TK 1425 .S8 A23 no.1208 suppl.

ALASKA POWER AUTHORITY

SUSITNA HYDROELECTRIC PROJECT

TASK 2 - SURVEYS AND SITE FACILITIES

SUBTASK 2.10 ACCESS PLANNING STUDY SUPPLEMENT

SEPTEMBER 1982

PREPARED FOR: ACRES AMERICAN INCORPORTED

> PREPARED BY: R&M CONSULTANTS, INC.

ARLIS

Alaska Resources Library & Information Services Anchorage, Alaska

EXPLANATION OF SUPPLEMENT

The Access Planning Study was published in January of 1982. It contained a detailed discussion and cost estimate for eleven different proposed access routes to the Susitna Hydroelectric In March of 1982 the Susitna Hydroelectric Feasibility Project. Report was presented by the Alaska Power Authority to the public resource agencies and organizations. The report recommended an access plan which for reasons of project schedule, would have necessitated the construction of a pioneer road prior to the FERC license being issued. The construction of a pioneer road. however, was considered unacceptable by the resource agencies and the plan was discarded. Consequently a further study was initiated in which, the evaluation criteria were refined and an additional seven alternative plans developed. One of the main issues that affected the selection and development process was the elimination of any pre-license construction. In order to meet the overall project scheduling requirements this constraint makes it necessary to secure initial access to the Watana damsite within one year of the FERC license being issued. Amongst the other important issues considered was the desire of Native organizations to have access to their lands expecially those to the south of the Susitna River, and the objective of minimizing environmental impacts.

Subsequent to the Access Planning Study of January 1982 being published the locations of the construction camps were finalized; the Watana camp being north of the Susitna River and the Devil Canyon Camp to the south. The change in camp location slightly modified the lengths of the road segments, but considering the samll difference, Plans One through Eleven were not revised.

i

ARLIS Alaska Resources Library & Information Services Anchorage, Alaska

Throughout the studies conducted subsequent to the Feasibility Report of March 1982 numerous comments have been received from interested agencies, groups and individuals. These include State resource agencies, environmental groups, local communities, Native organizations, The Alaska Power Authority and Acres American Inc. together with their specialist subconsultants. As a result of this comment and exchange of information, the seven new access plan represent a more coordinated compromise among the interested groups.

The new plans, for the most part, follow segments discussed in the original report. This supplement covers the new plans by supplementing the original report where needed. The major items found in this supplement are:

- 1. Additional segments needed for new plans discussed (Chapter Nine).
- 2. New plans discussed (Chapter Ten).
- 3. Segment, Terrain Unit, and Environmental Concerns maps in Appendices updated to show new routes.
- 4. Cost estimates generated for new plans (Appendix F).
- 5. Plan Eleven has been revised to include a low level crossing at Devil Canyon for access to the camp on the south side. It is now Plan 11R.

In order not to change the page numbering of the entire report, the following numbering policy has been used:

ii

- 1. Where a figure or table is revised, the page number is reused.
- 2. Where a figure, table, or text is added at the end of the chapter, the page numbering is sequential.
- 3. Where a figure, table, or text is added in to the middle of a chapter, the page number of the immediately preceeding page, plus a letter are used as the new page number. For example if three new pages of text are to be inserted between Pages 10-49 and 10-50 of the original report, the three new pages will be labeled 10-49A, 10-49B, and 10-49C.

ALASKA POWER AUTHORITY SUSITNA HYDROELECTRIC PROJECT ACCESS PLANNING STUDY SUPPLEMENT

TABLE OF CONTENTS

	Page
LIST OF TABLES	vi
LIST OF FIGURES	vii
1 - INTRODUCTION - no change	
2 - SUMMARY	•
2.7 Alternative Segments - Revised Figure 2.12.8 Alternate Access Plans - Supplement	2-5 2-9A
3 - SCOPE OF WORK - no change	
4 - PREVIOUS STUDIES - no change	
5 - PROJECT DESIGN - no change	
6 - PROJECT SCHEDULE - no change	
7 - LOGISTICS REQUIREMENTS - no change	
8 - ACCESS ROUTE DESIGN PARAMETERS - no change	
9 - CORRIDOR SELECTION	
9.1 Discussion of Alternate Segments - Supplement 9.4 Corridor Summary - Supplement	9-16A 9-60
10 - ACCESS PLAN	
10.1 Supply Sources & Shipping Options - Table	10-7A
10.4 Access Plans - Revised Figure 10.5 Access Plans - Revised Figure 10.8 Access Plans - Supplemental text & figures	10-27 10-37 10-47
11 - CONCLUSIONS & RECOMMENDATIONS - no change	

iv

TABLE OF CONTENTS (Continued)

		Page
12 - APP	ENDICES	
Α.	Preliminary Design Development - no change	
В.	Proposed Alternative Segments - revised	B-2
C.	Alternative Comparison - Grade, Curvature & Distance - no change	
D.	Terrain Unit Mapping - Supplement & Revisions D.3 Terrain Unit Descriptions - Supplement D.9 Terrain Unit Maps - Supplement	D-9A D-45
Ε.	Environmental Concerns - no change	
F.	Cost Estimates F.5 Bridges - Supplemental Tables & Figures F.7 Culverts - Supplemental Table F.10 Logistics Costs - Revised F.11 Cost Estimate Itemization - Supplement	F-9A F-35A F-40A F-45A
G	Borrow Pits - Revised	G-2

V

LIST OF TABLES

<u>Table</u>		Page
9.4	Corridors, Sections & Segments	9-61
10.1	Mileage from Ports to Railhead or Project - Supplement	10-7A
10.4	Basic Corridor Segments - Supplement	10-10A
10.5	Maintenance Factors - Supplement	10-11A
F.5.1	Bridges - Plans 1-11R	F-9A
F.5.2	Bridges - Plans 12-18	F-9B
F.7.1	Culverts - Supplement	F-35A
F.10.1	Watana Logistic Breakdown - Supplement	F-40A
F.10.2	Devil Canyon Logistic Breakdown - Supplement	F-41A
F.10.3	Roadhaul Segment Costs - Revised	F-42A
F.10.4	Logistic Total - Revised	F-44A
F.11	Cost Estimate Summary - Revised	F-45A

Vi

LIST OF FIGURES

Figure		Page
2.1	Project Access Location Alternatives - Revised	2-5
9.2A	Susitna Access Corridor - Segments 1G, 1H	9-16C
9.8A	Susitna Access Corridor - Segment 2Q	9-46B
9.10A	Susitna Access Corridor - Segment 2RRR	9-52B
9.10B	Susitna Access Corridor - Segment 2S, 2T, 2U, 2V	9-52J
9.10C	Susitna Access Corridor - Segment 2W	9-52L
9.11R	Susitna Access Corridor - Segments 3D, 3E	9-57C
9.12	Project Access Location Alternatives - Revised	9-59
10.5	Access Plan #5 - Revised	10-27
10.8	Access Plan #8 - Revised	10-37
10.11R	Access Plan 11R	10-48
10. 12	Access Plan #12	10-51
10.13	Access Plan #13	10-54
10.14	Access Plan #14	10-57
10.15	Access Plan #15	10-61
10.16	Access Plan #16	10-64
10.17	Access Plan #17	10-6 6
10.17A	Access Plan #17A	10-69
10.18	Access Plan #18	10-7 2
В.0	Access Corridors - Index Map - Revised	B-2
B.1	Access Corridors - Alignments - Revised	В-3
B.2	Access Corridors - Alignments - Revised	B-4
В.З	Access Corridors - Alignments - Revised	B-5

r35/a8

LIST OF FIGURES (Continued)

Figure		Page
B.6	Access Corridors - Alignments - Revised	в-7
B.7	Access Corridors - Alignments - Revised	В-8
B.8	Access Corridors - Alignments - Revised	В-9
B.16	Access Corridors - Alignments - Revised	B-13
B.19	Access Corridors - Alignments - Revised	в-16
B.22	Access Corridors - Alignments - Addition	B-19
D.1	Terrain Unit Map - Revised	D-47
D.2	Terrain Unit Map - Revised	D-48
D.3	Terrain Unit Map - Revised	D-49
D.4	Terrain Unit Map - Revised	D-50
D.6	Terrain Unit Map - Revised	D-52
D.7	Terrain Unit Map - Revised	D-53
D.8	Terrain Unit Map - Revised	D-54
D.9	Terrain Unit Map - Revised	D-55
D.14	Terrain Unit Map - Revised	D-60
D.15	Terrain Unit Map - Revised	D-61
D.16	Terrain Unit Map - Revised	D-62
D.17	Terrain Unit Map - Revised	D-63
D.18	Terrain Unit Map - Revised	D-64
D.19	Terrain Unit Map - Revised	D-65
D.20	Terrain Unit Map - Revised	D-66
D.21	Terrain Unit Map - Revised	D-67
D.22	Terrain Unit Map - Addition	D-67A

viii

LIST OF FIGURES (Continued)

Figure		Page
F.5.8	Portage Creek Bridge at Susitna River	F-18A
F.5.9	Susitna River west of Portage Creek	F-18B
F.5.10	Susitna River southwest of Fog Creek	F-18C
G.1	Borrow Pit Locations - Revised	G2

SUMMARY Alternate Access Plans Supplement

r35/a11



<u> Plan 11</u>

Plan 11 was revised to Plan 11R to provide access to the camp on the south side of Devil Canyon.

<u>Plan 11R</u> supercedes Plan 11. Plan 11R serves the entire project from the Denali Highway. No access is provided at Gold Creek. Supplies are shipped by rail to a railhead at Cantwell, then trucked to Watana via the Denali Highway, then on to Devil Canyon along the north side. Access to the South side of the damsite is via a low level crossing similar to the one found in Plan 5. This plan has the advantage of a low risk of schedule delay. The longer haul, however, makes this route the most expensive from a logistics standpoint.

Plans 12-18

These plans use modifications of the 3 basic corridor routes used in Plans 1-11.

<u>Plan 12</u> is an all road, north side route that avoids the undesirable Portage Creek traverse by crossing at the mouth of Portage Creek. A low level crossing of the Susitna river is included at Devil Canyon. The road is served by railhead from Hurricane. The disadvantage of this plan is the major bridge and associated schedule delay at Portage Creek.

<u>Plan 13</u> is all road, with direct access from the Alaska Railroad and Parks Highway at Hurricane, to the Watana Damsite, via a pass near the upper end of Portage Creek. A branch road serves the Devil Canyon Damsite, crossing the Susitan River near Portage Creek.

2**-**9A

<u>Plan 14</u> is a combination of road and rail. Rail is extended from Gold Creek north to a railhead on a terrace on the Susitna River. From here, road continues to both damsites on the south side of the Susitna river, crossing to the north side near Fog Creek. Access to the Parks Highway is provided by a road spur from the railhead north to Hurricane.

<u>Plan 15</u> is the same as Plan 14, but deletes the road link to the Parks Highway. This lowers the construction cost and effectively eliminates public access.

<u>Plan 16</u> consists of a railhead at Gold Creek, road to Devil Canyon, road from Devil Canyon to Watana, and a public access road from Hurricane to Devil Canyon. The road from Devil Canyon to Watana is on the south side to Fog Creek, then crosses the Susitna to join the camp on the north side.

<u>Plan 17</u> is similar Plan 6, except that, instead of a service road on the north side, this plan has a service road that is on the south side between Devil Canyon and Fog Creek, then crosses to the northside to reach Watana. As with Plan 6, Devil Canyon is served by rail and Watana by road from the Denali Highway. Railheads are located at both Devil Canyon and Cantwell.

<u>Plan 17A</u> is a slight modification of Plan 17. From Fog Creek to Watana Dam, the road stays on the south side of the river.

<u>Plan 18</u> is another modification of Plan 6. It includes rail access from Gold Creek to Devil Canyon, road access from the Denali Highway to Watana, and a service road between the dams on the north side. Plan 18 differs from Plan 6 in that Devil Canyon is crossed by a high level bridge, and the alignment has been improved.

2**-**9B

CORRIDOR SELECTION Deiscussion of Alternate Segments Supplement

(fa) <u>Segment 1-G</u>

(i) Description

Segment 1-G is an alternate to a portion of 1-A from the Parks Highway to Chulitna Pass. Unlike segments 1-A and 1-F, this segment avoids Denali State Park lands and the recently surveyed Indian River Subdivision. The segment passes Chulitna Butte on the east side, follows the base of the mountains, and joins the highway and railroad at Hurricane. See Figure 9.2A

This segment is six miles long.

(ii) Line and Grade

This segment conforms with the preferred design parameters. Though longer than the portion of 1-A it replaces, the line and grade are comparable.

(iii) Drainage Features

A number of small drainages are crossed on this segment. All can be easily crossed with culverts except Granite Creek, which may require a pipe arch or small bridge.

(iv) Bridges

No bridges will be required other than the possible short span at Granite Creek, just east of the Hurricane Siding.

9**-**16A

(v) <u>Soils</u>

By traversing the base of the mountains east of Chulitna Butte, this segment avoids the extensive organics encountered in 1-A. Terrain unit mapping is not yet available in this area, however, the steeper slope and better drainage definition would suggest more manageable soils.

(vi) Environmental Concerns

A final analysis of environmental impacts for this segment have not yet been received. The segment does alleviate the problems created by 1-A. Segment 1-G will avoid the wetlands encountered in 1-A, circumnavigate the existing cabins in Chulitna Pass, and away from the State lands that have been designated Denali State Park or Indian River Subdivision.

(vii) Segment Suitability

Segment 1-G appears to be a superior choice to the portion of Segment 1-A in the Chulitna Pass area. This cannot be confirmed, however, until aerial photography, terrain unit maps, and environmental maps are generated.

(fb) <u>Segment 1-H</u>

(i) Description



9-16C

This segment joins 1-A at the head of Portage Valley to 1-A/1-B in Devil Creek Valley. The line shortens the haul to Watana Damsite, but does not provide access to Devil Canyon Damsite. The segment is six miles in length. See Figure 9.2A.

(ii) Line and Grade

Grades will be in excess of the desired parameters. An 8% grade will be needed for one to two miles.

(iii) Drainage Features

The segment traverses a steep slope above a tributary of Portage Creek. Care must be taken to control side hill erosion as Portage Creek is an anadromous stream and the tributary paralleled may also be. No other significant drainages are encountered.

(iv) Bridges

Portage Creek will be crossed just upstream of the crossing anticipated for 1-A. The same class of bridge - approximately 200 feet long with two or three spans - should be sufficient.

(v) <u>Soils</u>

This segment crosses frozen basal till in the relatively flat

Portage Creek Valley, colluvium over bedrock and exposed bedrock along the steep side slopes of the Portage Creek tributary, and frozen basal till along the gentler drainage into Devil Creek. Problems with erosion and thaw settlement will be similar to those encountered in Portage Valley on 1-A.

(vi) Environmental Concerns

The major environmental impact anticipated is on the possibly anadromous tributary of Portage Creek that the route will parallel.

By shortening the route to Watana Damsite and removing the loop of road that serves Devil Canyon Damsite, this segment alleviates several major environmental concerns. There would be less impact on Portage Creek because only one side of the valley would be traversed. The valley is a fur bearer habitat and salmon spawning area. Also avoided is the potential raptor habitat in the Devil Canyon and Portage Creek confluence, and the fur bearer habitat and lodge at High Lake.

(vii) Segment Suitability

This segment's suitability is dependent on several criteria. The grade is above the desireable 6%, but only for a short distance. When joined with 1-A, Devil Canyon is bypassed, which will necessitate a separate spur road be built for the Devil Cayon Dam Construction and access. The original Segment 1-A traversed both sides of Portage Creek, which was considered to be an unsuitably high environmental impact. By limiting the traverse to only one side, the combination of Segments 1-A and 1-H becomes suitable.

(ua) <u>Segment 2-Q</u>

(i) Description

This segment joins 2-1 to 2-B. Presently, 2-1 ends at Devil Canyon and 2-B starts there. Segment 2-Q would start on 2-1 about 2 miles before the damsite, traverse Chechako Creek and its major tributary at their upstream reaches, and join 2-B about four miles southeast of the damsite. See Figure 9.8A.

This segment is nine miles long.

(ii) Line and Grade

This segment substitutes a longer route, with maximum grades and minimum radius curves for the major bridges required on 2-B. By starting south several miles west of Devil Canyon Damsite, the unacceptably high grades found in 2-B can be avoided.

(iii) Drainage Features

As with 2-B, the alignment is on high ground and avoids most drainage conflicts.



(iv) <u>Bridges</u>

Because Chechako Creek and its tributary are crossed well upstream of 2-B, the gorges are much smaller. Smaller, conventional bridges can be used.

(v) <u>Soils</u>

The segment traverse colluvium over bedrock and exposed bedrock. Some patches of solifluction are in the vicinity, but can be avoided. No significant probelms are foreseen.

(vi) Environmental Concerns

This segment may enter into the caribou wintering areas at the upper reaches of Chechako Creek. No other significant concerns have been noted. When used in conjunction with 2-B, as a substitute for 2-G, a raptor nesting area is avoided.

(vii) Segment Suitability

This segment combined with the east part of Segment 2-B, appears to be equally as suitable as Segment 2-G. Though it lengthens the total mileage to Watana Damsite, it eliminates the problems associated with the high bridges at Chechako Creek and neighboring gorges, extensive rock excavation, and possible construction delays.

(wa) Segment 2-RRR

(i) Description

This segment is a seven mile spur of railroad that leaves the existing tracks at Gold Creek, traverses the bluffs on the south side of the Susitna River, and ends in a railhead on a flat terrace on the south bank of the Susitna River. See Figure 9.10A

(ii) Line and Grades

By sidehill cutting into the Susitna River bluffs, the railroad remains at a low elevation with a relatively flat grade. Minimum radius curves will be needed to conform to the bluff as much as possible.

(iii) Drainage Features

Gold Creek and several minor unnamed drainages can be crossed with culverts.

(iv) Bridges

No bridges are required on this segment.

(v) Soils

The Susitna River bluffs are composed of frozen basal till,

9**-**52A



9-52B

. Ā

which has a relatively low slope stability. Bin walls or other soil reinforcement may be needed. The terrace and flood plain soils encountered in the beginning and end of the segment should pose no special problems.

(vi) Environmental Concerns

Both 2-RR and 2-I parallel this segment. No environmental conflicts were found when reviewing them.

(vii) Segment Suitability

This segment of railroad would be suitable to use in conjunction with a road that continues on to Devil Canyon (such as 2-1). It effectively eliminates all public access from the Gold Creek vicinity. It also precludes the use of segments 2L, 2H and 2K due to conflicting grades.

(wb) Segment 2S

(i) Description

This segment connects segment 2A in the Stephan Lake vicinity with Segment 1C by crossing the Susitna River. See Figure 9.10B. The segment is seven miles long.

(ii) Line and Grade

Maximum grades will be needed on both the north and south

9**-**52C

banks of the Susitna River. The banks lie at 50 to 100% cross slopes, with exposed bedrock in some places on the south bank.

