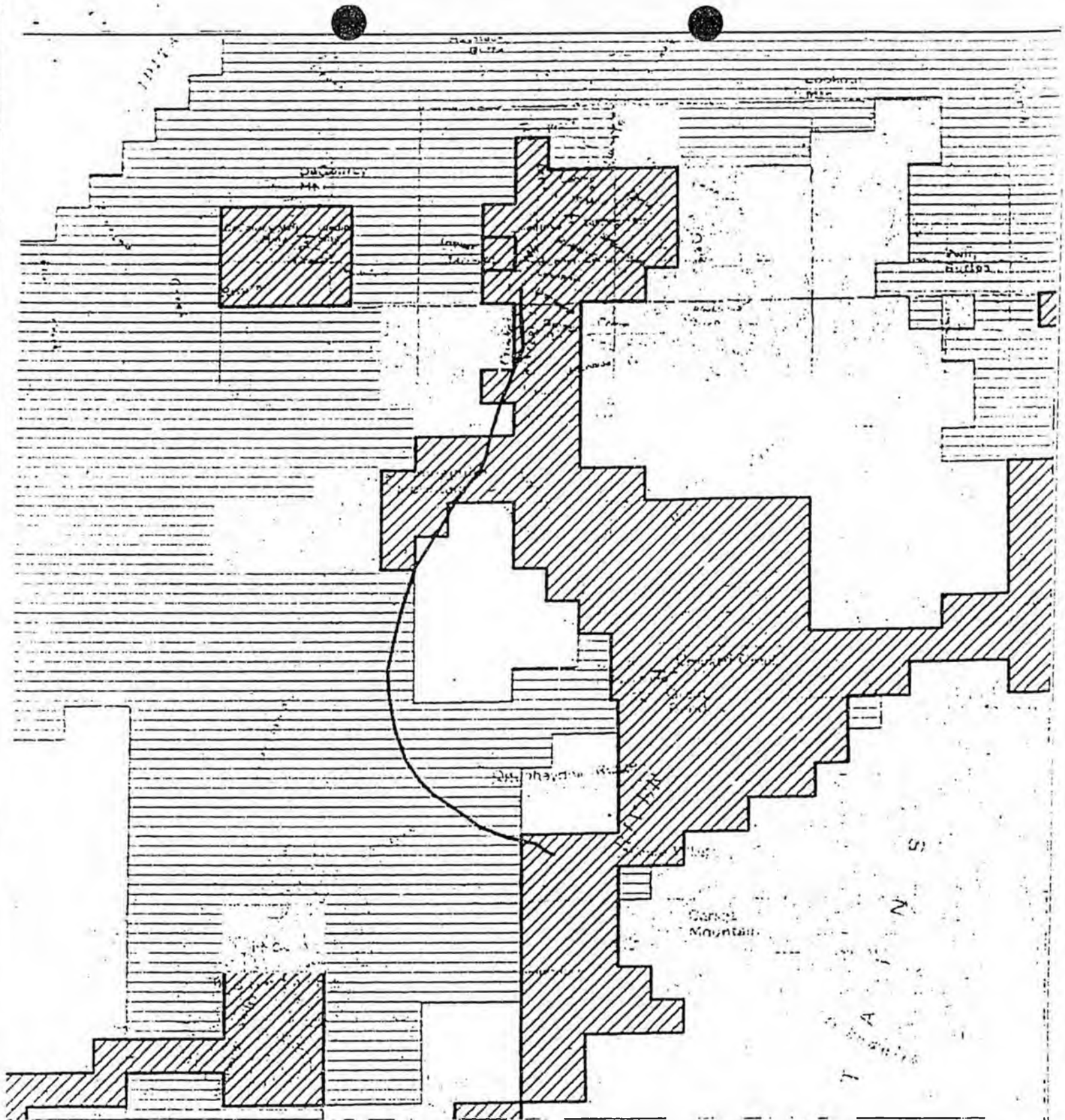
Unappropriated Federal Lands	7.3 Miles
State Selected	6 Miles
ANCSA Selected	1 Mile
ANCSA Conveyed	7.47 Miles
	24.8 Miles (estimate)



Proposed Route: Donlin Creek to Canoe Village

Map Base Steelmute and Iditarod 1:250000 quads
Projection UTM zone 4 NAD 1927 Datum
Calista Land Dept 2/10/99

Calista Corporation

601 W. 5th Avenue, Suite 200 • Anchorage, AK 99501-2226 • (907) 279-5516 Facsimile (907) 272-5060

Pat

March 31, 1999

The Honorable Ted Stevens
United States Senate
522 Hart Building
Washington, D.C. 20510-0201

Dear Mr. Chairman:

Per my conversations with Representative Gail Phillips, she indicated that you require certain information of the proposed road route, from Donlin Creek to Jungjuk Creek on the Kuskokwim River, namely, how much federal land does the road cross.

It is estimated, the proposed road map which was provided to your staff, the road crosses over the following designated lands:

- 2 miles of BLM lands
- 6.5 miles of ANCSA conveyed lands
- 1.5 miles of ANCSA selected lands
- 11 miles of State selected lands

Please be aware that the estimated total miles of the road may differ from what we originally submitted because we lack an actual road survey for the proposed route. In addition, we are producing an alternative road route, which will cross over more federal lands and could be a more preferable road design. As soon as we complete the proposed mapping we will send it to you, at least you will have an option to choose from.

If you need any further information please feel free to contact me at (907)279-5516. Thank you for your assistance and your attention in this critical matter.

Sincerely,

Richard Romer

Richard Romer
1st Vice President

cc: Representative Gail Phillips

REQUEST FOR FUNDING
PRELIMINARY ENGINEERING AND DESIGN
CROOKED CREEK DONLIN CREEK MINE ROAD

PROJECT BACKGROUND

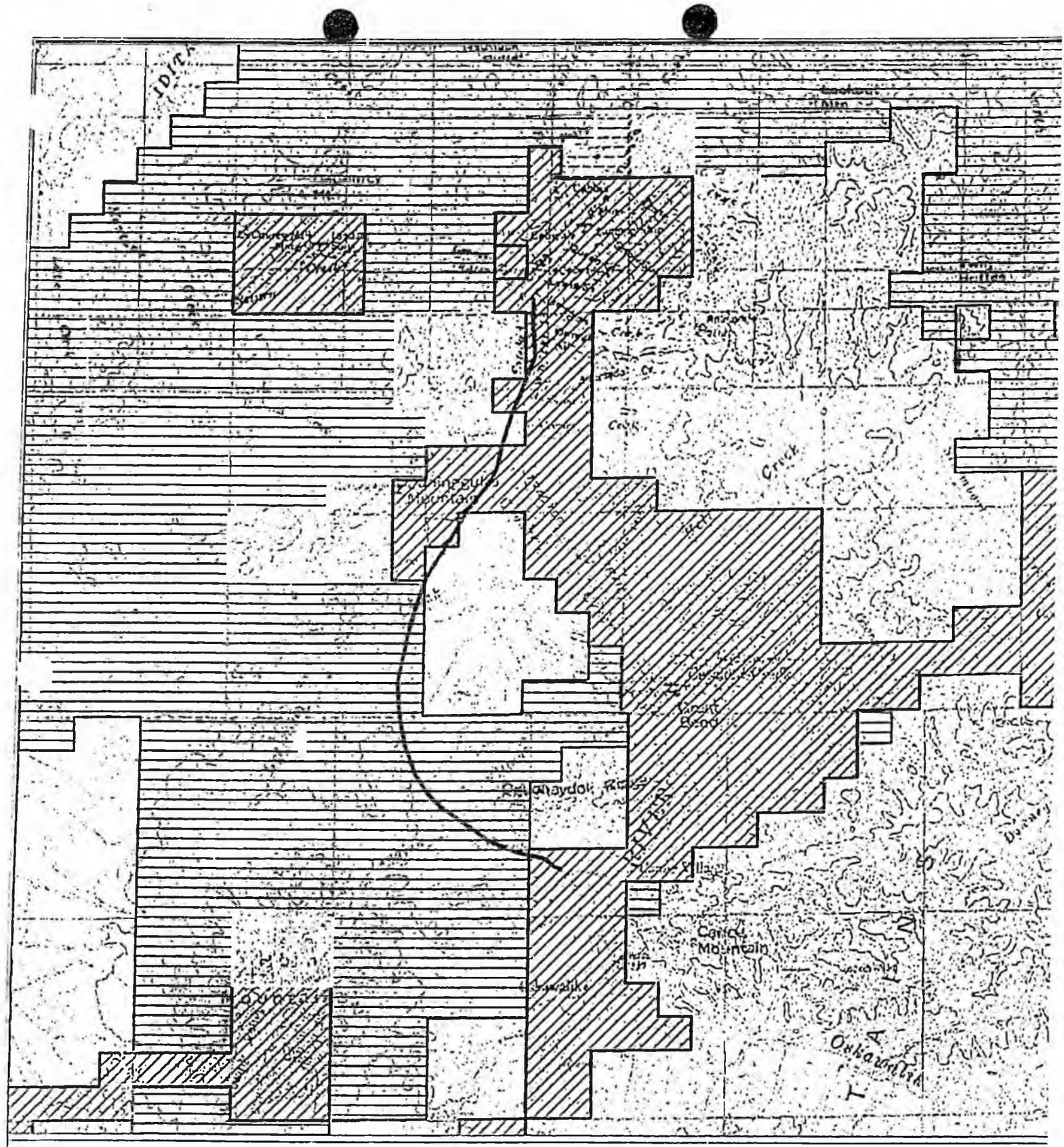
The Donlin Creek mine is a lode-gold exploration project located 15 miles north of the village of Crooked Creek (population 144). Small placer mining operations (total production 35,000 oz.) have been present in the area since 1915. In the mid-1980's, Calista geologists determined that a significant lode source could exist in the uplands above the existing placer mining operations near Snow Gulch.

