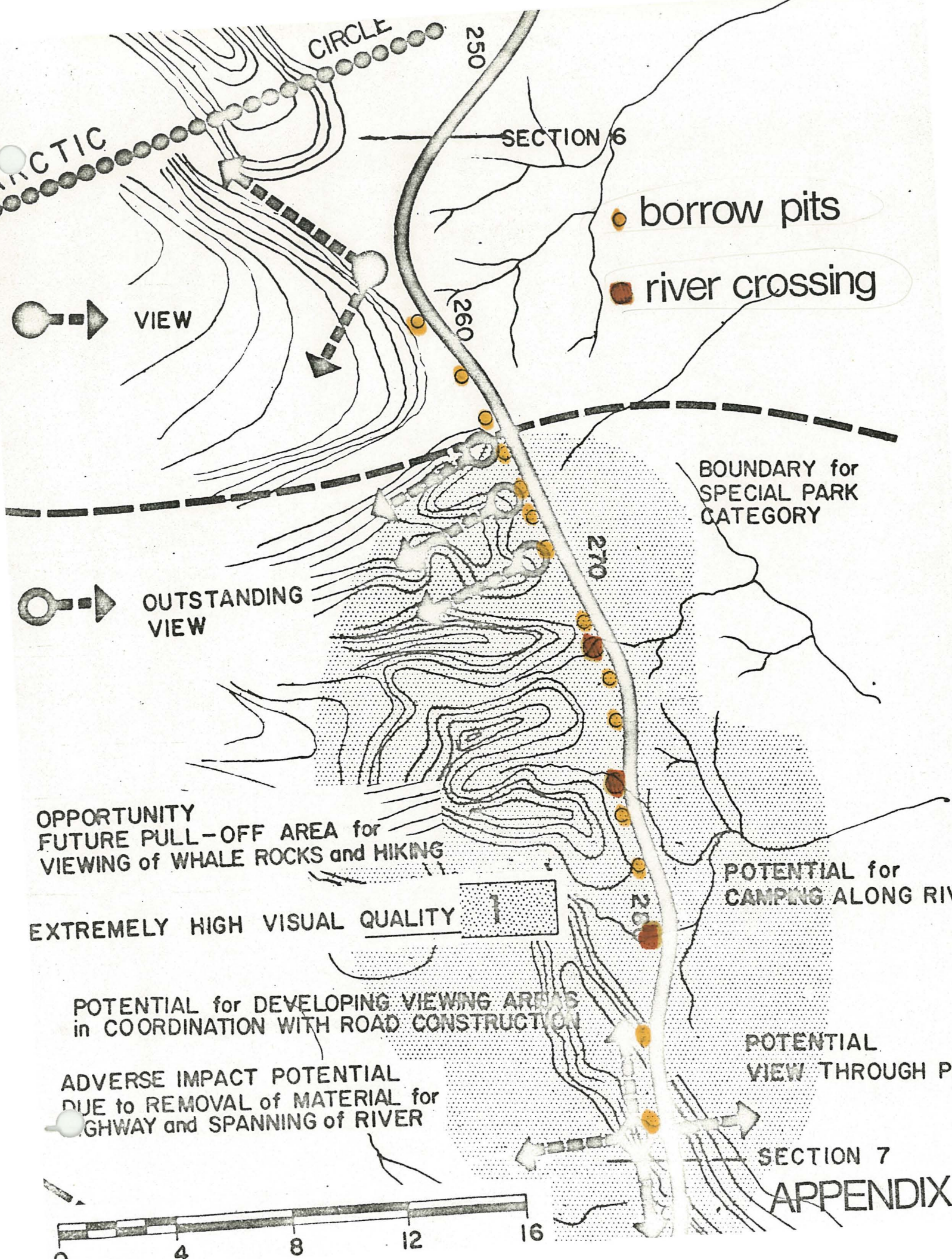
4. Every effort should be made to maintain existing stream channels for culverts. Diversions should be avoided to minimize erosion and siltation.

1. Gas Arctic Systems Study Group - Transportation Corridor Study Final Report Vol. II P.P. 2-47. This could be implemented on an an experimental basis.

E. ACCOMPANYING MAPS/PHOTOGRAPHS

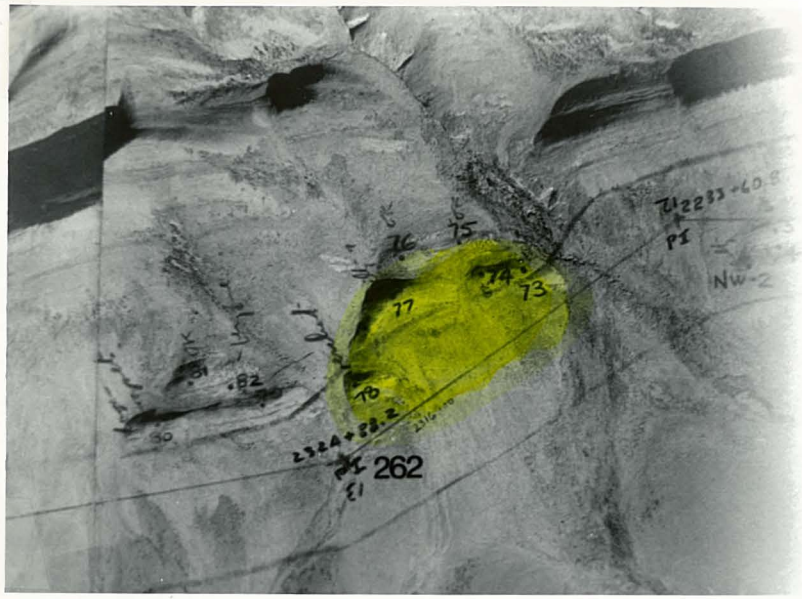
Appendix	1.	Shows Borrow Pit and River Crossing locations.
Appendix	2.	Shows Borrow Pit and River Crossings as related to visual values.
Appendix	3.	Shows Borrow Sites, Stream Crossings, and Road Alignment on air photographs.
Appendix	4.	Shows borrow pit and stream crossing alternates/ recommendations.