(iii) Drainage Features

On the south side of Susitna River, several small drainages are crossed for which culverts should be adquate.

(iv) Bridges

The Susitna River bridge will be a major high level span, with approximately 600 feet of steel truss and 2600 feet of plate girder, and over 100 feet above the present water surface. The height is necessary in order to span the future Devil Canyon Reservoir. During initial road construction, there would be sufficient room to construct a road to the bottom of the valley for a temporary low level crossing or ferry. This would speed bridge construction and avoid access delays to the Watana Damsite.

(v) Soils

The segment is largely on frozen basal till, similar to those discussed in other sections of this report.

(vi) Environmental Concerns

This area has not been studied in detail from an environ-

9-52D

mental standpoint. Previous overviews of the area did not reveal any conflicts.

(vii) Segment Suitability

Segment 1-C has been deemed unsuitable for construction, alignment, and environmental reasons. However, the small piece that joins Segment 2-S to Watana Dam appears satisfactory. Segment 2-S itself is within acceptable design parameters and is deemed suitable for further consideration.

(wc) <u>Segment 2-T</u>

(i) <u>Description</u>

Segment 2-T connects 1-A just east of Indian River with Segment 2-I. Included in this segment is a major bridge across the Susitna River. The segment is seven miles long. See Figure 9.10B.

(ii) Line and Grade

The north bluff of the Susitna River will have to be side hill traversed at a maximum grade. The rest of the segment is made up of milder grades and few curves.

(iii) Drainage Features

Only minor drainages are crossed, which can be suitably

9-52E

crossed with culverts.

(iv) <u>Bridges</u>

The bridge across the Susitna River will be similar to the one anticipated in 2-E, a 2480-foot, orthotropic steel structure with approximately twelve spans.

(v) <u>Soils</u>

This segment travels across frozen basal till interspersed with patches of organics. The frozen basal till should not be a significant problem over the majority of the route, since the cross slope is slight. The potential for erosion and slope failure will be as high on the Susitna River north bluff, as it is on the south bluff (see Segment 2-R, 2-1 and 2-RRR)

(vi) Environmental Concerns

A detailed study was made of the environmental concerns in this area has not yet been completed. If this segment is used as a substitute for 2L or 2E, the major impact of road access to the Indian River Remote Parcel sites would be removed.

(vii) Segment Suitability

This segment is suitable for roadway construction and

compares favorably with Segment 2-L. It's major positive attribute is the circumvention of the Indian River Remote Parcel Sites.

(wd) Segment 2-U

(i) Description

Segment 2-U shortens the 1-A segment by eliminating the loop up Portage Creek. Instead, the segment crosses Portage Creek at its confluence with the Susitna River, then rejoins 1-A above Devil Canyon Damsite. See Figure 9.10B. This segment is six miles long.

(ii) Line and Grade

The portion of this segment just before and after the Portage Creek crossing has to traverse steep (50% or higher) sidehills, but all curves and grades are within the design criteria.

(iii) Drainage Features

The major drainage - Portage Creek - will be crossed with a bridge. Of the other more minor drainages, one that drains a swampy area will be difficult as the entire valley that contains it is lined with organics. This and other drainages should be possible to cross with culverts. (iv) Bridges

9**-**52G

A major bridge is required across Portage Creek. It will be 1100 feet long, and cable stayed.

(v) Soils

The segment goes through several unavoidable areas of organics. The rest of the segment is on frozen basal till with some colluvium and exposed bedrock at the Portage Creek crossing. Construction will be similar to other areas with these materials.

(vi) Environmental Concerns

This segment deletes the long traverse up and down Portage Creek, thus avoiding impacts to salmon spawning areas, fur bearing habitat and a mining claim. The potential raptor nesting area, however, is still impacted. Also subject to possible impact is a historical site at the mouth of Portage Creek. It consists of an inscription, dated 1897, with the names of William Dickey and three other individuals. Dickey was one of the first white men in the region. It is not yet known if this site is eligible to be listed on the National Register of Historic Places. Actual construction of the Portage Creek bridge would require mitigation measures to prevent erosion into salmon spawning areas. Long-term erosion associated with segment 1-A is not anticipated.

(vii) Segment Suitability

This segment eliminates the less desirable portion of Segment 1-A, with its difficult side hill construction and

environmental impacts. The trade off is a major bridge at the mouth of Portage Creek that would impact the construction schedule by requiring two or more years to construct.

(we) Segment 2-V

(i) Description

Segment 2-V is a variation of 2-U. It branches off just before 2-U crosses Portage Creek. Segment 2-V instead crosses the Susitna River, and proceeds to the Devil Canyon Damsite along the south side of the river where it joins line 2-1. This segment is four miles long. See Figure 9.10B.

(ii) Line and Grade

Maximum allowable grades and minimum curvatures are used on this segment, but it stays within the design criteria.

(iii) Drainage Features

Several ravines are crossed on the south side of Devil Canyon. Though they drain fairly small areas, the deepness of the gorges may indicate that short bridges would be cheaper than culverts under massive fills.

9-52I



(iv) Bridges

In addition to the short bridges mentioned above, a major bridge will be needed across the Susitna River. It would be a steel deck truss, 1100 feet long.

(v) Soils

The problems associated with these soils - frozen basal till, with colluvium on the steep slopes - are as discussed else where (see Segments 2-RRR in this supplement and Segment 1-A in the main report).

(vi) Environmental Impacts

The only impacts noted for this segment are on the potential raptor nesting areas found within Devil Canyon.

(vii) Segment Suitability

This segment is found is to be quite suitable as it meets all the design criteria and has minimal environmental impact.

(wf) Segment 2-W

(i) <u>Description</u>

Segment 2-W is a short connector between 2-T and 2-U.


The segment is one mile long. (See Figure 9.10C).

(ii) Line and Grade

This segment is within design criteria.

(iii) Drainage Features

No significant features are encountered.

(iv) Bridges

No bridges are needed.

(v) <u>Soils</u>

Soils are similar to those for Segment 2-U.

(vi) Environmental Concerns

By "short-cutting" around the north end of Segment 2-U, impact on cabins in that area is reduced.

(vii) Segment Suitability

This segment is a suitable connection between Segments 2-T and 2-U.

9-52M

(za) Segment 3-D

(i) <u>Description</u>

The short segment starts at Line 3A near Big Lake, passes west of Deadman Mountain, and then joins Line 3C. While it shortens the overall length of road from the Denali Highway to Watana, it involves more difficult terrain. See Figure 9.11A. The line is eigtht and one half miles long.

(ii) Line and Grade

Maximum grade would be utilized over most of the length of this segment, in order to clear the pass between Deadman Mountain and the mountains to the west.

(iii) Drainage Feature

The line parallels a marshy tributary of Deadman Creek south of the pass. Several side branches would be crossed with culverts. North of the pass, the headwaters of Deadman Creek are paralleled, and crossed just before joining Line 3C. This crossing would also be via culverts.

(iv) Bridges

No bridges are required for this segment.

(v) Soils

No data available yet.

(vi) Environmental Concerns

A detailed study is not yet available on the majority of this route. The line does move slighty farther away from Deadman Lake than Line 3A, thus creating less impact on the cultural resources (ancient campsites) of the Deadman Lake/Big Lake area.

(vii) <u>Segment Suitability</u>

Though the segment is less desirable from an engineering and construction point of view, because of its steeper terrain, it is more favorable from an environmental standpoint and should be considered a viable alternative.

(zb) Segment 3-E

· 6.

(i) Description

This segment generally parallels Segment 3-D, but is 1 mile west and traverses higher ground. The segment starts its one mile offset near Tsusena Butte and rejoins Segment 3-D at the pass west of Deadman Mountain. The length is 14.7 miles. See Figure 9-11A.



9-57 C

(ii) Line and Grade

Segment 3E is longer than 3D, has longer stretches of maximum grade, and has a 180° minimum radius curve where it crosses a tributary of Deadman Creek.

(iii) Drainage Features

Generally, the same streams are crossed as in 3D, but they are crossed at a higher (upstream) elevation.

(iv) <u>Bridges</u>

No bridges will be needed on this segment.

(v) Soils

No data available yet.

(vi) Environmental Concerns

A detailed environmental study of the area west of Deadman Mountain has not yet been completed, but it appears that this segment is more favorable from an impact standpoint. The road would be farther away from Deadman Creek, its tributaries and associated wetlands, thereby mitigating to some extent secondary impacts on waterfowl and grayling. The route also avoids the cultural resource areas around Deadman Lake and Big Lake.

(viii) <u>Segment Suitability</u>

This route is within the minimum design standards, but has more difficult terrain, higher elevation, and longer length than other alternatives. The higher construction costs, construction time scheduling and maintenance costs are offset by the lower environmental impacts, making this segment a viable alternative to 3D.

CORRIDOR SELECTION Corridor Summary Supplement



9.4 Corridor Summary - Supplement

Plans 1 to 11R are very simple to arrange, with only one set of sections selected for each of the three main corridors. Plans 12 to 17A, however, do not fit into this same pattern. Several different sections in each corridor were considered of equal merit for further investigation and incorporation into plans. For clarity, the breakdown of segments, sections and corridors is resummarized on Table 9.4, according to the following system of ranking.

- Corridor denotes a wide band. The three corridors are #1 (north of Susitna River), #2 (South of Corridor #1) and #3 (Denali Highway to Watana). All study was conducted within the three proposed corridors.
- 2. Segment a proposed length of road or rail that may or may not be suitable for further consideration. Some segments, such as 1-A stretch the entire length of a corridor, while others are much shorter pieces. Segments are not necessarily used in their entirety, they may be superceded at one or more places by other, more feasible, segments.
- 3. Section a combination of one or more segments or pieces of segments found to be suitable for incorporation into plans.
 - Plan a combination of one or more sections to make a complete road and/or rail facility that can serve both dams.

9**-**61

TABLE 9.4 CORRIDORS, SECTIONS AND SEGMENTS

Corridor	Section	Description	Segments Used
1	A-1	Parks Highway at Chulitna to Devil Canyon (N)*	1-A
	A-2	Devil Canyon (N) to Watana (N)	1-A, 1-B, 1-E, 3-A
	A-3	Parks Highway at Hurricane to Indian River Area	1-A, 1-G
	A-4	Parks Highway at Hurricane to Gold Creek Rail Spur	1-A, 1-G, 2-T
	A-5	Indian River Area to Devil Canyon (N)	2-0
	A-6	Indian River Area to Devil Canyon (S)	2-U, 2-V
	A-7	Indian River Area to Watana (N)	1-A, 1-B, 1-H, 1-E, 3-A
	A-8	Parks Highway At Hurricane to Devil Canyon (S)	1-A, 1-G, 2-T, 2-U, 2-V, 2-W
2	B-1	Parks Highway at Chulitna to Gold Creek	1-A, 1-F, 2-L
	B-2	Gold Creek to Devil Canyon (S)	2-1
	B-3	Devil Canyon to Watana (S)	2-A, 2-B, 2-F, 2-G, 2-J
	B-4	Gold Creek Rail Spur to Devil Canyon	2-1
	B-5	not used	
	B-6	Devil Canyon to Watana (N)	2-A, 2-B, 2-Q, 2-S, 1-C
	в-7	Devil Canyon to Watana (S)	2-A, 2-B, 2-F, 2-G, 2-J, 2-Q,
3	C-1	Denali Highway to Watana, east of Deadman Mt.	3-A, 3-C
	C-2	Upgrade Denali Highway	n.a.
	C-3	Denali Highway to Watana, West of Deadman Mt.	3-A, 3-C, 3-D
	C-4	Denali Highway to Watana, West of Deadman Mt.	3-A, 3-C, 3-D, 3-E
R	R-1	Gold Creek to Devil Canyon (S)	2-R
	R-2	Devil Canyon (S) to Watana (S)	2-R, 2-RR
	R-3	Gold Creek Rail Spur	2-RRR
**	D	Devil Canyon Trans-Dam Crossing	2-P
	Н	Devil Canyon Low-Level Crossing	2-M
	Х	High bridge at Devil Canyon	2-N

(N) means northside, (S) means south side of Devil Canyon Dam or Watana Dam
connections between Corridors 1 & 2 at Devil Canyon

<u>Supplement</u>

ACCESS PLANS Supply Sources & Shipping Options Table Supplement

ł.

	Miles		
Rail Haul To	Anchorage	Seward	<u>Whittier</u>
Hurricane	167	280	229
Gold Creek Spur End	156	269	218

SUPPLEMENT TO TABLE 10.1 MILEAGE FROM PORTS TO RAILHEAD OR PROJECT

SUPPLEMENT TO TABLE 10.4 BASIC CORRIDOR SEGMENTS

<u>Section</u>	Description	
A-3	Hurricane to Indian River	
A-4	Hurricane to Gold Creek Spur	
A-5	Indian River to Northside of Devil Canyon	
A-6	Indian River to Southside of Devil Canyon	
A-7	Indian River to Watana via Upper Portage	
A-8	Hurricane to Southside of Devil Canyon	
B-4	Gold Creek Spur to Devil Canyon	
B-5	Not Used	
B-6	Devil Canyon to Northside Watana	
B-7	Devil Canyon to Southside Watana	
C-1	Denali Highway to Watana, East of Deadman Mt.	
C-2	Upgrade Denali Highway	
C-3	Denali Highway to Watana, West of Deadman Mt.	
C-4	Denali Highway to Watana, Upland & West of Deadman Mt.	
R-3	Gold Creek Spur	

10-10A

SUPPLEMENT TO TABLE 10.5 MAINTENANCE FACTORS

Segment	Maintenance Factor
A-3	1.3
A-4	1.3
A-5	1.3
A-6	1.0
A-7	1.0
A-8	1.2
B-4	1.2
B-6	1.3
B-7	1.3
C-1	0.8
C-2	0.8
C-3	0.9
C-4	0.9
R-3	0.5

10-11A

ACCESS PLANS Supplement

r35/a40



10-



(k) <u>Plan 11R</u>

Plan 11 is hereby deleted and replaced with Plan 11R (revised).

(i) Description

This plan serves the entire project by road, from a rail head at Cantwell. Material is hauled to Watana via the Denali Highway, then to Devil Canyon along the north side, with a low level crossing at Devil Canyon damsite.

(ii) <u>Sea Ports</u>

Common to all plans are Anchorage and Whittier.

(iii) Modal Split

Material would travel by rail to a rail head at Cantwell, then be transfered to trucks and driven to Watana. Material for Devil Canyon would continue along the north side to Devil Canyon, than cross Susitna River via a low level crossing to the South side of the damsite. Personnel access would be via private car.

(iv) Sections Included

This plan includes Sections A-2, C-1, C-2, H and D



(v) Borrow Pits

Plan 11R uses borrow areas 7 and 8.

(vi) Cost Estimates

The estimated cost of this plan is outlined below:

Construction	\$131,511,355
Camp Facilities	13,166,496
Maintenance	11,027,000
Logistics	257,903,604
Total	\$413,608,455

(vii) Advantages/Disadvantages

The advantages of this plan are:

- No time constraint, as the portion of the road to Watana can be completed in one year. The portion from Watana to Devil Canyon and the low level crossing, can be completed during construction of Watana.
- Personnel access via private vehicle.
- No major bridges.
- ^o Lowest borrow quantity of the road only plans.

The disadvantages of this plan are:

- Longest haul of all plans, resulting in highest logistics cost and highest maintenance cost, and third to highest construction cost.
- Potential environmental impacts resulting from public access to additional portions of the Nelchina Caribou Range.
- Highest total cost.

(I) <u>Plan 12</u>

(i) Description

This plan serves both Devil Canyon and Watana Dams by truck on the north side of the river. See Figure 10.12. The railhead is at Hurricane. A low level temporary crossing at Devil Canyon is needed to provide immediate access to the south side of the damsite.

(ii) <u>Sea Port</u>

Common to all plans are Anchorage and Whittier.

(iii) Modal Split



Material would travel by rail to a railhead at Hurricane, then by truck to Devil Canyon and Watana. Personnel access would be via private car.

(iv) Sections Included

This plan includes Sections A-3 and A-5 to Devil Canyon, A-2 between the dam sites, and H, the low level crossing, to serve the south side of Devil Canyon.

(v) Borrow Pits

No data available yet.

(vi) Cost Estimates

The preliminary estimated cost of this plan is outlined below:

Construction	\$ 96,289,722
Camp Facilities	9,629,024
Maintenance	7,499,000
Logistics	226,085,887
Total	\$339,503,633

(vii) Schedule

The major bridge on Portage Creek will cause a time delay of two years. There would be no access to the Watana damsite until the bridge is substantially completed.

(viii) <u>Advantages/Disadvantages</u>

The advantages of Plan 12 are:

- Personnel access via private vehicles.
- No impact to the Indian River Remote Parcels.

The disadvantages of this plan are:

- Construction schedule delays due to Portage Creek Bridge.
- A low level, substandard crossing would be needed at Devil Canyon to supply the south side of the damsite.

(m) <u>Plan 13</u>

(i) Description

Access Plan 13 serves both dams by truck from a railhead at Hurricane. The road is entirely on the north side, with a main route directly to Watana and a spur road to Devil Canyon.

(ii) Sea Port

Common to all plans are Anchorage and Whittier.



(iii) Modal Split

Material travels by train as far as Hurricane siding, then by truck to the dam sites. Personnel travel would be by private vehicle.

(iv) Section Included

The sections include A-3 and A-7 from Hurricane to Watana, with the side road A-6 to Devil Canyon. A railhead is planned at Hurricane.

(v) Borrow Pits

No data available yet.

(vi) Cost Estimates

The estimated cost of Plan 13 is outlined below:

Construction	\$ 82,889,180
Camp Facilities	8,288,779
Maintenance	6,344,900
Logistics	222,733,838
Total	\$320,256,697

(vii) Schedule

The major advantage of this access plan is the direct routing to Watana. Although no major bridges are anticipated on the road to Watana, there will be some construction difficulties associated with the segment traversing parallel to Portage Creek, giving this plan a medium level of risk of scheduling delay. The major bridge just down stream of Devil Canyon will not be needed until construction of Devil Canyon dam commences, thus, it is not a construction scheduling restraint.

(viii) Advantages/Disadvantages

- 2 Low risk of schedule delays.
- All personnel access via private auto.
- Adverse environmental impacts associated with the side hill traverse of Indian River Valley.
- Third lowest construction cost.

(n) Plan 14

(i) <u>Description</u>

This plan includes a short rail spur from Gold Greek, along the Susitna River. The railhead joins a road that starts at Hurricane, passes the railhead, serves Devil Canyon, then continues along the south side of the Susitna River, to Watana.

(ii) Seaports



Common to all plans are Anchorage and Whittier.

(iii) Modal Split

Material would travel by train to Gold Creek, then by smaller trains to the railhead at the end of the spur. There, they would be transferred to trucks and hauled to the two damsites. The road from Hurricane to the railhead would provide access for personnel via private autos.