In 1988 and 1989 Western Gold Mining an Exploration Ltd. (WestGold) spent $2 million drilling and trenching the Donlin Creek deposit. Based on their fieldwork they estimated the Donlin Creek gold reserve to be over 400,000 ounces. In 1995, Placer-Dome North America (PDNA) operated a $2 million exploration and drilling program. In 1996 and 1997 they extended $18 million on additional drilling and exploration work at Donlin Creek, delineating a 3.6 million-ounce gold resource. Successful field results in 1998 produced an estimated 11.5 million ounces of resource which could lead to a preliminary mine feasibility determination by the end of 1999.

The level of exploration and financial investment PDNA is making at the Donlin Creek Project is a sign this area is considered a very advanced exploration property. The actual development cost for a mine facility will require an outlay of more than $300 million dollars. The construction of an access road is just one of the costs associated with developing a producing mine. It is in the best interest of the mining industry that the State of Alaska encourages the development of remote mines.

An airstrip suitable for Hercules and DC-6 type aircraft was constructed at American Creek. Although it was expensive, Placer-Dome and Calista believed the expenditure was necessary to conduct advanced exploration. The airstrip will meet this project's needs for exploration support, but it will not be sufficient for use during actual construction and development of a mine. Long-term mine development will require access to the mine site over land. Over the next two years, it is essential to link the mine site with the Kuskokwim River via a road.

There is minimal road access to the Donlin Creek area. A pioneer road is in place from the placer mine sites at Snow Gulch and Queen Gulch. PDNA constructed an additional one and one half miles of road during 1997 from Queen Gulch to American Creek. The road provides access to the general location of the exploration camp, which was constructed in 1996. The road project and campsite represent a very high level of commitment by PDNA to undertake a viable exploration program to prove up the gold reserve in the area.



Proposed Route: Donlin Creek to Canoe Village

Map Base: Sleetmute and Iditarod 1:250000 quads
Projection: UTM zone 4, NAD 1927 Datum
Calista Land Dept. 2/10/09

BERING STRAITS NATIVE CORPORATION

Park Program
Roads for Committee

March 19, 1999

Representative Gail Phillips
State Capitol, Room 411
Juneau, Alaska 99801-1182

Dear Representative Phillips,

Thank you for your letter of March 9th in response to my letter suggesting a new resource road in the Nome area. I am enclosing some information for your review from our files including:

1) A Finding of No Significant Impact (FONSI) of the proposed road
2) BSNC's offer to grant an easement to the State to move the project forward
3) Portions of DOT/PF's Environmental Assessment of the project

The preferred alternative (#3) route would cost roughly three million to build. Summer maintenance is minimal ($4,000). This road would eliminate the sharp switch back at Anvil Creek and provide a shorter route into a known lode gold resource at Rock Creek. Published data from Kennecott Exploration indicate that the Rock Creek deposit has a resource of ten million tons grading .075 ounces per ton or, 750,000 ounces of gold.

Please let me know if I can provide further information. I sincerely, appreciate your assistance.

Sincerely,

Thomas S. Sparks
Land & Resource Manager BSNC

Map —> over —>

P.O. Box 1008 • Nome, Alaska 99762 • (907) 443-5252 • FAX (907) 443-2985

BERING STRAITS NATIVE CORPORATION

BERING STRAITS NATIVE CORPORATION
RESOLUTION 2-4-94-2

A resolution of the Bering Straits Native Corporation granting a perpetual subsurface easement and restrictive covenant to the Department of Transportation and Public Facilities.

RECITALS

WHEREAS, approximately eight million dollars of private exploration funds have been spent during the period between 1987 to present to assess the potential economic mineral reserves at Rock Creek and surrounding lands; and

WHEREAS, the State of Alaska, residents of the community of Nome and residents throughout northwestern Alaska will benefit from such a road through increased employment opportunities, severance taxes, and increased economic development within the private sector; and

WHEREAS, the existing Glacier Creek Road has numerous switch backs and steep grades, which pose a threat to public safety and do not adequately provide access for exploration and development of known and inferred economic mineral reserves; and

WHEREAS, a new resource development road will provide for greater public safety, increased access for exploration and development, and decrease winter maintenance cost; and

WHEREAS, the new resource development road connecting the Bob Blodgett Nome Teller Highway to Glacier Creek Road has been identified as a Priority #3 in the Department of Transportation and Public Facilities October 1993 Draft List of Priorities; and

WHEREAS, it will be at lease six to ten years before any Priority No. 3's will be under construction; and

WHEREAS, this road will be ready for construction in 1994; and

WHEREAS, mineral development is imminent and is pending completion of construction of this road; and

WHEREAS, it has been understood by BSNC, the City of Nome, Representative Richard Foster and Senator Al Adams that this project would remain a top priority of the DOT & PF; and

P.O. Box 1008 • Nome, Alaska 99762 • Phone (907) 443-5252 • FAX (907) 443-2985

Alaska State Legislature

· Interim (May-Dec) ·
[illegible] Eagle River Rd., Suite 140
Eagle River, Alaska 99577
☎ (907) 694-6683
fax (907) 694-1015

· Session (Jan-May) ·
Alaska State Capitol
Juneau, Alaska 99801-1182
☎ (907) 465-2199
fax (907) 465-4587

Toll free (800) 842-2199

· E-mail ·
Representative_Fred_Dyson
@Legis.state.ak.us

· Internet ·
http://www.akrepublicans.org

REPRESENTATIVE FRED DYSON

MEMORANDUM

04-05-99P01:55 CFND

May 4, 1999

To: Gail Phillips

From: Fred Dyson FDD

RE: Roads for Development

locally known as the "Williams pork" road

I would like to nominate the existing road from Iliamna Bay, Cook Inlet to Pile Bay, Lake Iliamna for development. This is an old road about 15 miles long. DOT has estimated some $15 million for rebuilding it to a really useful road.

The road goes from the NE corner of Lake Iliamna across a small river across the low mountain pass and down to tidewater at the head of Iliamna Bay on Cook Inlet. The existing bridge is too narrow for most traffic and may have weight limit problems. The road at the pass is now very narrow.

A rebuilding of this road and the same sort of docks or ramps at the waterfront will open the Lake Iliamna country to:

(1) Easier and cheaper logistics (supply) for area residents and business. Now freight must go across the North Pacific, through False Pass, east through Bristol Bay and up the Kuichak River to Lake Iliamna. The transverse of the Kuichak Flats is difficult at all times and impassable at low river periods.

(2) Access for the entire population riming Cook Inlet (CI) to immense and magnificent recreation opportunities. CI residents could take their watercraft from Homer (or other parts) to Iliamna Bay or Cook Inlet and then have access to all of Lake Iliamna. I anticipate that support services will develop to provide: barge service, trucking/trailing services, and watercraft rentals to meet customer needs.

(3) Tourist opportunities, the Lake Country has world class fishing, beauty, bird-watching, rock-hounding and good hunting.

(4) Ultimately there are some excellent mineral deposits in the area that will be economic someday. This haul road will be an asset to that development.

The only foreseeable downside to the road improvement is the significant impact on existing non-commercial residents. When I have discussed this issue with local residents, native corporations, and local legislators, there is consistent ambivalence. The existing local people will be impacted. The question is, should we improve access for thousands?

KENAI PENINSULA BOROUGH
144 N. BINKLEY SOLDOTNA, ALASKA 99669-7599
BUSINESS (907) 262-4441 FAX (907)262-1892

DALE BAGLEY
MAYOR

December 29, 1999

The Honorable Tony Knowles
Alaska State Governor
Post Office Box 110001
Juneau, Alaska 99811-0001

Re: Kenai Peninsula Borough Resolution 99-088
Williamsport – Pile Bay Road Upgrade

Dear Governor Knowles:

Following discussion with the numerous parties that would benefit from an upgrade of the Williamsport – Pile Bay Road, the Kenai Peninsula Borough Assembly adopted Resolution 99 – 088 on December 14, 1999.