STUDY AREA
borrow pits
river crossing
DEMPSTER HIGHWAY
250
260
270
280
290
SECTION 5
SECTION 6
APPENDIX 1
MILES
0
4
8
12


CIRCLE
250
SECTION 6
borrow pits
river crossing
VIEW
260
BOUNDARY for
SPECIAL PARK
CATEGORY
270
OUTSTANDING
VIEW
OPPORTUNITY
FUTURE PULL-OFF AREA for
VIEWING of WHALE ROCKS and HIKING
POTENTIAL for
CAMPING ALONG RIVE
EXTREMELY HIGH VISUAL QUALITY
1
POTENTIAL for DEVELOPING VIEWING AREAS
in COORDINATION WITH ROAD CONSTRUCTION
POTENTIAL
VIEW THROUGH PAS
ADVERSE IMPACT POTENTIAL
DUE to REMOVAL of MATERIAL for
GHWAY and SPANNING of RIVER
SECTION 7
APPENDIX
0
4
8
12
16

BORROW PITS

Mile
262



Mile
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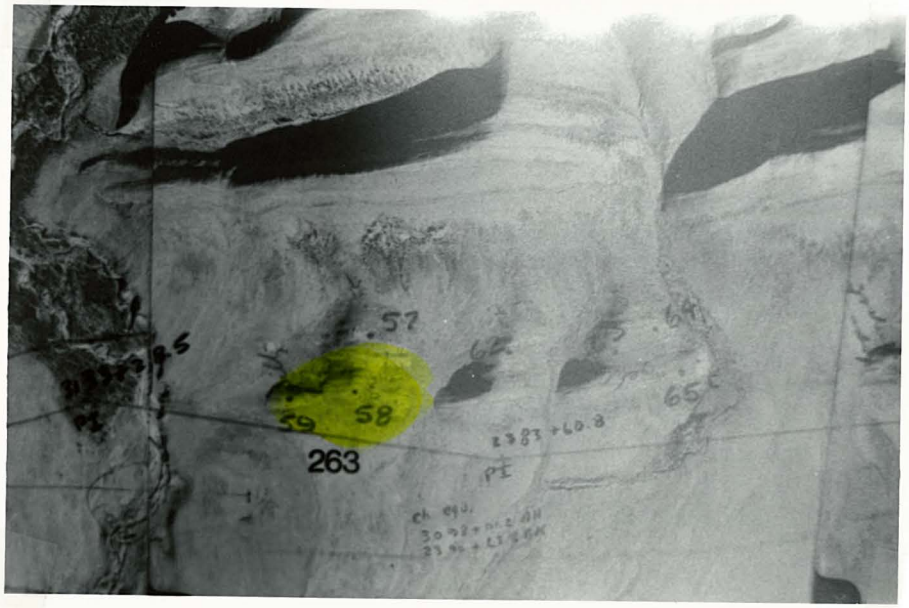

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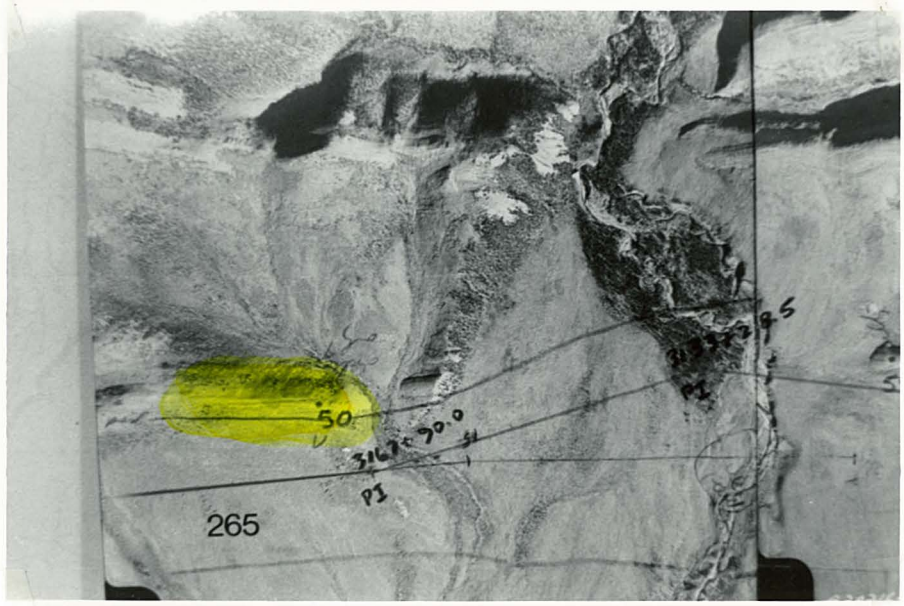

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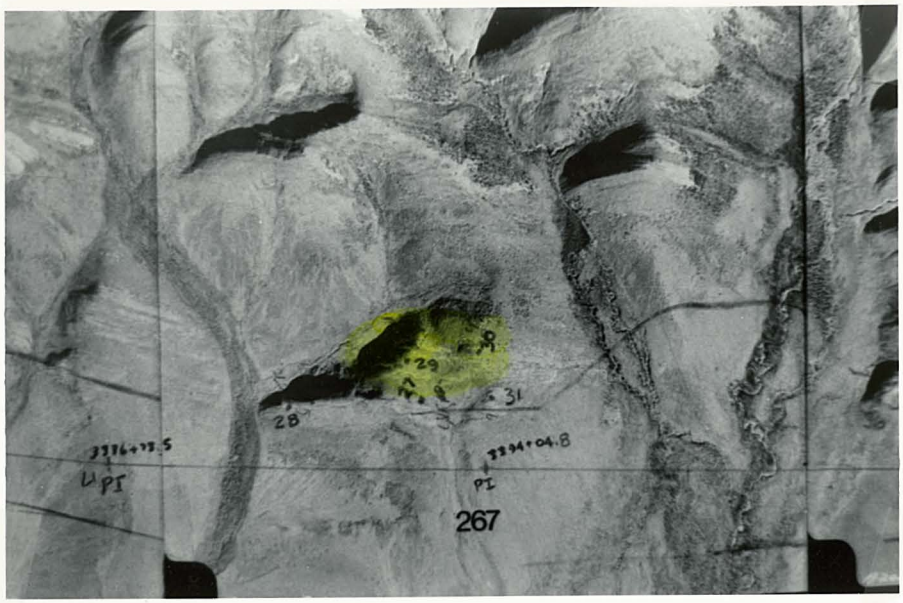