(iv) Sections Included

Plan 14 includes Rail Section R-3, Road Sections B-4 and B-6 to the damsites, and Road Section A-4 to connect to the public road system.

(v) Borrow pits

No data available yet.

(vi) Cost Estimates

Construction	\$120,338,513
Camp Facilities	12,033,699
Maintenance	9,493,000
Logistics	_215,246,144
Total	\$357.111.356

(vii) <u>Schedule</u>

Avoids major problems associated with the south route between dams. Major bridges at Chechako Creek and Fog Creek, heavy rock excavation and massive ice are all avoided on this variation of the southern route. The road construction is such that resupply can be achieved after the first season, however, there would be some risk of schedule delay.

The bridge across the Susitna at the railhead is not on the critical path.

The bridge across the Susitna near Fog Creek is a major, several year project, but the terrain is such that a low level crossing by ferry or temporary bridge is feasible.

(viii) Advantages/Disadvantages

The advantages of the plan include:

 Avoids major direct environmental conflicts, difficult construction and time delays associated with the alternative south route.

The disadvantages of this plan include:

• The rail spur must be built linearly, across difficult bluff terrain. Limited construction road access is feasible until the rail spur is completed.

(o) <u>Plan 15</u>

(i) Description

This plan is essentially the same as Plan 14, except that there is no road connection between the railhead and the Parks Highway. The plan is served by a rail spur from the Alaska Railroad at Gold Creek to a railhead 8 miles northeast, then by road from the railhead to the damsites, on the south side of Susitna River.

(ii) <u>Sea Ports</u>

Common to all plans are Anchorage and Whittier.

(iii) Modal Split

Material would be shipped by rail to the railhead, then by truck to the damsites. Personnel would travel via rail shuttle to the railhead, then via bus shuttle to the damsites.

(iv) Sections Included

The sections that would be included in this plan are the Rail Spur R-3, and the Road Sections B-4 and B-6.

(v) Borrow Pits

No data available yet.



(vi) Cost Estimates

Construction	\$ 86,247,131	
Camp Facilities	8,624,602	
Maintenance	6,373,000	
Logistics	215,246,144	
Total	\$316 490 877	

(vii) Schedule

Same as Plan 14.

(viii) Advantages/Disadvantages

Essentially, this plan shares all the advantages/disadvantages of Plan 14, with the following exceptions:

• No access to the public.

 Lower cost due to deletion of construction of about 15 miles of road.

 No impact on the Chulitna Pass existing community in the Chulitna Pass area.

(p) Plan 16

(i) Description

This plan serves Devil Canyon by road from a railhead at Gold Creek. Watana is served by a road between the dams,



mostly on the south side of the river. In addition, there is a road from Hurricane to Devil Canyon. This road is for passenger vehicle traffic and truck transport if necessary.

(ii) <u>Seaport</u>

Common to all plans are Anchorage and Whittier.

(iii) Modal Split

Freight is hauled from seaport to Gold Creek by rail, then by truck to Devil Canyon and Watana. Passenger vehicles use the road from Hurricane to Devil Canyon.

(iv) <u>Sections Included</u>

Plan 16 includes road Sections B-2 and B-6 to the dam sites, and road Section A-8 to connect to the public road system. There is a railhead at Gold Creek.

(v) Borrow Pits

No data available yet.

(vi) Cost Estimates

Construction	\$108,803,900
Camp Facilities	10,880,244
Maintenance	7,968,200
Logistics	215,571,651
Total	\$343,223,995

10-64

(vii) Schedule

Same as Plan 14.

(viii) Advantages/Disadvantages

This plan has the same advantages and disadvantages of Plan 14, except that the bridge over the Susitna River, for Plan 16, is cheaper and will therefore lower the overall construction cost, and the small section of rail (R-3) is replaced with a road that would be easier to keep on schedule.

(q) <u>Plan 17</u>

(i) Description

Plan 17 is similar to Plan 4, but with a service road mostly on the southside. The service road would be on the south side from Devil Canyon to just downstream of Fog Creek, then would cross the Susitna River and follow the north bank to Watana. Devil Canyon is served by rail from Gold Creek. Watana is served by road from the Denali Highway.

(ii) <u>Seaports</u>

Common to all plans are Anchorage and Whittier.


(iii) Modal Split

Watana would be served by rail to Cantwell, then truck to the damsite via the Denali Highway. Personnel would access by private vehicle. Devil Canyon would be served directly by rail, via Gold Creek. Personnel would travel via rail shuttle.

(iv) Sections Included

Plan 17 includes rail Section R-1 and road Sections C-2 and C-3, with a service road on B-6.

(v) Borrow Pits

No data available yet.

(vi) Cost Estimates

Construction	\$145,265,069
Camp Facilities	14,546,934
Maintenance	9,087,000
Logistics	226,772,354
Total	\$395,671,357

(vii) Schedule

The risk of schedule delay is low, therefore this plan has the highest probability of being completed within one construction season. The railroad and service road have areas of difficult construction, with major bridges, but that part of the construction is not necessary until the Devil Canyon Dam stage.

(viii) <u>Advantages/Disadvantages</u>

- No public access to Devil Canyon; rail shuttle needed for personnel.
- Direct access between dams for maintenance and operations staff.
- Increased public access to the area south of Denali Highway - with associated negative environmental impacts.

(r) <u>Plan 17A</u>

(i) <u>Description</u>

Plan 17A varies from Plan 17 only in the last few miles of the east end of the maintenance road. Instead of crossing the Susitna at Fog Creek, the road continues on the south side to Watana, and crosses the dam crest.

(ii) <u>Seaports</u>

Common to all plan are Anchorage and Whittier.



(iii) Modal Split

Identical to Plan 17.

(iv) Sections Included

Plan 17A includes rail Section R-1 and road Sections C-2 and C-3, with a service road B-7.

(v) Borrow Pits

No data available yet.

(vi) Cost Estimates

Construction	\$134,969,032
Camp Facilities	13,517,304
Maintenance	9,295,000
Logistics	226,772,354
Total	\$384,553,690

(vii) Schedule

Same as Plan 17.

ο

(viii) Advantages/Disadvantages

Though construction costs are cut by using a trans-dam crossing instead of a bridge on the

Susitna River, there will be an increase in maintenance cost.

 Increased access to the native-owned lands in the Fog Creek area which although meeting the preference of Native organizations would introduce direct environmental impacts.

All other advantages and disadvantages are as per Plan 17.

(s) Plan 18

(i) Description

0

Plan 18 varies from Plan 6 only in the way it crosses Devil Canyon. The service road between the dams, on the north side, crosses Devil Canyon with a high suspension bridge downstream from the dam. As with Plan 6, Devil Canyon Dam is served by rail from Gold Creek, and Watana Dam is served by road from the Denali Highway.

(ii) <u>Seaports</u>

Common to all plans are Anchorage and Whittier.

(iii) Modal Split

Watana would be served by rail to a railhead at Cantwell, then trucked to the damsite via the Denali Highway. Devil



Canyon would be served by rail, via Gold Creek, with a railhead at the damsite. Personnel would travel via private vehicles to Watana, and by rail shuttle to Devil Canyon.

(iv) Sections Included

Plan 18 includes Rail Section R-1 and Road Sections C-2 and C-4, with a service road made from Section A-2 and X.

(v) Borrow Pits

No data available yet.

(vi) Cost Estimates

Construction	\$137,413,171
Camp Facilities	13,535,536
Maintenance	· 8,167,000
Logistics	226,772,354

Total

\$385,888,061

(vii) Schedule

Watana can be served within one season via the road to the Denali Highway. Therefore there is no time delay. The risk of schedule delay is low, therefore this plan has the highest probability of being completed within one construction season.

(viii) <u>Advantages/Disadvantages</u>

Generally, Plan 18 has the same advantages and disadvantages as Plan 6. There is:

- Direct access between dams for maintenance and operations staff.
- Potential indirect impacts from increased public access.
- High construction cost due to the fact that more road is being built.
- Nedd for a rail shuttle to bring personnel to the Devil Canyon site.

APPENDIX B Proposed Alternative Segments Figure Revisions

.









B-6















が R&M CONSULTANTS, INC.

APPENDIX D Terrain Unit Mapping Text Supplement Figure Revisions Ca - Avalanche Deposits:

Ff - <u>Fluvial Fan</u>:

A gently to steeply sloping cone shaped deposit of angular coarse grained material with a variable silt content, accumulating below avalanche chutes. Can grade into fluvial fan deposits.

A gently sloping cone shaped deposit of coarse granular material, with varying amounts of silt, accumulating below avalanche chutes and tributary valleys. Can include avalanche deposits and/or mudflow deposits.



D-47

Terrain Unit Symbol	Terrain Unit Name
Bxu	Unweathered, consolidated bedrock
С	Colluvial -deposits
CI	Landslide
Cs-f	Solifluction deposits (frozen)
Ffg	Granular altuvial fan
Fp	Floodplain deposits
Fpt	Terrace
GFo	Outwash: deposits
GFe	Esker deposits
GFk	Kame deposits
Gta	Ablation, till
Gtb-f	Basal till (frozen)
0	Organic deposits
L-f	Lacustrines (frozen)
<u>L</u> Gta	Lacustrine sediments over ablation till
L Gtb-f	Lacustrine deposits over basal till (frozen)
<u>Cs-f</u> Gtb-f	Solifiuction deposits (frozen) over basal till (frozen)
<u>Cs-f</u> Gta	Solifluction deposits (frozen) over ablation till
<u>Cs-f</u> Fpt	Salifluction deposits (frozen) over terrace sediments
<u>Cs-f</u> Bxu	Solifluction deposits (frozen) over bedrock
<u>Gtb-f</u> Bxu	Frozen basai till over bedrock
<u>Gta</u> Bxu	Ablation till over un- weathered bedrock
C Bxu+Bxu	Colluvium over bedrock and bedrock exposures
C Bxw+Bxw	Colluvium over weathered or _ poorly consoli- dated bedrock

				ALA SUSIT	SKA POWER	AUTHORITY
				PHOTO TERRA	INTERPRE	TATION MAPS
REVISIONS.	сн,	APP.	APP,		DATE APRIL 1981 DEPARTMENT PROJECT 052502	SCALE DRAWING NO. SHEET 1 OF 21



D-49

DRAWING NO



- - -



D-	5	З	

DATE

	· · · · · · · · · · · · · · · · · · ·
Terrain Unit Symbol	Terrain Unit Name
Bxu	Unweathered , consolidated bedrock
с	Colluvial deposits
CI	Landslide
Cs-f	Solifluction deposits (frozen)
Ffg	Granular alluvial fan
Fp	Floodplain deposits
Fpt	Terrace
GFo	Outwash deposits
GFe	Esker doposits
GFk	Kame deposits
Gta	Ablation till
Gtb-f	Basal till (frozen)
0	Organic deposits
L-f	Lacustrines (frozen)
<u>L</u> Gta	Lacustrine sediments over ablation till
L Gtb-f	Lacustrine deposits over basal till (frozen)
<u>Cs-f</u> Gtb-f	Solifluction deposits (frozen) over basal till (frozen)
<u>Cs-f</u> Gta	Solifluction deposits (frozen) over ablation till
<u>Cs-f</u> Fpt	Solifluction deposits (frozen) over terrace sediments
<u>Cs-f</u> Bxu	Solifluction deposits (frazen) over bedrock
<u>Gtb-f</u> Bxu	Frozen basal till over bedrock
<u>Gta</u> Bxu	Ablation till over un- weathered bedrock
C Bxu + Bxu	Colluvium over bedrock and bedrock exposures
C Bxw + Bxw	Colluvium over weathered or poorly consoli- dated bedrock

				۵. ۲. ۲.
NV				ALASKA POWER AUTHORITY
A A				AUNEO SUSITNA HYDROELECTRIC PROJECT
2000 4000 FEET				SUBTABK 5.02
		+		PHOTO INTERPRETATION
				TERRAIN UNIT MAPS
		+		
REVISIONS	CH.	APP.	APP,	REM CONSULTANTS, INC. PROJECT 052502 SHEET 7 OF 21



Bedrock Mapping Units	Tv	Tsu	Tbgd	Tsmg	TKgr	Jam (Jtr)(Jgd)	₹v	Pzv (Pls)	Kag	Ŧvs		
Abbreviated Descriptions	Tertiary Volcanic rocks; shallow intrusives, flows, and pyroclastics; rhyolitic to basaltic.	Tertiary non-marine sedimentary rocks; conglomerate, sand- stone, and claystone.	Tertiary biotite granodiorite; local hornblende granodiorite (Thgd).	Tertiary schist, migmatite and granite, representing the roof of a large stock.	Tertiary and/or Cretaceous granitics forming small plutons.	Jurassic amphibolite, inclusions of green- schist & marble; local trondjemite (Jtr) and granodiorite (Jgd).	Triassic basaltic metavolcanic rocks formed in shallow marine environment.	Late Paleozoic basaltic and andesitic meta- volcanogenic rocks, local meta-limestone (PIs).	Cretaceous argillite and graywacke, of a thick deformed turbidite sequence, lowgrade metamorphism	Triassic metabasalt and slate, an interbedded shallow marine sequence.		SCALE
Miscellaneous Scarp	Map Symbols Slide Scar 🔨	TTT Buried	Channel	Trail	Rock Contact	\mathcal{I}	· ·					

_	_	_	_	THE OWNER ADDRESS OF THE OWNER	

					-	EOD CONTRACTO				FOR CONT.			
	Biodrook Magging Tr Tau Tagd Tang Tr Tang Tang </th <th></th> <th></th> <th>Committee orecon</th> <th>BXU BXU BXU BXU BXU BXU BXU BXU BXU</th> <th>FOR CONTINUATION BXU BXU BXU BXU BXU BXU BXU BXU BXU BXU</th> <th>A, SEE SHEET 7 Ku Kag Ss-f+Bxu O Fp-o f C +Bxu Bxu C A Bxu C C +Bxu Bxu C C +Bxu</th> <th>Bxu Bxu Bxu Bxu Bxu Bxu Bxu Bxu Bxu Bxu</th> <th></th> <th>FCR CONTINUE Togd Togd Co H14-1 Co Co Co Co Co Co Co Co Co Co</th> <th>Bxu Bxu Bxu Bxu Bxu Bxu Bxu Bxu Bxu Bxu</th> <th>C Bxu+Bxi O O O O O O O O O O O O O O O O O O O</th> <th>Gib-f Bxu Gib-f Bxu Gib-f Chi-f Chi-f Chi-f Chi-f Chi-f Chi-f Chi-f Chi-f Chi-f</th>			Committee orecon	BXU BXU BXU BXU BXU BXU BXU BXU BXU	FOR CONTINUATION BXU BXU BXU BXU BXU BXU BXU BXU BXU BXU	A, SEE SHEET 7 Ku Kag Ss-f+Bxu O Fp-o f C +Bxu Bxu C A Bxu C C +Bxu Bxu C C +Bxu	Bxu Bxu Bxu Bxu Bxu Bxu Bxu Bxu Bxu Bxu		FCR CONTINUE Togd Togd Co H14-1 Co Co Co Co Co Co Co Co Co Co	Bxu Bxu Bxu Bxu Bxu Bxu Bxu Bxu Bxu Bxu	C Bxu+Bxi O O O O O O O O O O O O O O O O O O O	Gib-f Bxu Gib-f Bxu Gib-f Chi-f Chi-f Chi-f Chi-f Chi-f Chi-f Chi-f Chi-f Chi-f
Bearock Mapping Tv Tsu Tbgd Tsmg TKgr Jam (Jtr)(Jgd) Rv Pzv (Pls) Kag Rvs	Units Tertiary Notanic rocks: shallow intrusives, flows, and pyroclastics; rhyolitic to basaltic. Tertiary nonamine sedimentary norks; songiomerate, sand- stone, and claystone. Tertiary scnist, regrandicitie (hgd). Tertiary and/or faring stnist, representing the roof of a large stock. Tertiary and/or protestics and grantics of a large stock. Tertiary and/or faring small plutons. Triassic basaltic proming small plutons. Late Paleozoic basaltic metavolcanic rocks marine environment. Triassic casaltic metavolcanic rocks marine environment. Creticeous argillite matavolcanic rocks marine environment. Triassic casaltic metavolcanic rocks marine environment. Triassic casaltic metavolcanic rocks marine environment. Triassic metabasalt and gravawacke, of a und gravawacke, of a und state, an marine environment. Triassic metabasalt proceed shallow marine environment. Triassic metabasalt and state, an marine environment.	Bedrock Mapping	Τν	Tsu	Tbgd	Tsmg	TKgr	Jam (Jtr)(Jgd)	S Bxu Fiv	Pzv (Pls)	Kag	rag Bru	Fo





4	· · · · · · · · · · · · · · · · · · ·	- <u></u>		Terrain	Terrain
-				Unit Symbol	Unit Name
- 				Bxu	Unweathered, consolidated bedrock
				c	Colluvial deposits
				СІ	Landslide
a and a second second				Cs-f	Solifluction deposits (frozen)
				Ffg	Granular alluviə(fan
				Fp	Floodplain deposits
				Fpt	Terrace
Service and the service of the servi				GFo	Outwash deposits
				GFe	Esker deposits
				GFk	Kame deposits
				Gta	Ablation till
- entry of a constraint state				Gtb-f	Basal till (frozen)
				0	Organic deposits
				L-f	Lacustrines (frozen)
-				<u>L</u> Gta	Lacustrine sediments over ablation t(fl
				Gtb-f	Lacustrinė deposits over basal till (frozen)
				<u>Cs-f</u> Gtb-f	Solifluction deposits (frozen) over basal till (frozen)
				<u>Cs-f</u> Gta	Solifluction deposits (frozen) over ablation till
a manual constants of				<u>Cs-f</u> Fpt	Solifluction deposits (frozen) over terrace sediments
	•			<u>Cs-f</u> Bxu	Solifluction deposits (frozen) over bedrock
				<u>Gtb-f</u> Bxu	Frozen basal till over bedrock
-	÷.,			<u>Gta</u> Bxu	Ablation till over un- weathered bedrock
1000000 - 1000000 - 1000000 - 1000000 - 1000000 - 1000000 - 1000000 - 100000000	· 5			C Bxu + Bxu	Colluvium over bedrock and bedrock exposures
				<u>C</u> Bxw+Bxw	Colluvium over weathered or poorly consoli- dated bedrock
NJ)		APDEQ	ALASKA POW	ER AUTHORITY
2000	4000 FEET			SUSITNA HYDRO	ELECTRIC PROJECT
B				SUBTASK HOTO INTERP	RETATION
					IIT MAPS
					981 *CALE





