ANCHORAGE - FAIRBANKS TRANSMISSION INTERTIE

ROUTE SELECTION REPORT

ALASKA POWER AUTHORITY

JANUARY 1982

ANCHORAGE - FAIRBANKS TRANSMISSION INTERTIE

ROUTE SELECTION REPORT

ALASKA POWER AUTHORITY

Prepared at the Offices of:

Commonwealth Associates Inc.
209 East Washington Avenue
Jackson, Michigan 49201

January 1982

Gilbert/Commonwealth engineers/consultants/architects

COMMONWEALTH ASSOCIATES INC., 209 E. Washington Avenue, Jackson, MI 49201/Tel. 517 788-3000

January 29, 1982

Mr. David D. Wozniak
Alaska Power Authority
334 West 5th Avenue
Anchorage, Alaska 99501

Dear Mr. Wozniak:

This will confirm the transmittal of the Anchorage/Fairbanks Intertie Route Selection Report (Final) to the Alaska Power Authority.

The report has been amended to include material addressing the proposed access for construction and maintenance of the Intertie. This information was requested by the Alaska Power Authority Board of Directors in our presentation to them on November 13, 1981, and presented during the Board Meeting on November 19, 1981.

During these two meetings, the Board solicited and heard extensive testimony from concerned citizens, affected landowners, utilities, and federal and state resource agencies.

During the meeting of November 19, 1981, Commonwealth Associates Inc. consultants, Dr. Harry Kornberg and Dr. Sol Michaelson, presented, and the Alaska Power Authority accepted, expert testimony to the effect that the project presents no health hazards.

The Board accepted the recommendations that the line be constructed for 345 kV, initially operated at 138 kV (System Configuration 1B) and that the line be constructed overhead along the eastern line route including Moody-Montana (Line Configuration 19) with the following two provisions:

Gilbert / Commonwealth
209 E. Washington Avenue, Jackson, MI 49201

a) that Alaska Power Authority staff and the consultant make a good faith effort to completely avoid Denali State Park and

b) work with the National Park Service to substitute the northern routing by line segments 10 and 11 instead of 12, if this can be done without delaying the project.

The Board requested that the staff and consultants continue to involve and inform landowners directly affected in the final location of the line.

Thirty-five copies of this amended report (final) are being transmitted for your files and distribution.

Yours very truly,

Lytle G. Miller, P.E.
Project Manager

LGM/kb
Enclosures

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

I. PROJECT BACKGROUND

Economic Benefits

The following section reviews the economic benefits which can be derived from the intertie between Anchorage and Fairbanks. The numbers given below are taken from Commonwealth's Feasibility Report submitted on May 1, 1981. No reason to revise these numbers has since been disclosed.

The first benefit of the intertie will be to permit economy energy interchange between Anchorage and Fairbanks. It is estimated that by 1984 the cost of energy generation by oil-fired combustion turbines in Fairbanks will cost roughly four times that produced by gas-fired units in Anchorage. By 1993, this ratio is predicted to drop to about 2.5. Substantial savings can be achieved by shipping off-peak energy potential in Anchorage to Fairbanks so that the latter can correspondingly reduce its usage of the more expensive oil. The resulting savings is estimated at $160 million for the period 1984 to 1993.

The second benefit of the intertie is to allow reserve sharing. When Anchorage and Fairbanks are isolated, one from another, each should have installed reserve generating capacity approximately equal to the two largest generating units. When joined, each can provide the same quality service as before by carrying reserve equal to its single largest unit, and relying upon the intertie to back up its second largest unit. This will avoid the need to install as much new generating capacity in the future as would otherwise be the case. It is estimated that by reserve sharing Anchorage can reduce its need for new generating capacity by 70 MW by 1993, and Fairbanks can reduce its need by 55 MW, bringing the total reduction to 125 MW. This will save an additional $14 million in the 1984-1993 time frame. Thus, the total saving in the 1983-1994 period is roughly $174 million.

Relation to the Susitna Project

If the intertie is built for future 345 kV operation as a part of the Susitna Project, the question arises whether a portion of the Susitna transmission system should be installed ten years early in order to gain the benefits noted above. The cost of installing the intertie early is only a fraction of the cost for its total life cycle cost. Thus, there is opportunity to achieve the $174 million saving noted earlier at an attractive ratio of benefit to costs.

Configurations

As a result of the May 1 Feasibility Study, Commonwealth recommended that the intertie be designed for 138 kV initial operation and 345 kV future operation. At that time, it was not recognized that the existing 138 kV transmission line from Point MacKenzie to Teeland would be raised to 230 kV. This line, owned by Chugach Electric Association, is a vital connection point for the intertie. It has since been decided that this line will be changed to 230 kV by the time the intertie is tentatively planned to go in service. This event reopened the possibility of operating the intertie at 230 kV, but still being constructed for 345 kV operation as a future part of the Susitna Project.

Thus, there are under consideration two alternative system configurations at this time:

1B - 138 kV initial operation, designed for future 345 kV operation

2B - 230 kV initial operation, designed for future 345 kV operation.

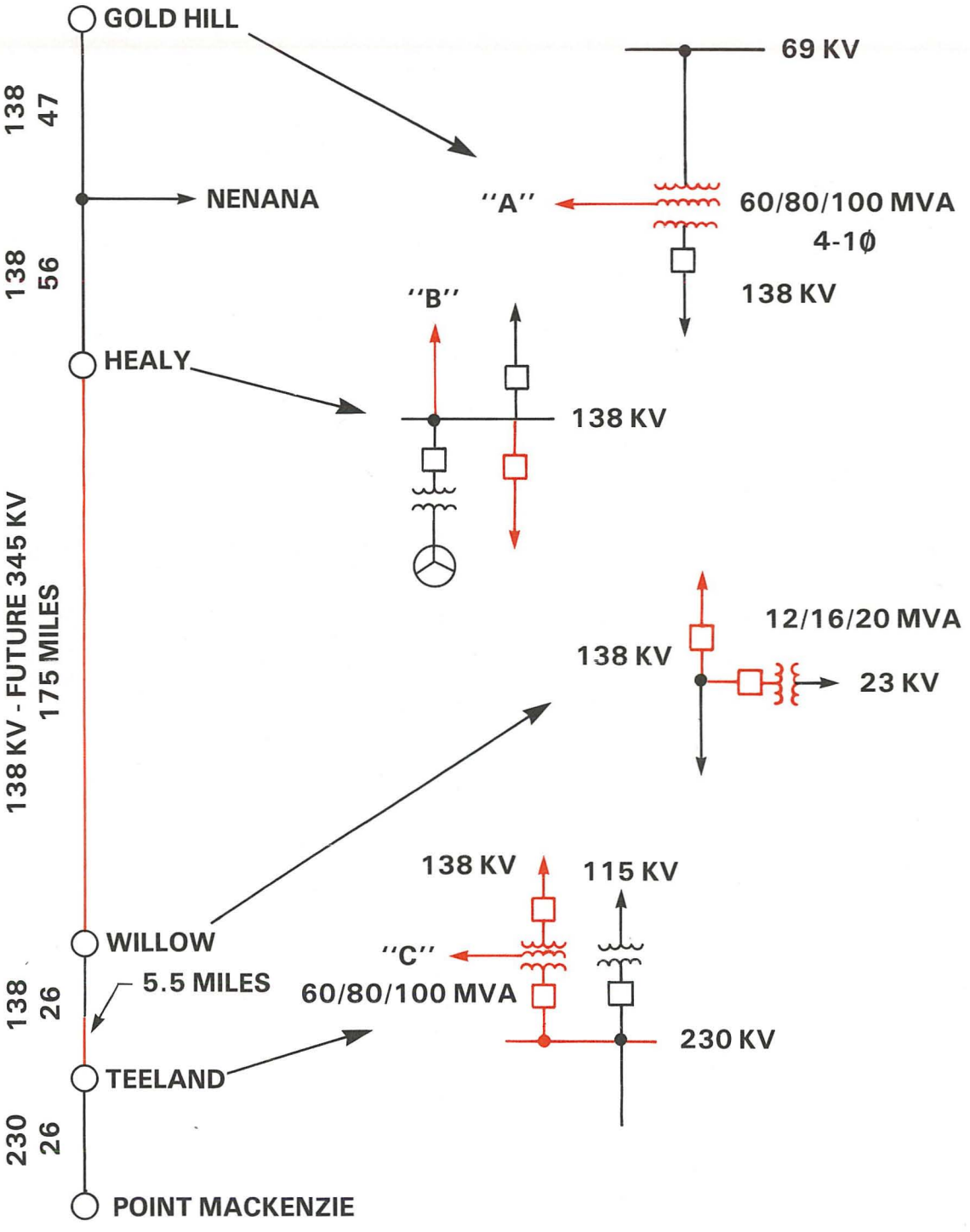
These two configurations are illustrated in Figures 1 and 2 attached. Later in this report, a cost comparison of these alternatives will be presented.

There is additionally a third possibility that is incidentally shown in the attached diagrams and treated in the cost comparison. This alternative is designated configuration 1A and is idential to 1B except that the intertie would be designed for 138 kV operation only. This third configuration is included only to reconfirm the decision to design for future 345 kV operation.

Conceptual Studies

A design criteria study was prepared to establish the criteria for line component alternative studies and the line design. The study included electrical, mechanical, and structural parameters. Nortec, Dowl Engineers, Dryden & LaRue of Anchorage and Shannon & Wilson of Fairbanks provided basic meteorological and geophysical data on the Alaska environment. The preliminary Design Criteria Study was distributed to Alaska Power Authority (APA) and the Alaska Utilities for comments. Comments were received and are now being incorporated into the final study.

PRESENT CONCEPT OF CONFIGURATION 1B

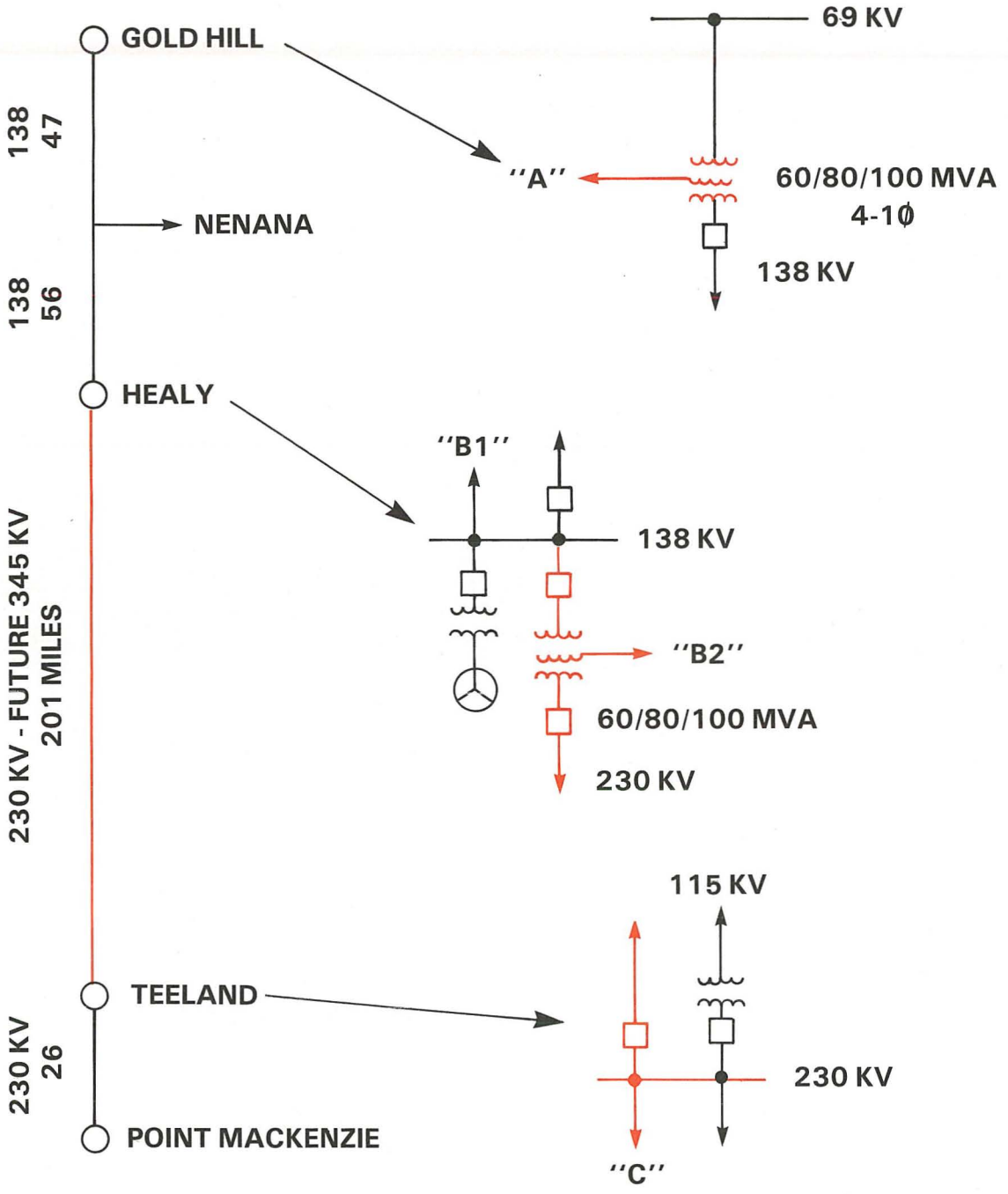


	REACTORS			CAPACITORS		
	NO.	MVAR EACH	TOTAL	NO.	MVAR EACH	TOTAL
"A"	1(a)	5	5	6	5	30
"B"	3	5	15	4	5	20
"C"	4	5	20	4	5	20

(a) EXISTING

FIGURE 1

PRESENT CONCEPT OF CONFIGURATION 2B



	REACTORS			CAPACITORS		
	NO.	MVAR EACH	TOTAL	NO.	MVAR EACH	TOTAL
"A"	1(a)	5	5	6	5	30
"B1"	1(a)	5	5	—	—	—
"B2"	6	5	30	3	5	15
"C"	6	5	30	—	—	—

(a) EXISTING

FIGURE 2

The preliminary Structure Study was prepared which evaluated seven 345 kV single-circuit structures. This preliminary Structure Study was distributed in Alaska for comments. Based on the comments received, the following additions were made: aluminum structures were studied, bringing the total structures to 10, screw anchors were considered, shield wires were added and a life cycle analysis was prepared. The revised structure study recommends the Corten, or equal, guyed pole "X" for the Intertie Project. Illustrations of the structures, Figures 3, 4, 5 and 6, follow this discussion.

The phase conductors selected for the 345 kV project are nonspecular twin bundle 954 kcmil "ACSR."

Lightning outage calculations based on no shield wires and on an isokeraunic level of eight thunderstorm days per year, indicate 12.9 line outages per 100 miles per year would occur on this intertie. With two shield wires protecting the line, the line outages would reduce to 0.82 per 100 miles per year.

In conclusion, the intertie life cycle costs to compare fifty-seven project alternatives are based on: design criteria which is essentially approved; the guyed pole "X" structure; supporting nonspecular twin bundle "Rain" conductors; and two shield wires.