The enclosed copy is being forwarded to you and cross-copied to those listed below. The Kenai Peninsula Borough Assembly considered the upgrade of this road of such importance to the borough that it is included in the list of capital improvements priorities.

Your efforts to support this project will be appreciated by all concerned.

Sincerely yours

Dale L Bagley

Dale L. Bagley
Kenai Peninsula Borough Mayor

cc: Mayor Glen Alsworth, Sr., Lake and Peninsula Borough
Manager Ron Drathman, City of Homer
Senator John Torgerson, Kenai Peninsula Borough Legislative Delegation
Senator Gary Davis, Kenai Peninsula Borough Legislative Delegation
Representative Jerry Ward, Kenai Peninsula Borough Legislative Delegation
Representative Hal Smalley, Kenai Peninsula Borough Legislative Delegation
Representative Gail Phillips, Kenai Peninsula Borough Legislative Delegation
Representative Carl Moses, Lake and Peninsula Legislative Delegation
Senator Lyman Hoffman, Lake and Peninsula Legislative Delegation
Commissioner Joseph L. Perkins, Department of Transportation

Introduced by:	Mayor
Date:	12/14/99
Action:	Adopted
Vote:	7 Yes, 0 No, 2 Absent

KENAI PENINSULA BOROUGH
RESOLUTION 99-088

A RESOLUTION IN SUPPORT OF THE WILLIAMSPORT-PILE BAY ROAD UPGRADE PROJECT

WHEREAS, there is a demonstrated need to improve the transportation system linking Cook Inlet with Iliamna Lake; and

WHEREAS, the Williamsport-Pile Bay Road acts as a gateway from Cook Inlet to Lake Iliamna and Lake Clark National Park, and

WHEREAS, the Williamsport-Pile Bay Road upgrade will provide economic opportunities for increased boat hauling traffic, freight transportation and tourism into the region; and

WHEREAS, the Kenai Peninsula Borough adopted Resolution 93-103 agreeing to act as local sponsor for a Corps of Engineers reconnaissance study in 1993; and

WHEREAS, the Corps of Engineers completed a feasibility study in 1995 that found the project to be economically feasible and environmentally acceptable; and

WHEREAS, the Williamsport-Pile Bay Road is a priority on the Kenai Peninsula Borough Capital Improvement list adopted in Resolution 99-010; and

WHEREAS, elected representatives and officials of the Lake and Peninsula Borough, the Kenai Peninsula Borough, and the City of Homer held a joint meeting on November, 6, 1999, to discuss the Williamsport-Pile Bay Road upgrade; and

WHEREAS, the Kenai Peninsula Borough will economically benefit from the increased use of the Williamsport-Pile Bay Road.

NOW, THEREFORE, BE IT RESOLVED BY THE ASSEMBLY OF THE KENAI PENINSULA BOROUGH:

SECTION 1. The Kenai Peninsula Borough strongly supports the Williamsport-Pile Bay Road upgrade project and supports the efforts of the Lake and Peninsula Borough to get the Williamsport-Pile Bay Road upgraded.

Lake and Peninsula Borough
P.O. Box 495
King Salmon, Alaska 99613

Telephone: (907) 246-3421
Fax: (907) 246-6602

January 14, 2000

Mayor Dale L. Bagley
Kenai Peninsula Borough
144 N. Binkley
Soldotna, AK. 99669-7599

SUBJ: Williamsport-Pile Bay Road / KPB Resolution 99-088

Dear Mayor Bagley:

The Lake and Peninsula Borough would like to express its appreciation to you and the Kenai Peninsula Borough Assembly for adopting Resolution 99-088: A Resolution In Support Of The Williamsport-Pile Bay Road Upgrade Project. We also appreciate your letter of support to Governor Knowles and your efforts to make this support known to legislators and other interested parties. Strong support for this project from the Kenai Peninsula Borough will definitely help us raise the profile of this project.

We would also like to thank you and the Borough Assembly for the hospitality you provided us back in November when we had our joint meeting in Soldotna. We really appreciated the warm reception we received. We believe the meeting was very productive and came away from it feeling that a mutually beneficial partnership was possible. It has been our intent to write a follow-up letter to that meeting and your recent letter and attached resolution reminded us that it was time to do so.

We believe that now is a good time to begin discussing where we should go next and how we can further develop our partnership. Following are several ideas on ways the Kenai Peninsula Borough could help us achieve our immediate objectives on this project so that we can keep making progress:

- Matching Money for EDA Grant: You will recall that we are applying for a $250,000 grant from the Economic Development Administration to replace or repair three and possibly four bridges on the road. The Lake and Peninsula Borough Assembly has pledged $50,000 as a local match to leverage this grant. DOT/PF will also be making a significant contribution. A local match contribution from the KPB would be very helpful because it would enable us to leverage more money and plan for additional

upgrades. This could include replacement of the Iliamna River bridge. This is the bridge who e size is placing limits upon the number of fishing boats that can be transported across the road. A contribution from the KPB also seems appropriate because two of the four bridges we are proposing to repair or replace are in the KPB.

- Memorandum of Understanding on Maintenance: As you know, one of the reasons that this project does not appear in DOT/PF's STIP is the fact that neither borough has agreed to accept responsibility for routine maintenance. It is our understanding that routine maintenance would cost approximately $50,000 to $60,000 per year maximum provided that major repairs were made first and we assume that the road will only be open in the late spring, summer, and fall. In other words, taking over routine maintenance responsibility might cost each borough between $20,000 to $30,000 per year. There are many other details to work out of course, but doing this would be a very significant step forward.
- Local Match for Military Operation: You may remember that we have asked the military to make improvements on the road as part of a training exercise under the IRT program. They have expressed some initial interest in this project and if they got involved, would probably do so in the summer of 2001. They will require local participation and this could include cash, logistical support, planning and permitting support, housing and supplies for the troops, etc.
- Technical and Planning Assistance: We could use assistance and support from your planning department. For example, Commissioner Perkins has made it known that he does not believe there should be a large State commitment to this project until it can be demonstrated that the public will have equal and unrestricted access to the dock and port facilities at either end. Therefore, we need to research existing land ownership at either end and identify suitable public lands (if any) that would be available for these facilities. If necessary, we need to identify willing sellers of private land and put together a package for the acquisition of those lands.
- Local Sponsorship / Corps of Engineers Project: Our borough's most immediate objective is to improve this road so that it is possible to transport more freight including fuel, construction materials and equipment, and other goods and services. This will lower the cost of living and stimulate economic development in the Lake Iliamna and upper Bristol Bay region. It is also likely that our communities will begin purchasing more goods and services from the Kenai Peninsula rather than Seattle or other commercial centers. Eventually, we may shift our focus to improving the dock and port facilities at either end of the road. This will of course mean dredging and new dock construction at Williamsport. A 20% local cash match is usually required for Corps of Engineers Projects of this type. This is potentially a large financial commitment that we all should be aware of and planning for.

We believe it would be prudent to establish a meeting schedule and get together on a regular basis to discuss these issues. The MOU on maintenance, local match for the EDA grant, and research on land ownership are our most immediate concerns.

Thanks to you and the Assembly for your time and consideration. Please do not hesitate to contact either myself or Walt Wrede, the Borough Manager, if you want to schedule a meeting. We are available to meet with you in Soldotna and want you to know that you,

your staff, and the Assembly are welcome to visit us in King Salmon or in one of the Lake Iliamna communities that would be most affected by this project. We hope to hear from your soon.

Sincerely,

Glen Alsworth Sr.
Mayor

c.

Governor Tony Knowles
Commissioner Joseph Perkins
Senator Lyman Hoffman
Representative Carl Moses
Senator John Torgerson
Senator Gary Davis
Representative Jerry Ward
Representative Hal Smalley
Representative Gail Phillips

SOUTHWEST ALASKA
TRANSPORTATION PLAN

FREIGHT MOVEMENT ISSUES AND IMPACTS

TECHNICAL MEMORANDUM

DRAFT

prepared for the

Alaska Department of Transportation and Public Facilities

prepared by

Parsons Brinckerhoff

December 1999

TABLE OF CONTENTS

LIST OF TABLES

INTRODUCTION

This report explores the probably freight movement impacts of selected alternatives developed as part of the Southwest Alaska Transportation Plan. The analyses presented herein focus on the proposed Trans-Peninsula Roadway, which would create an new overland route from Williamsport, which lies on the western shore of Cook Inlet, down the Alaska Peninsula, terminating at Ivanof Bay, Between these beginning and endpoints, the road would also link the following communities:[1]

- Pile Bay
- Pedro Bay
- Iliamna
- Nondalton
- Igiugig
- Naknek
- Egegik
- Pilot Point
- Ugashik
- Port Heiden
- Chignik Lagoon
- Chignik Lake
- Chignik
- Perryville

Ferry service linking the Kenai Peninsula with the Alaska Peninsula at Williamsport is proposed in conjunction with these roadway segments. Of the many transportation concepts explored and developed as part of the Southwest Alaska Transportation Plan, it is the proposed roadway links and Kenai to Alaska Peninsula ferry service, which taken together constitute a regional surface network, that have the most potential to impact freight movement—as reflected in changes or shifts in mode split, intermodal transfer nodes, and shipping costs. For this reason, the probable freight impacts of the Trans-Peninsula Roadway System merit special attention. The freight movement impacts of two scenarios within this alternative are explored: (1) those impacts associated with implementation of the Trans-Peninsula Roadway System in its entirety; and (2) those impacts resulting from implementation of a select portion of the alternative, namely, the proposed roadway and improvements between Williamsport and Pile Bay, along with navigational improvements at Williamsport.