Bxu Unweathered, consolidated bedrock C Colluvial deposits CI Landstide CS-f Satifluction deposits (frozen) Ffg Granular alluvial fan Fp Floodplain deposits Fp1 Terrace GFo Outwash deposits GFe Esker druposits GFe Esker druposits Gfa Ablation till Gta Ablation till Q Organic deposits L-f Lacustrines definet over ablation till Losset (frozen) Cs-f Satifluction deposits (frozen) Satifluction deposits (frozen) Q Organic deposits L-f Lacustrines definets over ablation till Losset (frozen) Satifluction deposits (frozen) Cs-f Satifluction deposits (frozen) Station till Over bedrock Gtb-f Satifluction deposits (frozen) Bxu Ablation till over bedrock </th <th>Terrain . Unit Symbol</th> <th>Terrain Unit Name</th>	Terrain . Unit Symbol	Terrain Unit Name
CColluvial depositsCILandslideCs-fSolifluction deposits (frozen)FfgGranular alluvial fanFpFloodplain depositsFptTerraceGFoOutwash depositsGFeEsker drupositsGFkKame depositsGfdAbiation tillGtb-fBasal till (frozen)OOrganic depositsL-fLacustrines (frozen)Gtb-fSoliffuction deposits over addition tillL-fLacustrine sectiments over addition tillCs-fSoliffuction deposits (frozen)Cs-fSoliffuction deposits (frozen)Cs-fSoliffuction deposits (frozen) over abiation till (frozen)Cs-fSoliffuction deposits (frozen) over abiation tillCs-fSoliffuction deposits (frozen) over abiation tillCs-fSoliffuction deposits (frozen) over abiation tillGtd-fSoliffuction deposits (frozen) over abiation tillCs-fSoliffuction deposits (frozen) over bedrockGtb-fSoliffuction deposits (frozen) over bedrock <td>Bxu</td> <td>Unweathered, consolidated bedrock</td>	Bxu	Unweathered, consolidated bedrock
CI Landsilde CS - f Soliffuction deposits (frozen) Ffg Granular alluvial fan Fp Floodplain deposits Fpt Terrace GFo Outwash deposits GFe Esker diposits GFa Ablation till Gtd Ablation till Gtd Ablation till Gtd Lacustrine deposits L- f Lacustrine deposits over ablation till L Lacustrine deposits over ablation till CS-f Soliffuction deposits (frozen) over ablation till CS-f Soliffuction deposits (frozen) over balation till CS-f Soliffuction deposits (frozen) over ablation till CS-f Soliffuction deposits (frozen) over terrace Gtd Soliffuction deposits (frozen) over terrace CS-f Soliffuction deposits (frozen) over terrace Gtb-f Soliffuction deposits (frozen) over terrace CS-f Soliffuction deposits (frozen) over terrace Gtb-f Soliffuction deposits (frozen) over terrace <	С	Colluvial deposits
Cs-fSolifluction deposits (frozen)FfgGranular alluvial fanFpFlootplain depositsFptTerraceGFoOutwash depositsGFeEsker dipositsGFkKame depositsGfaAblation tillGtaAblation tillGtaLacustrines deposits over ablation tillLLacustrine deposits over ablation tillCs-fSolifluction deposits (frozen)Cs-fSolifluction deposits (frozen)Cs-fSolifluction deposits (frozen)Cs-fSolifluction deposits (frozen)Cs-fSolifluction deposits (frozen)Cs-fSolifluction deposits (frozen)Cs-fSolifluction deposits (frozen) over basal till over terraceCs-fSolifluction deposits (frozen) over terraceGtb-fSolifluction deposits (frozen	CI	Landslide
FfgGranular alluvial fanFpFloodplain depositsFptTerraceGFoOutwash depositsGFeEsker dipositsGFeEsker dipositsGFkKame depositsGfaAblation tillGtb-fBasal till (frozen)OOrganic depositsL-fLacustrines (frozen)GtaSolifluction deposits over ablation tillL <ft< td="">Lacustrine sectiments over ablation tillGtaSolifluction deposits (frozen)Cs-fSolifluction deposits (frozen) over basal till over terraceCs-fSolifluction deposits (frozen) over terraceGtb-fSolifluction deposits (frozen) over terraceCs-fSolifluction deposits (frozen) over terraceGtb-fSolifluction deposits (frozen) over bedrockGtb-fSolifluction deposits (frozen) over bedrockGtb-fSolifluction deposits (frozen) over bedrockGtb-fSolifluction deposits (frozen) over bedrockGtb-fSolifluction deposits (frozen) over bedrockGtb-fSolifluction dep</ft<>	Cs-f	Solifluction deposits (frozen)
FpFlootplain depositsFptTerraceGFoOutwash depositsGFeEsker drupositsGFkKame depositsGFkKame depositsGfaAblation tillGtb-fBasal till (frozen)OOrganic depositsL-fLacustrines (frozen)GtaLacustrines deposits over 	Ffg	Granular alluvial fan
Fpt Terrace GF0 Outwash deposits GFe Esker diposits GFk Kame deposits GFk Kame deposits Gfa Abiation till Gtb-f Basal till (frozen) O Organic deposits L-f Lacustrines (frozen) L Lacustrine sediments over eblation Gtb-f Lacustrine Gta Solifluction deposits over eblation gtb-f Cs-f Solifluction deposits (frozen) over ablation till Cs-f Solifluction deposits (frozen) over terrace sediments Cs-f Solifluction deposits (frozen) over terrace sediments Cs-f Solifluction deposits (frozen) over terrace sediments Cs-f Solifluction deposits (frozen) over terrace Gtb-f Solifluction deposits (frozen) over terrace Sta Solifluction deposits (frozen) over terrace Sta Solifluction deposits (frozen) over terrace Gtb-f Solifluction deposits (frozen) over terrace Sta Solifluction deposits (frozen) over terrace Gtb-f Frozen basal till over terrace Bxu Ablation till over un-wasthreed bedrock	Fp	Floodplain deposits
GF0 Outwash deposits GFe Esker diposits GFk Kame deposits GFk Kame deposits Gfd Abiation till Gfd Abiation till Gfd Generation till Gfd Generation till Gfd Companic deposits L-f Lacustrines (frozen) L Lacustrine sediments over abiation till L Lacustrine deposits over abiation till L Lacustrine deposits (frozen) Gfd Soliffluction deposits (frozen) over basal till (frozen) Gs-f Soliffluction deposits (frozen) over terrace sediments Cs-f Soliffluction deposits (frozen) over terrace sediments Gto-f Soliffluction deposits (frozen) over terrace Gtb-f Soliffluction deposits (frozen) over terrace Gto-f Soliffluction deposits (frozen) over terrace Gto-f Soliffluction deposits (frozen) over terrace Bxu Ablation till over bedrock Gto-f Frozen basal till over bedrock	Fpt	Terrace
GFe Esker diposits GFk Kame deposits Gfd Abiation till Gtb-f Basal till (frozen) O Organic deposits L-f Lacustrines (frozen) L-f Lacustrine abiation till L Lacustrine setiments over abiation till L Lacustrine deposits over abiation till Cs-f Solifluction deposits (frozen) over abiation till Cs-f Solifluction deposits (frozen) over abiation till Cs-f Solifluction deposits (frozen) over abrace sediments Cs-f Solifluction deposits (frozen) over bedrock Gtb-f Solifluction deposits (frozen) over bedrock Gtb-f Solifluction deposits (frozen) over bedrock Gtb-f Solifluction deposits (frozen) over bedrock Gtb-f Frozen basal till over bedrock Gtd Frozen basal till over un-washtered bedrock	GFo	Outwash deposits
GFk Kame deposits Gta Abiation till Gtb-f Basal till (frozen) O Organic deposits L-f Lacustrines (frozen) L Lacustrine sediments over ablation till L Lacustrine deposits over ablation till L Lacustrine deposits over ablation till Cs-f Solifluction deposits (frozen) over basal till (frozen) Gtb-f Solifluction deposits (frozen) over basal till (frozen) Cs-f deposits (frozen) over bedrock Gtb-f Solifluction deposits (frozen) over bedrock Gtb-f Frozen basal till over bedrock Gtb-f Frozen basal till over un-wasthered bedrock	GFe	Esker doposits
Gta Abiation till Gtb-f Basal till (frozen) O Organic deposits L-f Lacustrines (frozen) L Lacustrine sediments over abiation till L Lacustrine sediments over abiation till L Lacustrine sediments over abiation till L Lacustrine deposits (frozen) Cs-f deposits (frozen) over basal till (frozen) Cs-f Solifluction deposits (frozen) over balation till Cs-f Solifluction deposits (frozen) over terrace sediments Cs-f Solifluction deposits (frozen) over bedrock Gtb-f Solifluction deposits (frozen) over bedrock Gtb-f Solifluction deposits (frozen) over bedrock Gtb-f Frozen basal till over bedrock Gtb-f Frozen basal till over bedrock Bxu Ablation till over un-wasthered bedrock	GFk	Kame deposits
Gtb-f Basal Lill (frozen) 0 Organic deposits L-f Lacustrines sectiments over abilition till L Gta Lacustrine abilition till L Gtb-f Lacustrine deposits over abilition till Cs-f Solifluction deposits (frozen) over oits (frozen) over abilition till Cs-f Solifluction deposits (frozen) over abilition till Cs-f Solifluction deposits (frozen) over terrace sediments Cs-f Solifluction deposits (frozen) over terrace sediments Cs-f Solifluction deposits (frozen) over bedrock Gtb-f Solifluction deposits (frozen) over bedrock Gtb-f Frozen basal till over bedrock Gtd Frozen basal till over un-weathered bedrock	Gta	Ablation till
O Organic deposits L-f Lacustrines (frozen) L Gta Lacustrine sediments over ablation till L Gtb-f Lacustrine deposits over ablation till Cs-f Solifluction deposits (frozen) over basal till (frozen) Cs-f deposits (frozen) over ablation till Cs-f deposits (frozen) over ablation till Cs-f Solifluction deposits (frozen) over ablation till Cs-f Solifluction deposits (frozen) over bedrock Cs-f Solifluction deposits (frozen) over bedrock Gtb-f Frozen basal till over bedrock Gtb-f Frozen basal till over un- wasthered bedrock over un- deposits (frozen)	Gtb-f	Basal till (frozen)
L-f Lacustrines (frozen) L Gta Lacustrine sediments over ablation till L Gtb-f Lacustrine deposits over basal till (frozen) Cs-f Gtb-f Solifluction deposits (frozen) over basal till (frozen) Cs-f Gtb-f Solifluction deposits (frozen) over basal till (frozen) Cs-f Gta Solifluction deposits (frozen) over balation till Cs-f Gta Solifluction deposits (frozen) over terrace sediments Cs-f Bxu Solifluction deposits (frozen) over bedrock Gtb-f Bxu Frozen basal till over over deposits deposits Gta Bxu Ablation till over un- weathered bedrock	0	Organic deposits
L Lacustrine Gta Sediments over sediments over ablation till L Lacustrine Gtb-f basil till (frozen) Cs-f deposits (frozen) Over basil till (frozen) Cs-f deposits (frozen) Over basil till over basil till Cs-f deposits (frozen) Over basil till over basil till Cs-f deposits (frozen) Over basil till over basil till Cs-f deposits (frozen) over terrace scdiments Cs-f deposits (frozen) over terrace scdiments Cs-f deposits (frozen) over terrace scdiments Gtb-f Frozen basal till over bedrock over bedrock Gtb-f Frozen basal till over bedrock over un-wasthered Bxu over un-wasthered bedrock over un-terrace	L-f	Lacustrines (frozen)
L Lacustrine Gtb-f basal till (frozen) Cs-f Solifluction deposits (frozen) over basal till (frozen) Gtb-f Solifluction Cs-f deposits (frozen) Over basal till (frozen) over basal till (frozen) Cs-f deposits (frozen) Over ablation till Cs-f Solifluction deposits (frozen) over terrace Solifluction solifluction Gta Solifluction Bxu over terrace Solifluction over terrace Solifluction solifluction Over bedrock Solifluction Bxu Ablation till Over bedrock Solifluction Bxu Ablation till Over un-wathreed bedrock	L Gta	Lacustrine sediments over ablation till
Cs-f Solifluction Gtb-f over basil till Cs-f oposits (frozen) Gta over basil till Cs-f deposits (frozen) over ablation till Uill till Cs-f deposits (frozen) over ablation till Cs-f deposits (frozen) over ablation till Cs-f deposits (frozen) over terrace sediments Solifluction deposits (frozen) over bedrock over bedrock Gto Frozen basal till Over our-weather Ablation till Bxu over our-weather Bxu weathered bedrock terrace	L_ Gtb-f	Lacustrine deposits over basal till (frozen)
Cs-f Solifluction Gta ver ablation Utilitie Solifluction Cs-f Solifluction deposits (frozen) over ablation Fpt over terrace Solifluction sediments Cs-f deposits (frozen) over bedrock over bedrock Gtb-f Frozen basal till over bedrock Gta Ablation till over un-weathered bedrock	<u>Cs-f</u> Gtb-f	Solifluction deposits (frozen) over basal till (frozen)
Cs-f Solifluction Fpt over terrace Solifluction deposits (frozen) wer terrace sediments Cs-f deposits (frozen) deposits (frozen) over bedrock Gtb-f Frozen basal till over bedrock Gto Ablation till over un-weathered bedrock	<u>Cs-f</u> Gta	Solifluction deposits (frozen) over ablation till
Cs-f Solifluction Bxu over befock Gtb-f Frozen basal till Bxu over befock Gta Ablation till Over befock befock	<u>Cs-f</u> Fpt	Solifluction deposits (frozen) over terrace sediments
Gtb-f Frozen basal till over bedrock Gta over bedrock Gta over un- weathered bedrock	<u>Cs-f</u> Bxu	Solifluction deposits (frozen) over bedrock
Gta Ablation till over un- bxu bedrock	<u>Gtb-f</u> Bxu	Frozen basal till over bedrock
	<u>Gta</u> Bxu	Ablation till over un- weathered bedrock
Colluvium over bedrock and bedrock exposures	C Bxu+Bxu	Colluvium over bedrock and bedrock exposures
Calluvium over weathered or poorly consoli- dated bedrock	C Bxw+Bxw	Collevium over weathered or poorly consoli- dated bedrock