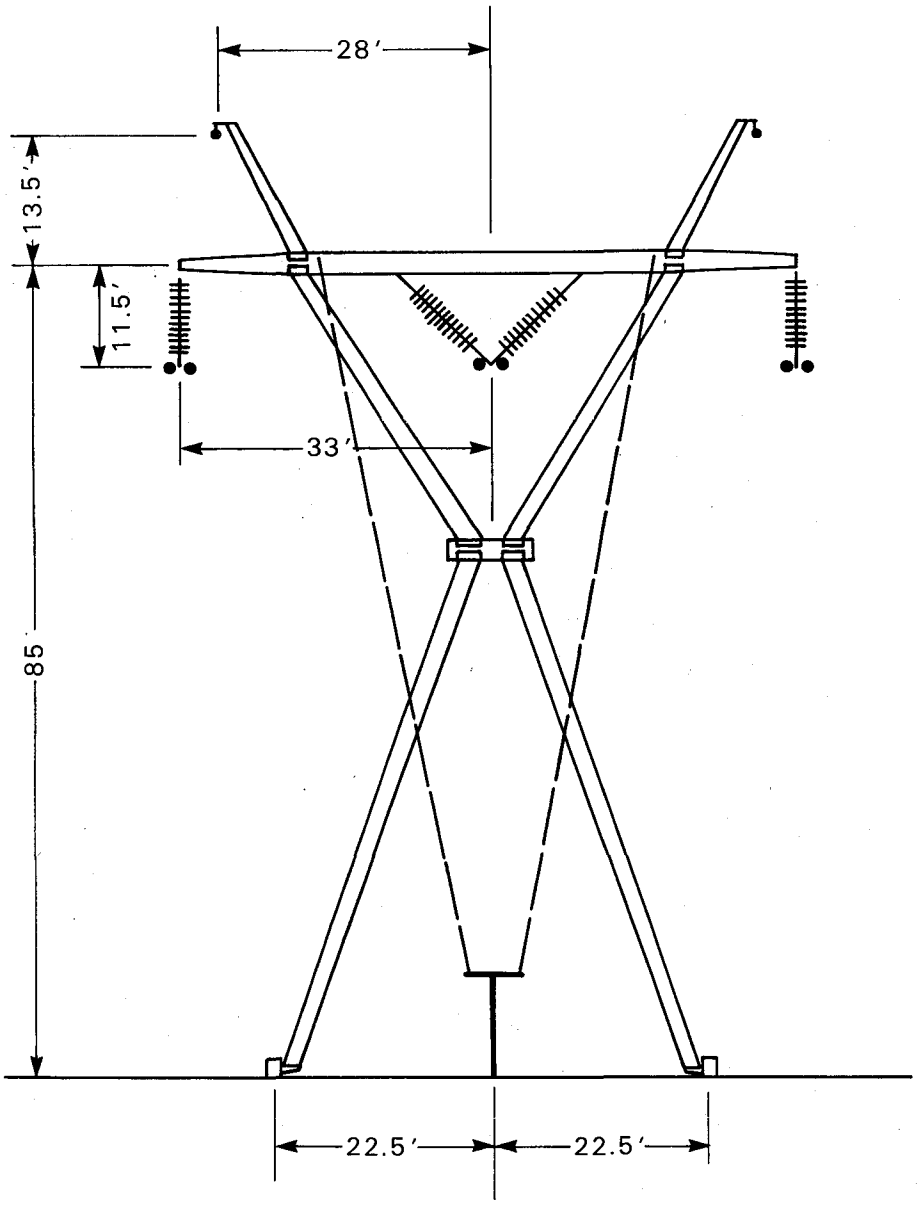


FIGURE 3

Alaska Power Authority | ANCHORAGE FAIRBANKS TRANSMISSION INTERTIE

345kV
Tangent Structure

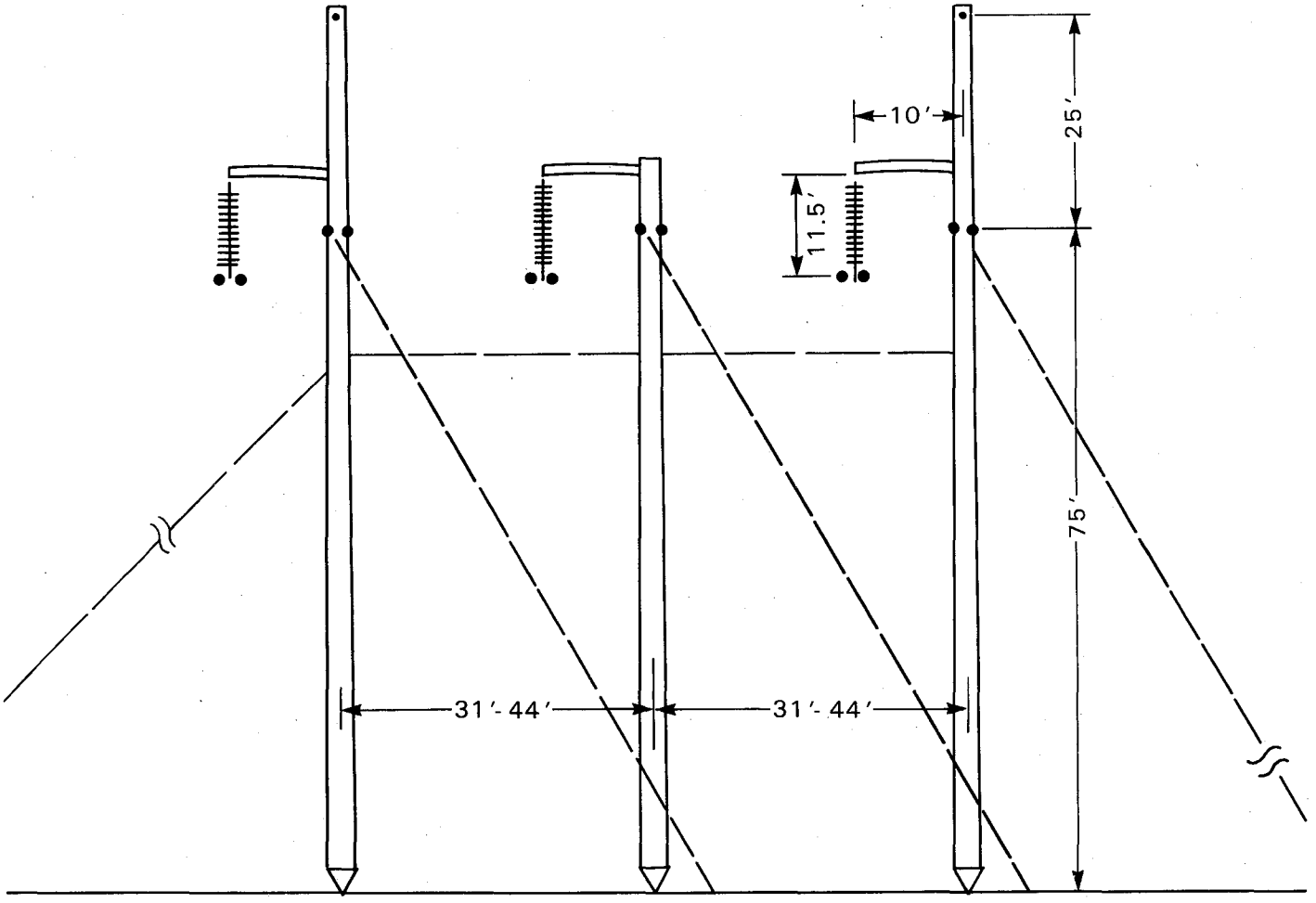


FIGURE 4

Alaska Power Authority **ANCHORAGE FAIRBANKS TRANSMISSION INTERTIE**

345kV
Angle Structure

Gilbert/Commonwealth

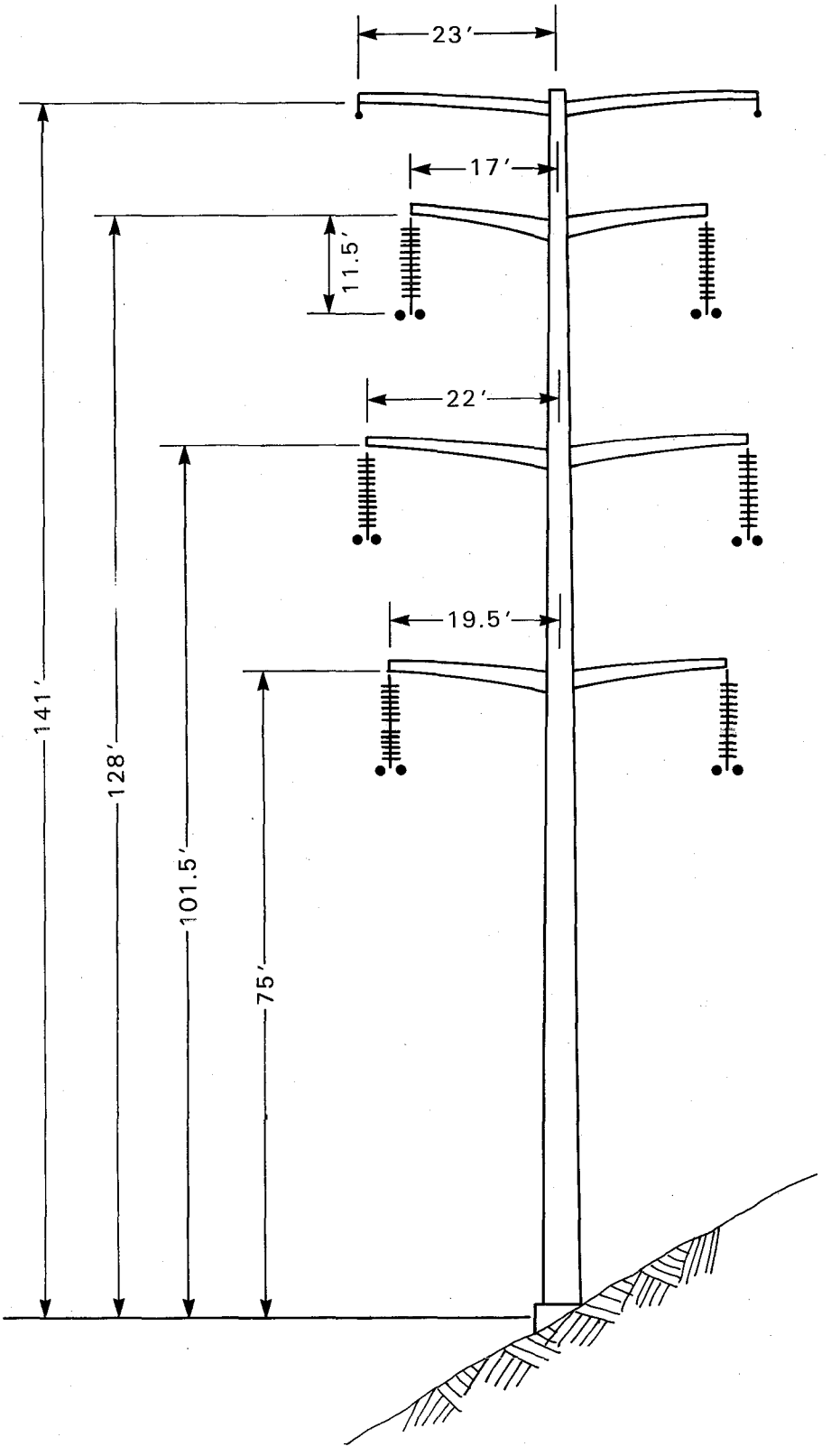


FIGURE 5

Alaska Power Authority ANCHORAGE FAIRBANKS TRANSMISSION INTERTIE

345kV Double Circuit Tangent Pole

Gilbert/Commonwealth

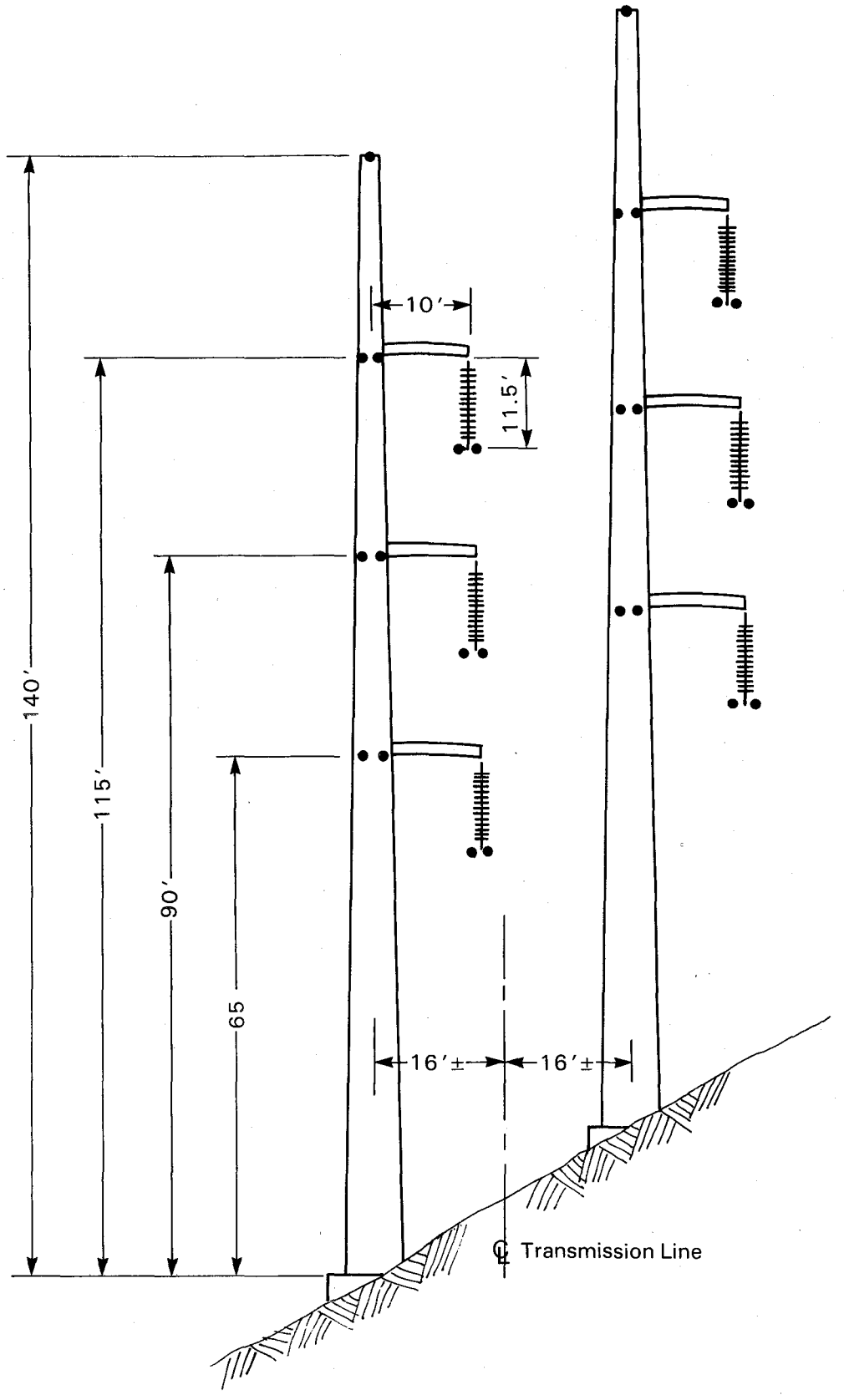


FIGURE 6

Alaska Power Authority **ANCHORAGE FAIRBANKS TRANSMISSION INTERTIE**

345kV Double Circuit Angle Pole

Gilbert/Commonwealth

II. ENVIRONMENTAL CONSIDERATIONS

Route Selection Methodology

Formulate Study Process - The initial phase of the route selection process was to define a study approach most suitable to the Intertie Project. It was determined that selection of an acceptable route would be made with respect to three important goals:

1. Satisfy regulatory and permit requirements
2. Respond to concerns expressed through the Public Participation Program
3. Achieve routing objectives

In order to satisfactorily initiate the route selection process, a methodology was adapted for the Intertie Project based on the network theory. This process involves the identification of corridors, establishes a network of potential line route segments within them and evaluates alternative routes based on specific criteria. Figure 7 graphically depicts the overall route selection process and should be referenced throughout this introduction.

Several objectives were agreed upon by Commonwealth Associates Inc. and the Alaska Power Authority to assist in the routing process. They were:

- Minimize Impact on Land Use
- Minimize Conflict with Existing Life Styles
- Minimize Impact on Natural Systems
- Minimize Visual Impact
- Minimize Impact on Cultural Resources
- Maximize Sharing of Existing Rights-of-Way
- Optimize Construction and Opertional Costs

The alignments selected for study were evaluated with respect to these objectives so that a route would be selected which balances environmental resources, public concerns, construction and maintenance feasibility, and reliability.

Develop Data - Upon selection of a routing methodology, data collection was initiated to obtain available and published data. Existing aerial photography for the project area was acquired to assist in the analysis of existing conditions. In the general absence of the mapped data, this data source

Route Selection Process

ANCHORAGE-FAIRBANKS TRANSMISSION INTERTIE

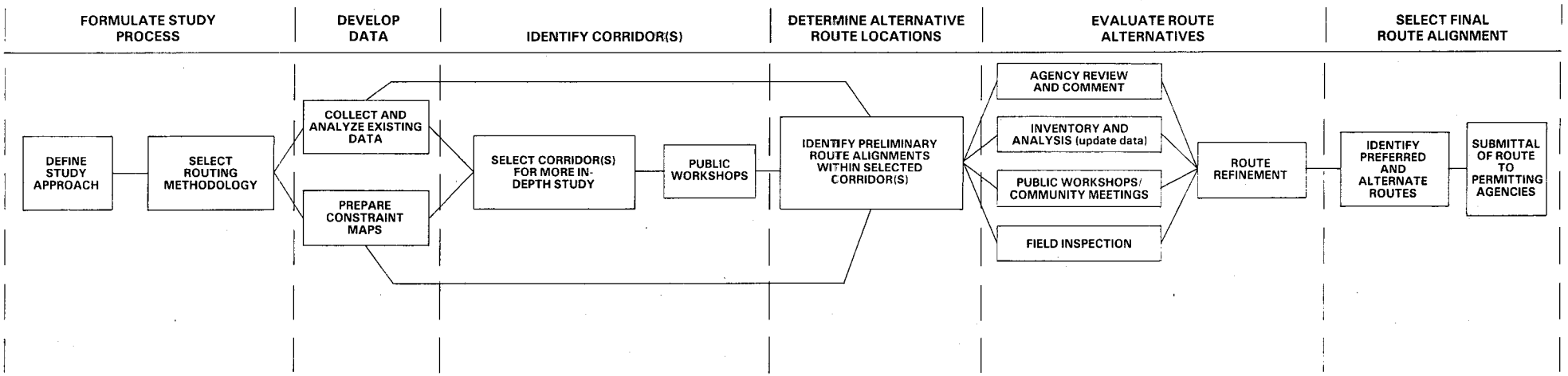


FIGURE 7

became an important tool; photographic sources included color infrared (NASA U-2 Photography, 1977), true color photography (Alaska Railroad, 1979) and black and white photography (Lower Susitna River Basin, 1980). Later in the evaluation of alignments, project photography was also made available (North Pacific Aerial Surveys, Inc., 1981).

Agency contacts were an essential aspect of data collection. In obtaining existing literature, agency interests and concerns were also discussed to identify significant issues or problem areas.

Agencies contacted during the course of the project have included:

FEDERAL

U. S. Department of the Army
Corps of Engineers
U. S. Department of Agriculture
Soil Conservation Service
U. S. Department of the Interior
Bureau of Land Management
National Park Service
Fish and Wildlife Service
U. S. Department of Transportation
Alaska Railroad

STATE

Alaska Department of Commerce and Economic Development
Alaska Department of Fish and Game
Alaska Department of Natural Resources
Division of Forest, Land and Water Management
Division of Parks
Division of Research and Development
Alaska Department of Transportation and Public Facilities
University of Alaska

REGIONAL

Ahtna, Inc.
Matanuska - Susitna Borough, Inc.

Identify Corridors - Identification of transmission line corridors was the initial step in the route selection process for the Anchorage-Fairbanks Transmission Intertie. The corridors were delineated to generally outline the project study area, providing the basis from which more detailed

studies would be conducted. Corridors were defined in broad terms with variable widths in order to accommodate a number of alternative route segments within them. For the Anchorage-Fairbanks Transmission Intertie, corridors were thus delineated between the Willow Substation to the south and Healy Substation to the north. Figure 8 depicts the general location of the corridors selected.

Preliminary alignment of corridors was based on the identification of potentially feasible line locations. Corridors were initially selected which satisfied two fundamental objectives:

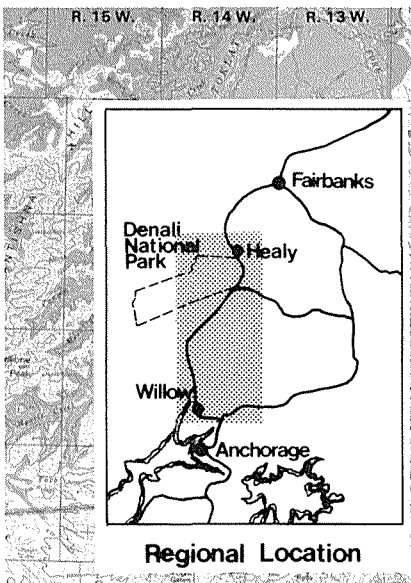
1. Technically acceptable corridors which posed reasonable engineering constraints and afforded reliable and maintainable service.

2. Environmentally acceptable corridors which combined transportation and utility facilities to avoid establishing dispersed rights-of-way.

A review of corridor locations then commenced, utilizing U.S. Geological Survey maps (1:63360), various aerial photographic data, and previously assembled information for the study area. Major geological features, severe topography or evaluations, principal river courses, and other natural features which would preclude use for transmission corridors were avoided to the extent possible. Additional consideration was given to existing land use developments, utility rights-of-way, and transportation systems. Based on this data, corridors were delineated which offered potentially feasible alignments, although varying in width from over four miles in Broad Pass to less than one mile in the Nenana Gorge and Windy Pass. Further description of these corridors provides a more detailed rationale for their alignment.

Corridor Description - Alignment of the corridor north of the Willow Substation was facilitated by the presence of an existing Matanuska Electric Association right-of-way. This 180 foot right-of-way will be paralleled in part by the Intertie, enabling joint use of access and a net reduction in total land requirements. Proceeding north for approximately 22 miles the corridor then splits into two alternative alignments: a) a western corridor essentially parallel to the Parks Highway, and b) a more easterly corridor situated east of Talkeetna and later parallel to the Alaska Railroad.

The western corridor at its point of beginning was located west and south of the Parks Highway, avoiding more intensive development near the intersection of the Talkeetna Spur



Regional Location

Healy Substation

Healy

Cantwell

Talkeetna

Willow Substation

16 S
15 S
14 S
13 S
12 S
11 S
10 S
9 S
8 S
7 S
6 S
5 S
4 S
3 S
2 S
1 S

SOUTH BOUNDARY FAIRBANKS MERIDIAN
NORTH BOUNDARY SEWARD MERIDIAN

Legend:

Corridor Boundary
Original Network
1S Final Network (Super Links)

Base Map Source:
— U.S.G.S. 1:250,000 Topographic Maps

FIGURE 8

Alaska Power Authority

ANCHORAGE FAIRBANKS TRANSMISSION INTERTIE

Corridor & Final Network

0 10 20 Miles
0 10 20 Kilometers

North

Gilbert/Commonwealth

Road and the Parks Highway, while allowing for a reasonably narrow crossing of the Susitna River. At this point, the corridor widened to include both sides of the Parks Highway. Near Petersville Road, the corridor was generally confined by Sawmill and Scotty Lakes and wetland areas to the west and the Chulitna River along the east. After crossing the Chulitna River near Mile Post 126, the corridor continued to parallel both sides of the Parks Highway bounded by the Chulitna River on its boundary and avoiding steep topography along Curry Ridge to the east. It varied from 1-1/2 to 3 miles in width.

The alternative eastern corridor was situated approximately 3 miles east of the Talkeetna Spur Road at its closest point to avoid numerous lakes and associated small tracts in the vicinity of Sunshine and Answer Creeks and Bartlett Hills. After crossing the Talkeetna River near its confluence with Chunilna Creek, the corridor widened to more than four miles in the vicinity of Chase. North of Chase the corridor becomes more closely aligned with the Alaska Railroad right-of-way, being bounded by the Susitna River on the west and steep topography associated with the Talkeetna Mountains on the east. The corridor width did not exceed one or two miles in this area as it crossed Gold Creek, the Susitna River and Indian River. The corridor then merged with the Parks Highway corridor near Chulitna Pass, generally being aligned along the Chulitna River.

At this juncture there was a single corridor bounded by the Chulitna River to the west and Indian Hills (near Chulitna Butte) to the east. As the corridor proceeded north crossing Hurricane Gulch, Honolulu Creek and the East Fork Chulitna River, it was narrowly confined by steep topography to the east and lowland areas associated with the Chulitna River to the west. In the vicinity of Mile Post 194, the corridor widened considerably to accommodate numerous routing alternatives in Broad Pass. North of Cantwell the corridor was narrowly constricted through Windy Pass. Panorama Mountain, Reindeer Hills and mountain ranges in excess of 5,000 feet (MSL) limited consideration of other corridors in this locale. North of Carlo Creek, the corridor was extended to the west near Riley Creek and to the east, where topography becomes less severe in the vicinity of the Yanert Fork.

Near Montana Creek north of the Yanert Fork, the second corridor major option was delineated. The western alternative proceeds north through Nenana Gorge with the corridor confined to widths approximating one-half mile, while the second alternative is aligned with the Montana and Moody Creek drainages. Both corridor options converge at the Healy Substation north of Healy Creek.

Public workshops were conducted on January 19-21, 1981, at Anchorage, Talkeetna, Cantwell, and Fairbanks to receive comments on the project's overall feasibility and preliminary corridor locations.

Determine Alternative Route Locations - Within the corridors a preliminary network of route segments or links was delineated. The links were located using the USGS topographic maps as a base and aligned where most suited to existing study area conditions. Initial selection of alignments was based on use of acceptable terrain and topographic conditions, avoidance of private tracts, as well as excessive stream and river crossings, use of vegetation edges, and property and section lines. Additional consideration was given to effects on scenic quality and existing land use development. A network consisting of 89 links and 58 nodes, or points of intersection, was originally prepared on March 27, 1981.

Evaluate Route Alternatives - The first revision to the network occurred during the period April and May 1981 and resulted in numerous additional links and nodes. Impetus was provided by agency meetings and field reconnaissance conducted in late May and early June 1981. Additions to the network were incorporated during this time and included alignments: 1) east of Chulitna Butt, 2) west of the Parks Highway in Broad Pass, 3) in the vicinity of the entrance to Denali National Park, and 4) west side of Nenana Gorge. The network, as modified, consisted of 115 links and 69 notes and was issued June 3, 1981.

A second series of public workshops was held to incorporate comments on the network previously described. Meetings were held in Talkeetna, Cantwell and McKinley Village June 9-11, 1981.

Response during these sessions prompted two major changes in the network: 1) provision for crossover segment south of Denali State Park to connect east and west corridors, and 2) addition of a "near east" alignment east of the original route near Talkeetna and extending north across the upper elevations of the Talkeetna Mountains to merge with original eastern route near Gold Creek. This second revision of the network resulted in a new total of 123 links and 76 nodes and was issued on June 26, 1981.

Informal "brown bag lunch" meetings were conducted on July 7, 1981 in Anchorage and July 10, 1981 in Fairbanks to assure that these principal communities in the vicinity of the project were kept informed of the project's status. An interagency meeting was also conducted on July 9 to review

current status of the network; agencies included the Alaska Department of Natural Resources, Alaska Department of Fish and Game, and U.S. Fish and Wildlife Service.

A third and final revision of the network was made on July 17, 1981 in order to accommodate: 1) interconnection of near east and railroad alignments, and 2) addition of route segment west of Parks Highway in the vicinity of the Middle Fork Chulitna River. This revised network yielded 125 links and 78 nodes and is shown in Figure 8.

An examination of the network commenced in order to refine the 125 link segments to a more effectively manageable number, with respect to engineering, environmental and economic concerns. The links remaining were then combined into larger route segments or "superlinks" and formed the basis for detailed engineering and economic analyses described in the following sections. The superlinks and their respective lengths are described in Table 1.

TABLE 1

ROUTE ALIGNMENT SEGMENTS
(SUPERLINKS)

ANCHORAGE-FAIRBANKS INTERTIE PROJECT

Superlink	Nodes	Links	Length (Miles)
1S	A-B	1	21.6
2S	B-I	2,4,5,7,11,	31.6
3S	B-YYY	33,34,36,120,121,124	41.4
4S	I-YYY	13,15,16,45,46,47	17.5
5S	I-LL	14,18,20,22,23,26,29,30,32,54,58.	45.3
6S	YYY-LL	47a,48,50,52	28.5
7S	LL-OO	59,62	5.1
8S	OO-ZZZ	125	19.6
9S	OO-PP	63	14.9
10S	PP-ZZZ	65	4.2
11S	ZZZ-UU	65a,70	18.4
12S	PP-UU	66,68,71,72	22.4
13S	UU-FFF	74,77,80,85,87	19.9
14S	FFF-UUU	105,107,105,111,112,114,116,117	13.1
15S	FFF-UUU	106,109	14.9
16S	UUU-VVV	118	0.9

Reference: Commonwealth Associates Inc., Anchorage-Fairbanks Intertie Project, Preliminary Network Maps, June 26, 1981 (Sheets 3,4 and 5, revised July 17, 1981).

Environmental Overview

A brief description of the various superlinks is provided with respect to significant environmental features. The subjects addressed are: 1) Land Ownership, 2) Land Use, 3) Areas and Species of Concern and 4) Aesthetics. The data presented is abbreviated and will be more thoroughly and comprehensively described in the Environmental Analysis Report.

Land Ownership - Land ownership along superlink 1 is shown in Figure 9. The land is predominately state-owned south of the Kashwitna River and privately owned north of the river. Borough lands are generally located along the Kashwitna River.

Land is primarily borough-owned along superlink 2. State lands are located in the vicinity of the Susitna River, while private lands are present in the Montana Creek and Trappers Creek areas.

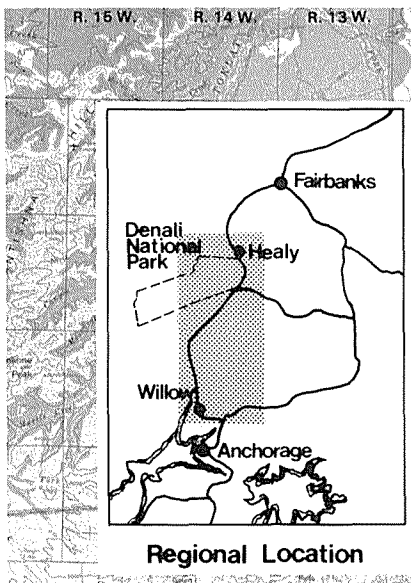
Land along superlink 3 is predominantly state-owned north of the Talkeetna River and private, borough or state-owned south of the river. The state lands are primarily tentatively approved. Some private lands are along Montana Creek and in the Emil Lake area; the remainder are in the Talkeetna agricultural lands. Borough lands lie immediately south and adjacent the Talkeetna River.

Land ownership along superlink 4 is evenly distributed between borough, state and federal.

Land associated with superlink 5 is predominantly state-owned tentatively approved within Denali State Park. Private ownership lands crossed, including the Indian Hills subdivision, are native allotment lands and private lands in the Mountain Haus-Ruth Glacier Overlook area. Borough lands exist adjacent the Denali State Park southern boundary.

State (tentatively approved) lands encompass almost all of superlink 6. A few private lands are crossed in the Chunilna and Gold Creek areas.

Land is either state-owned, tentatively approved, or federally owned along superlink 7, while it is predominantly state-owned, tentatively approved, along superlink 8. State selected lands are also present. Some private native allotments are crossed.



Regional Location

Healy Substation

Healy

16 S

15 S

14 S

13 S

Cantwell

11 S

12 S

10 S

8 S

9 S

7 S

5 S

6 S

4 S

Talkeetna

2 S

3 S

1 S

Willow Substation

SOUTH BOUNDARY FAIRBANKS MERIDIAN
NORTH BOUNDARY SEWARD MERIDIAN

R. 15 W. R. 14 W. R. 13 W. R. 12 W. R. 11 W. R. 10 W. R. 9 W. R. 8 W. R. 7 W. R. 6 W. R. 5 W. R. 4 W.

R. 7 W. R. 6 W. R. 5 W. R. 4 W. R. 3 W. R. 2 W. R. 1 W. R. 1 E. R. 2 E. R. 3 E. R. 4 E. R. 5 E.

T. 12 S.
T. 13 S.
T. 14 S.
T. 15 S.
T. 16 S.
T. 17 S.
T. 18 S.
T. 19 S.
T. 20 S.
T. 21 S.
T. 22 S.
T. 33 N.
T. 32 N.
T. 31 N.
T. 30 N.
T. 29 N.
T. 28 N.
T. 27 N.
T. 26 N.
T. 25 N.
T. 24 N.
T. 23 N.
T. 22 N.
T. 21 N.
T. 20 N.
T. 19 N.

Legend:

- Federal
  - National Park Service
  - Bureau of Land Management
- State
  - State Selected (Federal SS)
  - State Tentatively Approved (TA)
  - Disposals
- Borough
- Regional
  - C.I.R.I.
  - Ahtna, Inc.
  - Village Selection
- Private
  - Native Allotments
  - Agriculture
  - Subdivisions
  - Small Tracts
- 1S Super Link

Sources:
- Land Field Services, Inc.
- Alaska Department of Natural Resources, Division of Lands
- Alaska Department of Natural Resources, Division of Forest, Land and Water Management

Base Map Source:
- U.S.G.S. 1:250,000 Topographic Maps

0 10 20 Miles
0 10 20 Kilometers

North

Gilbert/Commonwealth

FIGURE 9

Alaska Power Authority **ANCHORAGE FAIRBANKS TRANSMISSION INTERTIE**

Land Ownership

Land is primarily state-owned, tentatively approved, south of the East Fork Chulitna River. North of the Chulitna River lands are principally owned by the borough or by the federal government.

Land ownership is entirely village selection along superlink 10 and predominantly village selection along superlink 11. Two areas of superlink 11 lie within Denali National Park and Preserve.

Superlinks 12 and 13 are primarily located on village selection lands. Both links also cross small stretches of native allotments.