Mile
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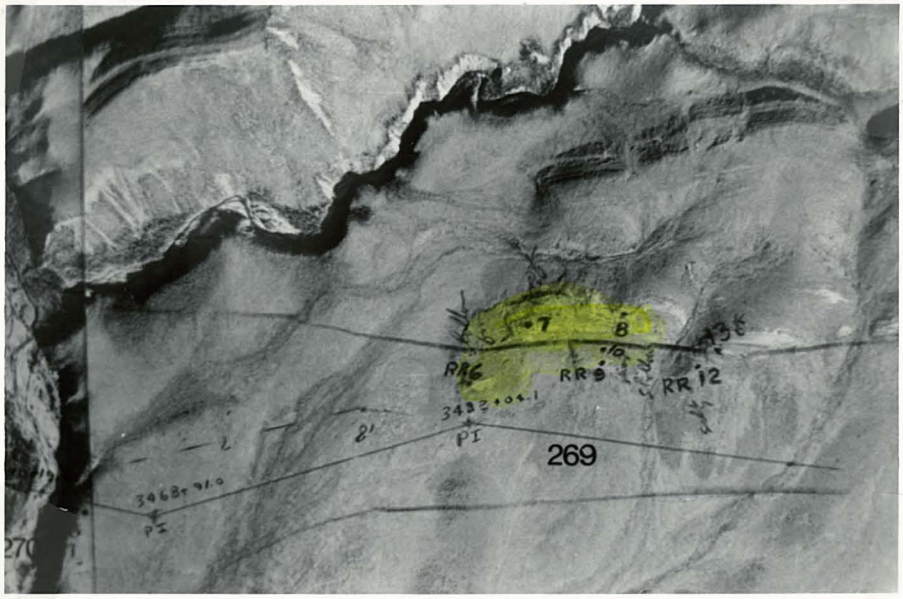

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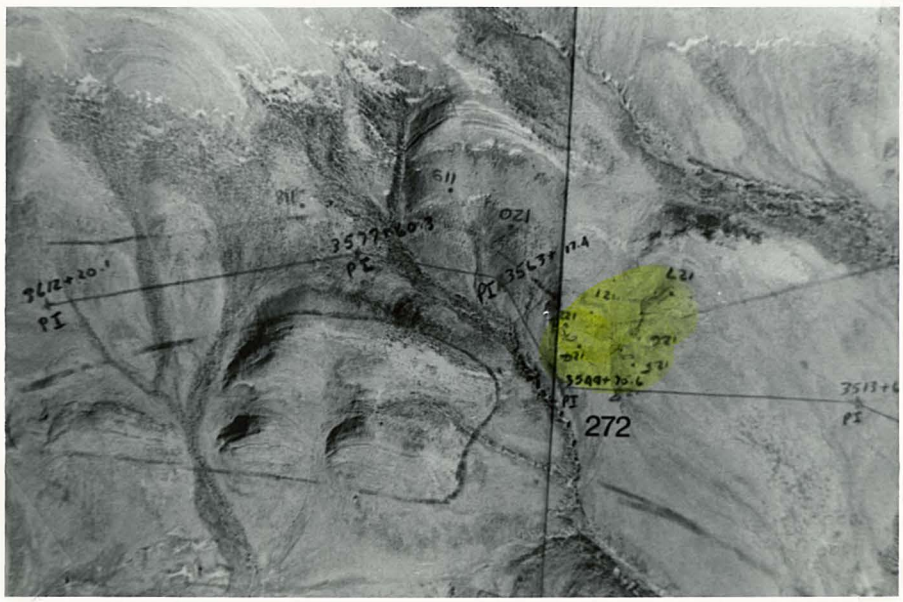

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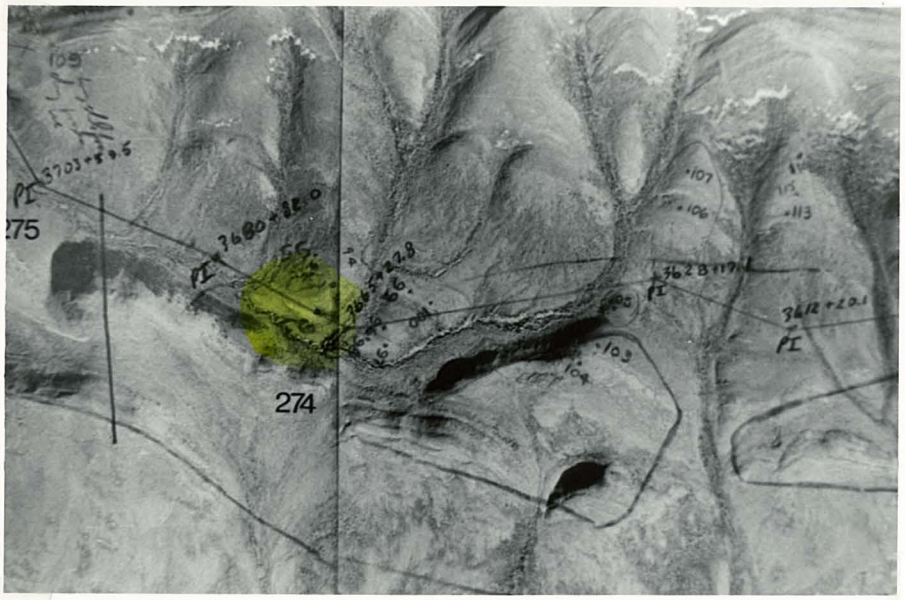

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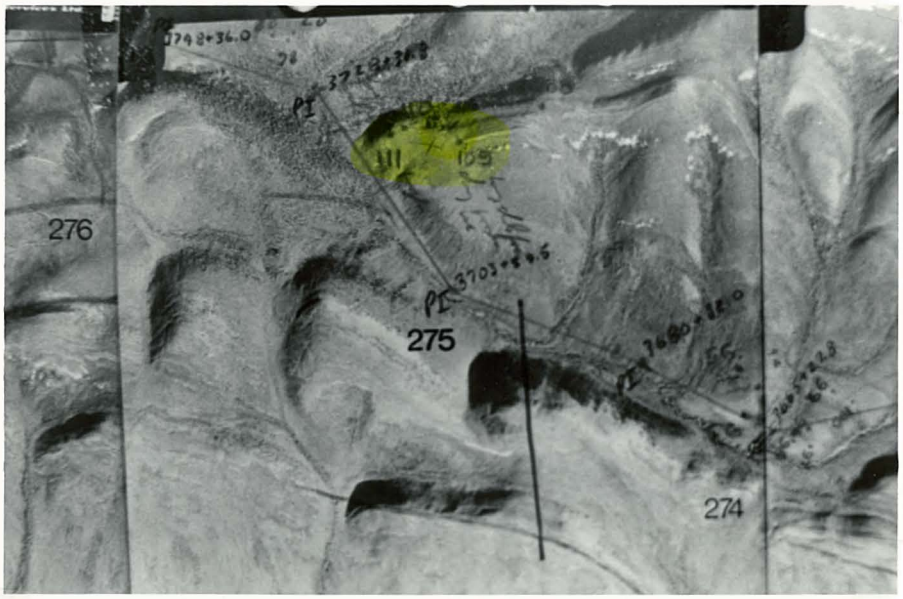