			~~~~~ ~				L	ن ـ
			AUDLO	ALA	SKA	POWER	AUTHORIT	Y
			HUNCO	SUSIT	NA H	YDROELEC	TRIC PROJEC	Ť
				5	SUBT	ASK 5.0	12	
		├	F	ното	INT	ERPRE	TATION	
·	<u>† </u>		TE		INI			5
					31.04	UI11		
	1				DATE	APRIL 1981	BCALE	
	1			-lVL	DEFASTI	INT	DRAWING NO.	AEV.
СН.	APP.	APP.	REM CONSU	LTANTS, INC.	PROJECT	052502	SHEET 17 OF 21	



			_
			Ter Un Syn
			B×
			C
			с
			Cs
			FI
			F
			Fp
			GF
5. · ·			GF
10			GF
			Gt
			Gtb
			C
N.X. ACLAN			Ŀ
(0F8)			Gt
			L Gt
		1	<u>Cs</u> Gtt
			<u>Cs</u> Gt
			<u>Cs</u> Fp
			<u>Cs</u> Bx
			<u>Gtb</u> Bx
			<u>Gt</u> Bx
			<u>C</u> Bxu
		-	C Bxw
	ACRES	ALA	SKA
2000 4000 FEET	חטונט	SUSI	SUB.
	ТЕ	RRA	יאו וו א.
		S.M.	DATE

Terrain Unit Symbol	Terrain Unit Name
Bxu	Unweathered, consolidated bedrock
С	Colluviai deposits
CI	Landslide
Cs-f	Solifluction deposits (frozen)
Ffg	Granular alluvia) fan
Fp	Floodplain deposits
Fpt	Terrace
GFo	Outwash deposits
GFe	Esker deposits
GFk	Kame deposits
Gta	Ablation till
Gtb-f	Basal till (frozen i
0	Organic deposits
L-f	Lacustrines (frozen)
L Gta	Lacustrine sediments over ablation till
L Gtb-f	Lacustrine deposits over basal till (frozen)
<u>Cs-f</u> Gtb-f	Solitluction deposits (frozen) over basal till (frozen)
<u>Cs-f</u> Gta	Solifluction deposits (frozen) over ablation till
<u>Cs-f</u> Fpt	Solifluction deposits (frozen) over terrace sediments
<u>Cs-f</u> Bxu	Solifluction deposits (frozen) over bedrock
<u>Gtb-f</u> Bxu	Frozen basal till over bedrock
<u>Gta</u> Bxu	Ablation till over un- weathered bedrock
<u>-C</u> +Bxu	Colluvium over bedrock and bedrock
<u>C</u> +Bxw	exposures Colluvium over weathered or poorly consoli- dated befreek
0.1	dated bedrock

J				ALASKA POWER	AUTHORITY
00 4000 FEET				SUBTASK S Photo interpr	.02 ETATION
				TERRAIN UNI	T MAPS
					SCALE DRAWING NO. REV.
ISIONS	CH,	APP.	APP.	REM CONSULTANTS, INC PROJECT 052502	SHEET18 OF 21

rock ping its	 Тѕи	Tbgd	Tsmg	°	25 5 SCALE 1: 24 Jam (Jtr)(Jgd)	<u>ιο</u> <u>ι</u> 5 ,000		classical and cl	Cs-f Gib-f Bxu Bxu Bxu Bxu Ca Bxu Ca Ca Ca Ca Ca Ca Ca Ca Ca Ca Ca Ca Ca	Cos-f Bxu Cos-f Bxu Cos-f Bxu Cos-f Bxu Fp Fp
					25 5 SCALE 1: 24			class cl	Cs-f Gib-f Bxu Bxu Bxu GFo GFo GFo GFo GFo GFo GFo GFo GFo GFo	Cos-f Bxu Cos-f Bxu Cos-f Bxu Fp Fp
									Cs-f. Gib-f Bxu Bxu Of of GF of GF of GF O	Cos-f Bxu Cos-f Bxu Cos-f Bxu Fp
									Cs-f. Gib-f Bxu Bxu GFo GFo	Cos-f Bxu Cos-f Bxu Cos-f Cos-f Bxu
								C BXU +BXU +BXU C C RXU C C RXU C C C C C C C C C C C C C C C C C C C	Cs-f Gib-f Bxu Bxu GFo	Content of the second s
									Cs-f Gib-f Bxu + Bxu	C
							- - -	<u>с</u> Вли +Вхи 48хи	<u>Cs-f</u> Gib-f B	$\frac{C}{Bxu} + Bxu$
							Ç		$\frac{Cs-f_i}{Gtb-f} =$	C BAU + BAU
									Cont. 1	BXU
		•						Filme .	Gfa	
		•					•	Bxu Bxu		
•				• •				T A		+ Bxu C
										AH19-
							N. Contraction		X	
								9f.9		Gra



		<u></u>				<u></u>							
							,	C THE	FOR CONTINUAT		デート デート AH20-3		
									4 BNU		GIU I I I I I I I I I I I I I I I I I I		
							HD-1						
					, ,	ALL STREET	Ball	ra ta	14 20-P4				
						<u>ettë</u> Bx		<u>Gib-1</u> - Bxu	AHZ		X		
							Corb-1						
								<u> </u>					
								STATES OF A	stpri Bid		20-RI		A
											AHZO-1		
	Bedrock Mapping	Τν	Tsu	Tbgd	Tsmg	TKgr	Jam (Jtr)(Jgd)	Ēν	and the second s	BU -			
	Units Abbreviated Descriptions	Tertiary Volcanic rocks; shallow intrusives, flows, and pyroclastics;	Tertiary non-marine sedimentary rocks; conglomerate, sand- stone, and claystone.	Tertiary biotite granodiorite; local hornblende granodiorite (Thgd).	Tertiary schist, migmatile and granite, representing the roof of a large stock.	Tertiary and/or Cretaceous granitics forming small plutons.	Jurassic amphibolite, inclusions of green- schist & marple; local trondjemite (tr.) and	Triassic basaltic metavolcanic rocks formed in shallow marine environment		FOR	CONTINUATION SEE SHE	ET 19	-275 S
	Miscellaneous Scarp	Map Symbols Slide Scar	Buried	Channel	Trail	Rock Contact	granodiorite (Jgd).	ing the environment.	Pzv (P/s)	Kag c Cretaceous argillite and graywacke, of a thick detormed turbidite sequence, lawgrade metamorohism	RVS Triassic metabasalt and slate, an interbedded shallow marine sequence.		
L									D-6	6		DATE NO.	

				Terrain Unit Symbol	Terrain Unit Name
				Bxu	Unweathered , consolidated bedrock
	: : :			C .	Colluvial deposits
	*			CI	Landsiide
				Cs-f	Solifluction deposits (frozen)
				Ffg	Granular əlluvial fan
				Fp	Floodplain deposits
				Fpt	Terrace
				GFo	Outwash deposits
				GFe	Esker doposits
				GFk	Kame deposits
				Gta	Ablation till
				Gtb-f	Basal till (frozen)
				0	Organic deposits
				L-f	Lacustrines (frozen)
				<u> </u>	Lacustrine sediments over ablation till
				L Gtb-f	Lacustrine deposits over basal till (frozen)
		-		<u>Cs-f</u> Gtb-f	Solifluction deposits (frozen) over basal till (frozen)
				<u>Cs-f</u> Gta	Solifluction deposits (frozen) over ablation till
				<u>Cs-f</u> Fpt	Solifluction deposits (frozen) over terrace sediments
				<u>Cs-f</u> Bxu	Solifluction deposits (frozen) over bedrock
	•			<u>Gtb-f</u> Bxu	Frozen basal till over bedrock
				<u>Gta</u> Bxu	Abiation till over un- weathered bedrock
				C + Bxu	Colluvium over bedrock and bedrock 7 exposures
				C Bxw+Bxw	Colluvium over weathered or poorly consoll- dated bedrock
SCA		DOO FEET	ACRES	SUBTABK	L
	· · · · · · · · · · · · · · · · · · ·			INTERPA	
			IERRA	DATE AUGUST 19	
REV	SIGNS	CH. APP. APP.		DEPARTMENT PROJECT 052502	



Bedrock Mapping Units	Τν	Tsu	Tbgd	Tsmg	TKgr	Jam (Jtr)(Jgd)	<i>₹v</i>	Pzv (Pls)	Kag	F vs	
Abbreviated Descriptions	Tertiary Volcanic rocks; shallow intrusives, flows, and pyroclastics; rhyolitic to basaltic.	Tertiary non-marine sedimentary rocks; congiomerate, sand- stone, and claystone.	Tertiary biotite granodiorite; local hornblende granodiorite (Thgd).	Tertiary schist, migmatite and granite, representing the roof of a large stock.	Tertiary and/or Cretaceous granitics forming small plutons.	Jurassic amphibolite, inclusions of green- schist & marble: local trondjemite (Jtr) and granodiorite (Jgd).	Triassic basaltic metavolcanic rocks formed in shallow marine environment.	Late Paleozoic basa tic and andesitic meta- volcanogenic micks, local meta-limestone (PIS).	Cretaceous argihite and graywacke, of a thick deformed turbidite sequence, lowgrade metamorphism	Triassic metabasalt and slate, an interpedded shallow marine sequence.	SCAL
Miscellaneous Scarp	Map Symbols Slide Scar 🗸	STT Buried	Channel	Trail	Rock Contact .		L	·	-	1	

	Terrain Unit Symbol	Terrain Unit Name
	Вхи	Unweathered, consolidated bedrock
	с	Colluvial deposits
	CI	Landslide
	Cs-f	Solifluction deposits (frozen)
	Ffg	Granular alluvial fan
	Fp	Floodplain deposits
	Fpt	Terrace
	GFo	Outwash deposits
	GFe	Esker deposits
	GFk	Kame deposits
	Gta	Ablation ull
	Gtb-f	⇔asai till √frozen i
	0	- Organic deposits
	L-f	Lacustrines (frozen)
	L Gta	Lacustrine sediments over ablation till
	L Gtb-f	Lacustrine deposits over basal till (frozen)
	<u>Cs-f</u> Gtb-f	Solifluction deposits (frozen) over basal till (frozen)
	<u>Cs-f</u> Gta	Solifluction deposits (frozen) over ablation till
	Cs-f Fpt	Solifluction deposits (frozen) over terrace sediments
	<u>Cs-f</u> Bxu	Solifluction deposits (frozen) over bedrock
	<u>Gtb-f</u> Bxu	Frozen basal till over bedrock
	<u>Gta</u> Bxu	Ablation till over un- weathered bedrock
	C Bxu + Bxu	Colluvium over bedrock and bedrock exposures
	C Bxw+Bxw	Colluvium over weathered or poorly consoli- dated bedrock
	BUBTABK PHOTO INTERPE	5.02 RETATION
		1981 SCALE
REVISIONS. CH. APP. APP.	DEPARTMENT PROJECT 05250	2 SHEET OF



TERRAIN UNIT SYMBOL	TERRAIN UNIT NAME	G
Bxu	Unweathered, consolidated bedrock	
с	Colluvial deposits	
CI	Landslide deposits	
Cs−f	Solifluction deposits	
Ca+Ff	Avalanche and Fan deposits	-
Ffg	Granular alluvial fan	
Fp	Floodplain deposits	
Fpt	Terrace	
GFo	Outwash deposits	E
GFe	Esker deposits	
GFk	Kame deposits	
Gta	Ablation till	+
Gtb-f	Basal till (frozen)	
0	Organic deposits	D
L-f	Lacustrines (frozen)	
L Gta	Lacustrine sediments over ablation till	
L Gtb-f	Lacustrine deposits over basal till	
<u>Cs-f</u> Gtb-f	Solifiuction deposits (frozen) over basal till (frozen)	
<u>Cs-f</u> Gta	Solifluction deposits (frozen) over ablation till	С
Cs-f Fpt	Solifluction deposits (frozen) over terrace sediments	
<u>Cs-f</u> Ff	Solifluction deposits over fluvial fan sediments	
<u>Cs-f</u> Bxu	Solifluction deposits (frozen) over bedrock	
<u>Gtb-f</u> Bxu	Frozen basal till over bedrock	в
<u>Gta</u> Bxu	Abiation till over un-weathered bedrock	
C Bxu + Bxu	Colluvium over bedrock and bedrock exposures	
$\frac{C}{Bxw} + Bxw$	Colluvium over weathered, poorly consolidated	<u> </u>
Supplement

APPENDIX F

Cost Estimates

Figure Supplements Table Revisions & Supplements Supplement to Cost Estimate Itemizations

Supplement

TABLE F.5.1 BRIDGES - PLANS 1-11R

Segment	River	Length (feet)	Cost	Figures	Section		
B-1	Indian R.	180	\$ 1,101,600	B.1, F.5.1	R2W T32N Sec 12		
	Susitna @ G.C.	2,480	15,177,600	B.6, F.5.2	R2W T31N Sec 9		
B-3	Fog Creek	1,250	7,650,000	B.9, F.5.4	R5E T31N Sec 19		
	Chechako Creek	1,160	7,099,200	B.7, F.5.3	R1E T31N Sec 4		
	No Name Creek	800	4,896,000	B.7, F.5.5	R1E T31N Sec 15		
R-2	Chechako Creek	1,160	7,099,200	B.7, F.5.3	R1E T31N Sec 4		
	No Name Creek	1,000	6,120,000	B.7, F.5.7	R1E T31N Sec 10		
Н	Low Level Xing	780	2,246,400	В.7	R1E T32N Sec 32		
х	High Level @ D.C.	2,600	15,912,000	B.7, F.5.6	R1E T32N Sec 32		

Note: All bridges 34' wide and \$180/sf except RR which are 17' wide and \$360/sf, and low level xing which is 16' wide and \$180/sf.

r35/b3

Supplement

TABLE F.5.2 BRIDGES -PLANS 12-18

Plan	River	Length (feet)	Cost	Figures	Section
12	Indian R.	180	\$ 1,101,600	B.1, F.5.1	R1W T32N Sec 6
	Low Level Xing	780	2,246,400	B.7	R1E T32N Sec 32
	Portage Creek	1,100	6,732,000	B.7, F.5.8	R1W T32N Sec 25
13	Indian R. Upper Portage	180 -	1,101,600 2,000,000	B.1, F.5.1 B.2	R1W T32N Sec 6 R1W T32N Sec 12 R2F T32N Sec 30
	Susi @ Portage	1,100	6,732,000	B.7, F.5.9	R1W T32N Sec 26
14	Susi @ G.C. (Sim)	2,480	15,177,600	B.6, F.5.2	R2W T31N Sec 9
	Indian R.	180	1,101,600	B.1, F.5.1	R1W T32N Sec 6
	Susi @ Fog	3,250	19,890,000	B.8, F.5.10	R4E T31N Sec 19
	Tsusena Cr.	160±	1,000,000	B.4	R5E T32N Sec 30
15	Susi @ Fog	3,250	19,890,000	B.8, F.5.10	R4E T31N Sec 19
	Tsusena Cr.	160±	1,000,000	B.4	R5E T32N Sec 30
16	Indian R.	180	1,101,600	B.1, F.5.1	R1W T32N Sec 6
	Susi @ Portage	1,100	6,732,000	B.7, F.5.9	R1W T32N Sec 26
	Susi @ Fog	3,250	19,890,000	B.8, F.5.10	R4E T31N Sec 19
	Tsusena Cr.	160±	1,000,000	B.4	R5E T32N Sec 30
17	Tsusena Cr.	160±	1,000,000	B.4	R5E T32N Sec 30
	Susi @ Fog	3,250	19,890,000	B.8, F.5.10	R4E T31N Sec 19
17A	Fog Creek	1,250	7,650,000	B.9, F.5.4	R5E T31N Sec 19
18	High Level @ D.C.	2,600	15,912,000	B.7, F.5.6	R1E T32N Sec 32











Supplement

r35/b8

	SUPPLEMENT TO TABLE F-7.1 CULVERTS (in lineal feet)											
Size Dia.	A-3 <u>L.F.</u>	A-4 <u>L.F.</u>	A-5 L.F.	A-6 L.F.	A-7 <u>L.F.</u>	A-8 _L.F.	B-4 L.F.	B-6 	B-7 L.F.	R-3 <u>L.F.</u>	C-3 <u>L.F.</u>	C-4 L.F.
18"	6,375	2,975	4,420	5,015	24,395	10,625	3,485	24,565	27,540	2,850	23,720	26 , 350
36"	400	600		-		500	100	300	400		100	100
42"			100	100	300	200	100	300			400	300
48"	100	100			200	100	100	100	200		600	500
54"	100	100			200	100	100	200	200	200	200	200
60"	200	200			500	200		400	200		200	300
72"					100			100	100		100	300
84"					200			400	200		200	200
96"					400			100	100		100	100
108"			1		200			100	100	100	200	200
120 ["]											100	200
144"					100	-						
168"	× -										100	

r35/f1 Supplement

WATANA LOGISTIC BREAKDOWN SUPPLEMENT TO TABLE F-10.1

			Rail Road			
•	Tons	Cost \$/Ton_Mi	18 Mi. Gold Creek To <u>Hurricane</u>	7 Mi. Gold Creek To Spur End		
Const. Equipment	16,000	0.1878	\$ 54,086	\$ 21,034		
Explosive	20,000	0.6267	225,612	87,738		
Cement	350,000	0.1565	985 <i>,</i> 950	383,425		
Rein. Steel	33,000	0.2577	153,074	59 <i>,</i> 529		
Rock Bolts	12,500	0.2577	57,983	22,549		
Steel Support	3,600	0.2577	16 <i>,</i> 699	6,494		
Mech., str., elc. equip.	15,000	0.1262	34,074	13,251		
Constr. Fuel	300,000	0.1450	783,000	304,500		
Camp Fuel	51,000	0.1450	133,110	51,765		
Tires & Parts	21,800	0.1878	73,693	28,658		
Camp Supplies	74,600	0.1262	169,461	65,902		
Village	1,400	0.1262	3,180	1,237		
Contingency & Misc.	196,600	0.1262	446,597	173,676		
	1,095,500		\$3,136,519	\$1,219,758		
			23	24		

Supplement

· Arrive

۰.,

DEVIL CANYON LOGISTIC BREAKDOWN SUPPLEMENT TO TABLE F-10.2

, r

				Rail Road	
			18 Mi.	7 Mi.	14 Mi.
		- ·	Gold Creek	Gold_Creek	Gold Creek
		Cost	. То		to Devil
	<u> lons </u>	<u>\$/ I on MI</u>	Hurricane	Spur End	Canyon Camp
Const. Equipment	5,000	0.1878	\$ 16,902	\$ 6,573	\$ 13,146
Explosive	3,000	0.6267	33,842	13,161	26,321
Cement	650,000	0.1565	1,831,050	712,075	1,424,150
Rein. Steel	22,000	0.2577	102,049	39,686	79,372
Rock Bolts	3,000	0.2577	13,916	5,412	10,823
Steel Support	2,200	0.2577	10,205	3,969	7,937
Mech., str., elc. equip.	13,500	0.1262	30,667	11,926	23,852
Constr. Fuel	68,000	0.1450	177,480	69,020	138,040
Camp Fuel	30,000	0.1450	78,300	30,450	60,900
Tires & Parts	18,700	0.1878	63,213	24,583	49,166
Camp Supplies	44,000	0.1262	99 <i>,</i> 950	38,870	77,739
Village	1,300	0.1262	2,953	1,148	2,297
Contingency & Misc.	205,900	0.1262	467,722	181,892	363,784
	1,066,600		\$2,928,249	\$1,138,765	\$2,277,527
	·	,	25	26	35

r35/b4

Supplement

ROAD HAUL SEGMENT COSTS SUPPLEMENT TO F.10-3

Item	Tons	\$/Ton Mi Rate	#12 Hurricane to Devil 26 Mi	#12 Hurricane to Watana 59 Mi	#13 Hurricane to Devil 18 Mi	#13 Hurricane to Watana 52 Mi	#14 & 15 RR Spur to Devil <u>6 Mi</u>	#14, 15 & 16 Devil to Watana 41 Mi	#17, 17A, & 18 Cantwell to Watana 61 Mi