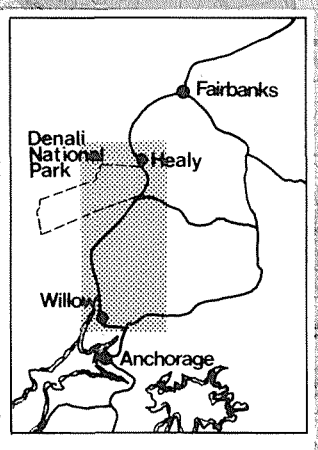
Land is primarily state-owned, tentatively approved, along superlinks 14 and 16, and solely state-owned tentatively approved, along superlink 15. There are Bureau of Land Management lands within the Gorge along superlink 14.

Land Use - Residential development associated with superlink 1 is depicted in Figure 10 and is located along Willow Creek Road. Residential growth is also extending east from the Parks Highway just south of Montana. Land use along superlink 2 is predominantly residential. Residential growth is located along the Parks Highway south of its juncture with the Talkeetna Spur Road and again with commercial and residential development along Petersville road west of Trappers Creek. Numerous private and one FAA airstrips are situated at the south end of this alignment.

Superlink 3 traverses the Talkeetna Bluffs West Division, the Chase II, Unit IV subdivision and the Talkeetna agricultural lands. There are few residences in the Emil Lake area. Land use associated with superlink 4 consists of scattered residences along Lane and MacKenzie Creeks.

Along superlink 5, land use development is dominated by the Denali State Park. Some residential development occurs along the Parks Highway near the Mountain Haus-Ruth Glacier Overlook area and again along the Highway in the Pass Creek-Division Creek area. Several campgrounds are also situated along the Parks Highway in the immediate vicinity of superlink 5 including Byers Lake State Campground and Troublesome Creek and Indian Pass trailhead and picnic area.

The predominant land use associated with superlink 6 is scattered residential growth along the Alaska Railroad. Residential growth exists in Sherman, Gold Creek and Chulitna and seems to be extending east from these locales along



Regional Location

Healy Substation

Denali National Park & Preserve

Carlo Creek

Windy

Cantwell

Summit

Broad Pass

Colorado

Honolulu

Hurricane

Chulitna

Canyon

Gold Creek

Sherman

Curry

Chase

Talkeetna

Fish Lake

Sunshine

Montana

Caswell

Kashwitna

Willow Substation

Denali State Park

Byers Lake State Campground

Matanuska-Susitna Borough Boundary

Ahtna Native Regional Boundary

SOUTH BOUNDARY FAIRBANKS MERIDIAN
NORTH BOUNDARY SEWARD MERIDIAN

R. 15 W. R. 14 W. R. 13 W. R. 12 W. R. 11 W. R. 10 W. R. 9 W. R. 8 W. R. 7 W. R. 6 W. R. 5 W. R. 4 W.

R. 7 W. R. 6 W. R. 5 W. R. 4 W. R. 3 W. R. 2 W. R. 1 W. R. 1 E. R. 2 E. R. 3 E. R. 4 E. R. 5 E.

16 S 15 S 14 S 13 S 12 S 11 S 10 S 9 S 8 S 7 S 6 S 5 S 4 S 3 S 2 S 1 S

T. 12 S. T. 13 S. T. 14 S. T. 15 S. T. 16 S. T. 17 S. T. 18 S. T. 19 S. T. 20 S. T. 21 S. T. 22 S.

T. 33 N. T. 32 N. T. 31 N. T. 30 N. T. 29 N. T. 28 N. T. 27 N. T. 26 N. T. 25 N. T. 24 N. T. 23 N. T. 22 N. T. 21 N. T. 20 N. T. 19 N.

Legend:

- Community or Railroad Stop
- Subdivision
- Planned Disposal
- Agriculture
- Park or Campground
- Airport Facility
- FAA
- Private Landing Strip
- 1S Super Link

Sources:
- Matanuska-Susitna Borough
- Alaska Department of Natural Resources, Division of Research and Development, Land and Resource Planning Section
- United States Geological Survey Topographic Maps
- CAI Field Investigations
- 1" = 3000' Color Infrared NASA U-2 Photography, 1977
- Alaska Division of Parks
- National Park Service
- Alaska Railroad
- Alaska Department of Transportation and Public Facilities
- U.S.G.S. 1:63360 Topographic Maps

Base Map Source:
- U.S.G.S. 1:250,000 Topographic Maps

0 10 20 Miles
0 10 20 Kilometers

North

Gilbert/Commonwealth

FIGURE 10

Alaska Power Authority **ANCHORAGE FAIRBANKS TRANSMISSION INTERTIE**

Land Use

water courses. The presently developed Indian Hills subdivision is bypassed east of Chulitna Butte, although additional undeveloped lands are traversed.

No land use will be affected by superlinks 7, 8, 9 and 11. Some residential development associated with superlink 10 exists near the railroad stops of Broad Pass and Colorado. Superlink 12 bisects residential development east of Cantwell along the Denali Highway, and could affect future growth east of the highway. Residential lands are bypassed by superlink 13 usage extending east along the Nenana River and Carlo and Slime Creeks. This alignment avoids crossing of federal park lands. Superlink 14 traverses near a residential land use area across the Parks Highway from Denali National Park. No developed land use is crossed by superlink 15 in the Moody-Montana drainages. Residential land use will be marginally affected in Healy by superlink 16.

Areas and Species of Concern - Certain wildlife species or groups of species which occur in the project area were selected for special consideration during the route selection process. These species were chosed because: 1) their populations provide a source of actual or economic subsistence (i.e. big game); 2) their populations indicate the ecological health of the environment (i.e. birds of prey); or 3) their populations are in danger of expiration (i.e. threatened and endangered species). It was assumed that impacts of construction and maintenance of a transmission line on these species would be indicative of the impacts on other species utilizing the project area.

Big game species, especially moose and caribou, occur throughout the project area but tend to concentrate, at least during some seasons, in certain locales. These areas of concentration are shown in Figure 11 and include all or part of the superlinks shown except 4, 6, 10, 11 and 12 for moose and 1, 3 and 6 for caribou.

While brown bear reportedly occur throughout the project, the only area of intensive spring use is along superlink 14. The areas of intensive spring use provide an important nutrition source for bears coming out of hibernation.

Dall sheep are found in the project area only in the vicinity of Sugarloaf Mountain. This area provides year around habitat for dall sheep. Superlinks 14, 15 and 16 surround Sugarloaf Mountain.

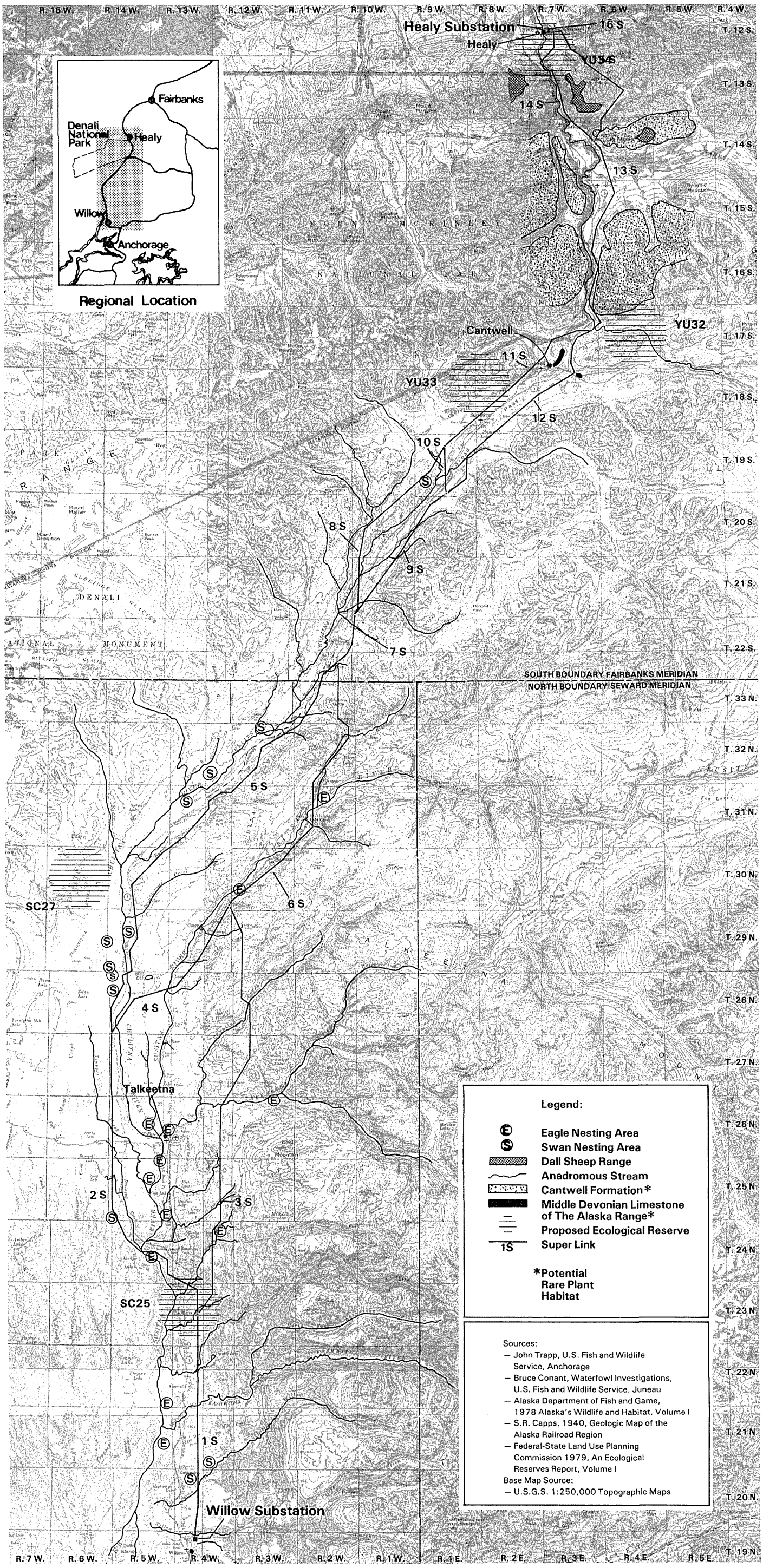


FIGURE 11

Alaska Power Authority **ANCHORAGE FAIRBANKS TRANSMISSION INTERTIE**

Areas & Species of Concern

Gilbert/Commonwealth

Bald eagles are large birds of prey which feed primarily on fish and carrion, although other foods are taken when available. Because of their position in the food web, the populations of this species are particularly reflective of the health of the ecosystem. That is, contaminants entering the food chain, whether naturally or artifically, would tend to concentrate in these species. These contaminants frequently affect the presence through a decrease in population levels. The presence of eagle nests provides an important opportunity to check on the health of food chain to which they belong. Bald eagle nests have been recorded within two miles of superlinks 2, 3 and 6 and are shown in Figure 11.

Although the species is not listed as endangered or threatened, trumpeter swan populations have undergone severe depletions in the past and have not recovered in recent years. Known locations of trumpeter swan nests have been plotted on Figure 11. These nests occur within 2 miles of superlinks 1, 2, 4, 5 and 8, primarily along the western corridor. Two nests have been recorded near superlink 1 and seven nests have been found near superlink 5. Each of the other superlinks listed have one nest each.

Some endangered, threatened or provisionally listed plants are known to utilize certain rock outcrops. Although the plants were not found, the location of suitable habitat, which is rock outcrop substrates, is shown in Figure 11 along superlinks 11, 12, 13, 14 and 15.

Watercourses used by anadromous and resident fish for their migration and spawning activities are particularly sensitive to sedimentation and siltation. These watercourses which are sensitive occur throughout the project area and are shown in Figure 11.

The Joint Federal-State Land Use Planning Commission for Alaska has complied a list of Ecological Reserves. The purpose of these reserves is to provide sites for natural science research and education. Five reserves are found in the project area, as shown. In the South Central Region, these are SC25-Susitna/ Montana Creek, along superlinks 1 and 2, and SC27-Ruth Glacier Terminus near superlink 5. In the Yukon Region, YU32-Nenana Canyon is near superlinks 12 and 13, YU33-Cantwell/Broad Pass Caribou Winter Range lies across superlink 11, and YU34-Healy/Suntrana Mine Revegetation Studies area is near superlinks 14 and 16.

Visual - Superlink 1 is located within the Susitna River lowlands landscape type as shown in Figure 12. The eight mile stretch between Willow Creek and two miles north of Kashwitna Lake is characterized by very high scenic values. View one represents this stretch. The view is oriented east across open black spruce bogs and muskegs to the Talkeetna Mountains. The remainder of the superlink is characterized by moderate to low scenic values, although there are two stretches of particularly high scenic values near the Kashwitna River and Sheep Creek crossings. Views from the crossings are oriented away from this alignment. Moderate visual impact is expected along the superlink.

Superlink 2 is located within the Susitna River lowlands, crossing the river at milepost 104.3 where view 2 originates. This stretch of the lowlands is characterized by high visual absorption potential because of the dense birch-spruce vegetation, allowing only occasional views to the mountains. The stretch from the Montana Creek crossing north to Sawmill Creek crossing is considered having very high scenic values. The remainder of the superlink is located in generally low quality landscape. View 3 is an aerial photograph representing how the alignment would be perceived from the residences along Petersville Road. Moderate visual impact is generally expected along the superlink.

Superlink 3 is located in the Susitna River lowlands and the Talkeetna Mountains. Visual absorption potential in the lowlands is high because of the dense birch-spruce vegetation, while the absorption potential of the mountains is low because of the low shrub to barren vegetation. The link is in a landscape of high scenic value. Low to moderate visual impact is expected along the superlink.

Superlink 4 is in the Curry Ridge landscape type. The Curry Ridge landscape is characterized by very high scenic values. The visual absorption capabilities of the landscape is also very high because of the dense birch-spruce-aspen vegetation, therefore, visual impact is expected to be moderate along the superlink.

Superlink 5 is located within the Curry Ridge landscape characterized by very scenic values. A small stretch of the link lies within the Chulitna River landscape and is characterized by exceptionally high scenic values. The visual absorption capabilities along the link are high because of the dense birch-spruce-aspen stands in the Curry Ridge landscape and the dense bottomland spruce-poplar stands in the Chulitna River landscape. Views 4, 6, 7 and 8 are representative of view impacts within the Curry Ridge land-

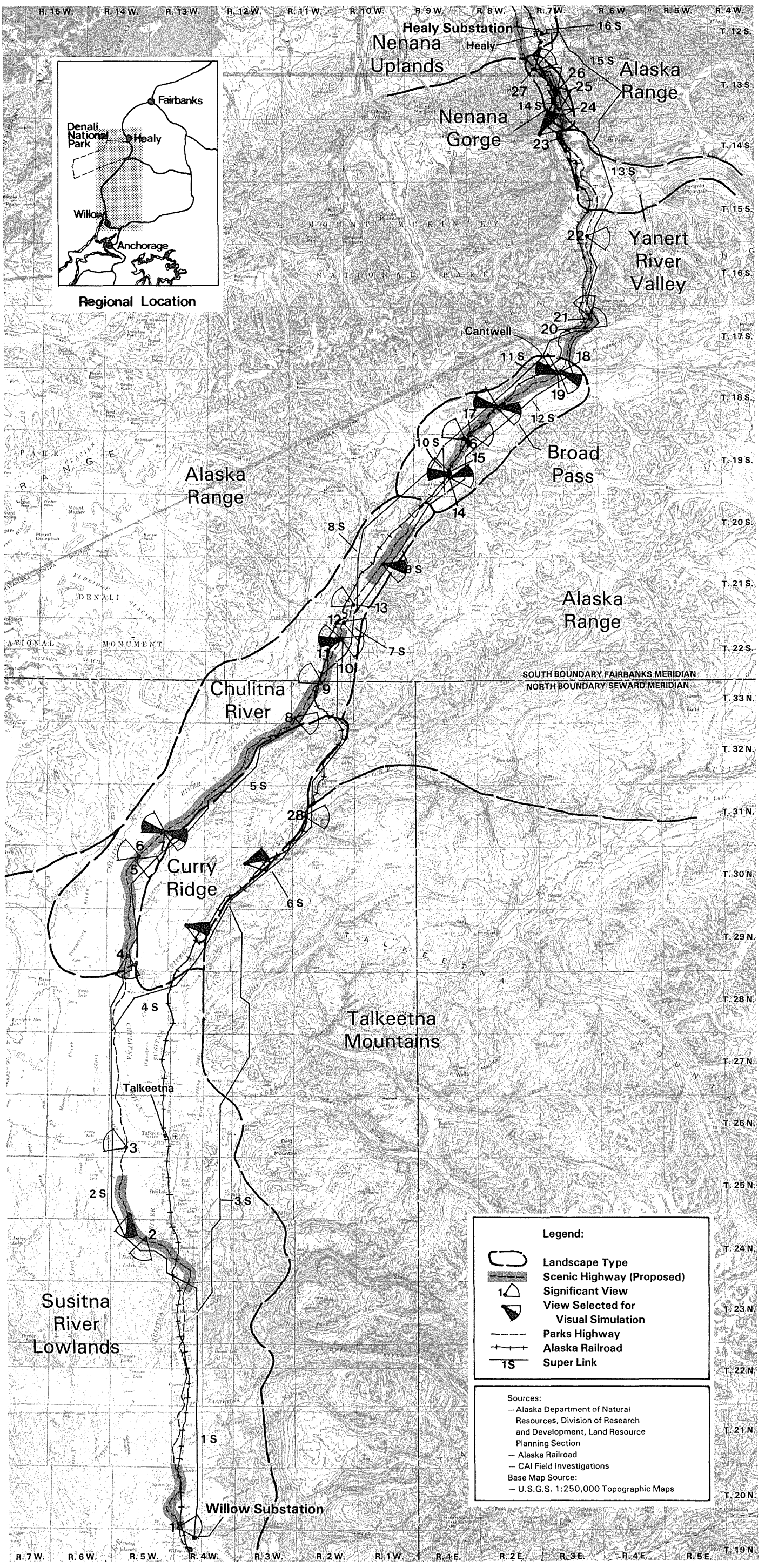


FIGURE 12

Alaska Power Authority **ANCHORAGE FAIRBANKS TRANSMISSION INTERTIE**

Visual Resources

0 10 20 Miles
0 10 20 Kilometers

Gilbert/Commonwealth

North

scape, which are expected to be moderate. Impacts could be significant in the Chulitna River landscape, represented by view 9 and in the vicinity of Byers Lake State Campground at view 5.

Superlink 6 generally parallels the Alaska Railroad within the Curry Ridge landscape. The landscape is characterized by very high potential for visual absorption because of the dense spruce-birch-aspen vegetation. View 28 is associated with superlink 6 and is expected to have low visual impact.

Superlink 7 is in that stretch of the Chulitna River landscape characterized as having exceptionally high scenic values. The railroad and Parks Highway bridges over Hurricane Gulch are a part of this stretch of the Chulitna River landscape. Visual absorption potentials are low to moderate. Visual impacts associated with views 10, 11 and 12 are expected to be moderate.

Superlinks 8 and 9 are located in the Chulitna River landscape, the Broad Pass landscape and a transitional landscape type between these two primary landscape types. Visual absorption capabilities along both superlinks are low to moderate. Scenic values are characterized as moderately high in the Chulitna River landscape, and exceptionally high in the Chulitna River-Broad Pass landscape. Low to moderate visual impacts are expected along both superlinks as represented by views 13 and 15.

Superlink 10 lies within the most scenic portion of the Broad Pass landscape. The visual absorption potential is low resulting in an expected significant visual impact. See view 15a.

Superlinks 11 and 12 are located in the Broad Pass-Alaska Range landscape type. Scenic values are characterized as very high. The potential for visual absorption is low through Broad Pass, because of the high visibility of almost all foreground lands, and moderate to high north of the Denali Highway. Views 14, 15, 16, 17, 18 and 19 are expected to receive moderate to significant visual impacts.

Superlink 13 is located within the Nenana Gorge landscape which is characterized as having very high scenic values. A small three mile stretch is in the Alaska Range where the scenic value is considered moderate. Visual absorption is generally very low in the Gorge and high in this stretch of the Alaska Range while views 24 through 27 depict views within the Gorge. Impacts are expected to be low in the Alaska Range stretch but very significant within the Gorge.

Superlink 15 lies along Montana and Moody Creeks within the Alaska Range landscape type. Visual absorption along the two Creeks is low while the scenic value is high. Visual impact is expected to be low because of the minimal number of viewers.

Superlink 16 is located within the Nenana Uplands landscape type in an area of low scenic value due to existing residential, commercial and industrial development. Visual impact is expected to be low.

Conclusion

A review of the previous data has established major environmental characteristics of the various superlinks. In the recommendation of a preferred route an evaluation of the network depicted in Figure 8 has established the following:

1. The eastern alignment (Superlinks 3 and 6) offers less visual impact in its remote location than the western alignment (Superlinks 2 and 5) along the Parks Highway.

2. Land use impacts are also less evident in the eastern alignment, where impacts on small tracts, commercial development, and parks and recreation (Denali State Park) can be better avoided.

3. Vegetation clearing and resulting impacts are somewhat reduced along Superlinks 3 and 6, where less acreage of low brush and muskeg-bog are crossed. The incidence of bird collisions can be somewhat lessened when compared to Superlinks 2 and 5 along the Susitna and Chulitna Rivers. However, Superlinks 2 and 5 would have less overall impacts on natural systems by following an existing corridor of human disturbance.

4. Superlink 9 affords less environmental affects associated with its crossing of the East Fork Chulitna, while Superlink 8's crossing of the Middle Fork Chulitna will result in increased impacts on bottomland forest. The remote location of Superlink 8 reduces visual impacts but does provide increased potential for bird collisions in its location between the West Fork and Middle Fork Chulitna.

5. In Broad Pass, Superlink 11 would result in somewhat less visual impact than Superlink 10 by better utilizing topography and vegetation associated with Cantwell Creek. In addition, land use development has occurred principally in the west along the Parks Highway and an alignment in this location will be less obtrusive in the expanse of Broad Pass. However, this alignment does cross the Denali National Park and Preserve South of Cantwell and again at Windy Creek.

6. In approaching the Healy Substation along Superlink 14, the Nenana Gorge should be recognized as a valuable scenic resource unique in the project study area. An overhead alignment through this landscape feature will result in significant visual impacts to both the Nenana Gorge and the nearby entrance to Denali National Park and Preserve.

   The alternate alignment, Superlink 15, should also be recognized for its ecological value in the dall sheep and moose habitat it traverses. Given the respective characteristics of each superlink, it is recommended that consideration be given to underground installation through the Nenana Gorge and park entrance area for Superlink 14. Alternatively, the use of Superlink 15 should be subject to strict construction stipulations which should include aerial construction (no ground access) and seasonal constraints (April to August).

III. ENGINEERING AND OPERATING CONSIDERATIONS

Meteorology

Figure 13, "Meteorology and Geology," illustrates many of the subjects discussed in the next three sections.

The south end of the line, which includes superlinks 1, 2 and 3 lies in the broad Susitna River Valley. Temperatures have a much greater range than at Anchorage, as the area is away from the moderating influence of Cook Inlet. In this area the estimated temperature extremes are 103°F and - 93°F for a 50 year period of return. The record high temperature at Willow is 90°F and the record low temperature is - 56°F. Records were first recorded in 1963.

Superlinks 4, 5 and 6 lie in the Susitna and Chulitna River valleys in relatively low terrain. Portions of superlink 6 are higher and subject to greater wind speeds. Temperatures are expected to be similar to those on superlinks 1, 2 and 3. The superline maximum wind speed for superlinks 1 through 6 is anticipated to be 54 mph. Some wind and icing can be expected on the southern half of the line but wind will be less than 40 mph and radial ice will be less than one-half inch. NESC Heavy loading conditions will adequately design for the expected combination of wind and ice.

Superlink 7 is in the vicinity of Chulitna Pass. This is the southernmost area of unusual winds due to topographic features. The location of superlink 7 minimized the exposure to extreme winds. It is estimated that winds in this area will not exceed 75 mph. Additional wind data is being obtained by NORTEC at Hurricane. If higher design winds are indicated from the NORTEC study, provision for the increased velocities will be made during the detail design phase of the project. NESC Heavy Loading will adequately satisfy the combined ice and wind loading for the line.

Superlinks 8, 9, 10, 11 and 12 are in the area generally known as Broad Pass. The temperature extremes are 107°F and - 68°F for a period of return of 50 years. The once in 100 years wind is estimated to be 72 mph. A combination of wind and ice is anticipated to be less than NESC Heavy Loading of 40 mph and one-half inch of radial ice. Located at the north end of Broad Pass are Cantwell and Windy Pass. At this point there is a significant change in the wind conditions on the project.