Rehabilitation of the existing Williamsport to Pile Bay Road has important freight movement implications in its own right, whether or not any other links are built. The existing Williamsport to Pile Bay road is a 15.5-mile gravel road with one drained, earthen lane and no shoulder. Historically, the road has been used to transport fishing vessels of the Bristol Bay gillnet fleet between Cook Inlet and Bristol Bay, which allows a safer, faster route than sailing around the Alaska Peninsula. However, the road and its bridges are in extremely poor repair. Portions of the road do not meet minimum width standards and are too narrow for current use. All of the bridges have sufficiency ratings below 50, and one has washed out and been dismantled. The major limitation restricting boat-haul traffic is the existing metal bridge across the Iliamna River, whose interior dimension of 12 feet is too narrow for the typical gillnet boat. The project contemplated as part of this regional transportation plan would reconstruct and widen the existing road in accord with national design standards.[2] Also included as part of this project

[1] Levelock could be added to this list, depending on which of two options were selected.

[2] The project would rebuild the existing road to meet standards set forth for a rural major collector with an ADT of less than 250 vehicles per day, as specified by the American Association of State Highway and Transportation Officials (AASHTO).

element would be navigational improvements at Williamsport, including dredging the approach channel, as recommended by the US Army Corps of Engineers in its 1995 study.

If this project were implemented, then it would become feasible (technically) to barge goods to Williamsport, truck them to Pile Bay, and then barge them to communities lying along the shores of Iliamna Lake. Goods could be moved down the Kvichak River to Bristol Bay between early August and late October, when the river is ice-free and when its water level is high enough to support navigation. The lake itself is navigable for six months a year, between May and October. As such, a marine shipper would need to dedicate a barge to serve Iliamna Lake communities during the six months the lake is navigable.[3]

Three challenging tasks had to be accomplished in order to quantitatively estimate the impacts of the roadway links proposed as part of the Southwest Alaska Transportation Plan: (1) documentation of existing freight movement patterns in the region--by mode, volume, direction, and commodity type; (2) development of freight demand forecasts by community and basic commodity type for the 2020 design year; and (3) development of a methodology with which to compare aggregate freight movement costs under both existing conditions and under the proposed infrastructure improvements. Each of these tasks was made difficult by the paucity of detailed and complete data on commodity flows by type, volume, seasonal split, shipping cost, or mode.

Moreover, to the author's knowledge, to date, no systematic study of freight movement in Southwest Alaska has ever been undertaken.[4] While this report constitutes an effort to develop a stronger, more empirically based understanding of the region's freight patterns and needs, the scope of the planning effort precluded the level of additional primary data collection that would be necessary to develop a suitably accurate, detailed understanding of how freight moves into, out of, and around the region.

Because of the many gaps in the data, and other data issues, such as comparability, the discussion and findings reported herein have had to be built on the basis of numerous assumptions. Although these assumptions are based on the best information currently available (absent a major new data collection effort), there is no denying that changing one or more assumptions could change the outcome significantly. In this case the ultimate outcome of the report is an estimate of total freight movement cost savings achievable by building a road from Williamsport to Ivanof Bay. In sum, the findings reported herein should be taken for what they are—a conceptual, planning-level estimate of costs and benefits. Even where data are available, problems exist in terms of their comparability. For example,

- While the US Army Corps of Engineers (COE) Waterborne Commerce Statistics Department collects data on marine shipments to and from Chignik, the Federal Aviation Administration (FAA) does not collect data on airborne cargo for this community. In fact, "complete" data sets, that is, COE, FAA, and AMHS, are only available for a handful of communities.

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[3] Another reason to explore the freight movement impacts of this project as a stand-alone element has to do with the fact that of all the roadway links contemplated, this one faces fewer environmental and political obstacles than do the others. The Williamsport to Pile Bay segment may face fewer implementation obstacles because a roadway—albeit in poor repair and primitive—already exists. The project proposed as part of this transportation plan would renovate this road, paving it, widening it, and bringing it up to national standards. As such, the political and environmental issues surrounding most roadway projects in Alaska would not be as formidable as building a new stretch of infrastructure through undeveloped wilderness.

[4] To the author's knowledge this report reflects the first instance in which available primary data sources for different modes have been assembled in a single document for what comparative analyses they can support.

- While the COE data on marine shipments specify both origin and destination, the FAA reports only "freight enplaned."
- While the COE reports the basic type of commodity shipped by sea, no specification of any kind of airborne cargo is available in FAA data, nor in the AMHS data.
- None of the available sources provide any indication of the value of goods shipped.

Insofar as these fairly disparate data sources had to be combined in order to develop a single, multimodal picture of overall volumes moved, mode split, and other measures, the level of specificity was determined by the "lowest common denominator." From the data it was possible to determine how much freight, in aggregate, is handled in Southwest Alaska; mode split by volume, and gross breakdowns of commodity type. Additional manipulations were used to develop a sense of freight movement in the many smaller communities for which no data at all are available. These analyses are discussed in Part 3.

Because understanding the nature, sources, and limitations of the data upon which the report is based is so important to interpretation of the results, the report begins with a discussion of the data sources themselves.

NOTES ON THE FREIGHT MOVEMENT DATA

Three major source types were used to gain an understanding of freight movement in Southwest Alaska: (1) published primary sources; (2) unpublished primary sources, namely, in-person and telephone interviews with representatives of shipping companies operating in Alaska; and (3) published secondary sources.

Primary Sources

Published sources. Compilation by mode of the "raw" data needed to establish existing freight movement patterns in the region had already been carried out in an earlier deliverable for this planning effort, "Southwest Alaska Existing Conditions Technical Memorandum," April 1998. This document reported statistics gathered by the Federal Aviation Administration, the US Army Corps of Engineers Waterborne Commerce Statistics Division, and the Alaska Marine Highway System.[5] The nature and type of data provided by each of these sources are summarized in Table 1. These data are at the core of the freight demand forecasting process, and in turn, for the analysis of freight movement impacts attributable to the proposed alternatives, with particular emphasis on the Trans-Peninsula Roadway System.

[5] AMHS provided the consultant team with access to its computerized database, which includes information on the volume of freight vans carried, by sailing, origin, and destination.

Table 1.
Primary Sources of Freight Movement Data for Southwest Alaska

Freight Mode	Primary Sources	Type of Data	SW Communities for which data are available	
Air Freight[6]	Federal Aviation Administration: 1. Airport Activity Statistics of Certificated Route Air Carriers 2. Commuter Air Carrier Activity	• Tons of enplaned mail and cargo from 1987-95 for certificated route air carrier; from 1988 to 1996 for small certificated and commuter air • Enplaned tons are tons put on the airplane at the given location carriers	Cold Bay Dillingham Iliamna King Cove King Salmon Kodiak	Port Heiden St. George St. Paul Sand Point Togiak Unalaska
AMHS Freight[7]	AMHS Database	• Van volumes by number and van length • Origin and destination for all ports served by AMHS	Chignik Cold Bay False Pass King Cove	Kodiak Port Lions Sand Point Unalaska
Private Marine Freight	US Army Corps of Engineers, Waterborne Commerce Statistics Center	• Incoming and outgoing tonnage by freight category: • Petroleum and petroleum products • Durable goods • Fish and fisheries products • All other commodities 1986 to 1994	Chignik Cold Bay Dillingham Egegik False Pass Iliamna King Cove King Salmon Kodiak	Naknek Old Harbor Port Heiden Port Lions St. George St. Paul Sand Point Togiak Unalaska

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[6] Data on cargo and mail shipped via air are available from the Federal Aviation Administration /Bureau of Transportation Statistics (BTS) from two sources: 1) *Airport Activity Statistics of Certified Route Air Carriers* and 2) *Commuter Air Carrier Activity*. These data provided the tons of enplaned mail and cargo from 1987 to 1995 for certified route air carrier, and from 1988 to 1996 for small certified and commuter air carrier freight. For this analysis, data from more recent years was used, that is, 1990 to 1995 for certified route air carrier and 1990 to 1996 for small certified and commuter air carrier. The data (for both cargo and mail) from these data sets were summed for each year to develop an annual average for each airport. The data are collected as enplaned tons; i.e., cargo put on the airplane at the given location.