All Watana	1,095,500	0.2069	-	13,372,878 27	-	11,786,265 28	1,359,954 29	9,293,017 30	13,826,196 31
All Devil	1,066,600	0.2069	5,737,668 32	-	3,972,232 33	-	1,324,077 34	-	-

r35/g1

Supplement

LOGISTICS TOTAL SUPPLEMENT TO TABLE F.10-4

Plan 12: Use: Water: 1, 2, 8, 9 \$134,388,000 Rail to Hurricane: 3, 4, 10, 11, 23, 25 72,587,341 Truck to Dams: 27, 32 19,110,546 TOTAL \$226,085,887 Plan 13: Use: Water: 1, 2, 8, 9 \$134,388,000 Rail to Hurricane: 3, 4, 10, 11, 23, 25 72,587,341 Truck to Dams: 28, 33 15,758,497 TOTAL \$222,733,838 ٠ Use: Water: 1, 2, 8, 9 Plan 14 & 15: \$134,388,000 Rail to Spur End: 3, 4, 10, 11, 24, 26 68,881,096 Truck to Dams: 29, 30, 34 11,977,048 TOTAL \$215,246,144 Plan 16: Use: Water: 1, 2, 8, 9 \$134,388,000 Rail to Gold Creek: 3, 4, 10, 11 66,522,573 Truck to Dams: 15, 19, 30 14,661,078 TOTAL \$215,571,651 Plan 17, 17A £ 18: Use: Water: 1, 2, 8, 9 \$134,388,000 Rail to Gold Creek: 3, 4, 10, 11 66,522,573 Rail to Cantwell: 7 9,758,058 13,826,196 Truck to Watana from Cantwell: 31 Rail to Devil from Gold Creek: 35 2,277,527 TOTAL \$226,772,354

COST ESTIMATE ITEMIZATION Supplement Plans 11R to 18

t/y1

	~ /	
S	12/m	1

4

ITEM		DESCRIPTION	QUANTITY	UNITS	PRICE	AMOUNT
11R.336	ROAD & RA	ALL FACILITIES				
	.11	Pioneer Roads	• •			
	.114	Gold Creek to Watana -South A-2 Road (41.25 Mi)				
		Clearing	369	AC	\$5,760.00	\$2,125,440.00
		Waste Excavation	855,321	CY	4.80	4,105,540.80
		Common Excavation	619,500	CY	4.20	2,601,900.00
		Rock Excavation	. 0	CY	14.40	0.00
		Borrow	0	CY	6.00	0.00
		18" Culverts	9,200	LF	28.80	264,960.00
		36" + Culverts	-	LS	114,960.00	114,960.00
		Bridges	0	SF	0.00	0.00
		D-1 Base Material	222,640	TON	21.60	4,809,024.00
		Fabric	14,946	SY	3.00	44,838.00
					TOTAL	\$14,066,662.80
		Maintenence	83	Mile-Years	\$4,000.00	\$332,000.00

1

....

DDICE

.

AMOUNT

ITEM		DESCRIPTION	QUANTITY	UNITS	PRICE	AMOUNT
11R.336	ROAD & RA	AIL FACILITIES				
	.115	Denali to Watana C Road (44.32 Mi) Clearing Waste Excavation Common Excavation Rock Excavation Borrow 18" Culverts 36" + Culverts Bridges D-1 Base Material Eabric		AC CY CY CY LF LS SF TON SY	\$5,760.00 4.80 4.20 14.40 6.00 28.80 0.00 0.00 21.60 3.00	\$0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0
					TOTAL	\$0.00
		Maintenence	0	Mile-Years	\$0.00	\$0.00

ຣ ເ2/mວ

ITEM		DESCRIPTION	QUANTITY	UNITS	PRICE	AMOUNT
11R.336	ROAD & RA	AL FACILITIES				
	.118	Devil Canyon Low Level Crossing H Road (7.88 Mi) Clearing Waste Excavation Common Excavation Rock Excavation Borrow 18" Culverts 36" + Culverts Bridges D-1 Base Material Fabric	170 498,845 549,417 749,641 0 5,100 - 12,480 36,966 0	AC CY CY CY LF LS SF TON SY	\$ 5,760.00 4.80 4.20 14.40 6.00 28.80 0.00 180.00 21.60 3.00	<pre>\$ 979,200.00 2,394,456.00 2,307,551.40 10,794,830.40 0.00 146,880.00 0.00 2,246,400.00 798,465.60 0.00</pre>
					TOTAL	\$19,667,783.40
		Maintenence	55	Mile-Years	\$5,000.00	\$275,000.00

ITEM		DESCRIPTION	QUANTITY	UNITS	PRICE	AMOUNT
11R.336	ROAD & RA	IL FACILITIES				
	.12	Permanent Roads & Bridges				
	.124	Watana to Devil Canyon - North, A-2, (41.25 Mi)	Road			
		Clearing	207	AC	\$ 5,760.00	\$ 1,192,320.00
		Waste Excavation	681,179	CY	4.80	3,269,659.20
		Common Excavation	984,473	CY	4.20	4,134,786.60
		Rock Excavation	146,527	CY	14.40	2,109,988.80
		Borrow	73,145	CY	6.00	438,870.00
		NFS Subbase Material	424,710	CY	8.40	3,567,564.00
		Grade "A" Base Material	231,739	CY	16.80	3,893,215.20
		D-1 Base Material	96,704	TON	21.60	2,088,806.40
		A.C. Surfacing	88,557	TON	79.20	7,013,714.40
		Guardrail	6,050	LF	43.20	261,360.00
		18" Culverts	13,840	LF	28.80	398,592.00
		36" + Culverts	-	LS	179,040.00	179,040.00
		Fabric	34,874	SY	3.00	104,622.00
		Thaw Pipes	24,435	LF	43.20	1,055,592.00
		Topsoil & Seed	326	AC	3,600.00	1,173,600.00
		Traffic Control Devices	41	MI	18,000.00	738,000.00
		Bridges	0	SF	180.00	0.00
					TOTAL	\$31,619,730.60
		Maintenence	206	Mile-Years	\$10,000.00	\$2,060,000.00

4

ITEM		DESCRIPTION	QUANTITY	UNITS	PRICE	AMOUNT
11R.336	ROAD & RA	AIL FACILITIES				
	. 125	Denali to Watana Road C, (44.32 Mi) (Plus 21.00 Mi)		`		
		Clearing	800	AC	\$ 5,760.00	\$ 4,608,000.00
		Waste Excavation	2,245,400	CY	4.80	10,777,920.00
		Common Excavation	2,450,800	CY	4.20	10,293,360.00
		Rock Excavation	41,800	CY	14.40	601,920.00
		Borrow	20,000	CY	6.00	120,000.00
		NFS Subbase Material	470,000	CY	8.40	3,948,000.00
		Grade "A" Base Material	300,000	CY	16.80	5,040,000.00
		D-1 Base Material	162,500	TON	. 21.60	3,510,000.00
		A.C. Surfacing	148,813	TON	79.20	11,785,989.60
		Guardrail	4,200	LF	43.20	181,440.00
		18" Culverts	30,350	LF	28.80	874,080.00
		36" + Culverts	-	LS	468,120.00	468,120.00
		Fabric	12,907	SY	3.00	38,721.00
		Thaw Pipes	28,750	LF	43.20	1,242,000.00
		Topsoil & Seed	514	AC	3,600.00	1,850,400.00
		Traffic Control Devices	69	MI	18,000.00	1,242,000.00
·		Bridges	0	SF	180.00	0.00
					TOTAL	\$56,581,950.60
		Maintenence	980	Mile-Years	\$8,000.00	\$7,840,000.00

ITEM		DESCRIPTION	QUANTITY	UNITS	PRICE	AMOUNT
11.R336	ROAD & RA	AIL FACILITIES				
	. 128	Devil Canyon Trans-Dam Crossing, Road D, (7.26 Mi)				
		Clearing	45	AC	\$ 5,760.00	\$ 259,200.00
		Waste Excavation	132,300	CY	4.80	635,040.00
		Common Excavation	114,500	CY	4.20	480,900.00
		Rock Excavation	12,200	CY	14.40	175,680.00
		Borrow	90,200	CY	6.00	541,200.00
		NFS Subbase Material	27,960	ĊY	8.40	234,864.00
		Grade "A" Base Material	15,260	CY	16.80	256,368.00
		D-1 Base Material	6,370	TON	21.60	137,592.00
		A.C. Surfacing	5,830	TON	79.20	461,736.00
		Guardrail	2,640	LF	43.20	114,048.00
		18" Culverts	1,785	LF	28.80	51,408.00
		36" + Culverts	-	LS	30,744.00	0.00
		Fabric	0	SY	3.00	0.00
		Thaw Pipes	1,785	. LF	43.20	77,112.00
	-	Topsoil & Seed	29	AC	3,600.00	104,400.00
		Traffic Control Devices	3	MI	18,000.00	54,000.00
		Bridges	0	SF	180.00	0.00
					TOTAL	\$3,583,548.00
		Maintenence	7	Mile-Years	\$13,000.00	\$91,000.00

 $\overline{\}$

ITEM	<u> </u>		DESCRIPTION	QUANTITY	UNITS	PRICE	AMOUNT
11R.336	ROA	AD & RA	AIL FACILITIES				
	.2	Rail Facilities					
	•	.22	Railheads				
		.221	Railhead - Cantwell				
			Clearing	25	AC	\$ 5,760.00	\$144,000.00
			Waste Excavation	78.000	CY	4,80	374,400.00
			Common Excavation	505,000	ĊY	4,20	2,121,000.00
			Grade A Base	4,900	CY	16.80	82,320.00
			D-1 Base Material	2,400	ĊY	21.60	51,840,00
			A.C. Surfacing	2,200	Ton	79.20	174,240.00
			Topsoil & Seed	15	AC	3,600,00	54,000.00
			Rail Yard Control Devices	-	LS	720.00	720.00
			Subballast	25,800	ĊY .	8,60	221,880.00
			Trackage	19,700	LF	140.00	2,758,000.00
			Dock Lumber	16	MBF	580.00	9,280.00
						TOTAL	\$5,991,680.00
			Maintenence	15	Year	\$28,600.00	\$429,000.00
					i cui	φ207000.00	φ 120,000

an an an

ITEM	DESCRIPTION		QUANTITY	UNITS	PRICE	AMOUNT	
11R.63	CAMP						
	.1	Camp					
		.11	Pioneer Road Camp Camp Facilities Catering & Operation Support	70,980	LS Manday	\$588,000.00 39.40	\$ 588,000.00 2,796,612.00
		.12	Access Road/Railhead Camp Camp Facilities Catering & Operation Support	- 225,240	LS Manday	975,000.00 39.10	975,000.00 8,806,884.00

\$13,166,496.00

ITEM	<u> </u>		DESCRIPTION	QUANTITY	UNITS	PRICE	AMOUNT
12.336	ROA	D & RA	AIL FACILITIES				
	.1	Road I	Facilities				
		.14	Permanent Road				
		.141	Hurricane to Indian River Road A-3, (11 Mi)				
			Clearing	184	AC	\$ 5,760.00	\$1,059,840.00
			Waste Excavation	506,450	CY	4.80	2,430,960.00
			Common Excavation	462,500	CY	4.20	1,942,500.00
			Rock Excavation	0	CY	14.40	0.00
			Borrow	258,600	CY	6.00	1,551,600.00
			NFS Subbase Material	113,256	CY	8.40	951,350.40
			Grade "A" Base Material	61,797	CY	16.80	1,038,189.60
			D-1 Base Material	12,894	TON	21.60	278,510.40
			A.C. Surfacing	23,615	TON	79.20	1,870,308.00
			Guardrail	10,800	LF	43.20	466,560.00
			18" Culverts	6,375	LF	28.80	183,600.00
			36" + Culverts	· -	LS	70,800.00	70,800.00
			Fabric	26,890	. SY	3.00	80,670.00
			Thaw Pipes	7,175	LF	43.20	309,960.00
			Topsoil & Seed	117	AC	3,600.00	421,200.00
			Traffic Control Devices	11	MI	18,000.00	198,000.00
			Bridges	6120	SF	180.00	1,101,600.00
						TOTAL	\$13,955,648.40
			Maintenence	165	Mile-Years	13,000.00	\$2,145,000.00

s16/az

ITEM		DESCRIPTION	QUANTITY	UNITS	PRICE	AMOUNT
12.336	ROAD & RAIL FACILITIES					
	.143	Indian River to Devil Canyon-North Road A-5, (7 Mi)				
4		Clearing	108	AC	\$ 5,760.00	\$ 622,080.00
		Waste Excavation	293,400	CY	4.80	1,408,320.00
		Common Excavation	237,850	CY	4.20	998,970.00
		Rock Excavation	26,250	ĊY	14.40	378,000.00
		Borrow	262,500	CY	6.00	1,575,000.00
		NFS Subbase Material	72,072	CY	8.40	605,404.80
		Grade "A" Base Material	39, 325	CY	16.80	660,660.00
		D-1 Base Material	8,205	TON	21.60	177,228.00
		A.C. Surfacing	15,028	TON	79.20	1,190,217.60
		Guardrail	5,600	LF	43.20	241,920.00
		18" Culverts	4420	LF	28.80	127,296.00
		36" + Culverts	-	LS	6,600.00	6,600.00
		Fabric	7,330	SY	3.00	21,990.00
		Thaw Pipes	4,320	LF	43.20	186,624.00
		Topsoil & Seed	[`] 66	AC	3,600.00	237,600.00
		Traffic Control Devices	7	MI	18,000.00	126,000.00
		Bridges	37,400	SF	180.00	6,732,000.00
					TOTAL	\$15,295,910.40
		Maintenence	105	Mile-Years	13,000.00	\$1,365,000.00
				•		

ITEM		DESCRIPTION	QUANTITY	UNITS	PRICE	AMOUNT
12.336	ROAD & RA	AIL FACILITIES				
•	.154	Devil Canyon to Watana - North Road A-2, (41 Mi)				· · · · · · · · · · · · · · · · · · ·
		Clearing	576	AC	\$ 5,760.00	\$3,317,760.00
		Waste Excavation	1,536,500	CY	4.80	7,375,200.00
		Common Excavation	1,603,973	CY	4.20	6,736,686.60
		Rock Excavation	146,527	CY	14.40	2,109,988.80
		Borrow	156,700	CY	6.00	940,200.00
		NFS Subbase Material	424,710	CY	8.40	3,567,564.00
		Grade "A" Base Material	231,739	CY	16.80	3,893,215.20
		D-1 Base Material	96,704	TON	21.60	2,088,806.40
		A.C. Surfacing	88,557	TON	79.20	7,013,714.40
		Guardrail	6,050	LF	43.20	261,360.00
		18" Culverts	23,040	LF	28.80	663,552.00
		36" + Culverts	-	LS	294,000.00	294,000.00
		Fabric	49,820	SY	3.00	149,460.00
		Thaw Pipes	24,435	LF	43.20	1,055,592.00
		Topsoil & Seed	326	AC	3,600.00	1,173,600.00
		Traffic Control Devices	41	MI	18,000.00	738,000.00
		Bridges	0	SF	180.00	0.00
•					TOTAL	\$41,378,699.40
		Maintenence	328	Mile-Years	10,000.00	\$3,280,000.00

ITEM		DESCRIPTION	QUANTITY	UNITS	PRICE	AMOUNT
12.336	ROAD & RAIL FACILITIES					
	.17	Semi-Permanent Roads				
	. 178	Low Level Crossing Road H, (8 Mi)				+ 070 000 00
		Clearing	1/0	AC	\$ 5,760.00	\$ 979,200.00
		Waste Excavation	498,845	CY	4.80	2,394,456.00
		Common Excavation	549,417	CY	4.20	2,307,551.00
		Rock Excavation	/49,641	CY	14.40	10,794,830.40
		Borrow	0	CY	6.00	0.00
		NFS Subbase Material	0	CY	8.40	0.00
		Grade "A" Base Material	0	CY	16.80	0.00
		D-1 Base Material	36,966	TON	21.60	798,465.60
		A.C. Surfacing	0	TON	79.20	0.00
		Guardrail	0	LF	43.20	0.00
		18" Culverts	5,100	LF	28.80	146,880.00
		36" + Culverts	·	LS	0.00	0.00
		Fabric	0	SY	3.00	0.00
		Thaw Pipes	0	LF	43.20	0.00
		Topsoil & Seed	0	AC	3,600.00	0.00
		Traffic Control Devices	0	MI	18,000.00	0.00
		Bridges	12,480	SF	180.00	2,246,400.00
					TOTAL	\$19,667,783.40
		Maintenence	56	Mile-Years	5,000.00	\$280,000.00

ITEM	<u> </u>		DESCRIPTION	QUANTITY	UNITS	PRICE	AMOUNT
12.336	ROA	ROAD & RAIL FACILITIES					
	.2	Rail Facilities			•		
		.25	Railheads				
		.253	Railhead at Hurricane Clearing Waste Excavation Common Excavation Grade A Base D-1 Base Material A.C. Surfacing Topsoil & Seed Rail Yard Control Devices Subballast Trackage Dock Lumber	25 78,000 505,000 4,900 2,400 2,200 15 - 25,800 19,700 16	AC CY CY CY TON AC LS CY LF MBF	\$ 5,760.00 4.80 4.20 16.80 21.60 79.20 3,600.00 720.00 8.60 140.00 580.00	\$144,000.00 374,400.00 2,121,000.00 82,320.00 51,840.00 174,240.00 54,000.00 720.00 221,880.00 2,758,000.00 9,280.00
			Maintenence	15	Year *	\$28,600.00	\$429,000.00

 \sim

ITEM	DESCRIPTION		QUANTITY	UNITS	PRICE	AMOUNT
12.63	CAMP					
	.12	Access Road/Railhead Camp Camp Facilities Catering & Operation Support	- 221,640	LS Manday	\$962,900.00 39.10	\$ 962,900.00 _8,666,124.00
						\$9.629.024.00

ITEM			DESCRIPTION	QUANTITY	UNITS	PRICE	AMOUNT
13.336	ROA	D & RA	AIL FACILITIES				
	.1	Road	Facilities				
		.14	Permanent Road				
		.141	Hurricane to Indian Ri∨er Road A-3, (11 Mi)		•		
			Clearing	184	AC	\$ 5,760.00	\$1,059,840,00
			Waste Excavation	506,450	CY	4.80	2,430,960.00
			Common Excavation	462,500	CY	4.20	1,942,500.00
			Rock Excavation	0	CY	14.40	0.00
			Borrow	258,600	ĊŶ	6.00	1,551,600.00
			NFS Subbase Material	113,256	CY	8.40	951,350.40
			Grade "A" Base Material	61,797	CY	16.80	1,038,189.60
			D-1 Base Material	12,894	TON	21.60	278,510.40
			A.C. Surfacing	23,615	TON	79.20	1,870,308.00
			Guardrail	10,800	LF	43.20	466,560.00
			18" Culverts	6,375	LF	28.80	183,600.00
			36" + Culverts	- ,	LS	70,800.00	70,800.00
			Fabric	26,890	SY	3.00	80,670.00
			Thaw Pipes	7,175	LF	43.20	309,960.00
			Topsoil & Seed	117	AC	3,600,00	421,200.00
			Traffic Control Devices	11	MI	18,000.00	198,000.00
			Bridges	6120	SF	180.00	1,101,600.00
						TOTAL	\$13,955,648.40
			Maintenence	165	Mile-Years	13,000.00	\$2,145,000.00

s16/ao

ITEM		DESCRIPTION	QUANTITY	UNITS	PRICE	AMOUNT
13.336	ROAD & RA	AL FACILITIES				
	.144	Indian River to Devil Canyon-South Road A-6, (7 Mi)			·	
		Clearing	100	AC	\$ 5,760.00	\$ 576,000.00
		Waste Excavation	270,990	CY	4.80	1,300,752.00
		Common Excavation	253,050	CY	4.20	1,062,810.00
		Rock Excavation	52,500	CY	14.40	756,000.00
		Borrow	156,600	CY	6.00	939,600.00
		NFS Subbase Material	72,072	CY	8.40	605,404.80
		Grade "A" Base Material	39,325	CY	16.80	660,660.00
		D-1 Base Material	8,205	TON	21.60	177,228.00
		A.C. Surfacing	15,028	TON	79.20	1,190,217.60