Superlink 13 traverses through Windy Pass to the intersection of the Nenana River and Montana Creek. A unique meteorological condition exists in this area and through Nenana Gorge

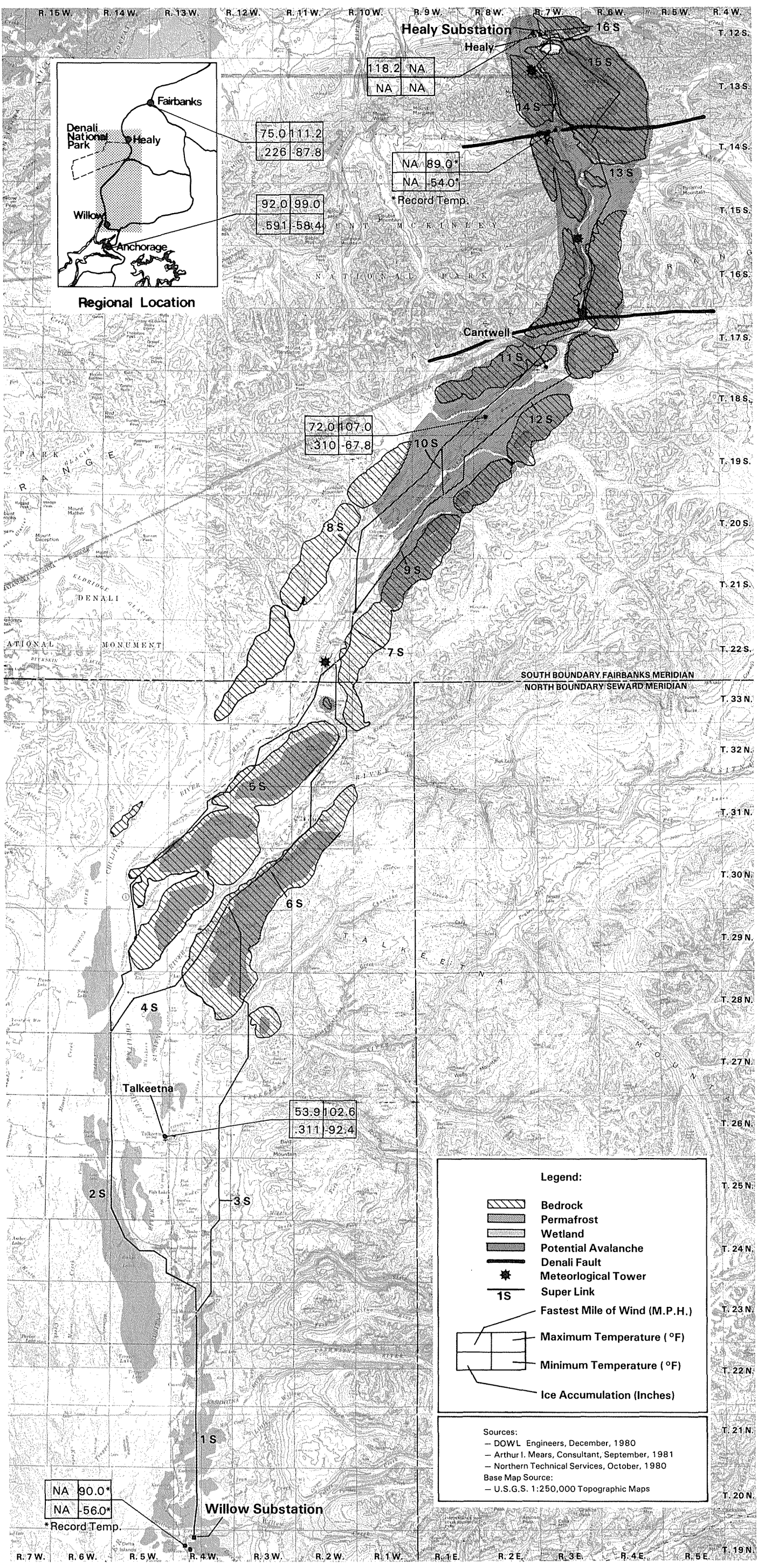


FIGURE 13

Alaska Power Authority

ANCHORAGE FAIRBANKS TRANSMISSION INTERTIE

Meteorology & Geology

due to the topography of Alaska. The Alaska Range forms a barrier to the low level movement of air. Under certain barometric conditions, wind is funneled through openings in this barrier at a much greater speed than would occur over flat terrain. Strong northerly winds can be expected when a large high pressure center is located over the Fairbanks area and a low pressure center is over the Anchorage area. Strong southerly winds are expected when the pressure patterns reverse.

The Nenana River Canyon from Windy to Healy, superlinks 14, 15 and 16, is the main wind funnel for a 100 mile stretch of the Alaska Range. The canyon drops from an elevation of 2,000 feet near Windy to 1,300 feet at Healy, forming a 30 mile-long wind funnel bringing southeasterly Chinook winds to Healy. Consequently, Healy has recorded the highest wind speeds of any location along the project. The maximum anticipated wind for the Healy area is 118.2 mph. Additional wind speed measuring devices have been installed at Healy, Carlo and Windy. The results of these additional measurements will be incorporated into the final design of the structures. NESC Heavy Loading will be adequate to design structures for the combined wind and ice loading on the line.

Snow depths are generally not great along the project. No special considerations for snow depth are being considered. Generally, all rivers in the project area freeze over in the winter time, making it possible to construct ice bridges, if permitted by the terrain in the area of the crossing.

Topography

Superlink 1 is very level with poorly drained soils. Slopes will not present any problem in this area.

Superlinks 2, 4 and 5 are in rolling terrain with occasional slopes too steep to traverse with construction equipment. Access difficulty should generally be considered as moderate.

Superlinks 3 and 6 have slopes ranging from flat to greater than 50 percent slope. Slopes will increase the difficulty of access for construction and maintenance. Additionally, structures cannot be constructed on sideslopes greater than approximately 45 percent. Final alignment of superlink 6 must be carefully evaluated because of these problems.

Superlinks 7, 8, 9, 10, 11 and 12 through Chulitna Pass and Broad Pass do not have any severe constraints because of topography. Generally the slopes in this area are less than 25 percent.

Superlink 13 contains the steep slopes of the Reindeer Hills and Windy Pass. Topography severely restricts the location of

the line in the lowlands of the Jack and Nenana Rivers. These rivers do have well-defined banks, however; and it will not be necessary to locate any structures in the floodplains. The slopes are severe in portions of this area and earth or snow avalanches are possible. The final alignment will minimize these hazards or the structures will be designed to withstand the pressures and winds associated with an avalanche.

Superlinks 14 and 15 both contain severe slopes. The remarks regarding superlink 13 also apply here. Superlink 14 is in an extremely narrow canyon with sharp slopes on both sides. Very little flexibility exists regarding the location of the line in this area.

Superlink 16 is the short, final connecting link to the Healy Substation. The topography is level to rolling. No severe terrain problems are anticipated along this segment.

Soils and Geophysical Aspects

Superlink 1 consists of a very high percentage of wetlands and peat. There are also numerous small stream crossings.

Superlink 2 crosses the Susitna River at a point where structures will not have to be located in the floodplain. Approximately 30-40 percent of the superlink is in wetlands and peat. Intermittent permafrost may occur in areas where the ground cover provides good insulation.

Superlinks 3 and 4 are located in an upland area that may contain some intermittent permafrost but very little wetlands or peat. The northern portion of superlink 4 contains some bedrock.

Superlinks 5 and 6 are also in upland well-drained areas. Ten to twenty percent bedrock and discontinuous permafrost can be expected. A mass movement area exists on superlink 6 approximately 6 miles north of Gold Creek.

Final exact alignment of superlink 6 is deferred because it is not known if the mass movement area will cross the proposed line. It is quite possible that the line can be located to avoid this problem.

Superlink 7 is in an area that is mostly underlain by bedrock. No other geotechnical condition is prominent on this section.

Superlinks 8, 9, 10, 11 and 12 are underlain with permafrost that varies from 50 percent to 100 percent coverage. There are a few mass movement areas along the edges of Broad Pass but they will not extend to the potential routes in this area.

Superlink 13 contains 50-95 percent permafrost and is about 50 percent underlain with bedrock. Mass movement areas also exist that could cross the transmission line and damage the structures. Exact alignment and structure locations must be known to determine the final impact, but correct alignment can minimize the problem to the maximum extent possible.

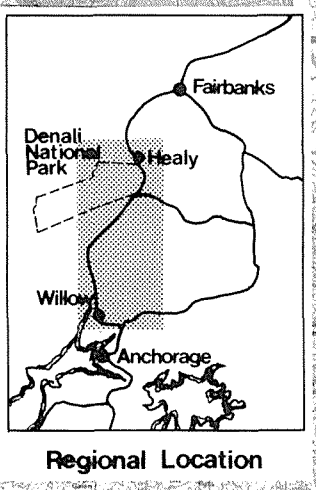
The sideslopes between Panorama Mountain north of Windy Pass and the Parks Highway are quite vulnerable to avalanches. After final alignment and structure locations are made, further review of the potential problem is indicated to determine if mitigating measures are required.

Superlinks 14, 15 and 16 are underlain with 50-95 percent permafrost and almost entirely with bedrock. Potential avalanche problems exist along the east and west facing slopes of Nenana Gorge, a portion of Montana Creek and nearly all of Moody Creek. The mountain on the west side of Nenana Gorge is gradually shifting into the gorge. There is no known way of inhibiting this movement and therefore location of the line on the west side of the river is not recommended. Exact alignment and structure locations will be critical in this area. After final alignment and structure locations are made, a further review of the avalanche problem will be conducted to determine if mitigating measures are required.

Maintainability

The maintainability of the line is a function of line location and the type of materials used during the initial construction and/or maintenance of the line. The structures will be designed to permit removal and installation of broken insulators while the line is energized. Vandalism can be expected as it is a problem on all transmission lines. The structures should be designed to accommodate hot-line maintenance.

In general, maintainability is better if the line is accessible from the ground, spare materials are available and the maintenance crews are well trained. If the line is located near the Parks Highway, it will be more maintainable. Both maintenance and reliability favor the best possible access to the line. Routes considering superlinks 2 and 5 are more maintainable than 2, 4 and 6 or 3 and 6. Superlink 14 is also better than 15. Figure 14, "Access," locates some of the access problem areas along the Intertie. The other key maintenance item relates to line operation in that spare parts and trained crews must be available on a continuous basis.



Regional Location

Healy Substation

Cantwell

Talkeetna

Willow Substation

Petersville Rd.

Denali Highway

Parks Highway

Alaska R.R.

Spur Rd.

16 S
15 S
14 S
13 S
12 S
11 S
10 S
9 S
8 S
7 S
6 S
5 S
4 S
3 S
2 S
1 S

R. 15 W. R. 14 W. R. 13 W. R. 12 W. R. 11 W. R. 10 W. R. 9 W. R. 8 W. R. 7 W. R. 6 W. R. 5 W. R. 4 W.

R. 7 W. R. 6 W. R. 5 W. R. 4 W. R. 3 W. R. 2 W. R. 1 W. R. 1 E. R. 2 E. R. 3 E. R. 4 E. R. 5 E.

T. 12 S. T. 13 S. T. 14 S. T. 15 S. T. 16 S. T. 17 S. T. 18 S. T. 19 S. T. 20 S. T. 21 S. T. 22 S.

SOUTH BOUNDARY FAIRBANKS MERIDIAN
NORTH BOUNDARY SEWARD MERIDIAN

T. 33 N. T. 32 N. T. 31 N. T. 30 N. T. 29 N. T. 28 N. T. 27 N. T. 26 N. T. 25 N. T. 24 N. T. 23 N. T. 22 N. T. 21 N. T. 20 N. T. 19 N.

Legend:

- Existing Highway or Road
- Alaska Railroad
- Probable Temporary Bridge Required for Construction
- Right-of-Way Blocked to Construction Access
- 1S Super Link

Sources:
- DOWL Engineers, December, 1980
- Alaska Railroad
- 1" = 3000' Color Infrared NASA U-2 Photography, 1977
- CAI Field Investigations

Base Map Source:
- U.S.G.S. 1:250,000 Topographic Maps

0 10 20 Miles
0 10 20 Kilometers

North

Gilbert/Commonwealth

FIGURE 14

Alaska Power Authority **ANCHORAGE FAIRBANKS TRANSMISSION INTERTIE**

Access

Reliability

Line reliability is a function of the hazards to which a transmission line is exposed and the ability to restore service after a hazard has caused a discontinuance of service. Some of these hazards are not route-sensitive and they, therefore, are not presently under consideration. The route-sensitive items that will be considered are wind, ice, earthslides, avalanches, frost heaving, and vandalism.

Superlink 1 can be constructed to be a reliable line without any unusual considerations. Frost heaving and vandalism are the only significant potential problems. Since this segment is not adjacent to a transportation corridor, if an outage should occur, repairs would be delayed due to access. Access would be particularly difficult during the summer months. Line outages would be shortened if the maintenance crews were equipped to perform maintenance and repair services by helicopter.

Superlinks 2 and 3 do have limited ground access and the response time for repair should be better than superlink 1. The northern portion of superlink 3 is quite inaccessible, however; therefore superlink 2 should have a greater degree of reliability. Superlinks 2 and 3 will be generally exposed to the same hazards as superlink 1.

Superlink 4 will also be exposed to the same hazards as superline 1, but since access is so difficult it must be considered a less reliable alternative since maintenance and repair time would be extended.

Superlink 5 is generally exposed to the same hazards as superlink 1 and therefore the same degree of reliability can be expected.

Superlink 6, because of its remoteness and a mass movement area, is less reliable than superlink 5.

Superlink 7 is exposed to higher winds in the Chulitna Pass area. Design to consider the higher winds will mitigate the problem but a certain degree of reliability is lost. No reasonable alternative exists, therefore the only mitigative measure is accomplished by design. This superlink is not easily accessible by road and outages can be expected to be of a longer duration.

Superlinks 8, 9, 10, 11 and 12 have approximately the same degree of reliability as superlink 1, with the same hazards as superlink 1. Access, again, would be moderately difficult.

Superlink 13 will be exposed to very high winds and potential avalanches. It is relatively close to the Parks Highway, which should shorten an outage, but the exposure in this area is great. The best mitigative measure is familiarity with the hazards that exist and consideration of those hazards during design.

Superlinks 14 and 15 are both subject to avalanches that would reduce their reliability. Superlink 14 is also subject to extremely high winds. Outages could be expected to be more frequent on superlink 14 but of shorter duration than on superlink 15 because of access problems.

Superlink 16 is also subject to high winds but it is quite accessible, therefora any outage should be of a shorter duration.

In general it can be concluded that the most reliable line is one that is competently designed and is located as close as possible to existing open-year-round transportation corridors. Vandalism can be expected to be about the same on any of the superlinks. Weather will play a significant role in reliability both because it is the most prominent cause of outages and the most significant problem during maintenance and repair.

Conceptual Access Plan

Need For Access - The construction of the Anchorage-Fairbanks Intertie will be a major extra high voltage electrical transmission line project. This project will have a construction force of approximately one hundred to one hundred fifty construction specialists actively employed and working on one hundred and seventy miles of right-of-way through a spectrum of topography. This force of workers will be responsible for receiving, assembling and installing approximately twelve thousand tons of material fabricated and shipped from suppliers.

Materials will be delivered by truck or by railroad to selected marshalling yards along the Parks Highway or the Alaska Railroad. This material as well as the contractor's equipment, tools and supplies must then be transported from the marshalling yards to the line right-of-way, then along the line right-of-way to the installation locations. In addition the contractor's work force must travel daily from work camps or assembly points along the Parks Highway or the Alaska Railroad to the right-of-way.

Access to the right-of-way from established transportation corridors and marshalling yards will be required on a daily basis. Construction activities will require five distinct requirements for access to and travel on the right-of-way: 1) clearing, 2) delivery of materials, 3) installation of foundations, 4) assembly and erection of structures and, 5) stringing of conductor and static wires.

Ideally, the machines and equipment required for foundations, structures and wire stringing activities are brought onto the right-of-way at the point of access and travel down the right-of-way until job completion. Where natural obstacles to continuous construction such as rivers, canyons or steep slopes prevents this, then exit from the right-of-way must be planned in advance and another access established.

Nature Of The Access - During the planning of this project careful consideration has been given to the use of helicopters for transport of men, materials and equipment. The helicopter has proven to be a very useful tool on many transmission construction projects and it is expected that it will be used to a great extent on this project. However, the size, weight and volume of equipment and material required for this project, coupled with the limitations of helicopters as transportation vehicles, makes it impractical to specify them as the sole means of access except in very limited locations where difficult terrain or environmental impacts make their use imperative. The limitations of helicopters include high cost, limited load carrying capacity, availability and operational limitations due to weather, temperature and available daylight. In addition, prudent planning for maintenance and restoration of the line to service following natural disasters requires provisions for ground access to the line. Such natural disasters most frequently occur during periods of severe weather. Being forced to depend solely on helicopters as the means of transport for service restoration presents an unacceptable risk. A carefully planned construction access plan can therefore enhance the maintainability and reliability of the line with the least possible impact on the environment and land use.

Proposed Access Plan - A conceptual access plan has been presented based on the following criteria:

1. Existing and planned roads and trails will be used to the maximum extent possible.

2. The contractors will be permitted to build construction trails from existing roads and trails or from proposed marshalling yards to the line right-of-way and on the right-of-way so that they have ground access to the entire line right-of-way except as noted below.

3. The contractors will be required to construct the Moody Creek - Montana Creek portion of the line by helicopter.

4. The contractors will be required to accept the conceptual access plan or obtain the approval of APA and the review of the permitting agencies on an alternate plan prior to the start of construction.

5. The contractors adherence to the approved access plan will be monitored by APA, their Engineer and Construction Manager.

To limit right-of-way traffic and to provide for minimal "haul time", a series of marshalling yards are proposed on or adjacent to the right-of-way. The distance between these yards and individual location is determined by nearness to established transportation facilities, site availability, line length and limitations of access. The Conceptual Access Plan shown in Figure 15 provides for 15 marshalling yards that are on or adjacent to the Alaska Railroad or Parks Highway right-of-way where storage facilities can be made available. With these locations, the materials can be loaded on trucks or rail cars and directly shipped to a selected yard with a minimum of handling resulting, in minimal damage and/or loss.

Environmental considerations have been incorporated in the preparation of the conceptual access plan. Proposed access has been recommended to utilize rights-of-way, trails and other existing means of access to the extent possible. Introduction of access into areas where none previously existed has been planned to minimize stream crossings, extensive switchbacks on steep topography and heavy clearing of vegetation. The location of residences and private property will be taken into account as more detailed studies are initiated to determine the final location of access into the right-of-way.

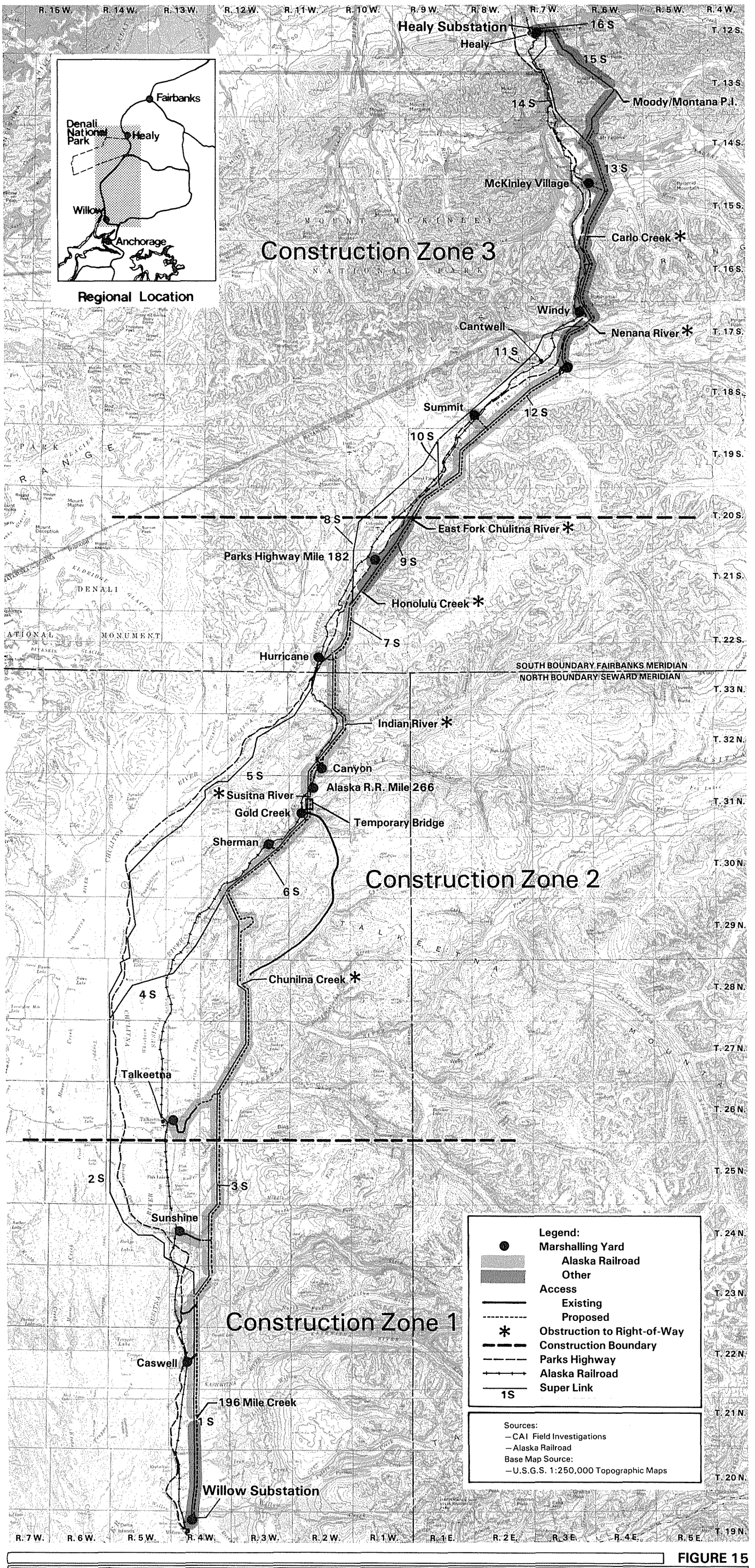


FIGURE 15

Alaska Power Authority

ANCHORAGE FAIRBANKS TRANSMISSION INTERTIE

Conceptual Access Plan

Gilbert/Commonwealth

IV. ECONOMIC CONSIDERATIONS

The environmental, engineering and operating considerations along each line route have been explained in parts I and II and now economic considerations of various line routes follow.

Capital investment and life-cycle costs are tabulated for the three system configurations under consideration. Nineteen route options were estimated for each of the three configurations resulting in a total of fifty-seven options to compare. The construction estimates methodology will be described before project cost comparisons are presented.

Project Cost Comparisons

In presenting these cost comparisons, we must first differentiate between PROJECT (capital) COSTS and CONSTRUCTION COSTS.

For purposes of discussion, the sum of the construction costs coupled with additional costs, such as contingencies, inflation, engineering and management, result in a Project Cost. These costs are listed separately on each of the estimates calculated for each of the line routes being considered. The initial data presented will be for "Construction Costs" only. The costs presented will be identified as to inclusions. The summary will reflect Project Costs.

In developing these costs, several departure points or assumptions were made. All estimates are based on the same assumptions--any changes to these will reflect a change in Project Costs.

The assumptions are:

- the transmission line route will be a combination of the established superlinks.
- the structure used for comparisons is the tubular steel "X" for tangent and light angle locations, and the three pole design will be used at heavy angle and dead-end locations, except steel poles will be used in Nenana Gorge and Windy Pass.
- CAI engineering data will be used for each superlink, i.e., number and type of structures and number and type of foundations.

- foundations will be the driven pile or rock anchor design for all "X" structures.
- access to and travel on the right-of-way will be permitted except where prevented by topography and in the Moody-Montana area.
- the all helicopter method construction will require some special equipment for erection and wire stringing that does not exceed 10,000 pounds in component weight.
- construction in the wetlands will be performed when the earth is frozen.
- three crew camps will be established by the contractor.
- all construction costs are in 1981 dollars.

In developing each of the cost estimates, certain standards, such as labor rates, equipment rates, and contractor furnished material were developed to reflect conditions that are site specific to the State of Alaska.

In addition, allowances were made for travel time from the base camp to the alignment, topography, geotechnical and seasonal constraints. Cost comparisons were made with recent transmission line construction in Alaska.

To provide a latitude in costs as a factor in route selection, three methods of transmission line construction were estimated. Separate cost estimates were accomplished for:

- conventional land construction methods
- helicopter transport of work crews to and from the base camps with conventional construction methods
- helicopter transport of labor, equipment, and materials with helicopter assist to all operations

Labor and equipment forces were mobilized for each specific job work unit to be accomplished and costed on a per hour basis. Then, each work unit was given a time to accomplish value. The time value of each work unit times the crew and equipment cost per hour produced a cost for each specific work unit. Work units included yard work, hauling materials, driving and cleanup. These costs were developed for both conventional and helicopter assisted construction. Where estimates were made for helicopter crew transport only, the conventional time values for specific jobs were used.