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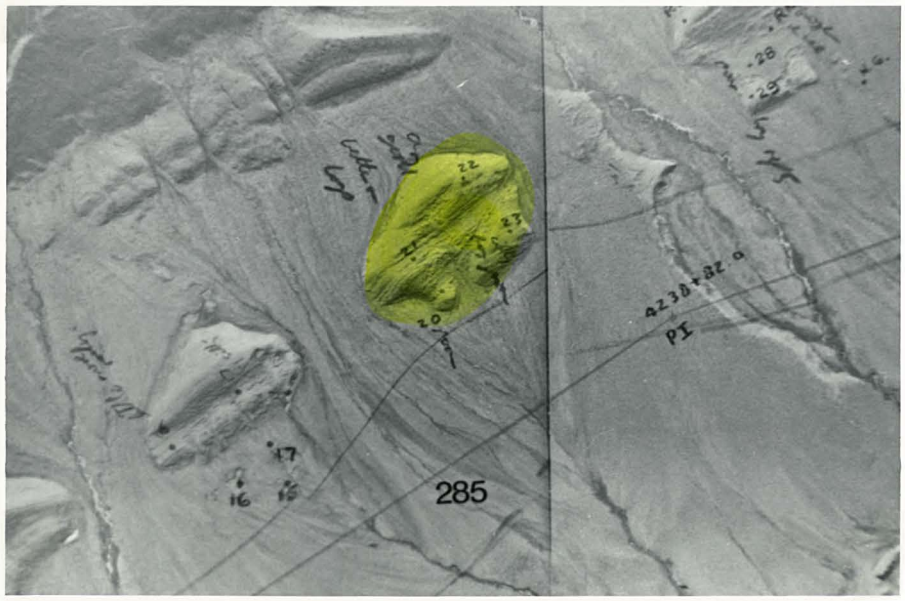

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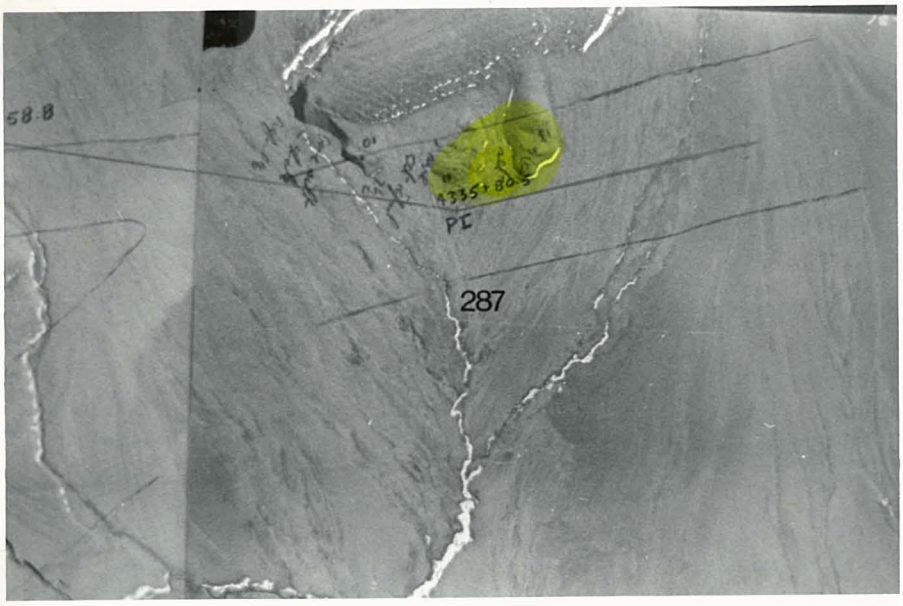

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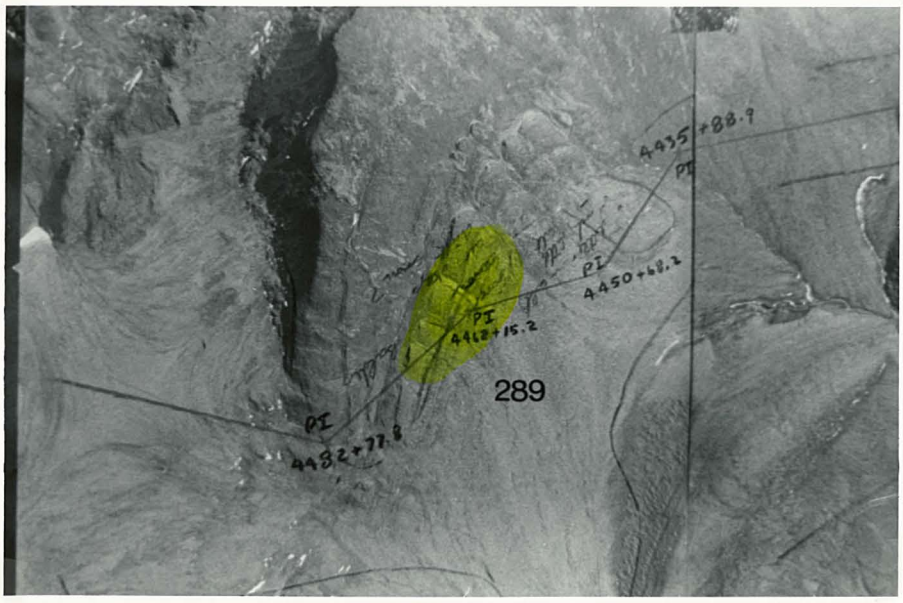
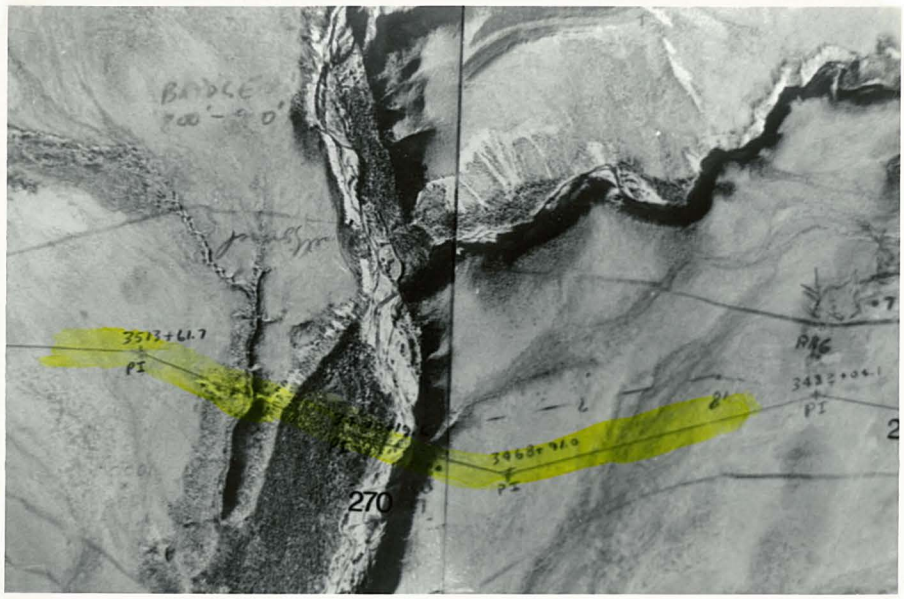
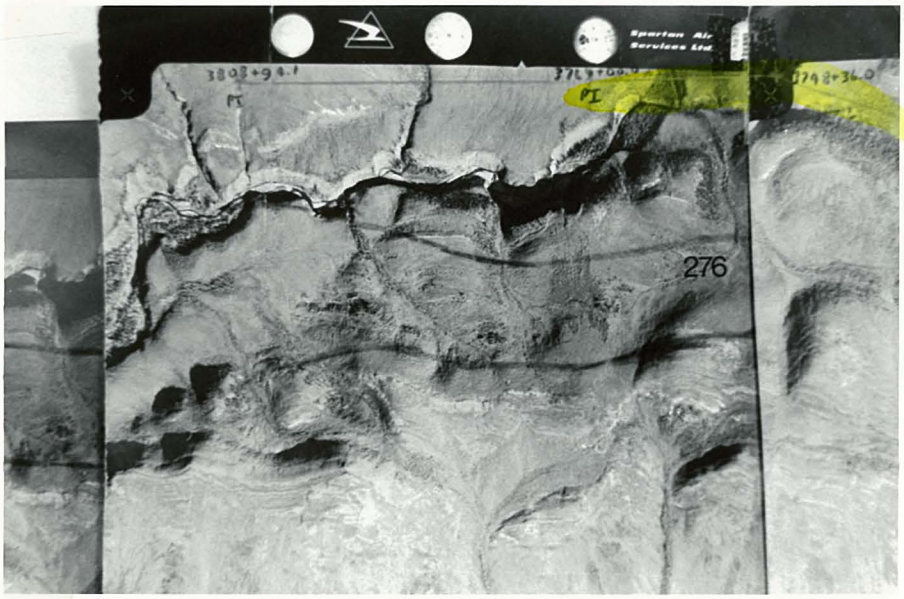