		Guardrail	3,600	LF	43.20	155,520.00
		18" Culverts	5,015	LF	28.80	144,432.00
		36" + Culverts	-	LS	6,600.00	6,600.00
		Fabric	7,330	SY	3.00	21,990.00
		Thaw Pipes	5,115	LF	43.20	220,968.00
		Topsoil & Seed	59	AC	3,600.00	212,400.00
		Traffic Control Devices	7	MI	18,000.00	126,000.00
		Bridges	-	LS	2,000,000.00	\$ 2,000,000.00
					TOTAL	\$10,156,582.40
		Maintenence	49	Mile-Years	10,000.00	\$490,000.00

	DESCRIPTION	QUANTITY	UNITS	PRICE	AMOUNT
ROAD & RA	AIL FACILITIES				
.145	Indian River to Watana Via Upper	Portage			
	Road A~7, (41 MI)	000	A (C)	A E 760 00	¢2 016 000 00
	Clearing	000	AU	\$ 5,760.00	\$3,910,000.00
	waste Excavation	1,874,700	CY	4.80	8,998,560.00
	Common Excavation	1,859,500	CY	4.20	7,809,900.00
	Rock Excavation	82,500	CY	14.40	1,188,000.00
	Borrow	482,400	CY	6.00	2,894,400.00
	NFS Subbase Material	422,136	CY	8.40	3,545,942.40
	Grade "A" Base Material	230,335	CY	16.80	3,869,628.00
	D-1 Base Material	48,059	TON	21.60	1,038,074.40
	A.C. Surfacing	88,020	TON	79.20	6,971,184.00
	Guardrail	25,700	LF	43.20	1,110,240.00
	18" Culverts	24,395	LF	28.80	702,576.00
	36" + Culverts	-	LS	448,560.00	448,560.00
	Fabric	39,100	SY	3.00	117,300.00
	Thaw Pipes	26,595	LF	43.20	1,148,904.00
•	Topsoil & Seed	432	AC	3,600.00	1,555,200.00
	Traffic Control Devices	41	MI	18,000.00	738,000.00
	Bridges	37,400	SF	180.00	6,732,000.00
				TOTAL	\$52,785,268.80
	Maintenence	328	Mile-Years	10,000.00	\$3,280,000.00

•

ITEM			DESCRIPTION	QUANTITY	UNITS	PRICE	AMOUNT
13.336	ROA	AD & RA	AIL FACILITIES				
	.2	<u>Rail F</u>	acilities				
~		.25	Railheads				
		. 253	Railhead at Hurricane Clearing Waste Excavation Common Excavation Grade A Base D-1 Base Material A.C. Surfacing Topsoil & Seed Rail Yard Control Devices Subballast Trackage Dock Lumber	25 78,000 505,000 4,900 2,400 2,200 15 25,800 19,700 16	AC CY CY CY CY TON AC LS CY LF MBF	\$ 5,760.00 4.80 4.20 16.80 21.60 79.20 3,600.00 720.00 8.60 140.00 580.00	\$144,000.00 374,400.00 2,121,000.00 82,320.00 51,840.00 174,240.00 54,000.00 720.00 221,880.00 2,758,000.00 9,280.00
						TOTAL	\$5,991,680.00
			Maintenence	15	Year	\$28,600.00	\$429,900.00

.

- i6/c..

•

· · ·

ITEM	<u> </u>	DESCRIPTION	QUANTITY	UNITS	PRICE	AMOUNT
13.63	CAMP	~				
	.12	Access Road/Railhead Camp Camp Facilities Catering & Operation Support	- 190,790	LS Manday	\$828,890.00 39.10	\$828,890.00 7,459,889.00
						\$8,288,779.00

٩

ITEM			DESCRIPTION	QUANTI	<u>TYUN</u>	IITS PF	RICE	AMOUNT
14.336	ROA	AD & RA	IL FACILITIES					
	.1	Road F	acilities					
		.14	Permanent Road					
		.142	Hurricane to Gold Creek Spur Road A-4, (16 Mì) Clearing	2	43 A	AC \$ 5	5,760.0 0	\$1,399,680.00
			Waste Excavation Common Excavation Rock Excavation	658,8 585,6	50 C 00 C	CY CY CY	4.80 4.20 14.40	3,162,480.00 2,459,520.00 0.00
			Borrow NFS Subbase Material	488,7 164,7	00 C 36 C	CY CY	6.00 8.40	2,932,200.00 1,383,782.40
			Grade "A" Base Material D-1 Base Material A.C. Surfacing	89,8 18,7 34 3	87 C 55 T 50 T	CY ON ON	16.80 21.60 79.20	1,510,101.60 405,108.00 2,720,520,00
			Guardrail 18" Culverts	14,0	00 L 75 L	LF	43.20 28.80	604,800.00 85,680.00
			36" + Culverts Fabric Thom Dines	26,8	- l 90 S	LS 82 SY	2,320.00 3.00	82,320.00 80,670.00
			Topsoil & Seed Topsoil Control Devices	3,9	46 A 16 I	∟F AC 3 MI 18	43.20 3,600.00 3,000.00	525,600.00
			Bridges	90,4	40 5	SF	180.00	16,279,200.00
	Maintenence		2	40 Mile-	Years 13	TOTAL 3,000.00	\$34,091, <u>3</u> 82.00 \$3,120,000.00	

٠

.

.

•

_ - -

IIEW	DESCRIPTION	QUANTITY	UNITS	PRICE	AMOUNI
14.336	ROAD & RAIL FACILITIES				
	.147 Gold Creek Spur to Devil Cany	on			
	Road B-4, (6 MI)	00		+ F 700 00	A 170 000 00
	Clearing	83	AC	\$ 5,760.00	\$ 478,080.00
	Waste Excavation	221,600	CY	4.80	1,063,680.00
	Common Excavation	180,000	CY	4.20	756,000.00
	Rock Excavation	0	CY	14.40	0.00
	Borrow	218,400	CY	6.00	1,310,400.00
	NFS Subbase Material	61,776	CY	8.40	518,918.40
	Grade "A" Base Material	33,708	CY	16.80	566,294.40
	D-1 Base Material	7,033	TON	21.60	151,912.80
	A.C. Surfacing	12,881	TON	79.20	1,020,175.20
	Guardrail	400	LF	43.20	17,280.00
	18" Culverts	3,485	LF	28.80	100,368.00
	36" + Culverts	· _	LS	31,320.00	31,320.00
	Fabric	12,200	SY	3.00	36,600.00
	Thaw Pipes	3,885	LF	43.20	167,832.00
	Topsoil & Seed	47	AC	3,600,00	169,200.00
	Traffic Control Devices	6	MI	18,000,00	108,000,00
	Bridges	Ō	SF	180.00	0.00
				TOTAL	\$6,496,060.80
	Maintenence	90	Mile-Years	12,000.00	\$1,080,000.00

s16/a14

ł

ITEM		DESCRIPTION	QUANTITY	UNITS	PRICE	AMOUNT
14.336	ROAD & RA	AIL FACILITIES				
	.149	Devil Canyon to Northside Watana Road B-6, (41 Mi)				
		Clearing	578	AC	\$ 5,760.00	\$3,329,280.00
		Waste Excavation	1,544,900	CY	4.80	7,415,520.00
		Common Excavation	1,733,400	CY	4.20	7,280,280.00
		Rock Excavation	45,000	CY	14.40	648,000.00
		Borrow	447,600	CY	6.00	2,685,600.00
		NFS Subbase Material	422,136	CY	8.40	3,545,942.40
		Grade "A" Base Material	230,335	CY	16.80	3,869,628.00
		D-1 Base Material	48,059	TON	21.60	1,038,074.40
		A.C. Surfacing	88,021	TON	79.20	6,971,263.20
		Guardrail	25,000	LF	43.20	1,080,000.00
		18" Culverts	24,565	LF	28.80	707,472.00
		36" + Culverts	-	LS	273,840.00	273,840.00
		Fabric	41,560	SY	3.00	124,680.00
		Thaw Pipes	26,565	LF	43.20	1,147,608.00
2		Topsoil & Seed	330	AC	3,600.00	1,188,000.00
74.		Traffic Control Devices	41	MI	18,000.00	738,000.00
<u>,</u>		Bridges	115,940	SF	180.00	20,869,200.00
					TOTAL	\$62,912,388.00
		Maintenence	328	Mile-Years	13,000.00	\$4,264,000.00

516/uru

n a

ITEM			DESCRIPTION	QUANTITY	UNITS	PRICE	AMOUNT				
14.336	ROAD & RAIL FACILITIES										
	.2	<u>Rail Fa</u>	acilities								
		.24	Permanent Railroad (including Rai	lheads)							
		.243	Gold Creek Spur Rail R-3, (8 Mi) Clearing	110	۸C	\$ 5,760,00	\$ 633,600,00				
			Waste Excavation	289,440	CY	4,80	1,389,312.00				
			Common Excavation	670,720	CY	4.20	2,817,024.00				
			Rock Excavation	2,200	CY	14.40	31,680.00				
			Borrow	86,860	CY	6.00	521,160.00				
			Subballast	150,281	CY	8.60	1,292,416.60				
			Grade "A" Base Material	4,900	CY	16.80	82,320.00				
			D-1 Base Material	2,400	TON	21.60	51,840.00				
			A.C. Surfacing	2,200	TON	79.20	174,240.00				
			Dock Lumber	16	MBF	580.00	9,280.00				
			18" Culverts	2,850	LF	28.80	82,080.00				
			36" + Culverts	-	LS	45,600.00	45,600.00				
			Fabric	3,110	SY	3.00	9,330.00				
			Thaw Pipes	3,150	LF	43.20	136,080.00				
			Topsoil & Seed	42	AC	3,600.00	151,200.00				
			Rail Yard Control Devices	-	LS	720.00	720.00				
			Bridges	0	SF	360.00	0.00				
			Trackage	67,220	LF	140.00	9,410,800.00				
						TOTAL	\$16,838,682.60				
			Maintenence								
			Rail	120	Mile-Years	5,000.00	\$600,000.00				
			Railhead	15	Years	28,600.00	\$429,000.00				

•

ร์เ6/ส์โช้

٩

ITEM	DESCRIPTION		QUANTITY	UNITS	PRICE	AMOUNT
14.63	CAMP		•			
	.12	Access Road/Railhead Camp Camp Facilities Catering & Operation Support	276,990	LS Manday	\$1,203,390.00 39.10	\$ 1,203,390.00 10,830,309.00
						\$12,033,699.00
s16/a19

		·	•			
		DESCRIPTION	QUANTITY	UNITS	PRICE	AMOUNT
ROA	D & RA	ALL FACILITIES				
.2	Rail F	acilities				
	.24	Permanent Railroad (including Rai	lheads)			
	.243	Gold Creek Spur Rail				
		Clearing	110		¢ 5 760 00	¢ 633 600 00
		Waste Excavation	289, 440	CY	4 80	1.389.312.00
		Common Excavation	670,720	CY	4.20	2,817,024.00
		Rock Excavation	2,200	CY	14.40	31,680.00
		Borrow	86,860	CY	6.00	521,160.00
		Subballast	150,281	CY	8.60	1,292,416.60
		Grade "A" Base Material	4,900	CY	16.80	82,320.00
		D-1 Base Material	2,400	TON	21.60	51,840.00
		A.C. Surfacing	2,200	TON	79.20	174,240.00
		Dock Lumber	16	MBF	580.00	9,280.00
		18" Culverts	2,850	LF	28.80	82,080.00
		36" + Culverts	-	LS	45,600.00	45,600.00
		Fabric	3,110	SY	3.00	9,330.00
		Thaw Pipes	3,150	LF	43.20	136,080.00
		Topsoil & Seed	42	AC	3,600.00	151,200.00
		Rail Yard Control Devices	-	LS	/20.00	720.00
		Bridges	0	SF	360.00	0.00
		l rackage	67,220	LF	140.00	9,410,800.00
					TOTAL	\$16,838,682.60
		Maintenence				
		Rail	120	Mile-Years	5,000.00	\$600,000.00
		Railhead	15	Years	28,600.00	\$429,000.00

318/d20	
---------	--

ITEM		DESCRIPTION	QUANTITY	UNITS	PRICE	AMOUNT
15.63	CAMP					
	.12	Access Road/Railhead Camp Camp Facilities Catering & Operation Support	198,520	LS Manday	\$862,470.00 39.10	862,470.00 7,762,132.00
						\$8,624,602.00

÷

,~~**.**

. . .

· •

ì

ITEM			DESCRIPTION	QUANTITY	UNITS	PRICE	AMOUNT
16.336	ROA	D & RA	ALL FACILITIES				
	.1	Road I	Facilities				
		.14	Permanent Road				
		.142	Gold Creek to Devil Canyon B-2 (12 Mi)				
			Clearing Waste Excavation Common Excavation Rock Excavation Borrow NFS Subbase Material Grade "A" Base Material D-1 Base Material A.C. Surfacing Guardrail 18" Culverts	141 422,890 335,935 23,625 445,200 126,750 69,160 28,860 26,429 6,700 8,410	AC CY CY CY CY CY CY TON LF	\$ 5,760.00 4.80 4.20 14.40 6.00 8.40 16.80 21.60 79.20 43.20 28.80	<pre>\$ 812,160.00 2,029,872.00 1,410,927.00 340,200.00 2,671,200.00 1,064,700.00 1,161,888.00 623,376.00 2,093,176.80 289,440.00 242,208,00</pre>
			36" + Culverts Fabric Thaw Pipes Topsoil & Seed Traffic Control Devices Bridges	8,410 - 8,777 8,845 86 12 0	LS SY LF AC MI SF	46,080.00 3.00 43.20 3,600.00 18,000.00 180.00	46,080.00 26,331.00 382,104.00 309,600.00 216,000.00 0.00
						TOTAL	\$13,719,262.80
			Maintenence	180	Mile-Years	\$12,000.00	\$2,160,000.00

ROAD & RA	AIL FACILITIES				•
.146	Huricane to South Side Devil Can	yon			· · · ·
	Road A-8 (16 Mi)	-			
	Clearing	248	AC	\$ 5,760.00	\$1,428,480.00
	Waste Excavation	673,644	CY	4.80	3,233,491.20
	Common Excavation	593,330	CY	4.20	2,491,986.00
	Rock Excavation	0	CY	14.40	0.00
	Borrow	532,200	CY	6.00	3,193,200.00
	NFS Subbase Material	164,736	CY	8.40	1,383,782.40
	Grade "A" Base Material	89,887	CY	16.80	1,510,101.60
	D-1 Base Material	18,755	TON	21.60	405,108.00
	A.C. Surfacing	34,350	TON	79.20	2,720,520.00
	Guardrail	5,100	LF	43.20	220,320.00
	18" Culverts	10,625	LF	28.80	306,000.00
	36" + Culverts	-	LS	38,760.00	38,760.00
	Fabric	26,900	SY	3.00	80,700.00
	Thaw Pipes	11,725	LF	43.20	506,520.00
	Topsoil & Seed	150	AC	3,600.00	540,000.00
	Traffic Control Devices	16	MI	18,000.00	288,000.00
	Bridges	43,520	SF	180.00	7,833,600.00
				TOTAL	\$26,180,569.20
	Maintenence	112	Mile-Years	12,000.00	\$1,344,000.00

ł.

s16/uzs

<u> </u>	DESCRIPTION	QUANTITY	UNITS	PRICE	AMOUNT
6 <u>ROAD 8</u>	RAIL FACILITIES				
.14	9 Devil Canyon to Northside Road B-6, (41 Mi)	Watana			
	Clearing	578	AC	\$ 5,760.00	\$3,329,280.00
	Waste Excavation	1,544,900	CY	4.80	7,415,520.00
	Common Excavation	1,733,400	CY	4.20	7,280,280.00
	Rock Excavation	45,000	CY	14.40	648,000.00
	Borrow	447,600	CY	6.00	2,685,600.00
	NFS Subbase Material	422,136	CY	8.40	3,545,942.40
	Grade "A" Base Materi	al 230,335	CY	16.80	3,869,628.00
	D-1 Base Material	48,059	TON	21.60	1,038,074.40
	A.C. Surfacing	88,021	TON	79.20	6,971,263.20
	Guardrail	25,000	LF	43.20	1,080,000.00
	18" Culverts	24,565	LF	28.80	707,472.00
	36" + Culverts	-	LS	273,840.00	273,840.00
	Fabric	41,560	SY	3.00	124,680.00
	Thaw Pipes	26,565	LF	43.20	1,147,608.00
	Topsoil & Seed	330	AC	3,600.00	1,188,000.00
	Traffic Control Device	s 41	MI	18,000.00	738,000.00
	Bridges	115,940	SF	180.00	20,869,200.00
				TOTAL	\$62,912,388.00
	Maintenence	328	Mile-Years	13,000.00	\$4,264,000.00

			5				
ITEM	,	·····	DESCRIPTION	QUANTITY	UNITS	PRICE	AMOUNT
16.336	ROA	D & RA	AL FACILITIES				
	.2	<u>Rail Fa</u>	acilities			•	
		.25	Railheads				
		.252	Railhead at Gold Creek Clearing Waste Excavation Common Excavation Grade A Base D-1 Base Material A.C. Surfacing Topsoil & Seed Rail Yard Control Devices Subballast Trackage Dock Lumber	25 78,000 505,000 4,900 2,400 2,200 15 - 25,800 19,700 16	AC CY CY CY TON AC LS CY LF MBF	\$ 5,760.00 4.80 4.20 16.80 21.60 79.20 3,600.00 720.00 8.60 140.00 580.00	\$144,000.00 374,400.00 2,121,000.00 82,320.00 51,840.00 174,240.00 54,000.00 720.00 221,880.00 2,758,000.00 9,280.00
						TOTAL	\$5,991,680.00
			Maintenence	7	Year	\$28,600.00	\$200,200.00

÷

,

.

.

ITEM	<u></u>	DESCRIPTION	QUANTITY	UNITS	PRICE	AMOUNT
16.63	CAMP					
	.12	Access Road/Railhead Camp Camp Facilities Catering & Operation Support	- 250,440	LS Manday	\$1,088,040.00 39.10	\$ 1,088,040.00 9,792,204.00
						\$10,880,244.00

s16/azo

ITEM			DESCRIPTION	QUANTITY	UNITS	PRICE	AMOUNT
17.336	ROA	D & RA	ALL FACILITIES				
	.1	Road I	Facilities				
		.15	Permanent Road				
		.155	Denali Highway to Watana, Road C-3, (40 Mile)				
			Clearing	712	AC	\$ 5,760.00	\$ 4,101,120.00
			Waste Excavation	1,981,270	CY	4.80	9,510,096.00
			Common Excavation	1,988,000	CY	4.20	8,349,600.00
			Rock Excavation	41,800	CY	14.40	601,920.00
			Borrow	0	CY	6.00	0.00
			NFS Subbase Material	414,820	CY	8.40	3,484,488.00
			Grade "A" Base Material	226,342	CY	16.80	3,802,545.60
			D-1 Base Material	94,450	TON	21.60	2,040,120.00
			A.C. Surfacing	86,495	TON	79.20	6,850,404.00
			Guardrail	4,200	LF	43.20	181,440.00
			18" Culverts	23,720	LF	28.80	683,136.00
			36" + Culverts	-	LS	453,720.00	453,720.00
			Fabric	12,907	SY	3.00	38,721.00
			Thaw Pipes	26,020	LF	43.20	1,124,064.00
			Topsoil & Seed	467	AC	3,600.00	1,681,200.00
			Traffic Control Devices	40	MI	18,000.00	720,000.00
			Bridges	0	SF	180.00	0.00
						TOTAL	\$43,622,574.60
			Maintenence	320	Mile-Years	8,000.00	\$2,560,000.00

h,

ITEM		DESCRIPTION	QUANTITY	UNITS	PRICE	AMOUNT
17.336	ROAD & RA	AIL FACILITIES		, ,		
	.16	Service Roads				
	.162	Devil Canyon to Northside Watana Road B-6, (41 Mi)				
		Clearing	578	AC	\$ 5,760.00	\$3,329,280.00
		Waste Excavation	1,544,900	CY	4,80	7,415,520.00
		Common Excavation	1,733,400	CY	4.20	7,280,280.00
		Rock Excavation	45,000	CY	14.40	648,000.00