To determine inplace costs for each work unit, a time for travel and access factor was established for each superlink. Travel and access time was established for the mean distance of the superlink from the base camp. With this base established, then computations began to emerge that when completed, provided a cost estimate for each of the selected routes. These computations are provided in Tables 2 through 8 and are reflected in Figures 15 and 16.

Table 2 is a cost comparison of the three methods of construction applied to each superlink and reflects a labor and equipment cost to construct one mile of 345 kV transmission line.

Figure 16 reflects the same information but the costs have been rounded to the nearest one thousand dollars. The asterisk (*) denotes the least costly or most efficient method of construction.

Tables 3 and 4 reflect the same information for each superlink with various underground and overhead construction options, but are specific to 138 kV and 345 kV construction. These attachments are more definitive as they include, in addition to labor and equipment, tree clearing and material costs. The data presented on these tables is for the Most Economical method of construction, i.e. conventional, helicopter or helicopter assisted.

Figure 17 illustrates each of the superlinks being considered with a dollar value applied. This dollar value reflects the costs for labor and equipment, material and tree clearing, accomplished by the most economical method of construction. The variations cost per mile reflect the difficulty factor in constructing the transmission line at some distance from highways and roads. On this network of superlinks, several have been identified by bold line--when added together they represent Configuration 1B19, which, when compared to all other 1B Configurations, becomes the least costly line route to construct for 345 kV transmission.

With computations of Tables 3 and 4 applied to each of the three configurations in each of the nineteen routes selected for cost estimation, then Project Costs emerge in useable form as a tool in a final route selection and are presented in Tables 5, 6 and 7.

Table 8 provides a Summary Cost Comparison of each of the nineteen selected routes in each of the three configurations. It is interesting to note that the most economical route in all three configurations is Route 19.

TABLE 2

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
CONSTRUCTION COST COMPARISONS
LABOR & EQUIPMENT ONLY

Superlink No.	Length Miles	Helicopter Cost/Mile	Conventional Cost/Mile	Helicopter/Crew Transport Cost/Mile
1	21.6	194,530	164,742	173,613
2	31.6	193,855	153,872	170,061
3	41.4	184,924	191,902	182,102
4	17.5	186,026	199,809	180,904
5	45.3	184,655	161,372	168,942
6	28.5	185,484	185,696	181,054
7	5.1	184,812	156,054	172,985
8	19.6	184,851	179,435	173,492
9	14.9	180,347	161,303	170,096
10	4.2	188,808	177,724	175,849
11	18.4	182,032	167,196	178,185
12	22.4	187,873	166,021	182,476
13	19.9	n/a	162,249	179,339
14	13.1	n/a	230,645	223,649
15	14.9	189,955	223,250	189,751
16	.9	224,184	211,257	203,844

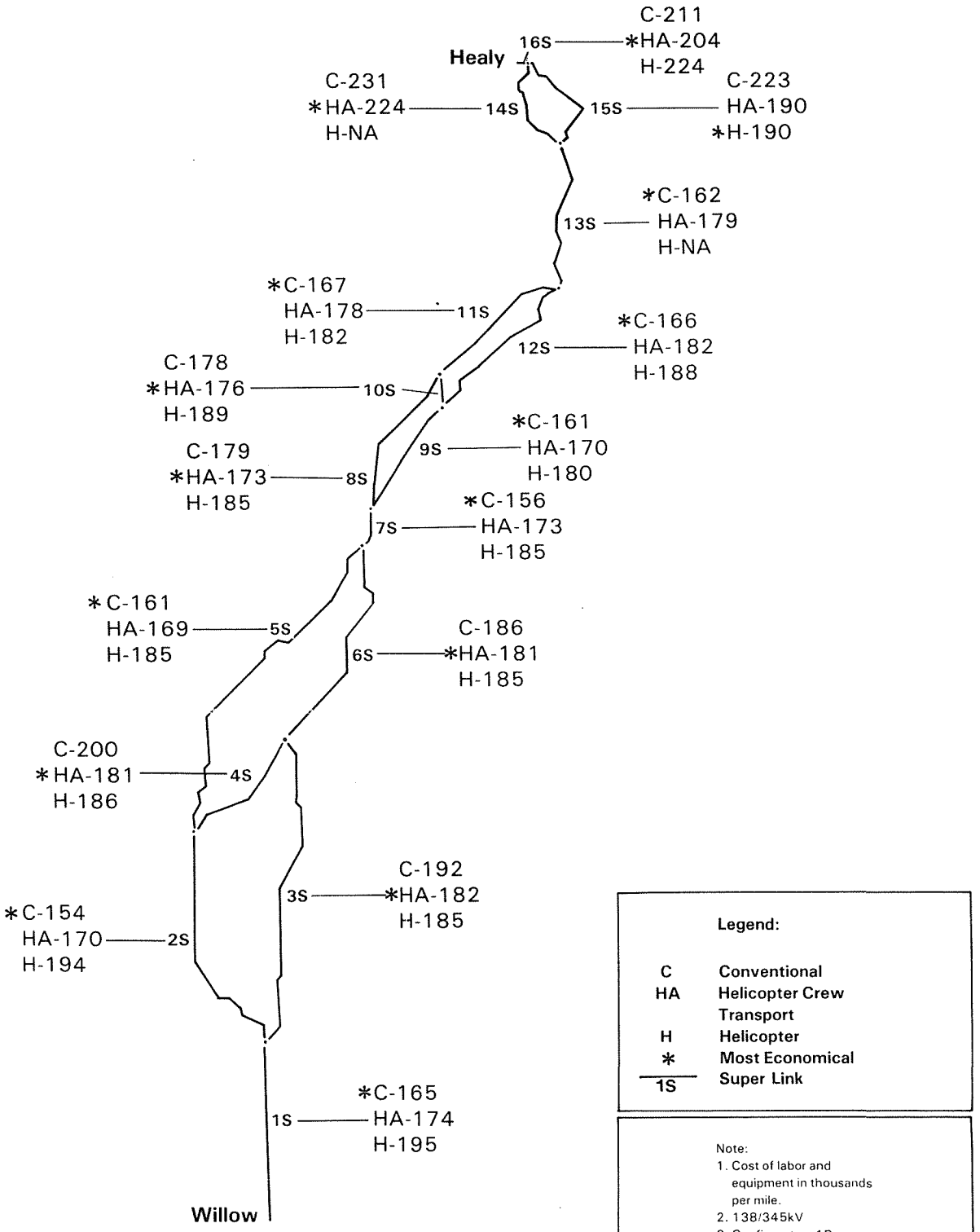


FIGURE 16

Alaska Power Authority **ANCHORAGE FAIRBANKS TRANSMISSION INTERTIE**

Comparative Cost By Method of Construction

Gilbert/Commonwealth

North

TABLE 3

SUPERLINK - 345 kV ESTIMATED CONSTRUCTION COSTS

ALASKA POWER AUTHORITY

ANCHORAGE - FAIRBANKS INTERTIE

SUPERLINK NUMBER	LENGTH MILES	METHOD OF CONSTRUCTION		TREE CLEARING	MATERIAL	EQUIPMENT AND LABOR	TOTAL
1	21.6	Conventional		317,952	2,863,987	3,565,000	6,747,000
2	31.6	"		825,645	4,166,807	4,866,000	9,859,000
3	41.4	Conventional Heli. Asst.		1,239,536	5,279,742	7,535,000	14,055,000
4	17.5	" " "		612,000	2,142,717	3,168,000	5,923,000
5	45.3	Conventional		1,400,314	5,850,857	7,293,000	14,544,000
6	28.5	Conventional Heli. Asst.		957,000	3,596,557	5,159,000	9,713,000
7	5.1	Conventional		26,275	605,002	795,600	1,427,000
8	19.6	Conventional Heli. Asst.		411,130	2,484,300	3,390,800	6,286,000
9	14.9	Conventional		389,307	1,851,802	2,398,900	4,640,000
10	4.2	Conventional Heli. Asst.		77,380	581,890	739,200	1,398,000
11	18.4	Conventional		250,534	2,302,116	3,072,800	5,625,000
11 with 13 UG	17.4	"		236,918	2,177,001	2,905,800	5,320,000
12	22.4	"		164,864	2,911,171	3,718,400	6,794,000
13 OH	19.9	"		161,110	3,578,935	3,223,800	6,964,000
13/13 UG	11.6	"		93,913	3,086,213	1,879,200	4,059,000
13 UG	6.0	Underground		0	8,069,000	5,651,000	13,720,000
13/14 UG	21.4	Conventional		173,254	3,848,704	3,466,800	7,489,000

PREPARED BY COMMONWEALTH ASSOCIATES INC.
JACKSON, MICHIGAN

TABLE 3 (Continued)

SUPERLINK - 345 kV ESTIMATED CONSTRUCTION COSTS

ALASKA POWER AUTHORITY

ANCHORAGE - FAIRBANKS INTERTIE

SUPERLINK NUMBER	LENGTH MILES	METHOD OF CONSTRUCTION		TREE CLEARING	MATERIAL	EQUIPMENT AND LABOR	TOTAL
13/13 & 14 UG	13.1	Conventional		106,057	2,355,982	2,122,200	4,584,000
14 OH	13.1	Conventional Heli. Asst.		143,000	2,551,435	2,934,400	5,629,000
14 OH/14 UG	3.6	" " "		35,770	701,158	806,400	1,543,000
14 UG	10.0	Underground		0	11,151,000	8,226,000	19,377,000
15	14.9	Helicopter		116,056	1,812,123	2,831,000	4,759,000
16	0.9	Conventional Heli. Asst.		0	144,645	183,600	328,000
TW	26.0	Conventional		382,720	3,447,392	4,440,200	7,888,000
TW	5.5	"		41,366	383,570	704,451	1,129,000

PREPARED BY COMMONWEALTH ASSOCIATES INC.
JACKSON, MICHIGAN

TABLE 4

SUPERLINK - 138 kV ESTIMATED CONSTRUCTION COSTS

ALASKA POWER AUTHORITY

ANCHORAGE - FAIRBANKS INTERTIE

COST ESTIMATE

SUPERLINK NUMBER	LENGTH MILES	METHOD OF CONSTRUCTION		TREE CLEARING	MATERIAL	EQUIPMENT AND LABOR	TOTAL
1	21.6	Conventional		162,432	1,294,300	2,673,750	4,130,000
2	31.6	"		421,797	1,877,170	3,649,500	5,949,000
3	41.4	Conventional Heli. Asst.		633,241	2,244,420	5,651,250	8,529,000
4	17.5	" "	"	312,652	927,245	2,376,000	3,616,000
5	45.3	Conventional		715,378	2,569,845	5,469,750	8,755,000
6	28.5	Conventional Heli. Asst.		488,900	1,559,025	3,869,250	5,917,175
7	5.1	Conventional		13,423	264,265	596,700	874,000
8	19.6	Conventional Heli. Asst.		210,034	1,094,730	2,543,100	3,848,000
9	14.9	Conventional		198,885	805,085	1,799,175	2,803,000
10	4.2	Conventional Heli. Asst.		39,480	260,080	554,400	854,000
11	18.4	Conventional		127,990	1,001,340	2,304,600	3,434,000
11 w/13 UG	17.4	"		121,034	950,790	2,179,350	3,251,000
12	22.4	"		84,224	1,270,860	2,788,800	4,144,000
13	19.9	"		82,306	1,776,055	2,417,850	4,276,000
13/13 UG	11.6	"		47,977	649,680	1,409,400	2,107,000
13 UG	6.0	Underground		-0-	4,365,000	4,802,000	9,167,000
13/14 UG	21.4	Conventional		88,510	1,292,140	2,600,100	3,981,000

PREPARED BY COMMONWEALTH ASSOCIATES INC.

JACKSON, MICHIGAN

TABLE 4 (Continued)
SUPERLINK - 138 kV ESTIMATED CONSTRUCTION COSTS

SUPERLINK NUMBER	LENGTH MILES	METHOD OF CONSTRUCTION		TREE CLEARING	MATERIAL	EQUIPMENT AND LABOR	TOTAL
13/13 & 14 UG	13.1	Conventional		54,182	759,555	1,591,650	2,405,000
14	13.1	Conventional Heli. Asst.		66,496	1,019,195	2,200,800	3,287,000
14 OH/14 UG	3.6	"	"	18,274	224,910	604,800	848,000
14 UG	10.0	Underground		-0-	5,774,000	7,144,000	12,918,000
15	14.9	Helicopter		36,416	774,995	2,123,250	2,935,000
16	0.9	Conventional Heli. Asst.		-0-	65,475	137,700	203,000
TW	5.5	Conventional		41,360	383,570	704,451	1,129,000

PREPARED BY COMMONWEALTH ASSOCIATES INC.
JACKSON, MICHIGAN

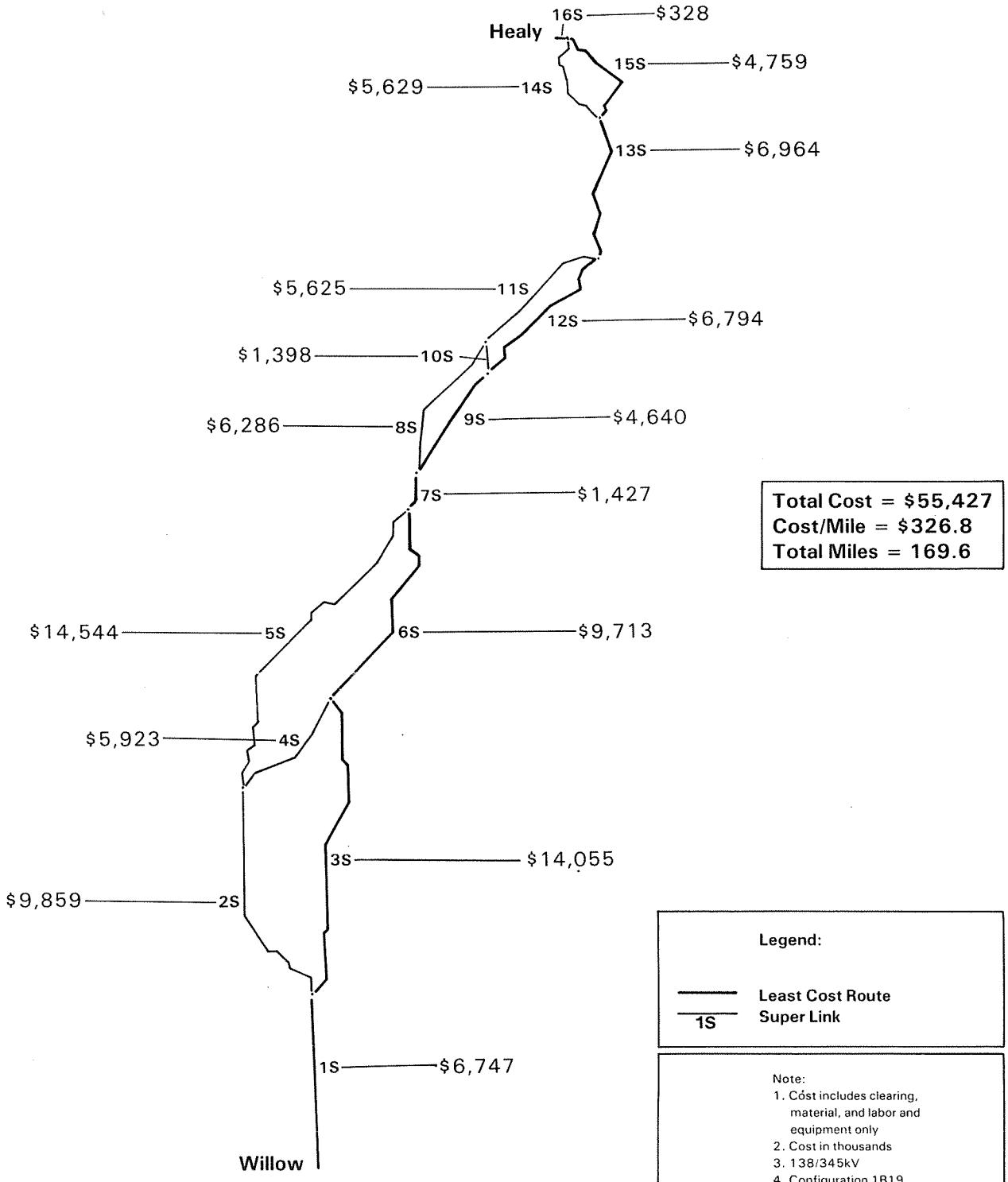


FIGURE 17

Alaska Power Authority **ANCHORAGE FAIRBANKS TRANSMISSION INTERTIE**

Construction Cost By Super Link

Gilbert/Commonwealth

North

TABLE 5

PROJECT COST ESTIMATE

CONFIGURATION 1A1 138/138

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

TABLE 5

Route Description: Western - 100% Overhead

Configuration: 1A1 138/138

Super Link No.	Miles	Total Cost
1	21.6	4,130
2	31.6	5,949
5	45.3	8,755
7	5.1	874
9	14.9	2,803
10	4.2	854
11	18.4	3,434
13	19.9	4,276
14	13.1	3,287
16	4.9	203
Subtotal Intertie	175.0	34,565
Teeland-Willow	5.5	1,129
Total Line	180.5	35,694
Total Substation Cost		9,449
Subtotal		45,143
R/W Acquisition ($40,000/Mile)		7,000
Mobilization-Demobilization 5%		2,257
Surveying		3,100
Engineering 6%		2,709
Construction Management 5%		2,257
Subtotal		62,466
Contingencies 25%		15,617
Total September 1981 Dollars		78,083
Inflation @ 10%/Year - 2 Years		94,480

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Western - Overhead Except UG in Nenana Gorge

Configuration: 1A2 138/138

Super Link No.	Miles	Total Cost
1	21.6	4,130
2	31.6	5,949
5	45.3	8,755
7	5.1	874
9	14.9	2,803
10	4.2	854
11	18.4	3,434
13/14 UG	21.4	3,981
14/OH-UG	3.6	848
14 UG	10.0	12,918
16	0.9	203
Subtotal Intertie	177.0	44,749
Teeland-Willow	5.5	1,129
Total Line	182.5	45,878
Total Substation Cost		9,449
Subtotal		55,327
R/W Acquisition ($40,000/Mile)		7,080
Mobilization-Demobilization 5%		2,766
Surveying		3,100
Engineering 6%		3,320
Construction Management 5%		2,766
Subtotal		74,359
Contingencies 25%		18,590
Total September 1981 Dollars		92,949
Inflation @ 10%/Year - 2 Years		112,468

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Western-Overhead Except Take Moody-Montana

Configuration: 1A3 138/138

Super Link No.	Miles	Total Cost
1	21.6	4,130
2	31.6	5,949
5	45.3	8,755
7	5.1	874
9	14.9	2,803
10	4.2	854
11	18.4	3,434
13	19.9	4,276
15	14.9	2,935
16	0.9	203
Subtotal Intertie	176.8	34,213
Teeland-Willow	5.5	1,129
Total Line	182.3	35,342
Total Substation Cost		9,449
Subtotal		44,791
R/W Acquisition ($40,000/Mile)		7,072
Mobilization-Demobilization 5%		2,240
Surveying		3,100
Engineering 6%		2,687
Construction Management 5%		2,240
Subtotal		62,130
Contingencies 25%		15,533
Total September 1981 Dollars		77,663
Inflation @ 10%/Year - 2 Years		93,972

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Western-Overhead Except UG in Windy Pass

Configuration: 1A4 138/138

Super Link No.	Miles	Total Cost
1	21.6	4,130
2	31.6	5,949
5	45.3	8,755
7	5.1	874
9	14.9	2,803
10	4.2	854
11/13 UG	17.4	3,251
13/13 UG	11.6	2,107
13 UG	6.0	9,167
14	13.1	3,287
16	0.9	203
Subtotal Intertie	171.7	41,380
Teeland-Willow	5.5	1,129
Total Line	177.2	42,509
Total Substation Cost		9,449
Subtotal		51,958
R/W Acquisition ($40,000/Mile)		6,868
Mobilization-Demobilization 5%		2,598
Surveying		3,100
Engineering 6%		3,117
Construction Management 5%		2,598
Subtotal		70,239
Contingencies 25%		17,560
Total September 1981 Dollars		87,799
Inflation @ 10%/Year - 2 Years		106,237

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Western-Overhead Except UG in Nenana Gorge and Windy Pass

Configuration: 1A5 138/138

Super Link No.	Miles	Total Cost
1	21.6	4,130
2	31.6	5,949
5	45.3	8,755
7	5.1	874
9	14.9	2,803
10	4.2	854
11/13 UG	17.4	3,251
13/13 & 14 UG	13.1	2,405
13 UG	6.0	9,167
14 OH/UG	3.6	848
14 UG	10.0	12,918
16	0.9	203
Subtotal Intertie	173.7	52,157
Teeland-Willow	5.5	1,129
Total Line	179.2	53,286
Total Substation Cost		9,449
Subtotal		62,735
R/W Acquisition ($40,000/Mile)		6,948
Mobilization-Demobilization 5%		3,137
Surveying		3,100
Engineering 6%		3,764
Construction Management 5%		3,137
Subtotal		82,821
Contingencies 25%		20,705
Total September 1981 Dollars		103,526
Inflation @ 10%/Year - 2 Years		125,266

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Western Overhead Except UG in Windy Pass and Take Moody-Montana

Configuration: 1A6 138/138

Super Link No.	Miles	Total Cost
1	21.6	4,130
2	31.6	5,949
5	45.3	8,755
7	5.1	874
9	14.9	2,803
10	4.2	854
11/13 UG	17.4	3,251
13/13 UG	11.6	2,107
13 UG	6.0	9,167
15	14.9	2,935
16	0.9	203
Subtotal Intertie	173.5	41,028
Teeland-Willow	5.5	1,129
Total Line	179.0	42,157
Total Substation Cost		9,449
Subtotal		51,606
R/W Acquisition ($40,000/Mile)		6,940
Mobilization-Demobilization 5%		2,580
Surveying		3,100
Engineering 6%		3,096
Construction Management 5%		2,580
Subtotal		69,902
Contingencies 25%		17,476
Total September 1981 Dollars		87,378
Inflation @ 10%/Year - 2 Years		105,727

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Eastern-100% Overhead Take Nenana Gorge

Configuration: 1A7 138/138

Super Link No.	Miles	Total Cost
1	21.6	4,130
3	41.4	8,529
6	28.5	5,917
7	5.1	874
9	14.9	2,803
10	4.2	854
11	18.4	3,434
13	19.9	4,276
14	13.1	3,287
16	0.9	203
Subtotal Intertie	168.0	34,307
Teeland-Willow	5.5	1,129
Total Line	173.5	35,436
Total Substation Cost		9,449
Subtotal		44,885
R/W Acquisition ($40,000/Mile)		6,720
Mobilization-Demobilization 5%		2,244
Surveying		3,100
Engineering 6%		2,693
Construction Management 5%		2,244
Subtotal		61,886
Contingencies 25%		15,472
Total September 1981 Dollars		77,358
Inflation @ 10%/Year - 2 Years		93,603

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Eastern-Overhead Except UG Thru Nenana Gorge

Configuration: 1A8 138/138

Super Link No.	Miles	Total Cost
1	21.6	4,130
3	41.4	8,529
6	28.5	5,917
7	5.1	874
9	14.9	2,803
10	4.2	854
11	18.4	3,434
13/14 UG	21.4	3,981
14 OH/UG	3.6	848
14 UG	10.0	12,918
16	0.9	203
Subtotal Intertie	170.0	44,491
Teeland-Willow	5.5	1,129
Total Line	175.5	45,620
Total Substation Cost		9,449
Subtotal		55,069
R/W Acquisition ($40,000/Mile)		6,800
Mobilization-Demobilization 5%		2,753
Surveying		3,100
Engineering 6%		3,304
Construction Management 5%		2,753
Subtotal		73,779
Contingencies 25%		18,445
Total September 1981 Dollars		92,224
Inflation @ 10%/Year - 2 Years		111,591

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Eastern-100% Overhead

Configuration: 1A9 138/138

Super Link No.	Miles	Total Cost
1	21.6	4,130
3	41.4	8,529
6	28.5	5,917
7	5.1	874
9	14.9	2,803
10	4.2	854
11	18.4	3,434
13	19.9	4,276
15	14.9	2,935
16	0.9	203
Subtotal Intertie	169.8	33,955
Teeland-Willow	5.5	1,129
Total Line	175.3	35,084
Total Substation Cost		9,449
Subtotal		44,533
R/W Acquisition ($40,000/Mile)		6,792
Mobilization-Demobilization 5%		2,227
Surveying		3,100
Engineering 6%		2,672
Construction Management 5%		2,227
Subtotal		61,551
Contingencies 25%		15,388
Total September 1981 Dollars		76,939
Inflation @ 10%/Year - 2 Years		93,096

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Eastern-Overhead Except UG in Windy Pass and Take Nenana Gorge