[7] Data on freight movement via AMHS were available from the AMHS Database, which provides van volumes, including each van's length in feet, by origin and destination. Van volumes were converted to a tonnage unit based on length. To convert feet to tons, each foot was multiplied by 650 for total pounds, then divided by 2000. The authors acknowledge that this equivalent is imprecise, since vans' weights are not measured or recorded. Nonetheless, the 650-pound figure is a conservative estimate the reference for which is *TRB Special Report 223, "Providing Access for Large Trucks,"* 1989, p.177. Data were available for each year from 1988 to 1997. For this analysis, data was averaged for the more recent years of 1992 to1996, because the data set for 1997 appeared incomplete.

Table 2.
Freight Movement Summary for Southwest Alaska

Community	FREIGHT MOVEMENT MODE					Total Tonnage
	Air	AMHS Vans		Private Marine		
	Combined Air (tons of cargo & mail enplaned)	Origin	Destination	Total Average (incoming tons)	Total Average (outgoing tons)	Total Reported
Akutan				8,300	11,200	19,500
Chignik		11	2	9,800	1,500	11,313
Cold Bay	782	8	29	3,100	900	4,819
Dillingham	4,372			10,900	7,300	22,572
Egegik				400	1,100	1,500
False Pass		4	0	300	100	404
Iliamna	1,255			0	0	1,255
King Cove	44	0	0	7,100	4,500	11,644
King Salmon/Naknek	5,413			19,800	23,600	48,823
Kodiak & Surrounding	3,516	770	845	252,900	304,800	562,831
Old Harbor				600	700	1,300
Port Heiden	119					119
St. George	59					59
St. Paul	181					181
Sand Point	185	2	6	9,100	100	9,393
Togiak	118					118
Unalaska	1,272	15	11	312,700	436,100	750,098
Total	17,326	810	893	635,000	791,900	1,445,929

Interviews. Another key source of primary data were in-person and telephone interviews conducted with representatives of Alaska Airlines, PenAir, ERA Aviation, Everts Air Fuel, Samson Tug and Barge, Crowley Marine Services, Bush Consolidators, Northland Transportation, Coastal Marine Transportation, Coastal Freight and Salvage, Iliamna Transportation Company, Harkness Enterprises, Sea-Land, Airland, and Carlile Transportation. These interviews elicited the carriers' views as to the probable pricing and service level effects of the alternatives proposed in this planning effort. These representatives also served as a "sounding board" in terms of the reasonableness of the methodology established to assess the freight movement impacts of the proposed alternatives.

In addition to the shippers and consolidators, a useful resource was found in Dennis Niedermeyer, at the suggestion of Southwest Alaska Advisory Committee member, Sheila Bergey. Niedermeyer, who is employed by the Lake and Peninsula School District, manages the district's capital projects. The projects are scattered throughout the Borough (whose boundaries, incidentally, incorporate almost all of the communities that would be linked by the Trans-Peninsula Roadway System). His work puts him in a unique position in terms of experiencing firsthand the difficulties and high costs associated with getting a wide range of goods, including building materials, heavy machinery, and petroleum products, to construction sites. His firsthand knowledge provides insight into the cost of moving goods to and within the region by type, mode, community, direction, and season.

In fact, Niedermeyer was in several respects a better source than the shippers themselves. First, he, unlike them, was able to provide candid, realistic rate estimates. The shipping companies contacted were, virtually without exception, circumspect about revealing rates for contract shipments. They attribute their reticence to two primary factors: (1) that revealing their rates would give their competition useful intelligence which would then be used to compete against them; and, (2) that revealing rates in a public document could open shippers up to charges of price gouging and other undesirable public scrutiny. The shippers did provide broad rate ranges, but anonymously. To the extent that shippers were used to estimate rates, under existing conditions, and under the hypothetical situation involving the proposed roadway system, multiple shippers were contacted and rate quotes were generally averaged to strive for as much validity in those rate quotes as feasible. Another reason that Niedermeyer's input was helpful is that shippers appeared to be familiar with only their mode and market niche, whereas Niedermeyer was able to provide a more accurate overview of freight shipment across commodity types and modes.

Secondary Sources

As noted, available primary sources in Southwest Alaska are limited in their ability to illuminate the full extent of regional freight movement. Therefore, a literature review was conducted to ferret out bits and pieces of freight movement information—particularly for smaller communities, on which subject the primary sources are completely silent. What we had hoped to find at this point was a clearer indication of how freight moves on to the smaller communities after having reached the marine and aviation hubs for which primary data are collected. Ultimately, this effort simply revealed how little freight movement in the Southwest has been studied. As such, the information uncovered in this literature review was of limited value in painting with even broad brushstrokes a picture of regional freight movement. In any case, listed in Table 3 are the secondary sources referenced in this effort to "fill in the blanks."

Table 3.
Secondary Sources of Freight Movement Data for Southwest Alaska

1. Alaska Department of Transportation and Public Facilities, *Alaska Intermodal Transportation Plan, Appendices A-C*, October 1994.

2. Alaska Department of Transportation and Public Facilities, Division of Planning Central Region, *Nondalton-Newhalen/Iliamna Pioneer Road Economic Feasibility Study*, March 1986.

3. Alaska Marine Highway System Department of Transportation and Public Facilities, *Alaska Marine Highway System Master Plan*, July 1991.

4. Community Planning, *Draft Secondary and Cumulative Impacts Study of the Proposed Iliamna-Nondalton Road Reconstruction*. Alaska Department of Transportation and Public Facilities, September 1996.

5. Department of Community and Regional Affairs, *Community Information Summaries*, downloaded from website www.comregaf.state.ak.us, June 1997.

6. Fried, Neal and Windisch-Cole, Brigitta, "A Trends Profile- The Bristol Bay Region" *Alaska Economic Trends*, July 1997.

7. HDR Alaska Inc., *Draft Assessment of Transportation Need, King Cove-Cold Bay Transportation Improvement Assessment*. Alaska Department of Transportation and Public Facilities, December 1997.

8. Kodiak Chamber of Commerce, *Kodiak Community Profile and Economic Indicators*, 1997.

9. Lake and Peninsula Borough, *Lake and Peninsula Borough FY'95 Transportation Improvement Program Priorities*. Prepared for the Alaska Department of Transportation and Public Facilities, October 1993.

10. Parsons Brinckerhoff, HDR Alaska, the Glosten Associates, Northern Economics, and Ogden Beeman Associates, *Southwest Alaska Transportation Plan- Existing Conditions Technical Memorandum*. Alaska Department of Transportation and Public Facilities, April 1998.

11. TRA-BV Airport Consulting, *Alaska Aviation System Plan Update Appendices*. Prepared for Alaska Department of Transportation and Public Facilities, March 1996.

12. TRA-BV Airport Consulting, *Alaska Aviation System Plan Update Executive Summary*. Prepared for Alaska Department of Transportation and Public Facilities, March 1996.

13. Tryck, Nyman, Hayes, Inc., *Reconnaissance of Navigation Improvements, Western and Arctic Coasts of Alaska, Task 1, 2, & 3*. Prepared for Alaska District Corps of Engineers, August 1997.

14. *Economic Impacts of the Copper River Highway*. Prepared for the State of Alaska Department of Transportation and Public Facilities, by the Institute of Social and Economic Research, University of Alaska, Anchorage, June 1993.

15. *Navigation Channel Feasibility Report and Environmental Assessment, Williamsport*; US Army Corps of Engineers, Alaska District, December 1995.

16. Parsons Brinckerhoff, Northern Economics, and the Glosten Associates, *Southwest Alaska Transportation Plan- Travel Demand Estimates Technical Memorandum*. Alaska Department of Transportation and Public Facilities, September 1998.

PART 1. OVERVIEW OF FREIGHT MOVEMENT IN SOUTHWEST ALASKA

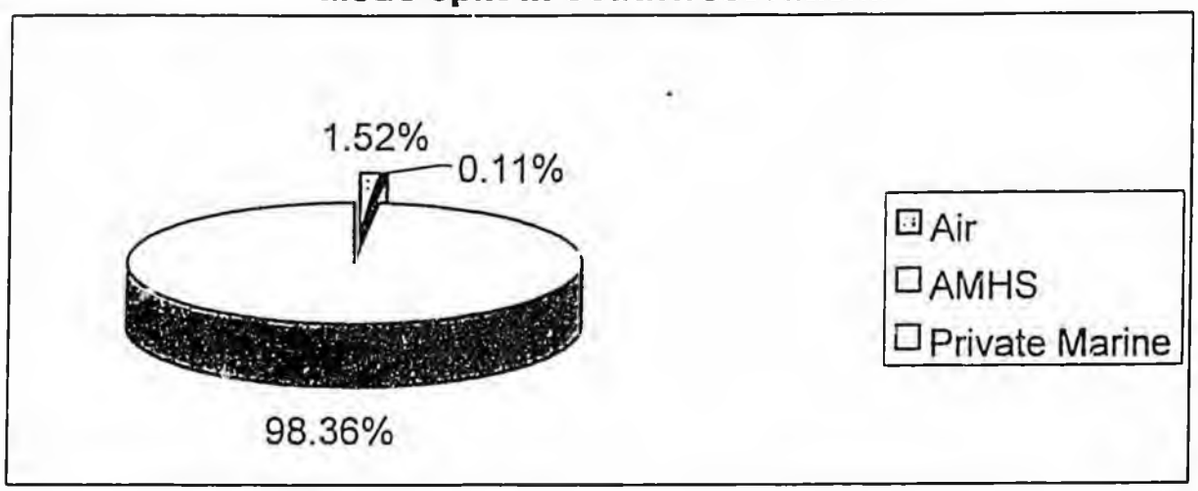
Because manufacturing in the region, outside of fish processing, is extremely limited, virtually everything Southwest Alaskans consume, apart from the subsistence resources they harvest, must be shipped in—by air or by sea. Imports include building materials, machinery, fishing support supplies, groceries, and consumer durables.