		Borrow	447,600	CY	6.00	2,685,600.00
		NFS Subbase Material	422,136	CY	8.40	3,545,942.40
		Grade "A" Base Material	230,335	CY	16.80	3,869,628.00
		D-1 Base Material	48,059	TON	21.60	1,038,074.40
		A.C. Surfacing	88,021	TON	79.20	6,971,263.20
		Guardrail	25,000	LF	43.20	1,080,000.00
		18" Culverts	24,565	LF	28.80	707,472.00
		36" + Culverts	· _	LS	273,840.00	273,840.00
		Fabric	41,560	SY	3.00	124,680.00
		Thaw Pipes	26,565	LF	43.20	1,147,608.00
		Topsoil & Seed	330	AC	3,600.00	1,188,000.00
		Traffic Control Devices	41	MI	18,000.00	738,000.00
		Bridges	115,940	SF	180.00	20,869,200.00
					TOTAL	\$62,912,388.00
		Maintenence	328	Mile-Years	13,000.00	\$4,264,000.00

ITEM	·····	DESCRIPTION	QUANTITY	UNITS	PRICE	AMOUNT	
17.336	ROAD & RA	AIL FACILITIES					
	.18	Upgrade Existing Road					
	.185	Denali Highway from Cantwell to New Road, Road C-2, (21 Mile)					
		Clearing Waste Excavation Common Excavation Rock Excavation Borrow NFS Subbase Material Grade "A" Base Material D-1 Base Material A.C. Surfacing Guardrail 18" Culverts 36" + Culverts Fabric Thaw Pipes Topsoil & Seed Traffic Control Devices Bridges	$ \begin{array}{r} 17\\ 66,000\\ 264,000\\ 0\\ 20,000\\ 13,700\\ 51,024\\ 58,604\\ 53,669\\ 3,000\\ 4,000\\ -\\ 0\\ 100\\ 10\\ 21\\ 1,700\\ \end{array} $	AC CY CY CY CY CY TON TON LF LS SY LF AC MI SF	\$ 5,760.00 4.80 4.20 14.40 6.00 8.40 16.80 21.60 79.20 43.20 28.80 55,560.00 3.00 43.20 3,600.00 18,000.00 180.00 TOTAL	$\begin{array}{c} \$ & 97,920.00 \\ & 316,800.00 \\ & 1,108,800.00 \\ & 0.00 \\ & 120,000.00 \\ & 115,080.00 \\ & 857,203.20 \\ & 1,265,846.40 \\ & 4,250,584.80 \\ & 129,600.00 \\ & 115,200.00 \\ & 115,200.00 \\ & 0.00 \\ & 4,320.00 \\ & 36,000.00 \\ & 378,000.00 \\ & 306,000.00 \\ \end{array}$	
		Maintenence	168	Mile-Years	8,000.00	\$1,344,000.00	

1

ITEM			DESCRIPTION	QUANTITY	UNITS	PRICE	AMOUNT
17.336	6 ROAD & RAIL FACILITIES						
	.2	<u>Rail F</u>	acilities				
		.24	Permanent Railroad (Including Raill	neads)			
		.244	Gold Creek to Devil Canyon - Rail R-1, (14 Mi) Clearing Waste Excavation Common Excavation Rock Excavation Borrow Subballast Grade "A" Base Material D-1 Base Material A.C. Surfacing Dock Lumber 18" Culverts 36" + Culverts Fabric Thaw Pipes Topsoil & Seed Rail Yard Control Devices Bridges Trackage	162 407,420 798,405 2,200 108,500 171,634 4,900 2,400 2,200 16 4,850 3,121 10,100 104 0 98,975	AC CY CY CY CY CY TON TON MBF LF LS SY LF AC LS SF LF	\$ 5,760.00 4.80 4.20 14.40 6.00 8.60 16.80 21.60 79.20 580.00 28.80 46,080.00 3.00 43.20 3,600.00 720.00 360.00 140.00	
			Maintenence				
			Rail Railhead	98 7	Mile-Years Years	5,000.00 28,600.00	\$490,000.00 \$200,200.00

`

s16/a30

ITEM		DESCRIPTION	QUANTITY	UNITS	PRICE	AMOUNT
17.336	ROAD & RAIL FACILITIES					
	.25	Railheads				
	.251	Railhead at Cantwell				
		Clearing	25	AC	\$ 5,760.00	\$144,000.00
		Waste Excavation	78,000	CY	4.80	374,400.00
		Common Excavation	505,000	CY	4.20	2,121,000.00
		Grade A Base	4,900	CY	16.80	82,320.00
	*	D-1 Base Material	2,400	ÇY	21.60	51,840.00
		A.C. Surfacing	2,200	TON	79.20	174,240.00
		Topsoil & Seed	15	AC	3,600.00	54,000.00
		Rail Yard Control Devices	-	LS	720.00	720.00
		Subballast	25,800	CY	8.60	221,880.00
		Trackage	19,700	LF	140.00	2,758,000.00
		Dock Lumber	16	MBF	580.00	9,280.00
					TOTAL	\$5,991,680.00
		Maintenence	8	Year	\$28,600.00	\$228,800.00

.

i.

ITEM	DESCRIPTION		QUANTITY	UNITS	PRICE	AMOUNT
17.63	CAMP					
	.12	Access Road/Railhead Camp Camp Facilities Catering & Operation Support	- 334,840	LS Manday	1,454,690.00 39.10	\$ 1,454,690.00 13,092,244.00
						\$14,546,934.00

ITEM		,	DESCRIPTION	QUANTITY	UNITS	PRICE	AMOUNT
17A.336	RO	AD & RA	AIL FACILITIES				
	.1	Road	Facilities				
		.15	Permanent Road				
		.155	Denali Highway to Watana, Road C-3, (40 Mile)				
			Clearing	712	AC	\$ 5,760.00	\$ 4,101,120.00
			Waste Excavation	1,981,270	CY	4.80	9,510,096.00
			Common Excavation	1,988,000	CY	4.20	8,349,600.00
			Rock Excavation	41,800	CY	14.40	601,920.00
			Borrow	. 0	CY	6.00	0.00
			NFS Subbase Material	414,820	CY	8.40	3,484,488.00
			Grade "A" Base Material	226,342	CY	16.80	3,802,545.60
			D-1 Base Material	94,450	TON	21.60	2,040,120.00
			A.C. Surfacing	86,495	TON	79.20	6,850,404.00
			Guardrail	4,200	LF	43.20	181,440.00
			18" Culverts	23,720	LF	28.80	683,136,00
			36" + Culverts	-	LS	453,720.00	453,720.00
			Fabric	12,907	SY	3.00	38,721.00
			Thaw Pipes	26,020	LF	43.20	1,124,064.00
			Topsoil & Seed	467	AC	3,600.00	1,681,200.00
			Traffic Control Devices	40	MI	18,000.00	720,000.00
			Bridges	0	SF	180.00	0.00
						TOTAL	\$43,622,574.60
			Maintenence	320	Mile-Years	8,000.00	\$2,560,000.00

516/400

Ţ

ITEM		DESCRIPTION	QUANTITY	UNITS	PRICE	AMOUNT	
17A.336	ROAD & RA	AIL FACILITIES					
	.16	Service Roads					
	. 161	Devil Canyon to Southside Watana Road B-7, (43 Mi)					
		Clearing	698	AC	\$ 5,760.00	\$4,020,480.00	
		Waste Excavation	1,913,213	CY	4.80	9,183,422.40	
		Common Excavation	2,061,325	CY	4.20	8,657,565.00	
		Rock Excavation	0	CY	14.40	0.00	
		Borrow	339,413	CY	6.00	2,036,478.00	
		NFS Subbase Material	442,728	CY	8.40	3,718,915.20	
		Grade "A" Base Material	241,570	CY	16.80	4,058,376.00	
		D-1 Base Material	50,403	TON	21.60	1,088,704.80	
		A.C. Surfacing	92.314	TON	79.20	7,311,268.80	
		Guardrail	3,500	LF	43.20	151,200.00	
		18" Culverts	27,540	LF	28.80	793,152.00	
		36^{μ} + Culverts		15	198,360.00	198,360.00	
ș.		Fabric	48,900	SY	3.00	146,700.00	
		Thaw Pipes	29.040	I F	43.20	1,254,528.00	
		Topsoil & Seed	437	AC	3,600,00	1,573,200.00	
		Traffic Control Devices	43	MI	18,000,00	774,000.00	
		Bridges	42,500	SF	180.00	7,650,000.00	
					TOTAL	\$52,616,350.20	
H		Maintenence	344	Mile-Years	13,000.00	\$4,472,000.00	

.

ITEM		DESCRIPTION	QUANTITY	UNITS	PRICE	AMOUNT
17A.336	ROAD & RA	AIL FACILITIES				
	.18	Upgrade Existing Road				
	.185	Denali Highway from Cantwell to New Road, Road C-2, (21 Mile)				
		Clearing Waste Excavation Common Excavation Rock Excavation Borrow NFS Subbase Material Grade "A" Base Material D-1 Base Material A.C. Surfacing Guardrail 18" Culverts 36" + Culverts Fabric Thaw Pipes Topsoil & Seed Traffic Control Devices Bridges	$ \begin{array}{r} 17\\ 66,000\\ 264,000\\ 0\\ 20,000\\ 13,700\\ 51,024\\ 58,604\\ 53,669\\ 3,000\\ 4,000\\ -\\ 0\\ 100\\ 10\\ 21\\ 1,700\\ \end{array} $	AC CY CY CY CY CY TON TON LF LF LS SY LF AC MI SF		
					TOTAL	\$9,156,914.40
		Maintenence	168	Mile-Years	8,000.00	\$1,344,000.00

•

ITEM			DESCRIPTION	QUANTITY	UNITS	PRICE	AMOUNT
17A.336	ROAD & RAIL FACILITIES						
	.2	Rail F	acilities				
		.24	Permanent Railroad (Including Rail	heads)			
•		.244	Gold Creek to Devil Canyon - Rail R-1, (14 Mi) Clearing Waste Excavation Common Excavation Rock Excavation Borrow Subballast Grade "A" Base Material D-1 Base Material A.C. Surfacing Dock Lumber 18" Culverts 36" + Culverts Fabric Thaw Pipes Topsoil & Seed Rail Yard Control Devices Bridges Trackage	162 407,420 798,405 2,200 108,500 171,634 4,900 2,400 2,200 16 4,850 - 3,121 10,100 104 - 0 98,975	AC CY CY CY CY CY TON TON MBF LF LS SY LF AC LS SF LF		
			Maintenence	98	Mile-Years	TOTAL 5,000.00	\$23,581,512.40 \$490,000.00
			Railhead	7	Years	28,600.00	\$200,200.00

.

ITEM		DESCRIPTION	QUANTITY	UNITS	PRICE	AMOUNT
7A.336	ROAD & RA	AL FACILITIES				
	.25	Railheads				
	.251	Railhead at Cantwell				
		Clearing	25	AC	\$ 5,760.00	\$144,000.00
- .		Waste Excavation	78,000	CY	4.80	374,400.00
		Common Excavation	505,000	CY	4.20	2,121,000.00
		Grade A Base	4,900	CY	16.80	82,320.00
		D-1 Base Material	2,400	CY	21.60	51,840.00
		A.C. Surfacing	2,200	TON	79.20	174,240.00
		Topsoil & Seed	15	AC	3,600.00	54,000.00
ļ		Rail Yard Control Devices	-	LS	720.00	720.00
		Subballast	25,800	CY	8.60	221,880.00
		Trackage	19,700	LF	140.00	2,758,000.00
		Dock Lumber	16	MBF	580.00	9,280.00
					TOTAL	\$5,991,680.00
		Maintenence	8	Year	\$28,600.00	\$228,800.00

ITEM		DESCRIPTION	QUANTITY	UNITS	PRICE	AMOUNT
17A.63	CAMP					
	.12	Access Road/Railhead Camp Camp Facilities Catering & Operation Support	- 311,140	LS Manday	\$1,351,730.00 39.10	\$1,351,730.00 12,165,574.00
						\$13,517,304.00

ITEM		·	DESCRIPTION	QUANTITY	UNITS	PRICE	AMOUNT
18.336	ROA	D & RA	AL FACILITIES				
	.1	Road Facilities					
		.15	Permanent Road				
		.155	Denali Highway to Watana, Road C-4, (42 Mile)				
			Clearing	748	AC	\$ 5,760.00	\$ 4,308,480.00
			Waste Excavation	2,080,330	CY	4.80	9,985,584.00
			Common Excavation	2,087,400	CY	4.20	8,767,080.00
			Rock Excavation	41,800	CY	14.40	601,920.00
			Borrow	0	CY	6.00	0.00
			NFS Subbase Material	435,560	CY	8.40	3,658,704.00
			Grade "A" Base Material	237,660	CY	16.80	3,992,688.00
			D-1 Base Material	99,170	TON	21.60	2,142,072.00
			A.C. Surfacing	90,820	TON	79.20	7,192,944.00
			Guardrail	7,000	LF	43.20	302,400.00
			18" Culverts	26,350	LF	28.80	758,880.00
			36" 🐮 Culverts	-	LS	373,680.00	373,680.00
			Fabric	12,907	SY	3.00	38,721.00
			Thaw Pipes	28,750	LF	43.20	1,242,000.00
			Topsoil & Seed	490	AC	3,600.00	1,764,000.00
			Traffic Control Devices	42	MI	18,000.00	756,000.00
			Bridges	0	SF	180.00	0.00
						TOTAL	\$45,885,153.00
			Maintenence	336	Mile-Years	9,000.00	\$3,024,000.00

÷

.

ITEM		DESCRIPTION	QUANTITY	UNITS	PRICE	AMOUNT
18.336	ROAD & RA	AIL FACILITIES				
	.16	Service Roads (Permanent)				
	. 164	Devil Canyon to Watana - North Road A-2 Mod*, (36 Mi)				
		Clearing	506	AC	\$ 5,760.00	\$2,914,560.00
		Waste Excavation	1,349,122	CY	4.80	6,475,785.60
		Common Excavation	1,408,366	CY	4.20	5,915,137.20
		Rock Excavation	146,527	CY	14.40	2,109,988.80
		Borrow	137,590	CY	6.00	825,540.00
		NFS Subbase Material	372,916	CY	8.40	3,132,494.40
		Grade "A" Base Material	203,478	CY	16.80	3,418,430.40
		D-1 Base Material	84,910	TON	21.60	1,834,056.00
		A.C. Surfacing	77,757	TON	79.20	6,158,354.40
		Guardrail	6,050	LF	43.20	261,360.00
		18" Culverts	23,040	LF	28.80	663,552.00
		36" + Culverts	-	LS	294,000.00	294,000.00
		Fabric	49,820	SY	3.00	149,460.00
		Thaw Pipes	24,435	LF	43.20	1,055,592.00
		Topsoil & Seed	286	AC	3,600.00	1,029,600.00
		Traffic Control Devices	36	MI	18,000.00	648,000.00
		Bridges	88,400	SF	180.00	15,912,000.00
					TOTAL	\$52,797,910.80
		Maintenence	288	Mile-Years	10,000.00	\$2,880,000.00

-

Note: A-2 Mod. includes A-2, high level x-ing to camp at Devil Canyon, and trans dam crossing at Watana.

ł

	DESCRIPTION	QUANTITY	UNITS	PRICE	AMOUNT
ROAD & RA	ALL FACILITIES				
.18	Upgrade Existing Road				
.185	Denali Highway from Cantwell to New Road, Road C-2, (21 Mile)				
	Clearing	17	AC	\$ 5,760.00	\$ 97,920.00
	Waste Excavation	66,000	CY	4.80	316,800.00
	Common Excavation	264,000	CY	4.20	1,108,800.00
	Rock Excavation	0	CY	14.40	0.00
	Borrow	20,000	ĊY	6.00	120,000.00
	NFS Subbase Material	13,700	CY	8.40	115,080.00
	Grade "A" Base Material	51,024	ĊY	16.80	857,203.20
	D-1 Base Material	58,604	TON	21.60	1,265,846.40
	A.C. Surfacing	53,669	TON	79.20	4,250,584.80
	Guardrail	3,000	LF	43.20	129,600.00
	18" Culverts	4,000	LF	28.80	115,200.00
	36" + Culverts	-	LS	55,560.00	55,560.00
	Fabric	0	SY	3.00	0.00
	Thaw Pipes	100	LF	43.20	4,320.00
	Topsoil & Seed	10	AC	3,600.00	36,000.00
	Traffic Control Devices	21	MI	18,000.00	378,000.00
X	Bridges	1,700	SF	180.00	306,000.00
				TOTAL	\$9,156,914.40
	Maintenence	168	Mile-Years	8,000.00	\$1,344,000.00

ITEM	·		DESCRIPTION	QUANTITY	UNITS	PRICE	AMOUNT
18.336	ROA						
	.2	Rail Fa	acilities				
		.24	Permanent Railroad (Including Rail	neads)			
		.244	Gold Creek to Devil Canyon - Rail R-1, (14 Mi) Clearing Waste Excavation	162 407 420	AC	\$ 5,760.00 4 80	\$ 933,120.00 1.955.616.00
			Common Excavation Rock Excavation	798,405	CY	4.20 14.40	3,353,301.00 31,680.00
			Borrow Subballast Crado #A# Base Material	108,500 171,634	CY CY CY	6.00 8.60 16.80	651,000.00 1,476,052.40 82,320,00
			D-1 Base Material A.C. Surfacing	2,400 2,200	TON	21.60 79.20	51,840.00 174,240.00
			Dock Lumber 18" Culverts 36" + Culverts	16 4,850 -	MBF LF LS	580.00 28.80 46,080.00	9,280.00 139,680.00 46,080.00
			Fabric Thaw Pipes	3,121 10,100	SY LF	3.00 43.20	9,363.00 436,320.00
i, I			Topsoil & Seed Rail Yard Control Devices Bridges	104 - 0	AC LS SF	3,600.00 720.00 360.00	374,400.00 720.00 0.00
			Trackage	98,975	LF	140.00	13,856,500.00
						TOTAL	\$23,581,512.40
			Maintenence Rail	98	Mile-Years	5,000.00	\$490,000.00
			Railhead	7	Years	28,600.00	\$200,200.00

4

.

.

ITEM		DESCRIPTION	QUANTITY	UNITS	PRICE	AMOUNT	
18.336	ROAD & RA	AIL FACILITIES					
	.25	Railheads					
	.251	Railhead at Cantwell					
		Clearing	25	AC	\$ 5,760.00	\$144,000.00	
		Waste Excavation	78,000	CY	4.80	374,400.00	
		Common Excavation	505,000	CY	4.20	2,121,000.00	
		Grade A Base	4,900	CY	16.80	82,320.00	
		D-1 Base Material	2,400	CY	21.60	51,840.00	
		A.C. Surfacing	2,200	TON	79.20	174,240.00	
		Topsoil & Seed	. 15	AC	3,600.00	54,000.00	
		Rail Yard Control Devices	-	LS	720.00	720.00	
		Subballast	25,800	CY	8.60	221,880.00	
		Trackage	19,700	LF	140.00	2,758,000.00	
		Dock Lumber	16	MBF	580.00	9,280.00	
					TOTAL	\$5,991,680.00	
	Maintenence		8	Year	\$28,600.00	\$228,800.00	

							•						
										an an Amerika A			
s16/d43	6.,	Samuel and a second s	Part Constant Street	A second second second second second	·	144.47 (Managara (1999) 144 (1997)	1.000 (1000) (1000) (1000)	A garden with the same finite spinots of	1	·***	and enquery communications	 1	1.00 and 1.0

÷

~

·

ITEM		DESCRIPTION	QUANTITY	UNITS	PRICE	AMOUNT
18.63	CAMP					
	.12	Access Road/Railhead Camp	`		\$1,353,540.00	\$1,353,540.00
		Catering & Operation Support	311,560	Manday	39.10	12,181,996.00
,						\$13,535,536.00

-

r35/g2

APPENDIX G BORROW PITS

Figure Supplement



4

- [***