RIVER CROSSINGS

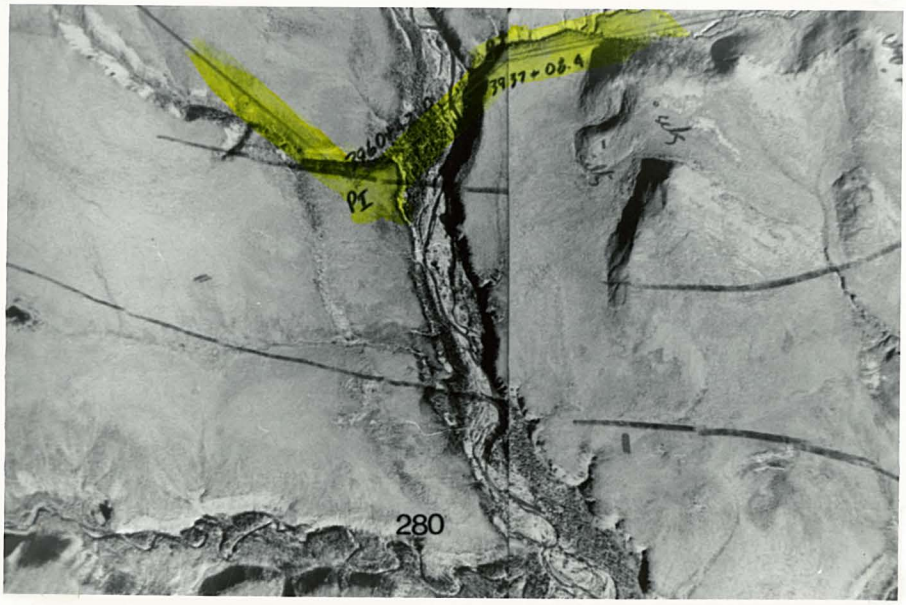
Rock River



South Cornwall



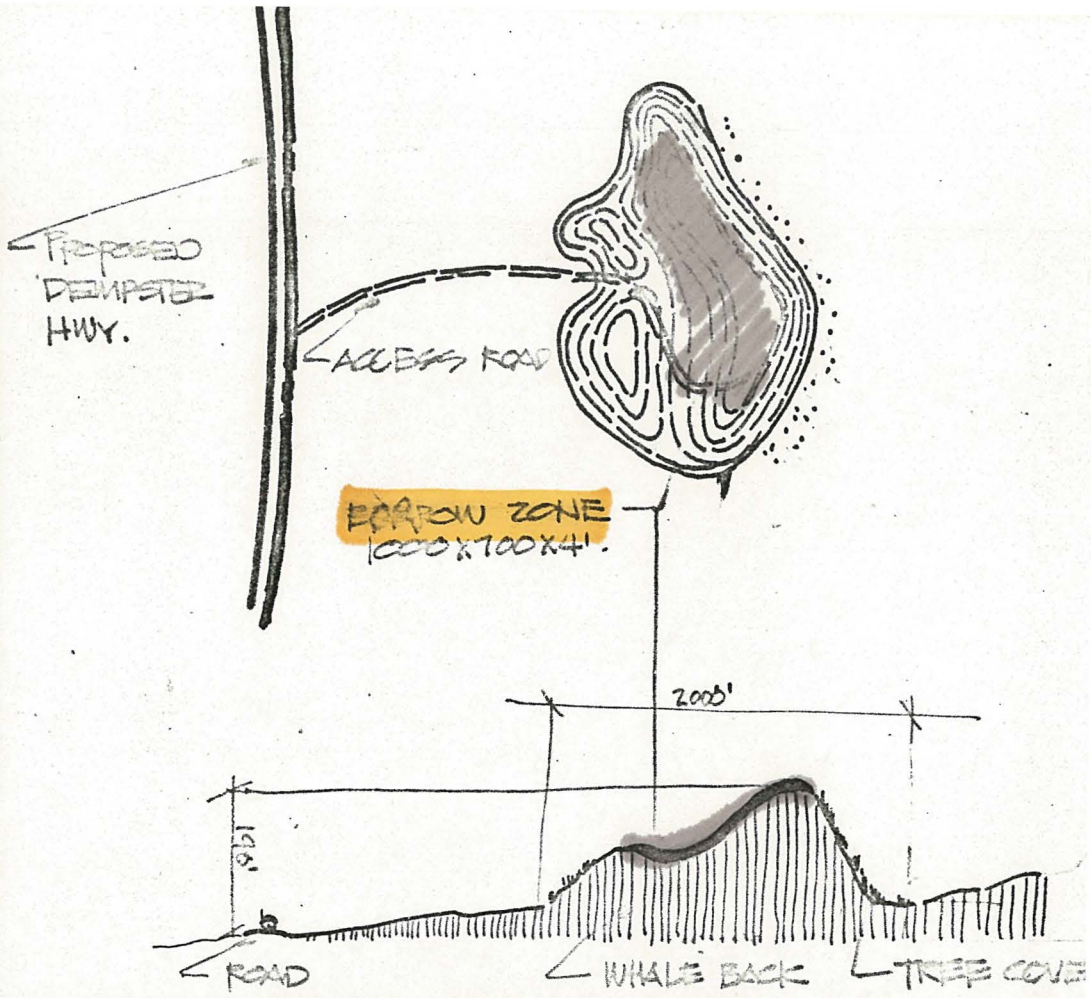
North Cornwall



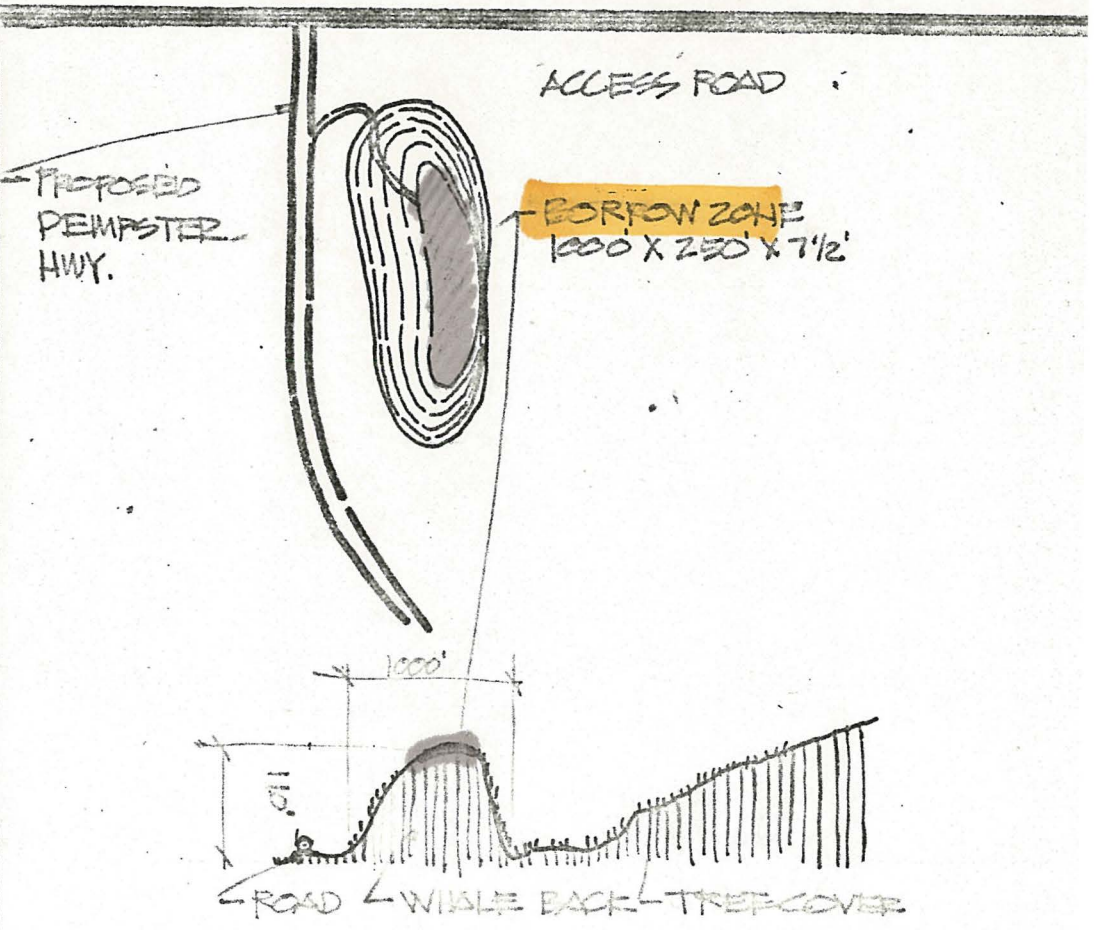