The vast majority of imports to the region originate not in Anchorage, but in the Puget Sound ports of Seattle and Tacoma. This is due to the fact that (1) Anchorage is a relatively minor manufacturer; and (2) Anchorage has few warehousing facilities, which limits its ability to serve as a transshipment point (Terry Hart, Sea-Land, Alaska Northbound Marketing Director, personal communications, September 23, 1999). In fact, Alaska ranks among the Port of Tacoma's biggest customers.[8] Unalaska, in addition to its role as a major fishing and fish-processing source, serves as a key international transshipment site—for Asia-bound goods and ship traffic.

MODE SPLIT

By volume, the vast majority of goods to and from Southwest Alaska are shipped by sea, via private carriers, which include both ships (container and Ro-Ro) and barges. Marine shipping accounts for over 98% of the volume of goods shipped through Southwest Ala...[9] AMHS freight haul makes up a miniscule percentage (less than 1%) of the region's total freight movement (Figure 1).

Figure 1.
Combined Freight Movement
Mode Split in Southwest Alaska



[8] Both SeaLand and TOTE, the largest Alaskan shippers, operate out of the Port of Tacoma.

[9] Data on private freight marine was available from the US Army Corps of Engineers, Waterborne Commerce Statistics Center. This data included both incoming and outgoing tons for 1986 to 1994 for 4 major categories: 1) petroleum and petroleum products, 2) durable goods, 3) fish and fisheries products, and 4) all other commodities. In analyzing the data it was important to note that in 1990 the Waterborne Commerce Statistics Center changed its data collection methods and started to record data in short tons, so an entry after 1990 of "0" indicates less then 500 short tons were reported. Annual data was averaged for Petroleum, Petroleum Products, Durable Goods, Fish, Fisheries Products, and All Other Commodities for 1986 to 1995.

Marine shipping in Southwest Alaska is challenging because of the region's harsh weather, small populations, and relatively undeveloped ports. Winter ice typically prevents any navigation to Bethel and other Bristol Bay ports as well as the northwest coast of the Alaska Peninsula. Small villages must often be served by lightering cargo from barges or small ships to landing craft or small boats. In the Bristol Bay region it is common for barges to be grounded at low tide and to spend a tide cycle on the beach discharging cargo. Barge-mounted cranes are typically used.

There are three primary components to marine shipping in Southwest Alaska:

(1) The large international shipping fleet represented by Sea-Land Services and American President Lines, both of which call at Unalaska on a weekly basis and transport frozen seafood products to the Far East. Sea-Land serves Kodiak and Dutch Harbor with freight from Seattle; APL only picks up export products for the Far East.

(2) The specialty ship fleet of Coastal Transportation and Western Pioneer Shipping. Both maintain fleets of small refrigerator ships. They are configured to carry frozen seafood south and general cargo and seafood processing supplies north. Coastal has a fleet of seven ships and Western Pioneer has a fleet of ten. Western also operates a fleet of bulk petroleum barges that distributes refined products from the Alaska Peninsula to Southwest Alaska and other points in Western Alaska.

(3) The barge operators that operate seasonal common carrier and contract services to Southwest Alaska. The principal barge operators are Northland Services and Samson Tug and Barge. These operators carry the majority of bulky freight to and from the towns and villages of Southwest Alaska. Container and individual items, such as buildings, vehicles, boats, construction equipment, and bulk materials can be transported on the flat deck barges operated by these carriers. Crowley Maritime also operates petroleum barges in the region. These carriers also act as feeder services for the international shippers and gather and distribute freight using Dutch Harbor as the hub. Other hubs include Naknek, Bethel, Sitka, and Kodiak. Sitka and Kodiak are used for transshipment of cargoes moving from Southeast Alaska and Prince William Sound ports.

A feature of marine service to Southwest Alaska is that capacity is quite elastic. Extra voyages can typically be added at the end of the normal season. For long-range projects, extra equipment can be dedicated to a service area. For example, both Western Pioneer and Coastal supplement their service during the peak of the fishing season. Furthermore, contract towing, wherein a customer contracts for a particular service, can provide substantial capacity; particularly for remote areas with only occasional service. Although excess capacity exists, it may not be available to all of the region's remote villages, or even some of its relatively large communities. This is because the fixed cost of making a stop is quite high. Aside from the fuel, and fixed vessel costs for the voyage, there is also the likelihood that a full longshore gang has to be called out—even for a small amount of cargo. One operator even noted that they provide service at a substantial loss during the off-season, in order to maintain relationships with customers for the peak season.

Table 5 contains a general schedule for marine service to Southwest Alaska ports. Do note that one item in this table is not up to date. Crowley recently rescinded its regularly scheduled service to Southwest Alaska for 1999, citing declining business, ostensibly related to poor fish harvests in Bristol Bay.

Table 4.
Freight Movement Mode Split
by Southwest Alaska Community

COMMUNITY	MODE			TOTAL	MODE SPLIT		
	Combined Air (tons of cargo & mail enplaned)	Combined inbound and outbound AMHS	Combined inbound and outbound Private Marine	TOTAL FREIGHT MOVED	% OF TONNAGE MOVED BY AIR	% OF TONNAGE MOVED BY AMHS	% OF TONNAGE MOVED BY PRIVATE MARINE
Akutan			19,500	19,500	0.00%	0.00%	100.00%
Chigniks*		13	11,300	11,313	0.00%	0.11%	99.89%
Cold Bay	782	37	4,000	4,819	16.23%	0.77%	83.00%
Dillingham	4,372		18,200	22,572	19.37%	0.00%	80.63%
Egegik			1,500	1,500	0.00%	0.00%	100.00%
False Pass		4	400	404	0.00%	0.99%	99.01%
Iliamna	1,255			1,255	100.00%	0.00%	0.00%
King Cove	44		11,600	11,644	0.38%	0.00%	99.62%
King Salmon/Naknek	5,423		43,400	48,823	11.11%	0.00%	88.89%
King Salmon	5,423			5,423	100.00%	0.00%	0.00%
Kodiak	3,516	1,615	557,700	562,831	0.62%	0.29%	99.09%
Naknek		0	43,400	43,400	0.00%	0.00%	100.00%
Old Harbor			1,300	1,300	0.00%	0.00%	100.00%
Port Heiden	119			119	100.00%	0.00%	0.00%
St. George	59			59	100.00%	0.00%	0.00%
St. Paul	181			181	100.00%	0.00%	0.00%
Sand Point	185	8	9,200	9,393	1.97%	0.09%	97.95%
Togiak	118			118	100.00%	0.00%	0.00%
Unalaska	1,272	26	748,800	750,098	0.17%	0.00%	99.83%
Total	**22,749**	**1,703**	**1,470,300**	**1,494,752**	**1.52%**	**0.11%**	**98.36%**

Note that "complete" mode split data are available only for a small subset of Southwest Alaska communities: Cold Bay, Dillingham, Kodiak, Sand Point, and Unalaska. This is a function of the basis upon which the data are collected. Akutan, as well as the Chigniks, for example, certainly experience some degree of airfreight movement. However, since cargo enplanement data are not available for these communities, it is no possible to ascertain the aviation cargo mode split without additional data collection. Similarly, the absence of marine cargo data for the communities in the Iliamna Lake area is another limitation. Though waterborne commerce statistics from the US Army Corps of Engineers are unavailable for Iliamna, it has been reported in another secondary source that only about 40% of freight is flown into Iliamna, the rest arriving by barge and landing craft (US Army Corps of Engineers, Navigation Channel Feasibility Report and Environmental Assessment, December 1995). The absence of marine cargo data for the communities in the Iliamna Lake area is another limitation.