Configuration: 1A10

Super Link No.	Miles	Total Cost
1	21.6	4,130
3	41.4	8,529
6	28.5	5,917
7	5.1	874
9	14.9	2,803
10	4.2	854
11/13 UG	17.4	3,251
13/13 UG	11.6	2,107
13 UG	6.0	9,167
14	13.1	3,287
16	0.9	203
Subtotal Intertie	164.7	41,122
Teeland-Willow	5.5	1,129
Total Line	170.2	42,251
Total Substation Cost		9,449
Subtotal		51,700
R/W Acquisition ($40,000/Mile)		6,588
Mobilization-Demobilization 5%		2,585
Surveying		3,100
Engineering 6%		3,102
Construction Management 5%		2,585
Subtotal		69,660
Contingencies 25%		17,415
Total September 1981 Dollars		87,075
Inflation @ 10%/Year - 2 Years		105,361

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Eastern-Overhead Except UG in Windy Pass and Nenana Gorge

Configuration: 1A11 138/138

Super Link No.	Miles	Total Cost
1	21.6	4,130
3	41.4	8,529
6	28.5	5,917
7	5.1	874
9	14.9	2,803
10	4.2	854
11/13 UG	17.4	3,251
13/13 & 14 UG	13.1	2,405
13 UG	6.0	9,167
14 OH/UG	3.6	848
14 UG	10.0	12,918
16	0.9	203
Subtotal Intertie	166.7	51,899
Teeland-Willow	5.5	1,129
Total Line	172.2	53,028
Total Substation Cost		9,449
Subtotal		62,477
R/W Acquisition ($40,000/Mile)		6,668
Mobilization-Demobilization 5%		3,124
Surveying		3,100
Engineering 6%		3,749
Construction Management 5%		3,124
Subtotal		82,242
Contingencies 25%		20,561
Total September 1981 Dollars		102,803
Inflation @ 10%/Year - 2 Years		124,392

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Eastern-Overhead Except UG in Windy Pass

Configuration: 1A12 138/138

Super Link No.	Miles	Total Cost
1	21.6	4,130
3	41.4	8,529
6	28.5	5,917
7	5.1	874
9	14.9	2,803
10	4.2	854
11/13 UG	17.4	3,251
13/13 UG	11.6	2,107
13 UG	6.0	9,167
15	14.9	2,935
16	0.9	203
Subtotal Intertie	166.5	40,770
Teeland-Willow	5.5	1,129
Total Line	172.0	41,899
Total Substation Cost		9,449
Subtotal		51,348
R/W Acquisition ($40,000/Mile)		6,660
Mobilization-Demobilization 5%		2,567
Surveying		3,100
Engineering 6%		3,081
Construction Management 5%		2,567
Subtotal		69,323
Contingencies 25%		17,331
Total September 1981 Dollars		86,654
Inflation @ 10%/Year - 2 Years		104,851

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Western-Avoid St. Park-100% Overhead

Configuration: 1A13 138/138

Super Link No.	Miles	Total Cost
1	21.6	4,130
2	31.6	5,949
4	17.5	3,616
6	28.5	5,917
7	5.1	874
9	14.9	2,803
10	4.2	854
11	18.4	3,434
13	19.9	4,276
14	13.1	3,287
16	0.9	203
Subtotal Intertie	175.7	35,343
Teeland-Willow	5.5	1,129
Total Line	181.2	36,472
Total Substation Cost		9,449
Subtotal		45,921
R/W Acquisition ($40,000/Mile)		7,028
Mobilization-Demobilization 5%		2,296
Surveying		3,100
Engineering 6%		2,755
Construction Management 5%		2,296
Subtotal		63,396
Contingencies 25%		15,849
Total September 1981 Dollars		79,245
Inflation @ 10%/Year - 2 Years		95,886

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Western-Avoid St. Park-Overhead Except UG Windy Pass

Configuration: 1A14 138/138

Super Link No.	Miles	Total Cost
1	21.6	4,130
2	31.6	5,949
4	17.5	3,616
6	28.5	5,917
7	5.1	874
9	14.9	2,803
10	4.2	854
11/13 UG	17.4	3,251
13/13 UG	11.6	2,107
13 UG	6.0	9,167
14	13.1	3,287
16	0.9	203
Subtotal Intertie	172.4	42,158
Teeland-Willow	5.5	1,129
Total Line	177.9	43,287
Total Substation Cost		9,449
Subtotal		52,736
R/W Acquisition ($40,000/Mile)		6,896
Mobilization-Demobilization 5%		2,637
Surveying		3,100
Engineering 6%		3,164
Construction Management 5%		2,637
Subtotal		71,170
Contingencies 25%		17,793
Total September 1981 Dollars		88,963
Inflation @ 10%/Year - 2 Years		107,645

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Western-Avoid St. Park-Overhead Except UG Nenana Gorge

Configuration: 1A15 138/138

Super Link No.	Miles	Total Cost
1	21.6	4,130
2	31.6	5,949
4	17.5	3,616
6	28.5	5,917
7	5.1	874
9	14.9	2,803
10	4.2	854
11	18.4	3,434
13/14 UG	21.4	3,981
14 OH/UG	3.6	848
14 UG	10.0	12,918
16	0.9	203
Subtotal Intertie	177.7	45,527
Teeland-Willow	5.5	1,129
Total Line	183.2	46,656
Total Substation Cost		9,449
Subtotal		56,105
R/W Acquisition ($40,000/Mile)		7,108
Mobilization-Demobilization 5%		2,805
Surveying		3,100
Engineering 6%		3,366
Construction Management 5%		2,805
Subtotal		75,289
Contingencies 25%		18,822
Total September 1981 Dollars		94,111
Inflation @ 10%/Year - 2 Years		113,874

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Western-Avoid State Park-Overhead Except Underground in Nenana Gorge and Windy Pass

Configuration: 1A16 138/138

Super Link No.	Miles	Total Cost
1	21.6	4,130
2	31.6	5,949
4	17.5	3,616
6	28.5	5,917
7	5.1	874
9	14.9	2,803
10	4.2	854
11/13 UG	17.4	3,251
13/13 & 14 UG	13.1	2,405
13 UG	6.0	9,167
14 OH/UG	3.6	848
14 UG	10.0	12,918
16	0.9	203
Subtotal Intertie	174.4	52,935
Teeland-Willow	5.5	1,129
Total Line	179.9	54,064
Total Substation Cost		9,449
Subtotal		63,513
R/W Acquisition ($40,000/Mile)		6,976
Mobilization-Demobilization 5%		3,176
Surveying		3,100
Engineering 6%		3,811
Construction Management 5%		3,176
Subtotal		83,752
Contingencies 25%		20,938
Total September 1981 Dollars		104,690
Inflation @ 10%/Year - 2 Years		126,675

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Western-Avoid State Park-Overhead Except Underground in Windy Pass and Take Moody-Montana

Configuration: 1A17 138/138

Super Link No.	Miles	Total Cost
1	21.6	4,130
2	31.6	5,949
4	17.5	3,616
6	28.5	5,917
7	5.1	874
9	14.9	2,803
10	4.2	854
11/13 UG	17.4	3,251
13/13 UG	11.6	2,107
13 UG	6.0	9,167
15	14.9	2,935
16	0.9	203
Subtotal Intertie	174.2	41,806
Teeland-Willow	5.5	1,129
Total Line	179.7	42,935
Total Substation Cost		9,449
Subtotal		52,384
R/W Acquisition ($40,000/Mile)		6,968
Mobilization-Demobilization 5%		2,619
Surveying		3,100
Engineering 6%		3,143
Construction Management 5%		2,619
Subtotal		70,833
Contingencies 25%		17,708
Total September 1981 Dollars		88,541
Inflation @ 10%/Year - 2 Years		107,135

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Western-Avoid State Park-Overhead and Take Moody-Montana

Configuration: 1A18 138/138

Super Link No.	Miles	Total Cost
1	21.6	4,130
2	31.6	5,949
4	17.5	3,616
6	28.5	5,917
7	5.1	874
9	14.9	2,803
10	4.2	854
11	18.4	3,434
13	19.9	4,276
15	14.9	2,935
16	0.9	203
Subtotal Intertie	177.5	34,991
Teeland-Willow	5.5	1,129
Total Line	183.0	36,120
Total Substation Cost		9,449
Subtotal		45,569
R/W Acquisition ($40,000/Mile)		7,100
Mobilization-Demobilization 5%		2,278
Surveying		3,100
Engineering 6%		2,734
Construction Management 5%		2,278
Subtotal		63,059
Contingencies 25%		15,765
Total September 1981 Dollars		78,824
Inflation @ 10%/Year - 2 Years		95,377

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Eastern-100% Overhead with Broad Pass East

Configuration: 1A19 138/138

Super Link No.	Miles	Total Cost
1	21.6	4,130
3	41.4	8,529
6	28.5	5,917
7	5.1	874
9	14.9	2,803
12	22.4	4,144
13	19.9	4,276
15	14.9	2,935
16	0.9	203
Subtotal Intertie	169.6	33,811
Teeland-Willow	5.5	1,129
Total Line	175.1	34,940
Total Substation Cost		9,449
Subtotal		44,389
R/W Acquisition ($40,000/Mile)		6,784
Mobilization-Demobilization 5%		2,219
Surveying		3,100
Engineering 6%		2,663
Construction Management 5%		2,219
Subtotal		61,374
Contingencies 25%		15,344
Total September 1981 Dollars		76,718
Inflation @ 10%/Year - 2 Years		92,829

TABLE 6

PROJECT COST ESTIMATE

CONFIGURATION 1B1 138/345

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Western-100% Overhead

Configuration: 1B1 138/345

Super Link No.	Miles	Total Cost
1	21.6	6,747
2	31.6	9,859
5	45.3	14,544
7	5.1	1,427
9	14.9	4,640
10	4.2	1,398
11	18.4	5,625
13	19.9	6,964
14	13.1	5,629
16	0.9	328
Subtotal Intertie	175.0	57,161
Teeland-Willow	5.5	1,129
Total Line	180.5	58,290
Total Substation Cost		9,449
Subtotal		67,739
R/W Acquisition ($40,000/Mile)		7,220
Mobilization-Demobilization 5%		3,387
Surveying		3,100
Engineering 6%		4,064
Construction Management 5%		3,387
Subtotal		88,897
Contingencies 25%		22,224
Total September 1981 Dollars		111,121
Inflation @ 10%/Year - 2 Years		134,456

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Western-Overhead Except UG in Nenana Gorge

Configuration: 1B2 138/345

Super Link No.	Miles	Total Cost
1	21.6	6,747
2	31.6	9,859
5	45.3	14,544
7	5.1	1,427
9	14.9	4,640
10	4.2	1,398
11	18.4	5,625
13/14 UG	21.4	7,489
14 ON/UG	3.6	1,543
14 UG	10.0	19,377
16	0.9	328
Subtotal Intertie	177.0	72,977
Teeland-Willow	5.5	1,129
Total Line	182.5	74,106
Total Substation Cost		9,449
Subtotal		83,555
R/W Acquisition ($40,000/Mile)		7,080
Mobilization-Demobilization	5%	4,178
Surveying		3,100
Engineering	6%	5,013
Construction Management	5%	4,178
Subtotal		107,104
Contingencies	25%	26,776
Total September 1981 Dollars		133,880
Inflation @ 10%/Year - 2 Years		161,995

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Western-Overhead Except Take Moody Montana

Configuration: 1B3 138/345

Super Link No.	Miles	Total Cost
1	21.6	6,747
2	31.6	9,859
5	45.3	14,544
7	5.1	1,427
9	14.9	4,640
10	4.2	1,398
11	18.4	5,625
13	19.9	6,964
15	14.9	4,759
16	0.9	328
Subtotal Intertie	176.8	56,291
Teeland-Willow	5.5	1,129
Total Line	182.3	57,420
Total Substation Cost		9,449
Subtotal		66,869
R/W Acquisition ($40,000/Mile)		7,072
Mobilization-Demobilization 5%		3,343
Surveying		3,100
Engineering 6%		4,012
Construction Management 5%		3,343
Subtotal		87,739
Contingencies 25%		21,935
Total September 1981 Dollars		109,674
Inflation @ 10%/Year - 2 Years		132,706

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Western-Overhead Except UG in Windy Pass

Configuration: 1B4 138/345

Super Link No.	Miles	Total Cost
1	21.6	6,747
2	31.6	9,859
5	45.3	14,544
7	5.1	1,427
9	14.9	4,640
10	4.2	1,398
11/13 UG	17.4	5,320
13/13 UG	11.6	4,059
13 UG	6.0	13,720
14	13.1	5,629
16	0.9	328
Subtotal Intertie	171.7	67,671
Teeland-Willow	5.5	1,129
Total Line	177.2	68,800
Total Substation Cost		9,449
Subtotal		78,249
R/W Acquisition ($40,000/Mile)		6,868
Mobilization-Demobilization 5%		3,912
Surveying		3,100
Engineering 6%		4,695
Construction Management 5%		3,912
Subtotal		100,736
Contingencies 25%		25,184
Total September 1981 Dollars		125,920
Inflation @ 10%/Year - 2 Years		152,363

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Western-Overhead Except UG in Nenana Gorge and Windy Pass

Configuration: 1B5 138/345

Super Link No.	Miles	Total Cost
1	21.6	6,747
2	31.6	9,859
5	45.3	14,544
7	5.1	1,427
9	14.9	4,640
10	4.2	1,398
11/13 UG	17.4	5,320
13/13 & 14 UG	13.1	4,584
13 UG	6.0	13,720
14 OH/UG	3.6	1,543
14 UG	10.0	19,377
16	0.9	328
Subtotal Intertie	173.7	83,487
Teeland-Willow	5.5	1,129
Total Line	179.2	84,616
Total Substation Cost		9,449
Subtotal		94,065
R/W Acquisition ($40,000/Mile)		6,948
Mobilization-Demobilization 5%		4,703
Surveying		3,100
Engineering 6%		5,644
Construction Management 5%		4,703
Subtotal		119,163
Contingencies 25%		29,791
Total September 1981 Dollars		148,954
Inflation @ 10%/Year - 2 Years		180,234

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Western-Overhead Except UG in Windy Pass and Take Moody-Montana

Configuration: 1B6 138/345

Super Link No.	Miles	Total Cost
1	21.6	6,747
2	31.6	9,859
5	45.3	14,544
7	5.1	1,427
9	14.9	4,640
10	4.2	1,398
11/13 UG	17.4	5,320
13/13 UG	11.6	4,059
13 UG	6.0	13,720
15	14.9	4,759
16	0.9	328
Subtotal Intertie	173.5	66,801
Teeland-Willow	5.5	1,129
Total Line	179.0	67,930
Total Substation Cost		9,449
Subtotal		77,379
R/W Acquisition ($40,000/Mile)		6,940
Mobilization-Demobilization 5%		3,869
Surveying		3,100
Engineering 6%		4,643
Construction Management 5%		3,869
Subtotal		99,800
Contingencies 25%		24,950
Total September 1981 Dollars		124,750
Inflation @ 10%/Year - 2 Years		150,948

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Eastern 100% Overhead Take Nenana Gorge

Configuration: 1B7 138/345

Super Link No.	Miles	Total Cost
1	21.6	6,747
3	41.4	14,055
6	28.5	9,713
7	5.1	1,427
9	14.9	4,640
10	4.2	1,398
11	18.4	5,625
13	19.9	6,964
14	13.1	5,629
16	0.9	328
Subtotal Intertie	168.0	56,526
Teeland-Willow	5.5	1,129
Total Line	173.5	57,655
Total Substation Cost		9,449
Subtotal		67,104
R/W Acquisition ($40,000/Mile)		6,720
Mobilization-Demobilization 5%		3,355
Surveying		3,100
Engineering 6%		4,026
Construction Management 5%		3,355
Subtotal		87,660
Contingencies 25%		21,915
Total September 1981 Dollars		109,575
Inflation @ 10%/Year - 2 Years		132,586

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Eastern-Overhead Except UG Thru Nenana Gorge

Configuration: 1B8 138/345

Super Link No.	Miles	Total Cost
1	21.6	6,747
3	41.4	14,055
6	28.5	9,713
7	5.1	1,427
9	14.9	4,640
10	4.2	1,398
11	18.4	5,625
13/14 UG	21.4	7,489
14 OH/UG	3.6	1,543
14 UG	10.0	19,377
16	0.9	328
Subtotal Intertie	170.0	72,342
Teeland-Willow	5.5	1,129
Total Line	175.5	74,471
Total Substation Cost		9,449
Subtotal		82,920
R/W Acquisition ($40,000/Mile)		6,800
Mobilization-Demobilization 5%		4,146
Surveying		3,100
Engineering 6%		4,975
Construction Management 5%		4,146
Subtotal		106,087
Contingencies 25%		26,522
Total September 1981 Dollars		132,609
Inflation @ 10%/Year - 2 Years		160,457

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Eastern-100% Overhead

Configuration: 1B9 138/345

Super Link No.	Miles	Total Cost
1	21.6	6,747
3	41.4	14,055
6	28.5	9,713
7	5.1	1,427
9	14.9	4,640
10	4.2	1,398
11	18.4	5,625
13	19.9	6,964
15	14.9	4,759
16	0.9	328
Subtotal Intertie	169.8	55,656
Teeland-Willow	5.5	1,129
Total Line	175.3	56,785
Total Substation Cost		9,449
Subtotal		66,234
R/W Acquisition ($40,000/Mile)		6,792
Mobilization-Demobilization 5%		3,312
Surveying		3,100
Engineering 6%		3,974
Construction Management 5%		3,312
Subtotal		86,724
Contingencies 25%		21,681
Total September 1981 Dollars		108,405
Inflation @ 10%/Year - 2 Years		131,170

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Eastern-Overhead Except UG in Windy Pass and Take Nenana Gorge

Configuration: 1B10 138/345

Super Link No.	Miles	Total Cost
1	21.6	6,747
3	41.4	14,055
6	28.5	9,713
7	5.1	1,427
9	14.9	4,640
10	4.2	1,398
11/13 UG	17.4	5,320
13/13 UG	11.6	4,059
13 UG	6.0	13,720
14	13.1	5,629
16	0.9	328
Subtotal Intertie	164.7	67,036
Teeland-Willow	5.5	1,129
Total Line	170.2	68,165
Total Substation Cost		9,449
Subtotal		77,614
R/W Acquisition ($40,000/Mile)		6,588
Mobilization-Demobilization 5%		3,881
Surveying		3,100
Engineering 6%		4,657
Construction Management 5%		3,881
Subtotal		99,721
Contingencies 25%		24,930
Total September 1981 Dollars		124,651
Inflation @ 10%/Year - 2 Years		150,828

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Eastern-Overhead Except UG in Windy Pass and Nenana Gorge

Configuration: 1B11 138/345

Super Link No.	Miles	Total Cost
1	21.6	6,747
3	41.4	14,055
6	28.5	9,713
7	5.1	1,427
9	14.9	4,640
10	4.2	1,398
11/13 UG	17.4	5,320
13/13 & 14 UG	13.1	4,584
13 UG	6.0	13,720
14 OH/UG	3.6	1,543
14 UG	10.0	19,377
16	0.9	328
Subtotal Intertie	166.7	82,852
Teeland-Willow	5.5	1,129
Total Line	172.2	83,981
Total Substation Cost		9,449
Subtotal		93,430
R/W Acquisition ($40,000/Mile)		6,668
Mobilization-Demobilization 5%		4,672
Surveying		3,100
Engineering 6%		5,606
Construction Management 5%		4,672
Subtotal		118,148
Contingencies 25%		29,537
Total September 1981 Dollars		147,685
Inflation @ 10%/Year - 2 Years		178,699

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Eastern-Overhead Except UG in Windy Pass

Configuration: 1B12 138/345

Super Link No.	Miles	Total Cost
1	21.6	6,747
3	41.4	14,055
6	28.5	9,713
7	5.1	1,427
9	14.9	4,640
10	4.2	1,398
11/13 UG	17.4	5,320
13/13 UG	11.6	4,059
13 UG	6.0	13,720
15	14.9	4,759
16	0.9	328
Subtotal Intertie	166.5	66,266
Teeland-Willow	5.5	1,129
Total Line	172.0	67,395
Total Substation Cost		9,449
Subtotal		76,844
R/W Acquisition ($40,000/Mile)		6,660
Mobilization-Demobilization	5%	3,842
Surveying		3,100
Engineering	6%	4,611
Construction Management	5%	3,842
Subtotal		98,899
Contingencies	25%	24,725
Total September 1981 Dollars		123,624
Inflation @ 10%/Year - 2 Years		149,585

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Western-Avoid St. Park-100% Overhead

Configuration: 1B13 138/345

Super Link No.	Miles	Total Cost
1	21.6	6,747
2	31.6	9,859
4	17.5	5,923
6	28.5	9,713
7	5.1	1,427
9	14.9	4,640
10	4.2	1,398
11	18.4	5,625
13	19.9	6,964
14	13.1	5,629
16	0.9	328
Subtotal Intertie	175.7	58,253
Teeland-Willow	5.5	1,129
Total Line	181.2	59,382
Total Substation Cost		9,449
Subtotal		68,831
R/W Acquisition ($40,000/Mile)		7,028
Mobilization-Demobilization 5%		3,442
Surveying		3,100
Engineering 6%		4,130
Construction Management 5%		3,442
Subtotal		89,973
Contingencies 25%		22,493
Total September 1981 Dollars		112,466
Inflation @ 10%/Year - 2 Years		136,084

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Western-Avoid St. Park-Overhead Except UG Windy Pass

Configuration: 1B14 138/345

Super Link No.	Miles	Total Cost
1	21.6	6,747
2	31.6	9,859
4	17.5	5,923
6	28.5	9,713
7	5.1	1,427
9	14.9	4,640
10	4.2	1,398
11/13 UG	17.4	5,320
13/13 UG	11.6	4,059
13 UG	6.0	13,720
14	13.1	5,629
16	0.9	328
Subtotal Intertie	172.4	68,763
Teeland-Willow	5.5	1,129
Total Line	177.9	69,892
Total Substation Cost		9,449
Subtotal		79,341
R/W Acquisition ($40,000/Mile)		6,896
Mobilization-Demobilization	5%	3,967
Surveying		3,100
Engineering	6%	4,760
Construction Management	5%	3,967
Subtotal		102,031
Contingencies	25%	25,508
Total September 1981 Dollars		127,539
Inflation @ 10%/Year - 2 Years		154,322

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Western-Avoid St. Park-Overhead Except UG Nenana Gorge

Configuration: 1B15 138/345

Super Link No.	Miles	Total Cost
1	21.6	6,747
2	31.6	9,859
4	17.5	5,923
6	28.5	9,713
7	5.1	1,427
9	14.9	4,640
10	4.2	1,398
11	18.4	5,625
13/14 UG	21.4	7,489
14 OH/UG	3.6	1,543
14 UG	10.0	19,377
16	0.9	328
Subtotal Intertie	177.7	74,169
Teeland-Willow	5.5	1,129
Total Line	183.2	75,298
Total Substation Cost		9,449
Subtotal		84,747
R/W Acquisition ($40,000/Mile)		7,108
Mobilization-Demobilization 5%		4,237
Surveying		3,100
Engineering 6%		5,085
Construction Management 5%		4,237
Subtotal		108,514
Contingencies 25%		27,129
Total September 1981 Dollars		135,643
Inflation @ 10%/Year - 2 Years		164,128

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Western-Avoid State Park-Overhead Except Underground in Nenana Gorge and Windy Pass

Configuration: 1B16 138/345

Super Link No.	Miles	Total Cost
1	21.6	6,747
2	31.6	9,859
4	17.5	5,923
6	28.5	9,713
7	5.1	1,427
9	14.9	4,640
10	4.2	1,398
11/13 UG	17.4	5,320
13/13 & 14 UG	13.1	4,584
13 UG	6.0	13,720
14/OH/14 UG	3.6	1,543
14 UG	10.0	19,377
16	.9	328
Subtotal Intertie	174.4	84,579
Teeland-Willow	5.5	1,129
Total Line	179.9	85,708
Total Substation Cost		9,449
Subtotal		95,157
R/W Acquisition ($40,000/Mile)		6,976
Mobilization-Demobilization 5%		4,758
Surveying		3,100
Engineering 6%		5,709
Construction Management 5%		4,758
Subtotal		120,458
Contingencies 25%		30,115
Total September 1981 Dollars		150,573
Inflation @ 10%/Year - 2 Years		182,193

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Western-Avoid State Park-Overhead Except Underground in Windy Pass and Take Moody-Montana