borrow pits

TYPICAL PLAN & PROFILE VIEWS

MILE 285

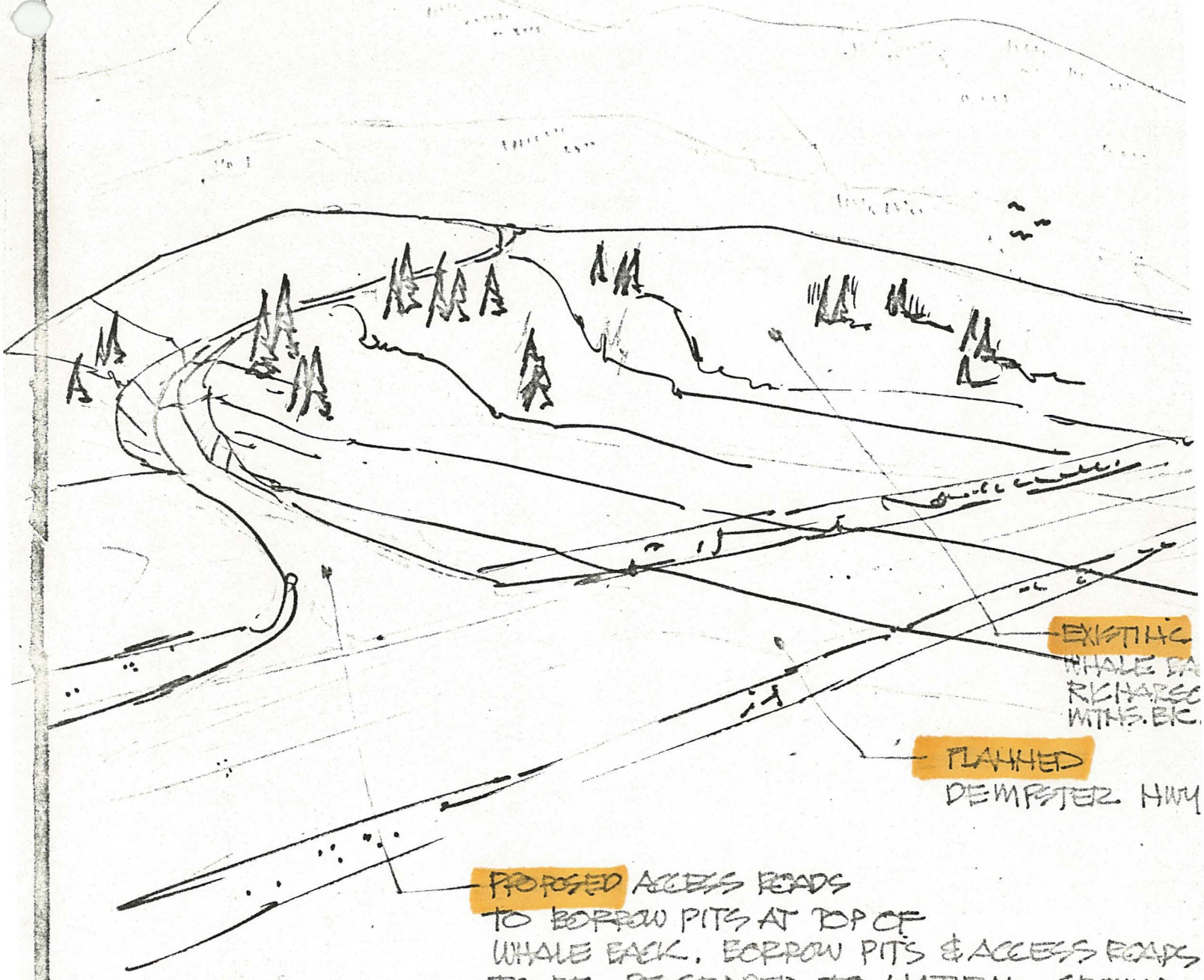


MILE 275



APPENDIX 4

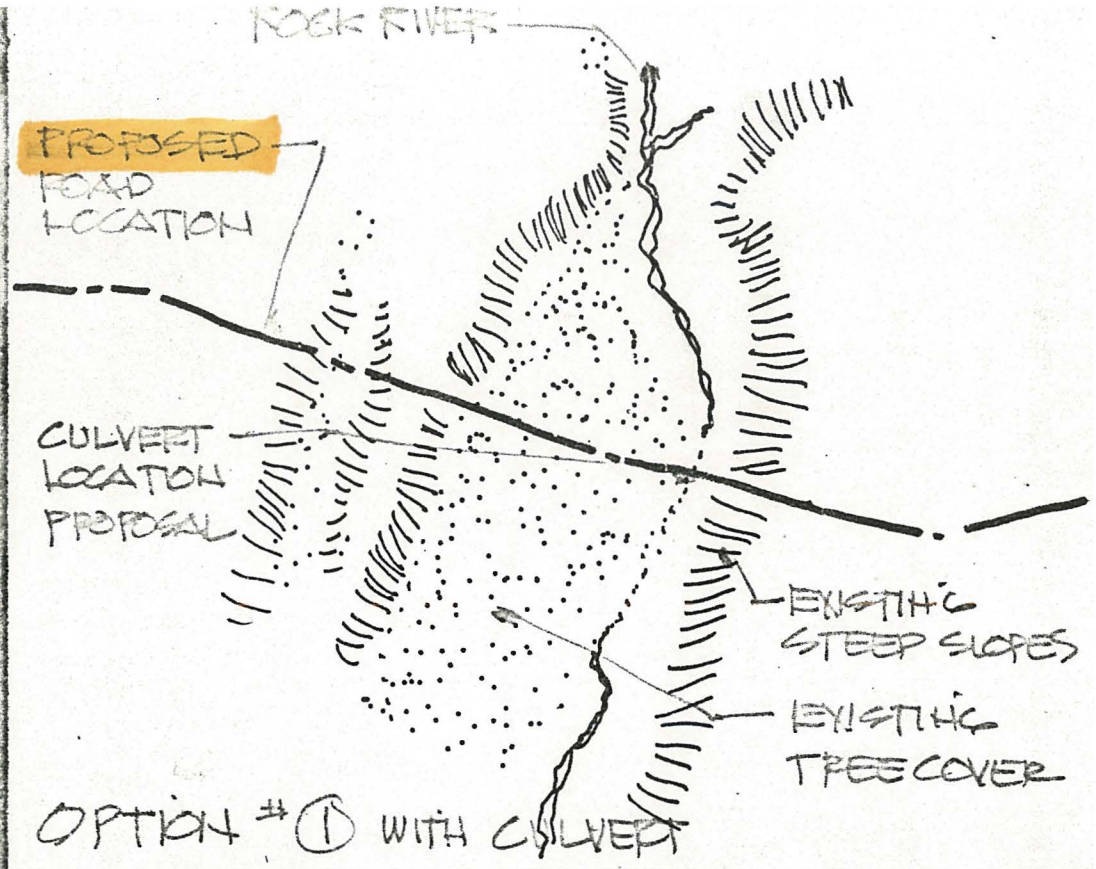
borrow pits



- VIEWS LOOKING TOWARD "WHALEBACKS" SHOULD NOT BE BAD BECAUSE OF THEIR HEIGTH TO PLANNED ROAD SURFACE.
- ONE OF THESE ACCESS ROADS COULD SERVE AS A FUTURE OVERLOOK ACCESS ROAD. WITHIN THE 40 MILE ZONE.