Table 5.
General Service Schedule for Private Marine Shipping to Southwest Alaska

Carrie	Coastal Transportation	Crowley Marine Services, Inc.	Northland Services, Inc.	Samson Tug & Barge	SeaLand Service	Western Pione[illegible]	American President Lines
Frequency of Service / Port	Jan 1-Nov 15 Weekly Nov 16-Dec 31 Bimonthly Apr-Aug Twice Weekly	April–September Only	April–September Only	Year-Round Service–Weekly May–September	Year-Round Service	Supplemented During Fishing Season	Year-Round Service
Akutan	Weekly					Every 10 days	
Aleknagik		Village service* provided via Dillingham	Service provided via Bristol Bay Villages				
Anchorage		4 times per season	6 times per season		Bi-Weekly		
Chignik	Weekly	2 times per season				Every 10 days	
Clarks Point		3 times per season					
Cold Bay	Weekly					Every 10 days	
Dillingham		7 times per season	9 times per season				
Egegik		2 times per season	4 times per season				
Ekuk			3 times per season				
Ekwok		Village service* provided via Dillingham	Service provided via Bristol Bay Villages				
False P[illegible]ss	Weekly					Every 10 days	
Igiugig			Service provided via Bristol Bay Villages				
Illiamna			Service provided via Bristol Bay Villages				
King Cove	Weekly			Bi-Weekly		Every 10 days	
Kodiak		1 time per season		Bi-Weekly	Bi-Weekly	Every 10 days	
Kodiak Island		3 times per season					
Koliganek		Village service* provided via Dillingham	Service provided via Bristol Bay Villages				
Larsen Bay						Every 10 days	
Levelock			Service provided via Bristol Bay Villages				
Manokotak		Village service* provided via Dillingham	Service provided via Bristol Bay Villages				
Naknek		7 times/season (incl. occasional village svc)	9 times per season				
Nelson Lagoon		1 time per season					
New Stuyahok		Village service* provided via Dillingham	Service provided via Bristol Bay Villages				
Newhalen			Service provided via Bristol Bay Villages				
Old Harbor						Every 10 days	
Ouzinkie						Every 10 days	
Pedro Bay			Service provided via Bristol Bay Villages				
Pilot Point		Village Service provided via Naknek					
Port Heiden		Village Service provided via Naknek					
Port [illegible]ons						Every 10 days	
Port Moller		4 times per season				Every 10 days	
Saint Paul	Weekly					Every 10 days	
Sand Point	Weekly		2 times per season			Every 10 days	
Seattle	Weekly	Varies	Varies	Bi-Weekly	Weekly	Every 10 days	
South Naknek		5 times per season					
Togiak			2 times per season				
Ugashik		Village Service provided via Naknek					
Unalaska (Dutch Harbor)	Weekly			Bi-Weekly	Bi-Weekly	Every 10 days	Weekly

Village service is subject to sufficient cargo

PRIVATE MARINE TRANSPORT

The only mode for which it is possible to determine what commodity is being shipped, as opposed to simply volumes, is private marine. The statistics collected by the US Army Corps of Engineers Waterborne Commerce Statistics Department are broken down into four broad categories: Petroleum Products (which include gasoline, jet fuel, and industrial lubricants); Durable Goods; Fish and Fisheries Products; and "All Other." For the purposes of the analyses conducted in this report, Durable Goods and "All Other" are collapsed into a single category, "All Other."

The single largest category of goods shipped to and from Southwest Alaska communities as reported in the Waterborne Commerce Statistics is "Other," which includes diverse commodities, such as lumber, dry groceries, fishing gear, machinery, mobile homes, cement, boats, automobiles, toys, office supplies, and apparel. All told, "Other" accounts for about 40% of the goods shipped by sea to and from Southwest Alaska communities (Table 6).

Trailing close behind "Other" by volume, is the region's primary economic mainstay and export: fish products. Overall, fish products make up about 35% by volume of products shipped to and from Southwest Alaska by private marine carriers. The highest percentage is experienced in Egegik, where 60% of goods carried by marine carriers are fish products. percentages in King Salmon/Naknek and King Cove are also relatively high.

Petroleum products make up a significant proportion of the freight carried by private marine shippers within Southwest Alaska. Petroleum products, compared to products such as lumber, dry groceries, or heavy machinery, are relatively inexpensive to ship, since they require much less handling and less wasted space than do products that have to be packaged and moved individually. Petroleum products are simply pumped in and pumped out mechanically.

Overall, about 26% of the volume of cargo moved by private marine carriers consists of petroleum products. The percentage is particularly high in selected communities, such as Old Harbor, where it reaches fully 83.3%, and to slightly lesser extents in Cold Bay and Chigniks, where the totals are 74.6% and 64.6%, respectively. Unalaska is by far the single largest recipient of petroleum products—ostensibly related to its role as a fueling and transshipment point for marine vessels. Unalaska alone accounts for 417,873 tons of petroleum shipments per year, which represents 70.5% of the regional total of petrol products.

Table 6.
Private Marine Shipments for Southwest Alaska:
Basic Commodity Type Splits
(incoming and outgoing, in tons)

Trip End	Incoming or Outgoing Petrol	Incoming or Outgoing Fish	Incoming or Outgoing Other	TOTAL	PETROL SPLIT	FISH SPLIT	"OTHER" SPLIT
Chignik (or Fisheries or Lagoon)	5,250	375	2,500	8,125	64.6%	4.6%	30.8%
Cold Bay	2,750		935	3,685	74.6%	0.0%	25.4%
Dillingham and Aleknagik	7,000	3,750	11,265	22,015	31.8%	17.0%	51.2%
Egegik	375	1,125	375	1,875	20.0%	60.0%	20.0%
False Pass	125		125	250	50.0%	0.0%	50.0%
Iliamna and Newhalen			976	976		0.0%	100.0%
King Cove	3,375	3,625	4,414	11,414	29.6%	31.8%	38.7%
King Salmon and Naknek	11,000	24,375	24,387	59,762	18.4%	40.8%	40.8%
Kodiak	65,875	105,625	427,903	599,403	11.0%	17.6%	71.4%
Old Harbor	625	125		750	83.3%	16.7%	0.0%
Port Heiden			114	114	0.0%	0.0%	100.0%
Port Lions	625		882	1,507	41.5%	0.0%	58.5%
Sand Point			139	139	0.0%	0.0%	100.0%
St. George			60	60	0.0%	0.0%	100.0%
St. Paul			176	176	0.0%	0.0%	100.0%
Togiak and Togiak Fish			139	139	0.0%	0.0%	100.0%
Unalaska	293,500	383,250	122,930	799,680	36.7%	47.9%	15.4%
Total	**390,500**	**522,250**	**597,320**	**1,510,070**	**25.9%**	**34.6%**	**39.6%**

AMHS FREIGHT TRANSPORT

As noted, the percentage of freight carried by AMHS in Southwest Alaska is extremely small. Private carriers simply do not perceive AMHS in its current capacity as a competitor for marine shipment (Terry Hart. Alaska Northbound Marketing Director, personal communications, October 1999).This is likely due to several factors, including the following:

- Current AMHS service to Southwest Alaska communities along the Alaska Peninsula and Aleutian chain is extremely infrequent.
- Compared to private marine shippers, AMHS vessels have very little capacity. For example, while the vessels used in Sea-Land's Alaska service have capacity for about 400 vans, the *Tustumena* can only accommodate in the neighborhood of eight vans.
- Given that they make multiple port calls, AMHS vessels are relatively slow cargo conveyers, compared to private service.
- As a non-competing freight carrier, AMHS is not oriented to providing high-volume, highly efficient logistical capability. For instance, while private carriers often arrange for the delivery of goods from ship or barge to its ultimate destination, AMHS does not offer full service shipping services.
- Most goods shipped to Southwest Alaska originate in Seattle/Tacoma, not Anchorage. Even if they did originate in Anchorage, they would still have to be transported overland to the current ferry terminal at Homer, since AMHS does not currently operate out of Anchorage. Costs accompany each modal transfer. In contrast, private carriers can sail directly to Southwest Alaska from Seattle, or they can proceed to Southwest Alaska following a brief stop in Anchorage to unload goods.

AIR FREIGHT TRANSPORT

Although air freight makes up less than 2% of all Southwest Alaskan freight movement by volume, it is very important for certain types of goods, such as those with high value and or relatively low weight and volume. Another function served by air freight is to move goods that could be moved by barge more economically—such as building materials—but which, for whatever reason, including poor planning, have to be flown in—either because they are so time-sensitive or because winter ice precludes marine shipment.

Air freight is also critical to those communities, such as Dillingham and Iliamna, which are difficult or impossible to reach by water during much of the year. The dependence of communities like Dillingham and Iliamna on air freight is reflected in Table . This table indicates that 19% of Dillingham's freight moves by air, and 100% of Iliamna's.[10] Cold Bay, and King Salmon also rely relatively heavily on of air freight. In Cold Bay, 16.23% of freight by volume is handled by air. In King Salmon, the figure is 11.11%.[11]

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[10] The 100% air freight figure for Iliamna is misleading insofar as it does not take into account the barge shipments provided by Coastal Transportation Inc., which serves communities on Lake Iliamna during the brief summertime window when the Kvichak River is high enough to support navigation. This case again reflects the limitations of the US Army Corps of Engineers statistics, which are only collected at relatively major marine ports; the data collection does not extend to cover what happens to the freight once it is broken down to smaller vessels at ports such as Naknek.