Configuration: 1B17 138/345

Super Link No.	Miles	Total Cost
1	21.6	6,747
2	31.6	9,859
4	17.5	5,923
6	28.5	9,713
7	5.1	1,427
9	14.9	4,640
10	4.2	1,398
11/13 UG	17.4	5,320
13/13 UG	11.6	4,059
13 UG	6.0	13,720
15	14.9	4,759
16	0.9	328
Subtotal Intertie	174.2	67,893
Teeland-Willow	5.5	1,129
Total Line	179.7	69,022
Total Substation Cost		9,449
Subtotal		78,471
R/W Acquisition ($40,000/Mile)		7,188
Mobilization-Demobilization	5%	3,924
Surveying		3,100
Engineering	6%	4,708
Construction Management	5%	3,924
Subtotal		101,315
Contingencies	25%	25,329
Total September 1981 Dollars		126,644
Inflation @ 10%/Year - 2 Years		153,239

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Western-Avoid State Park-Overhead and Take Moody Montana

Configuration: 1B18 138/345

Super Link No.	Miles	Total Cost
1	21.6	6,747
2	31.6	9,859
4	17.5	5,923
6	28.5	9,713
7	5.1	1,427
9	14.9	4,640
10	4.2	1,398
11	18.4	5,625
13	19.9	6,964
15	14.9	4,759
16	0.9	328
Subtotal Intertie	177.5	57,383
Teeland-Willow	5.5	1,129
Total Line	183.0	58,512
Total Substation Cost		9,449
Subtotal		67,961
R/W Acquisition ($40,000/Mile)		7,320
Mobilization-Demobilization 5%		3,398
Surveying		3,100
Engineering 6%		4,078
Construction Management 5%		3,398
Subtotal		89,255
Contingencies 25%		22,314
Total September 1981 Dollars		111,569
Inflation @ 10%/Year - 2 Years		134,998

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Eastern-100% Overhead with Broad Pass East

Configuration: 1B19 138/345

Super Link No.	Miles	Total Cost
1	21.6	6,747
3	41.4	14,055
6	28.5	9,713
7	5.1	1,427
9	14.9	4,640
12	22.4	6,794
13	19.9	6,964
15	14.9	4,759
16	0.9	328
Subtotal Intertie	169.6	55,427
Teeland-Willow	5.5	1,129
Total Line	175.1	56,556
Total Substation Cost		9,449
Subtotal		66,005
R/W Acquisition ($40,000/Mile)		6,784
Mobilization-Demobilization 5%		3,300
Surveying		3,100
Engineering 6%		3,960
Construction Management 5%		3,300
Subtotal		86,449
Contingencies 25%		21,612
Total September 1981 Dollars		108,061
Inflation @ 10%/Year - 2 Years		130,754

TABLE 7

PROJECT COST ESTIMATE

CONFIGURATION 2B1 230/345

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

TABLE 7
90

Route Description: Western-100% Overhead

Configuration: 2B1 230/345

Super Link No.	Miles	Total Cost
1	21.6	6,747
2	31.6	9,859
5	45.3	14,544
7	5.1	1,427
9	14.9	4,640
10	4.2	1,398
11	18.4	5,625
13	19.9	6,964
14	13.1	5,629
16	0.9	328
Subtotal Intertie	175.0	57,161
Teeland-Willow	26.0	7,888
Total Line	201.0	65,049
Total Substation Cost		8,440
Subtotal		73,489
R/W Acquisition ($40,000/Mile)		8,040
Mobilization-Demobilization 5%		3,674
Surveying		3,100
Engineering 6%		4,409
Construction Management 5%		3,674
Subtotal		96,386
Contingencies 25%		24,097
Total September 1981 Dollars		120,483
Inflation @ 10%/Year - 2 Years		145,784

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Western-Overhead Except UG in Nenana Gorge

Configuration: 2B2 230/345

Super Link No.	Miles	Total Cost
1	21.6	6,747
2	31.6	9,859
5	45.3	14,544
7	5.1	1,427
9	14.9	4,640
10	4.2	1,398
11	18.4	5,625
13/14 UG	21.4	7,489
14 OH/UG	3.6	1,543
14 UG	10.0	19,377
16	0.9	328
Subtotal Intertie	177.0	72,977
Teeland-Willow	26.0	7,888
Total Line	203.0	80,865
Total Substation Cost		8,440
Subtotal		89,305
R/W Acquisition ($40,000/Mile)		8,120
Mobilization-Demobilization 5%		4,465
Surveying		3,100
Engineering 6%		5,358
Construction Management 5%		4,465
Subtotal		114,813
Contingencies 25%		28,703
Total September 1981 Dollars		143,516
Inflation @ 10%/Year - 2 Years		173,654

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Western-Overhead Except Take Moody-Montana

Configuration: 2B3 230/345

Super Link No.	Miles	Total Cost
1	21.6	6,747
2	31.6	9,859
5	45.3	14,544
7	5.1	1,427
9	14.9	4,640
10	4.2	1,398
11	18.4	5,625
13	19.9	6,964
15	14.9	4,759
16	0.9	328
Subtotal Intertie	176.8	56,291
Teeland-Willow	26.0	7,888
Total Line	202.8	64,179
Total Substation Cost		8,440
Subtotal		72,619
R/W Acquisition ($40,000/Mile)		8,112
Mobilization-Demobilization 5%		3,631
Surveying		3,100
Engineering 6%		4,357
Construction Management 5%		3,631
Subtotal		95,450
Contingencies 25%		23,863
Total September 1981 Dollars		119,313
Inflation @ 10%/Year - 2 Years		144,369

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Western-Overhead Except UG in Windy Pass

Configuration: 2B4 230/345

Super Link No.	Miles	Total Cost
1	21.6	6,747
2	31.6	9,859
5	45.3	14,544
7	5.1	1,427
9	14.9	4,640
10	4.2	1,398
11/13 UG	17.4	5,320
13/13 UG	11.6	4,059
13 UG	6.0	13,720
14	13.1	5,629
16	0.9	328
Subtotal Intertie	171.7	67,671
Teeland-Willow	26.0	7,888
Total Line	197.7	75,559
Total Substation Cost		8,440
Subtotal		83,999
R/W Acquisition ($40,000/Mile)		7,908
Mobilization-Demobilization 5%		4,200
Surveying		3,100
Engineering 6%		5,040
Construction Management 5%		4,200
Subtotal		108,447
Contingencies 25%		27,112
Total September 1981 Dollars		135,559
Inflation @ 10%/Year - 2 Years		164,026

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Western-Overhead Except UG in Nenana Gorge and Windy Pass

Configuration: 2B5 230/345

Super Link No.	Miles	Total Cost
1	21.6	6,747
2	31.6	9,859
5	45.3	14,544
7	5.1	1,427
9	14.9	4,640
10	4.2	1,398
11/13 UG	17.4	5,320
13/13 & 14 UG	13.1	4,584
13 UG	6.0	13,720
14 OH/UG	3.6	1,543
14 UG	10.0	19,377
16	0.9	328
Subtotal Intertie	173.7	83,487
Teeland-Willow	26.0	7,888
Total Line	199.7	91,375
Total Substation Cost		8,440
Subtotal		99,815
R/W Acquisition ($40,000/Mile)		7,988
Mobilization-Demobilization 5%		4,991
Surveying		3,100
Engineering 6%		5,989
Construction Management 5%		4,991
Subtotal		126,874
Contingencies 25%		31,719
Total September 1981 Dollars		158,593
Inflation @ 10%/Year - 2 Years		191,898

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Western-Overhead Except UG in Windy Pass and Take Moody-Montana

Configuration: 2B6 230/345

Super Link No.	Miles	Total Cost
1	21.6	6,747
2	31.6	9,859
5	45.3	14,544
7	5.1	1,427
9	14.9	4,640
10	4.2	1,398
11/13 UG	17.4	5,320
13/13 UG	11.6	4,059
13 UG	6.0	13,720
15	14.9	4,759
16	0.9	328
Subtotal Intertie	173.5	66,801
Teeland-Willow	26.0	7,888
Total Line	199.5	74,689
Total Substation Cost		8,440
Subtotal		83,129
R/W Acquisition ($40,000/Mile)		7,980
Mobilization-Demobilization 5%		4,156
Surveying		3,100
Engineering 6%		4,988
Construction Management 5%		4,156
Subtotal		107,509
Contingencies 25%		26,877
Total September 1981 Dollars		134,386
Inflation @ 10%/Year - 2 Years		162,607

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Eastern-100% Overhead Take Nenana Gorge

Configuration: 2B7 230/345

Super Link No.	Miles	Total Cost
1	21.6	6,747
3	41.4	14,055
6	28.5	9,713
7	5.1	1,427
9	14.9	4,640
10	4.2	1,398
11	18.4	5,625
13	19.9	6,964
14	13.1	5,629
16	0.9	328
Subtotal Intertie	168.0	56,526
Teeland-Willow	26.0	7,888
Total Line	194.0	64,414
Total Substation Cost		8,440
Subtotal		72,854
R/W Acquisition ($40,000/Mile)		7,760
Mobilization-Demobilization 5%		3,643
Surveying		3,100
Engineering 6%		4,371
Construction Management 5%		3,643
Subtotal		95,371
Contingencies 25%		23,843
Total September 1981 Dollars		119,214
Inflation @ 10%/Year - 2 Years		144,249

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Eastern-Overhead Except UG Thru Nenana Gorge

Configuration: 2B8 230/345

Super Link No.	Miles	Total Cost
1	21.6	6,747
3	41.4	14,055
6	28.5	9,713
7	5.1	1,427
9	14.9	4,640
10	4.2	1,398
11	18.4	5,625
13/14 UG	21.4	7,489
14 OH/UG	3.6	1,543
14 UG	10.0	19,377
16	0.9	328
Subtotal Intertie	170.0	72,342
Teeland-Willow	26.0	7,888
Total Line	196.0	80,230
Total Substation Cost		8,440
Subtotal		88,670
R/W Acquisition ($40,000/Mile)		7,840
Mobilization-Demobilization 5%		4,434
Surveying		3,100
Engineering 6%		5,320
Construction Management 5%		4,434
Subtotal		113,798
Contingencies 25%		28,450
Total September 1981 Dollars		142,248
Inflation @ 10%/Year - 2 Years		172,120

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Eastern-100% Overhead

Configuration: 2B9 230/345

Super Link No.	Miles	Total Cost
1	21.6	6,747
3	41.4	14,055
6	28.5	9,713
7	5.1	1,427
9	14.9	4,640
10	4.2	1,398
11	18.4	5,625
13	19.9	6,964
15	14.9	4,759
16	0.9	328
Subtotal Intertie	169.8	55,656
Teeland-Willow	26.0	7,888
Total Line	195.8	63,544
Total Substation Cost		8,440
Subtotal		71,984
R/W Acquisition ($40,000/Mile)		7,832
Mobilization-Demobilization 5%		3,599
Surveying		3,100
Engineering 6%		4,319
Construction Management 5%		3,599
Subtotal		94,433
Contingencies 25%		23,608
Total September 1981 Dollars		118,041
Inflation @ 10%/Year - 2 Years		142,830

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Eastern-Overhead Except UG in Windy Pass and Take Nenana Gorge

Configuration: 2B10 230/345

Super Link No.	Miles	Total Cost
1	21.6	6,747
3	41.4	14,055
6	28.5	9,713
7	5.1	1,427
9	14.9	4,640
10	4.2	1,398
11/13 UG	17.4	5,320
13/13 UG	11.6	4,059
13 UG	6.0	13,720
14	13.1	5,629
16	0.9	328
Subtotal Intertie	164.7	67,036
Teeland-Willow	26.0	7,888
Total Line	190.7	74,924
Total Substation Cost		8,440
Subtotal		83,364
R/W Acquisition ($40,000/Mile)		7,628
Mobilization-Demobilization 5%		4,168
Surveying		3,100
Engineering 6%		5,002
Construction Management 5%		4,168
Subtotal		107,430
Contingencies 25%		26,858
Total September 1981 Dollars		134,288
Inflation @ 10%/Year - 2 Years		162,488

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Eastern-Overhead Except UG in Windy Pass and Nenana Gorge

Configuration: 2B11 230/345

Super Link No.	Miles	Total Cost
1	21.6	6,747
3	41.4	14,055
6	28.5	9,713
7	5.1	1,427
9	14.9	4,640
10	4.2	1,398
11/13 UG	17.4	5,320
13/13 & 14 UG	13.1	4,584
13 UG	6.0	13,720
14 OH/UG	3.6	1,543
14 UG	10.0	19,377
16	0.9	328
Subtotal Intertie	166.7	82,852
Teeland-Willow	26.0	7,888
Total Line	192.7	90,740
Total Substation Cost		8,440
Subtotal		99,180
R/W Acquisition ($40,000/Mile)		7,708
Mobilization-Demobilization 5%		4,959
Surveying		3,100
Engineering 6%		5,951
Construction Management 5%		4,959
Subtotal		125,857
Contingencies 25%		31,464
Total September 1981 Dollars		157,321
Inflation @ 10%/Year - 2 Years		190,358

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Eastern-Overhead Except UG in Windy Pass

Configuration: 2B12 230/345

Super Link No.	Miles	Total Cost
1	21.6	6,747
3	41.4	14,055
6	28.5	9,713
7	5.1	1,427
9	14.9	4,640
10	4.2	1,398
11/13 UG	17.4	5,320
13/13 UG	11.6	4,059
13 UG	6.0	13,720
15	14.9	4,759
16	0.9	328
Subtotal Intertie	166.5	66,266
Teeland-Willow	26.0	7,888
Total Line	192.5	74,154
Total Substation Cost		8,440
Subtotal		82,594
R/W Acquisition ($40,000/Mile)		7,700
Mobilization-Demobilization	5%	4,130
Surveying		3,100
Engineering	6%	4,956
Construction Management	5%	4,130
Subtotal		106,610
Contingencies	25%	26,653
Total September 1981 Dollars		133,263
Inflation @ 10%/Year - 2 Years		161,248

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Western-Avoid St. Park-100% Overhead

Configuration: 2B13 230/345

Super Link No.	Miles	Total Cost
1	21.6	6,747
2	31.6	9,859
4	17.5	5,923
6	28.5	9,713
7	5.1	1,427
9	14.9	4,640
10	4.2	1,398
11	18.4	5,625
13	19.9	6,964
14	13.1	5,629
16	0.9	328
Subtotal Intertie	175.7	58,253
Teeland-Willow	26.0	7,888
Total Line	201.7	66,141
Total Substation Cost		8,440
Subtotal		74,581
R/W Acquisition ($40,000/Mile)		8,068
Mobilization-Demobilization	5%	3,729
Surveying		3,100
Engineering	6%	4,475
Construction Management	5%	3,729
Subtotal		97,682
Contingencies	25%	24,421
Total September 1981 Dollars		122,103
Inflation @ 10%/Year - 2 Years		147,745

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Western-Avoid St. Park-Overhead Except UG Windy Pass

Configuration: 2B14 230/345

Super Link No.	Miles	Total Cost
1	21.6	6,747
2	31.6	9,859
4	17.5	5,923
6	28.5	9,713
7	5.1	1,427
9	14.9	4,640
10	4.2	1,398
11/13 UG	17.4	5,320
13/13 UG	11.6	4,059
13 UG	6.0	13,720
14	13.1	5,629
16	0.9	328
Subtotal Intertie	172.4	68,763
Teeland-Willow	26.0	7,888
Total Line	198.4	76,651
Total Substation Cost		8,440
Subtotal		85,091
R/W Acquisition ($40,000/Mile)		7,936
Mobilization-Demobilization 5%		4,255
Surveying		3,100
Engineering 6%		5,105
Construction Management 5%		4,255
Subtotal		109,742
Contingencies 25%		27,436
Total September 1981 Dollars		137,178
Inflation @ 10%/Year - 2 Years		165,985

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Western-Avoid St. Park-Overhead Except UG Nenana Gorge

Configuration: 2B15 230/345

Super Link No.	Miles	Total Cost
1	21.6	6,747
2	31.6	9,859
4	17.5	5,923
6	28.5	9,713
7	5.1	1,427
9	14.9	4,640
10	4.2	1,398
11	18.4	5,625
13/14 UG	21.4	7,489
14 OH/UG	3.6	1,543
14 UG	10.0	19,377
16	0.9	328
Subtotal Intertie	177.7	74,169
Teeland-Willow	26.0	7,888
Total Line	203.7	82,057
Total Substation Cost		8,440
Subtotal		90,497
R/W Acquisition ($40,000/Mile)		8,148
Mobilization-Demobilization 5%		4,525
Surveying		3,100
Engineering 6%		5,430
Construction Management 5%		4,525
Subtotal		116,225
Contingencies 25%		29,056
Total September 1981 Dollars		145,281
Inflation @ 10%/Year - 2 Years		175,790

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Western-Avoid State Park-Overhead Except Underground in Nenana Gorge and Windy Pass

Configuration: 2B16 230/345

Super Link No.	Miles	Total Cost
1	21.6	6,747
2	31.6	9,859
4	17.5	5,923
6	28.5	9,713
7	5.1	1,427
9	14.9	4,640
10	4.2	1,398
11/13 UG	17.4	5,320
13/13 & 14 UG	13.1	4,584
13 UG	6.0	13,720
14/OH/14 UG	3.6	1,543
14 UG	10.0	19,377
16	.9	328
Subtotal Intertie	174.4	84,579
Teeland-Willow	26.0	7,888

Total Line	200.4	92,467
Total Substation Cost		8,440
Subtotal		100,907
R/W Acquisition ($40,000/Mile)		8,016
Mobilization-Demobilization	5%	5,045
Surveying		3,100
Engineering	6%	6,054
Construction Management	5%	5,045
Subtotal		128,167
Contingencies	25%	32,042
Total September 1981 Dollars		160,209
Inflation @ 10%/Year - 2 Years		193,853

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Western-Avoid State Park-Overhead Except Underground in Windy Pass and take Moody-Montana

Configuration: 2B17 230/345

Super Link No.	Miles	Total Cost
1	21.6	6,747
2	31.6	9,859
4	17.5	5,923
6	28.5	9,713
7	5.1	1,427
9	14.9	4,640
10	4.2	1,398
11/13 UG	17.4	5,320
13/13 UG	11.6	4,059
13 UG	6.0	13,720
15	14.9	4,759
16	0.9	328
Subtotal Intertie	174.2	67,893
Teeland-Willow	26.0	7,888
Total Line	200.2	75,781
Total Substation Cost		8,440
Subtotal		84,221
R/W Acquisition ($40,000/Mile)		8,008
Mobilization-Demobilization	5%	4,211
Surveying		3,100
Engineering	6%	5,053
Construction Management	5%	4,211
Subtotal		108,804
Contingencies	25%	27,201
Total September 1981 Dollars		136,005
Inflation @ 10%/Year - 2 Years		164,566

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Western-Avoid State Park-Overhead and Take Moody-Montana

Configuration: 2B18 230/345

Super Link No.	Miles	Total Cost
1	21.6	6,747
2	31.6	9,859
4	17.5	5,923
6	28.5	9,713
7	5.1	1,427
9	14.9	4,640
10	4.2	1,398
11	18.4	5,625
13	19.9	6,964
15	14.9	4,759
16	0.9	328
Subtotal Intertie	177.5	57,383
Teeland-Willow	26.0	7,888
Total Line	203.5	65,271
Total Substation Cost		8,440
Subtotal		73,711
R/W Acquisition ($40,000/Mile)		8,140
Mobilization-Demobilization	5%	3,686
Surveying		3,100
Engineering	6%	4,423
Construction Management	5%	3,686
Subtotal		96,746
Contingencies	25%	24,187
Total September 1981 Dollars		120,933
Inflation @ 10%/Year - 2 Years		146,329

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
PROJECT COST ESTIMATE
(Thousands of Dollars)

Route Description: Eastern-100% Overhead with Broad Pass East

Configuration: 2B19 230/345

Super Link No.	Miles	Total Cost
1	21.6	6,747
3	41.4	14,055
6	28.5	9,713
7	5.1	1,427
9	14.9	4,640
12	22.4	6,794
13	19.9	6,964
15	14.9	4,759
16	0.9	328
Subtotal Intertie	169.6	55,427
Teeland-Willow	26.0	7,888
Total Line	195.6	63,315
Total Substation Cost		8,440
Subtotal		71,755
R/W Acquisition ($40,000/Mile)		7,824
Mobilization-Demobilization 5%		3,588
Surveying		3,100
Engineering 6%		4,305
Construction Management 5%		3,588
Subtotal		94,160
Contingencies 25%		23,540
Total September 1981 Dollars		117,700
Inflation @ 10%/Year - 2 Years		142,417

ALASKA POWER AUTHORITY
ANCHORAGE-FAIRBANKS INTERTIE
SUMMARY COST COMPARISON
WITH SUSITNA

10/23/81

ROUTE NO.	MILEAGE *	ROUTE DESCRIPTION	CONFIGURATION 1A-138/138 kV CAPITAL COST	CONFIGURATION 1A-138/138 kV LIFE CYCLE COST	CONFIGURATION 1B-138/345 kV CAPITAL COST	CONFIGURATION 1B-138/345 kV LIFE CYCLE COST	CONFIGURATION 2B-230/345 kV CAPITAL COST	CONFIGURATION 2B-230/345 kV LIFE CYCLE COST**
1	180.5	Western-100% Overhead	$ 94,480,000	$119,800,000	$134,456,000	$ 75,600,000	$145,784,000	$ 77,200,000
2	182.5	Western-Overhead Except UG in Nenana Gorge	112,468,000	141,900,000	161,995,000	86,100,000	173,654,000	88,200,000
3	182.3	Western-Overhead Except Take Moody Montana	93,972,000	119,200,00	132,706,000	74,500,000	144,369,000	76,700,000
4	177.2	Western-Overhead Except UG in Windy Pass	105,237,000	134,100,000	152,363,000	82,300,000	164,026,000	84,300,000
5	179.2	Western-Overhead Except UG in Nenana Gorge and Windy Pass	125,266,000	157,400,000	180,234,000	93,200,000	191,898,000	95,300,000
6	179.0	Western-Overhead Except UG in Windy Pass and Take Moody Montana	105,727,000	133,500,000	150,948,000	81,700,000	162,607,000	83,700,000
7	173.5	Eastern-100% Overhead - Take Nenana Gorge	93,603,000	118,700,000	132,586,000	74,700,000	144,249,000	76,700,000
8	175.5	Eastern-Overhead Except UG Thru Nenana Gorge	111,591,000	140,700,000	160,457,000	85,700,000	172,120,000	87,700,000
9	175.3	Eastern-100% Overhead	93,096,000	118,100,000	131,170,000	74,100,000	142,830,000	76,100,000
10	170.2	Eastern-Overhead Except UG in Windy Pass and Take Nenana Gorge	105,361,000	133,100,000	150,828,000	81,800,000	162,488,000	83,800,000
11	172.2	Eastern-Overhead Except UG in Windy Pass and Nenana Gorge	124,392,000	156,300,000	178,699,000	92,800,000	190,358,000	94,900,000
12	172.0	Eastern-Overhead Except UG in Windy Pass	104,851,000	132,500,000	149,585,000	81,300,000	161,248,000	83,300,000
13	181.2	Western-Avoid St. Park-100% Overhead	95,886,000	121,700,000	136,084,000	76,000,000	147,745,000	78,000,000
14	177.9	Western-Avoid St. Park-Overhead Except UG Windy Pass	107,645,000	135,900,000	154,322,000	83,100,000	165,985,000	85,300,000
15	183.2	Western-Avoid St. Park-Overhead Except UG Nenana Gorge	113,874,000	143,700,000	164,128,000	87,100,000	175,790,000	89,100,000
16	179.9	Western-Avoid St. Park-Overhead Except UG in Nenana Gorge & Windy Pass	126,675,000	159,300,000	182,193,000	94,200,000	193,853,000	96,300,000
17	179.7	Western-Avoid St. Park-Overhead Except UG in Windy Pass and Take Moody	107,135,000	135,300,000	153,239,000	82,600,000	164,566,000	84,400,000
18	183.0	Western-Avoid St. Park-Overhead Except Take Moody Montana	95,377,000	121,100,000	134,998,000	75,500,000	146,329,000	77,100,000
19	175.1	Eastern-100% Overhead with Broad Pass East	92,800,000	117,800,000	130,800,000	74,000,000	142,417,000	76,000,000

TABLE 8
109

* Includes 5.5 Miles 138 kV Teeland-Willow

** Includes 26.0 Miles 230/345 kV Pt. Mackenzie-Willow

Life Cycle Cost Analysis

A prominent feature of Commonwealth's Feasibility Study Report that was submitted on May 1, 1981 is an analysis of the life-cycle costs and benefits of the intertie alternatives then under consideration. That analysis has been updated and expanded for purposes of this report, and the results are shown on pages following.

These are the specific similarities and contrasts between the original and the updated life cycle cost - benefit analysis:

1. The methodologies and purely economic parameters employed are identical;

2. The benefits are of identical value since examination disclosed no reason for change since May 1, 1981;

3. The analysis is expanded to deal with each of nineteen line construction and routing options described earlier in this report;

4. Whereas the previous analysis dealt with five possible intertie configurations, the updated analysis deals with only the three that still have significant interest namely:

   a) Configuration 1A - 138 kV initial operation, 138 kV future operation,

   b) Configuration 1B - 138 kV initial operation, 345 kV future operation,

   c) Configuration 2B - 230 kV initial operation, 345 kV future operation;

5. Capital costs are revised upward according to Commonwealth's most recent technical findings and cost estimates, and the life cycle costs are raised proportionately;

6. As before, the analysis is presented in the light of three scenarios, namely:

   a) Excluding or ignoring the future need for 345 kV transmission voltage,

   b) Including or recognizing the need for future 345 kV transmission voltage,

   c) Sensitivity analysis considering change in a variety of parameters and assumptions that affect the results of the analysis.