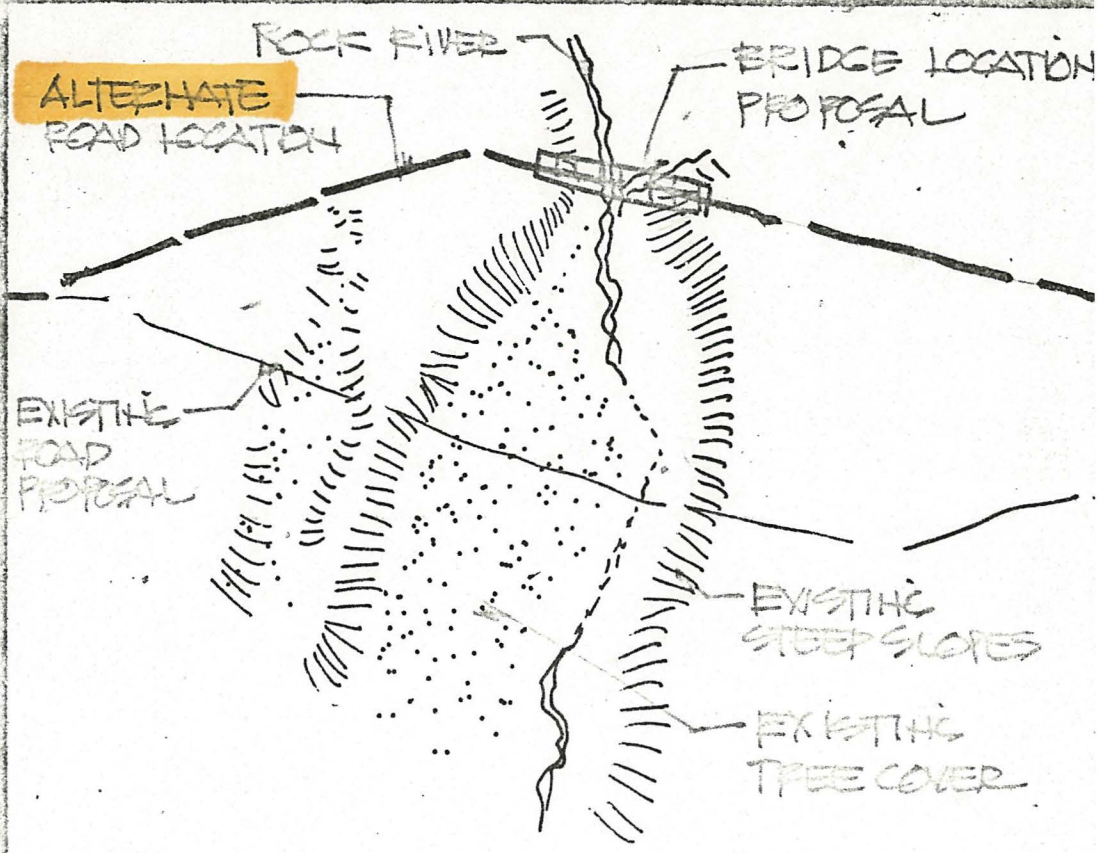
river crossing

MILE
270



OPTION #1 WITH CULVERT
COST $500,000
LOCKS/AHR TREE REMOVAL DISADVANTAGE

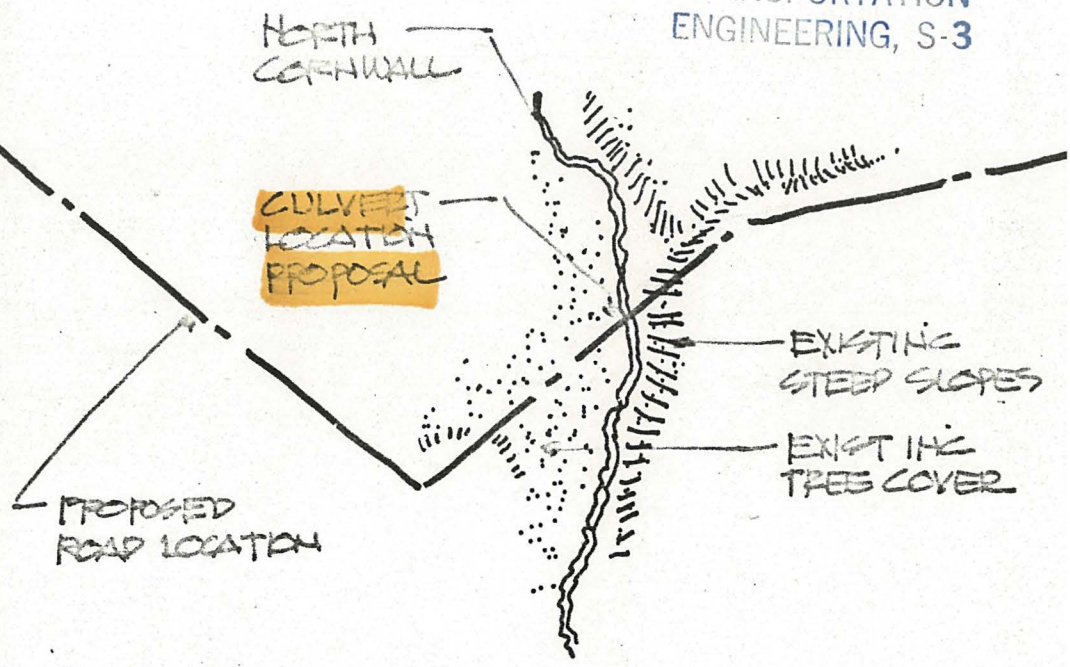
MILE
270



OPTION #2 WITH BRIDGE
COST $1,000,000 - DISADVANTAGE
LOCKS GOOD / SAVES TREES

river crossing

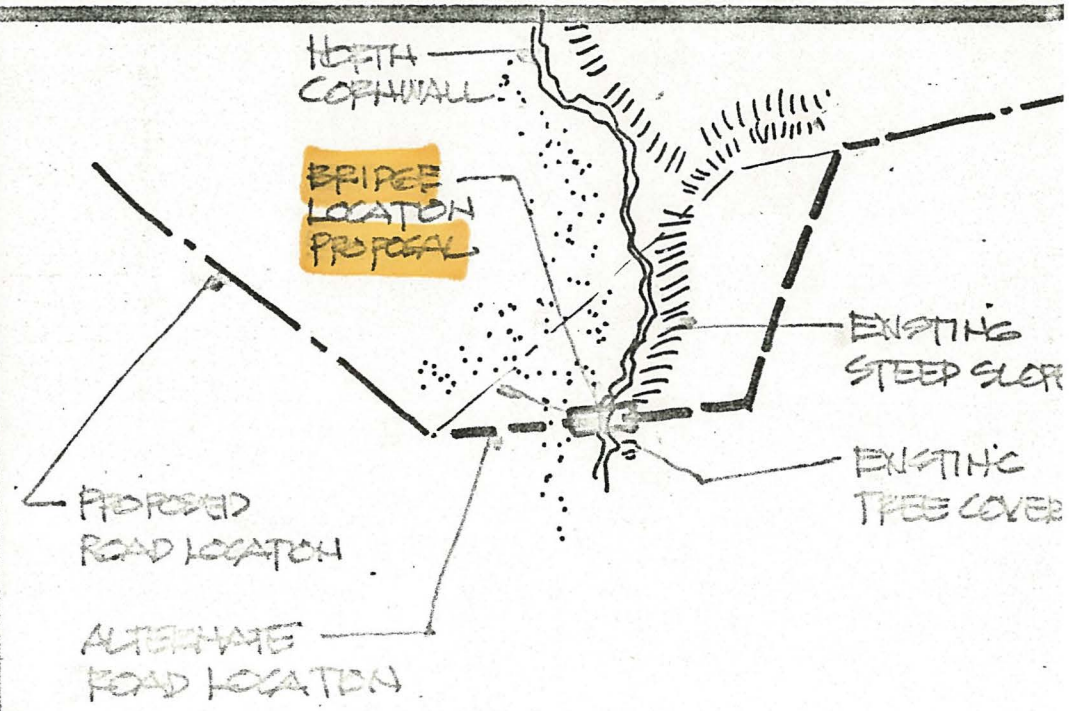
PLAN VIEWS



MILE 280

OPTION #1 WITH CULVERT

COST $500,000
LOOKS DISADVANTAGE



MILE 280

OPTION #2 WITH BRIDGE

COST 2,000,000 DISADVANTAGES
LOOKS GOOD
SAVES TREES

NOTE: SOUTH CORNWALL RIVER CROSSING SIMILAR ADVANTAGES & DISADVANTAGES

SCALE 1" = 1000'