Based on the results of the new analysis as displayed in Tables 9, 10 and 11, these following conclusions are drawn:

1. The line construction and routing options rank in the same economic order under all three system configurations. Thus, line route selection could proceed independent of the configuration selection, if that were necessary.

2. Line construction/route option number 19 involves least capital, least life cycle cost and highest ratio of benefits to costs under all configurations and assumptions.

3. There are six other line construction/routing options that rank closely behind option 19. These are options 1, 3, 7, 9, 13 and 18.

4. The reason that the seven options noted above rank above the rest from an economic standpoint is that those listed do not involve underground cable sections while the remainder do.

5. The economic choice between Configuration 1A and 1B depends upon what one assumes regarding future need for voltages above 138 kV. Since Commonwealth is persuaded that there will be future need for 345 kV, and compares the two alternatives in this context, Configuration 1B appears preferrable.

6. In comparing Configurations 2B and 1B, it will be observed that the former involves approximately $11.6 million more capital investment while yielding essentially the same ratio of benefits to costs. On this basis, Configuration 1B appears to be the better choice.

TABLE 9

LIFE-CYCLE COSTS AND BENEFITS (a) OF THE ANCHORAGE - FAIRBANKS INTERTIE INCLUDING FUTURE NEED FOR 345kV INTERCONNECTION (b)

CONFIG.	INTERTIE VOLTAGE (kV) OPERATION	DESIGN	LINE CONST. OPTION	CAPITAL INVESTMENT ($ Millions)	COSTS ($ Millions) FIXED CHARGES(c)	RETIREMENT CREDIT(d)	REDEDICATION CREDIT(e)	OPERATION & MAINTENANCE	TOTAL	BENEFITS ($ Millions) ECONOMY INTERCHANGE	RESERVE SHARING(f)	TOTAL	RATIO OF BENEFITS TO COSTS
1A	138	138	1	94.5	142.1	-27.8	0.0	5.5	119.8	130.9	11.3	142.2	1.2
			2	112.5	169.2	-33.1	0.0	5.8	141.9	130.9	11.3	142.2	1.0
			3	94.0	141.4	-27.7	0.0	5.5	119.2	130.9	11.3	142.2	1.2
			4	106.2	159.7	-31.3	0.0	5.6	134.1	130.9	11.3	142.2	1.1
			5	125.3	188.5	-36.9	0.0	5.9	157.4	130.9	11.3	142.2	0.9
			6	105.7	159.0	-31.1	0.0	5.6	133.5	130.9	11.3	142.2	1.1
			7	93.6	140.8	-27.6	0.0	5.5	118.7	130.9	11.3	142.2	1.2
			8	111.6	167.9	-32.9	0.0	5.7	140.7	130.9	11.3	142.2	1.0
			9	93.1	140.0	-27.4	0.0	5.5	118.1	130.9	11.3	142.2	1.2
			10	105.4	158.5	-31.0	0.0	5.6	133.1	130.9	11.3	142.2	1.1
			11	124.4	187.1	-36.6	0.0	5.8	156.3	130.9	11.3	142.2	0.9
			12	104.9	157.8	-30.9	0.0	5.6	132.5	130.9	11.3	142.2	1.1
			13	95.9	144.2	-28.2	0.0	5.7	121.7	130.9	11.3	142.2	1.2
			14	107.6	161.8	-31.7	0.0	5.8	135.9	130.9	11.3	142.2	1.0
			15	113.9	171.3	-33.5	0.0	5.9	143.7	130.9	11.3	142.2	1.0
			16	126.7	190.6	-37.3	0.0	6.0	159.3	130.9	11.3	142.2	0.9
			17	107.1	161.1	-31.5	0.0	5.8	135.3	130.9	11.3	142.2	1.1
			18	95.4	143.5	-28.1	0.0	5.7	121.1	130.9	11.3	142.2	1.2
			19	92.8	139.6	-27.3	0.0	5.6	117.8	130.9	11.3	142.2	1.2
1B	138	345	1	134.5	202.3	-6.4	-126.0	5.8	75.6	132.5	11.3	143.8	1.9
			2	162.0	243.7	-6.3	-157.2	6.0	86.1	132.5	11.3	143.8	1.7
			3	132.7	199.6	-6.3	-124.5	5.7	74.5	132.5	11.3	143.8	1.9
			4	152.4	229.2	-6.4	-146.4	5.9	82.3	132.5	11.3	143.8	1.7
			5	180.2	271.0	-6.3	-177.6	6.1	93.2	132.5	11.3	143.8	1.5
			6	150.9	227.0	-6.3	-144.8	5.8	81.7	132.5	11.3	143.8	1.8
			7	132.6	199.4	-6.4	-124.2	5.8	74.7	132.5	11.3	143.8	1.9
			8	160.5	241.4	-6.4	-155.5	6.1	85.7	132.5	11.3	143.8	1.7
			9	131.2	197.3	-6.4	-122.7	5.8	74.1	132.5	11.3	143.8	1.9
			10	150.8	226.8	-6.4	-144.6	5.9	81.8	132.5	11.3	143.8	1.8
			11	178.7	268.8	-6.4	-175.8	6.2	92.8	132.5	11.3	143.8	1.5
			12	149.6	225.0	-6.4	-143.3	5.9	81.3	132.5	11.3	143.8	1.8
			13	136.1	204.7	-6.3	-128.3	5.9	76.0	132.5	11.3	143.8	1.9
			14	154.3	232.1	-6.3	-148.6	6.0	83.1	132.5	11.3	143.8	1.7
			15	164.1	246.8	-6.3	-159.6	6.2	87.1	132.5	11.3	143.8	1.7
			16	182.2	274.0	-6.3	-179.9	6.3	94.2	132.5	11.3	143.8	1.5
			17	153.2	230.4	-6.3	-147.5	6.0	82.6	132.5	11.3	143.8	1.7
			18	135.0	203.1	-6.3	-127.1	5.9	75.5	132.5	11.3	143.8	1.9
			19	130.8	196.7	-6.4	-122.2	5.8	74.0	132.5	11.3	143.8	1.9
2B	230	345	1	145.8	219.3	-5.4	-142.6	5.9	77.2	135.6	11.3	146.9	1.9
			2	173.7	261.3	-5.4	-173.8	6.2	88.2	135.6	11.3	146.9	1.7
			3	144.4	217.2	-5.4	-141.8	5.9	76.7	135.6	11.3	146.9	1.9
			4	164.0	246.7	-5.4	-163.1	6.0	84.3	135.6	11.3	146.9	1.7
			5	191.9	288.6	-5.4	-194.3	6.3	95.3	135.6	11.3	146.9	1.5
			6	162.6	244.6	-5.4	-161.5	6.0	83.7	135.6	11.3	146.9	1.8
			7	144.2	216.9	-5.4	-140.8	6.0	76.7	135.6	11.3	146.9	1.9
			8	172.1	258.9	-5.4	-172.0	6.3	87.7	135.6	11.3	146.9	1.7
			9	142.8	214.8	-5.4	-139.2	6.0	76.1	135.6	11.3	146.9	1.9
			10	162.5	244.4	-5.4	-161.3	6.1	83.8	135.6	11.3	146.9	1.8
			11	190.4	286.4	-5.4	-192.5	6.4	94.9	135.6	11.3	146.9	1.5
			12	161.2	242.5	-5.4	-159.8	6.1	83.3	135.6	11.3	146.9	1.8
			13	147.7	222.2	-5.4	-144.8	6.1	78.0	135.6	11.3	146.9	1.9
			14	166.0	249.7	-5.4	-165.2	6.2	85.3	135.6	11.3	146.9	1.7
			15	175.8	264.4	-5.4	-176.3	6.4	89.1	135.6	11.3	146.9	1.6
			16	193.9	291.6	-5.4	-196.4	6.5	96.3	135.6	11.3	146.9	1.5
			17	164.6	247.6	-5.3	-164.1	6.2	84.4	135.6	11.3	146.9	1.7
			18	146.3	220.0	-5.3	-143.7	6.1	77.1	135.6	11.3	146.9	1.9
			19	142.4	214.2	-5.4	-138.8	6.0	76.0	135.6	11.3	146.9	1.9

(a) Present worth of additional annual expenses and benefits during the period 1984 to 1993, inclusive.

(b) Assuming that in 1994 it will be necessary to raise the intertie voltage to 345kV in order to provide for transmission of power from Susitna or other new generating plants within the Railbelt, and/or provide general systems growth.

(c) For a 35 - year amortization period.

(d) Deduction for facilities retired in 1994.

(e) Deduction for facilities rededicated to 345kV transmission in 1994.

(f) Including the advantages of load diversity.

TABLE 10

LIFE-CYCLE COSTS AND BENEFITS (a) OF THE ANCHORAGE - FAIRBANKS INTERTIE EXCLUDING FUTURE NEED FOR 345kV INTERCONNECTION (b)

CONFIG.	INTERTIE VOLTAGE (kV) OPERATION	DESIGN	LINE CONST. OPTION	CAPITAL INVESTMENT ($ Millions)	COSTS ($ Millions) FIXED CHARGES	OPERATION & MAINTENANCE	TOTAL	BENEFITS ($ Millions) ECONOMY INTERCHANGE	RESERVE SHARING(c)	TOTAL	RATIO OF BENEFITS TO COSTS
1A	138	138	1	94.5	142.1	13.9	156.1	229.3	45.3	274.6	1.8
			2	112.5	169.2	14.5	183.8	229.3	45.3	274.6	1.5
			3	94.0	141.4	13.9	155.3	229.3	45.3	274.6	1.8
			4	106.2	159.7	14.2	173.9	229.3	45.3	274.6	1.6
			5	125.3	188.5	14.8	203.2	229.3	45.3	274.6	1.4
			6	105.7	159.0	14.1	173.1	229.3	45.3	274.6	1.6
			7	93.6	140.8	13.9	154.6	229.3	45.3	274.6	1.8
			8	111.6	167.9	14.5	182.3	229.3	45.3	274.6	1.5
			9	93.1	140.0	13.8	153.8	229.3	45.3	274.6	1.8
			10	105.4	158.5	14.1	172.6	229.3	45.3	274.6	1.6
			11	124.4	187.1	14.7	201.8	229.3	45.3	274.6	1.4
			12	104.9	157.8	14.1	171.8	229.3	45.3	274.6	1.6
			13	95.9	144.2	14.3	158.6	229.3	45.3	274.6	1.7
			14	107.6	161.8	14.5	176.4	229.3	45.3	274.6	1.6
			15	113.9	171.3	14.9	186.2	229.3	45.3	274.6	1.5
			16	126.7	190.6	15.1	205.7	229.3	45.3	274.6	1.3
			17	107.1	161.1	14.5	175.6	229.3	45.3	274.6	1.6
			18	95.4	143.5	14.3	157.8	229.3	45.3	274.6	1.7
			19	92.8	139.6	14.1	153.6	229.3	45.3	274.6	1.8
1B	138	345	1	134.5	202.3	14.5	216.8	232.2	45.3	277.5	1.3
			2	162.0	243.7	15.2	258.9	232.2	45.3	277.5	1.1
			3	132.7	199.6	14.5	214.1	232.2	45.3	277.5	1.3
			4	152.4	229.2	14.8	244.0	232.2	45.3	277.5	1.1
			5	180.2	271.0	15.4	286.5	232.2	45.3	277.5	1.0
			6	150.9	227.0	14.7	241.7	232.2	45.3	277.5	1.1
			7	132.6	199.4	14.7	214.1	232.2	45.3	277.5	1.3
			8	160.5	241.4	15.4	256.8	232.2	45.3	277.5	1.1
			9	131.1	197.2	14.7	211.8	232.2	45.3	277.5	1.3
			10	150.8	226.8	15.0	241.8	232.2	45.3	277.5	1.1
			11	178.7	268.8	15.7	284.4	232.2	45.3	277.5	1.0
			12	149.6	225.0	14.9	239.9	232.2	45.3	277.5	1.2
			13	136.1	204.7	14.9	219.6	232.2	45.3	277.5	1.3
			14	154.3	232.1	15.2	247.3	232.2	45.3	277.5	1.1
			15	164.1	246.8	15.6	262.4	232.2	45.3	277.5	1.1
			16	182.2	274.0	15.9	289.9	232.2	45.3	277.5	1.0
			17	153.2	230.4	15.1	245.6	232.2	45.3	277.5	1.1
			18	135.0	203.1	14.8	217.9	232.2	45.3	277.5	1.3
			19	130.8	196.7	14.6	211.4	232.2	45.3	277.5	1.3
2B	230	345	1	145.8	219.3	15.0	234.3	237.6	45.3	282.9	1.2
			2	173.7	261.3	15.6	276.9	237.6	45.3	282.9	1.0
			3	144.4	217.2	14.9	232.1	237.6	45.3	282.9	1.2
			4	164.0	246.7	15.2	261.9	237.6	45.3	282.9	1.1
			5	191.9	288.6	15.9	304.6	237.6	45.3	282.9	0.9
			6	162.6	244.6	15.2	259.8	237.6	45.3	282.9	1.1
			7	144.2	216.9	15.1	232.0	237.6	45.3	282.9	1.2
			8	172.1	258.9	15.9	274.7	237.6	45.3	282.9	1.0
			9	142.8	214.8	15.1	229.9	237.6	45.3	282.9	1.2
			10	162.5	244.4	15.4	259.8	237.6	45.3	282.9	1.1
			11	190.4	286.4	16.1	302.5	237.6	45.3	282.9	0.9
			12	161.2	242.5	15.4	257.8	237.6	45.3	282.9	1.1
			13	147.7	222.2	15.3	237.5	237.6	45.3	282.9	1.2
			14	166.0	249.7	15.6	265.3	237.6	45.3	282.9	1.1
			15	175.8	264.4	16.1	280.5	237.6	45.3	282.9	1.0
			16	193.9	291.6	16.3	308.0	237.6	45.3	282.9	0.9
			17	164.6	247.6	15.6	263.2	237.6	45.3	282.9	1.1
			18	146.3	220.0	15.3	235.3	237.6	45.3	282.9	1.2
			19	142.4	214.2	15.1	229.3	237.6	45.3	282.9	1.2

(a) Present worth of additional annual expenses and benefits throughout a 35-year period of debt amortization.

(b) Ignoring any effect that system expansion may have upon the operation and usefulness of the intertie.

(c) Including the advantages of load diversity.

TABLE 11

SENSITIVITY ANALYSIS
OF LIFE-CYCLE COSTS AND BENEFITS
OF THE ANCHORAGE-FAIRBANKS INTERTIE

	Excluding Need for Future 345 kV			Including Need for Future 345 kV		
	Costs(a) ($ In Millions)	Benefits ($ In Millions)	Ratio of Benefits To Costs	Costs(b) ($ In Millions)	Benefits ($ In Millions)	Ratio of Benefits To Costs
Configuration 1A-19 (138/138 kV)(c)						
1. Base Case	153.6	274.6	1.8	117.8	142.2	1.2
2. Energy Consumption						
High Growth	153.6	315.9	2.1	117.8	169.9	1.4
Low Growth	153.6	231.1	1.5	117.8	114.9	1.0
3. Additional Power Sources						
Military Generation-Fairbanks	153.6	234.0	1.5	117.8	118.4	1.0
Bradley Lake Hydro	153.6	279.0	1.8	117.8	143.3	1.2
Military and Bradley Lake Hydro	153.6	237.6	1.5	117.8	119.0	1.0
4. New Coal Fueled Power Plants	153.6	635.6	4.1	117.8	232.0	2.0
5. Alternative Fuels in Fairbanks						
North Slope Gas	153.6	145.1	0.9	117.8	69.7	0.6
LNG Gas	153.6	221.3	1.4	117.8	111.9	0.9
Configuration 1B-19 (345/138 kV)(d)						
1. Base Case	211.4	277.5	1.3	74.0	143.8	1.9
2. Energy Consumption						
High Growth	211.4	320.2	1.5	74.0	172.3	2.3
Low Growth	211.4	233.0	1.1	74.0	115.9	1.6
3. Additional Power Sources						
Military Generation-Fairbanks	211.4	236.3	1.1	74.0	119.7	1.6
Bradley Lake Hydro	211.4	282.0	1.3	74.0	145.0	2.0
Military and Bradley Lake Hydro	211.4	239.9	1.1	74.0	120.3	1.6
4. New Coal Fueled Power Plants	211.4	638.5	3.0	74.0	233.6	3.2
5. Alternative Fuels in Fairbanks						
North Slope Gas	211.4	147.8	0.7	74.0	71.3	1.0
LNG Gas	211.4	224.1	1.1	74.0	113.5	1.5
Configuration 2B-19 (345/230 kV)(e)						
1. Base Case	229.3	282.9	1.2	76.0	146.9	1.9
2. Energy Consumption						
High Growth	229.3	326.4	1.4	76.0	176.0	2.3
Low Growth	229.3	237.5	1.0	76.0	118.4	1.6
3. Additional Power Sources						
Military Generation-Fairbanks	229.3	240.9	1.1	76.0	122.3	1.6
Bradley Lake Hydro	229.3	287.5	1.3	76.0	148.1	1.9
Military and Bradley Lake Hydro	229.3	244.6	1.1	76.0	122.9	1.6
4. New Coal Fueled Power Plants	229.3	643.9	2.8	76.0	236.7	3.1
5. Alternative Fuels in Fairbanks						
North Slope Gas	229.3	150.2	0.7	76.0	72.7	1.0
LNG Gas	229.3	228.3	1.0	76.0	115.9	1.5

(a) Present worth of additional annual expenses and benefits throughout a 35-year period of debt amortization.
(b) Present worth of additional annual expenses and benefits during the period 1984 to 1993, inclusive.
(c) 138 kV construction and operation.
(d) 345 kV construction, 138 kV initial operation.
(e) 345 kV construction, 230 kV initial operation.

Commonwealth Associates Inc.
11/2/81

V. SUMMARY AND RECOMMENDATIONS

Commonwealth has carefully examined all of the factors affecting the selection of a line route for the Intertie Project, including environmental, engineering and operating concerns and costs.

During the evaluation, we have given consideration to various modes of constructing each of the major line segments (superlinks); the environmental impacts, the constructability, maintainability and reliability, and the total cost. It has been concluded that several combinations of the line route segments could be selected to provide an environmentally acceptable line route from Willow to Healy, and of those several combinations, the line route described as Configuration 1B-19 (Eastern Route 100% overhead with Broadpass east consisting of superlinks 1, 3, 6, 7, 9, 12, 13, 15 and 16) would have the least environmental impact (refer to Figure 18).

Careful evaluation of the various line route alternatives indicates that a line route parallelling the Parks Highway as close by as possible would be the easiest line to construct and maintain, however, we believe it is possible to construct and maintain a reliable line by several of the line route alternatives.

The total project capital costs have been estimated for each of three system configurations and all line route alternatives including costs for labor, materials, equipment, right-of-way clearing, and all other capital costs.

Life cycle costs including capital investment, fixed charges, retirement credit, Susitna rededication credit and operation, and maintenance costs have been estimated for each of the above-mentioned combinations.

For each of the system configurations considered, the line route alternative which was concluded to have the least environmental impact also has the lowest estimated capital investment, and lowest life cycle cost, and ranks among the highest in benefit to cost ratio.

The estimated benefit to cost ratios shows marginal ratios for System Configuration 1A (138 kV construction).

The estimated benefit to cost ratios for both System Configuration 1B (345 kV construction with 138 kV initial operation) and 2B (345 kV construction with 230 kV initial operation) ranges from 1.5 to 1.9.

By agreement with APA project manager, the cost estimates include the cost of 5.5 miles of 138 kV construction between Willow and Teeland although at this time it is assumed that portion of line will be financed and constructed by Matanuska Electric Association.

Also by agreement with APA project manager, we have assumed that the line construction contractor would be permitted land access at reasonable intervals of all line route segments except Moody-Montana pass. The construction cost has been estimated for each line segment or superlink by three construction modes. In calculating the capital cost for each line route alternative, the lowest cost construction mode was chosen except Moody-Montana pass which was assumed to be constructed without land access.

Based on the conclusions reached we recommend:

1. That the line Configuration 1B-19 be selected and that the result of the evaluation be presented to participating utilities and to the permitting agencies and barring any major dissent, that permits for construction of an overhead 345 kV line be initiated.

2. No further consideration be given to System Configuration 1A (138 kV construction between Willow and Healy).

3. APA should decide as quickly as possible whether they wish to give further consideration to System Configuration 2B in view of the $11.56 million additional capital costs associated with this configuration as compared with Configuration 1B.

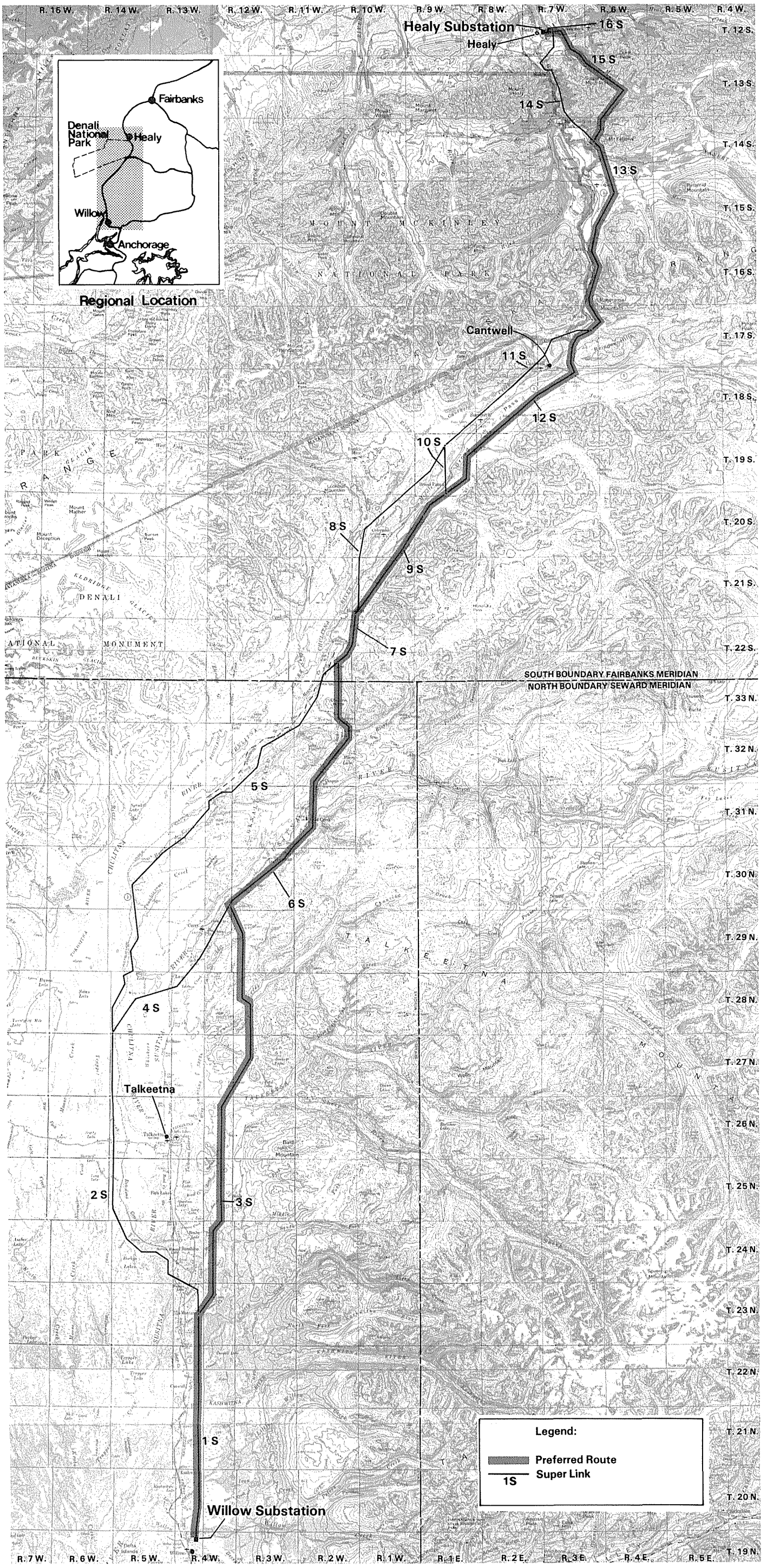


FIGURE 18

Alaska Power Authority **ANCHORAGE FAIRBANKS TRANSMISSION INTERTIE**

Preferred Line Route