[11] Another possibility for these communities' high air freight mode split is that the communities that experience higher rates of air transport also have lower rates of seafood exports—which magnifies the weight of cargo flown out since the mode splits are calculated on a percentage of volume basis.

Three of the four communities that are relatively dependent on air freight have long runways (Cold Bay, Dillingham, and King Salmon). In fact, each of these communities was considered a candidate in an earlier analysis to serve as a regional aviation hub. Clearly, these communities are already to some extent functioning as hubs.

Table 7.
Airport Runway Lengths for SW Alaska Communities Most Dependent on Air Freight

Airport	Runway Length (feet)
Cold Bay	10,420
Dillingham	6,404
Iliamna	5,085
King Salmon	8,500

The Role of the Mail Service in Southwest Alaskan Air Freight Movement

The US Postal Service (USPS) plays a bigger role in air freight movement in Bush Alaska than virtually anyplace else in the country. In fact, Crowley Marine cites USPS Bypass Mail as the #1 factor in its suspension of regularly scheduled barge service to Southwest Alaska (Jim Vandeveen, Crowley Marine, personal communications, 11/10/99). The USPS is mandated by law to provide universal mail service throughout the US at uniform rates, regardless of the fact that it is far more expensive to carry out this service in places like Southwest Alaska, where long distances and harsh conditions make air movement of the mail (including freight, such as groceries, carried as mail) necessary. Because mail rates must be uniform throughout the country, it costs far less to mail freight by parcel post through the USPS than it would to send goods through a private carrier. Tables 8 and 9 provide a comparison of rates for private air freight movement, priority mail, and Bypass Mail.[12]

[12] The Bypass Mail Program allows post shipments to bypass a post office, with postage affixed at its origin, thus benefiting from the uniform rate used by the postal service as described below.

Table 8.
Typical Air Freight and Mail Rates Between Representative City Pairs
($/Pound)

City Pairs	Distance (mi.)	Freight Rate		USPS Priority Mail 2 days			USPS Parcel Post (Bypass) Mail 4-7 Days		
		100lb	100lb-499lb	Up to 1lb	10lb	10lb-70lb (limit)	1lb	10lb	70lb (limit)
Anchorage–Dillingham	329	.70	.50	10.00	1.00	.48	2.31	.31	.08
Anchorage–Iliamna	195	.45	.34	10.00	1.00	.48	2.31	.31	.08
Anchorage–King Salmon	289	.70	.50	10.00	1.00	.48	2.31	.31	.08
Anchorage–Kodiak	252	.70	.49	10.00	1.00	.48	2.31	.31	.08
Anchorage–St. Paul	767	1.07	.97	10.00	1.00	.48	2.31	.31	.08
Dillingham–Anchorage	329	.45	.32	10.00	1.00	.48	2.31	.31	.08
Iliamna–Anchorage	195	.35	.32	10.00	1.00	.48	2.31	.31	.08
King Salmon–Anchorage	289	.45	.32	10.00	1.00	.48	2.31	.31	.08
Kodiak–Anchorage	252	.45	.34	10.00	1.00	.48	2.31	.31	.08
St. Paul–Anchorage	767	.69	.58	10.00	1.00	.48	2.31	.31	.08

Table 9.
Rates Applied to Example of 70-lb. Package

City Pair	Shipping Cost via Commercial Air	Shipping Cost via Priority Mail	Shipping Cost via Parcel Post (Bypass Mail)
Anchorage–Dillingham	$49.00	$33.60	$5.60
Anchorage–Iliamna	$31.50	$33.60	$5.60
Anchorage–King Salmon	$49.00	$33.60	$5.60
Anchorage–Kodiak	$49.00	$33.60	$5.60
Anchorage–St. Paul	$74.90	$33.60	$5.60
Dillingham–Anchorage	$31.50	$33.60	$5.60
Iliamna–Anchorage	$24.50	$33.60	$5.60
King Salmon–Anchorage	$31.50	$33.60	$5.60
Kodiak–Anchorage	$31.50	$33.60	$5.60
St. Paul–Anchorage	$48.30	$33.60	$5.60

An example illustrates the tremendous savings achievable by sending goods via the US Postal Service. Whereas it would cost $49.00 to send a 70-pound package from Anchorage to Dillingham via a private air freight shipper, the same package could be sent for $33.60 via Priority Service, or for a mere $5.60 if sent via Bypass Mail. No wonder one overland shipper in Alaska noted that, "*Everything that can be shipped through the Mail already is.*" Another cited the case of an Alaskan who had had most of the materials he used in building his house shipped piecemeal via Bypass Mail.[13] Freight consolidators, whose niche in the logistics market focuses on exploiting the opportunities provided by the USPS, operate in both Anchorage and Seattle.

The subsidization of mail delivery costs provides considerable benefits for the Alaskan residents and for air carriers that operate in the state. Air carriers rely on their mail delivery work as a mainstay of their Alaska service (Neil Fried, State of Alaska Economist, personal communications, September 30, 1999). The carriers' duty to carry mail to remote areas of the state also makes it more economical for them to provide passenger and private freight service. In the absence of the air freight business provided by the federal government to carriers to deliver mail by air, Alaskans would receive less frequent air service—at higher cost.

Under the current system, the USPS allocates mail equally among all carriers offering regularly scheduled service within a similar time frame. "The requirement to maintain competitive service frequency to handle a share of the mail has resulted in more frequent passenger service between Anchorage and Fairbanks and western-arctic hubs, and between hubs and outlying villages that could be supported otherwise" (*Alaska Intermodal Transportation Plan*, Alaska Department of Transportation and Public Facilities, October 1994). Communities in Southwest Alaska that currently serve as hubs include Cold Bay, Port Heiden, Dillingham, Kodiak, King Salmon, and Unalaska/Dutch Harbor.

Between 1987 and 1995, about 11% of total air freight by volume to Southwest Alaska comprised mail. Moreover, this percentage is increasing. The costs borne by the USPS to serve Alaska with the Bypass Mail Program have multiplied rapidly (Table 10). Between 1986 and 1991 the intra-Alaska air transportation costs paid by the USPS increased from $59 million to $95 million, most of which went to pay to move parcel post mail. "The increase in costs is due to increased volume, especially to bush destinations, as well as rate increases made under the continuing ratemaking responsibility of the US Department of Transportation to regulate the mail pay rates to air carriers in Alaska.

The deficit resulting from the difference between Alaska parcel post revenue from postage and the cost of purchased air transportation alone has risen from $23 million in 1986 to $70 million in 1991" (*Alaska Parcel Post Task Force Report*. 1993, provided by Carl Siebe, DOT&PF, January 1999). According to this report, the USPS, which was separated from direct Congressional control in 1971, is under pressure to operate more cost-effectively, and to balance user fees, in the form of postage, with delivery methods that allow the USPS to meet the actual costs of providing service. With this goal in mind, the USPS is seeking ways to deliver mail to remote regions of Alaska at a lower cost. Any such efforts will be monitored carefully by Alaska's congressional delegation, insofar as their effects on Alaskans' mobility and access to goods and services will be significant, particularly in the bush. In light of this pressure, one observer

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[13] As the result of public outcry over this case, USPS regulations were tightened up to specifically exclude building materials from eligibility for mail shipment (Sam Krogstad, Bush Consolidators, personal communications, October 4, 1999). Other items that cannot be mailed are hazardous materials, as defined by either the USPS or the air carrier.

suggested that the assumption that Alaska will always enjoy low postal rates may not be valid—particularly if and when the state's clout in Congress, now at an all-time high—were to suffer (Neil Fried, personal communications, September 30, 1999.[14]

Table 10.
Alaska Parcel Post
Financial and Operating Summary, 1986-1991

Fiscal Year	Volume (pounds) Mainline	Bush	Revenue	Costs	Loss
1986	90.5	36.4	$8	$31	$23
1987	96.2	38.5	$8	$47	$39
1988	102.3	42.6	$9	$58	$49
1989	108.5	47.0	$11	$62	$51
1990	113.2	49.5	$10	$79	$69
1991	113.7	52.0	$12	$82	$70
% Increase	25.6%	42.9%	50.0%	164.5%	204.4%

Were postal rates paid to move freight as mail to rise to levels that more accurately reflect the actual costs of delivery, then several repercussions would be likely.

- Rural Alaskans, including those who live and work in Southwest Alaska, would have to pay higher rates to mail in consumables, including groceries;
- The price of private freight *and* passenger movement would likely increase, with decreases in service frequency and convenience;
- As the result of the first two repercussions, benefits due to provision of a modal alternative, e.g., the Trans-Peninsula Roadway System, would be much magnified, with a shift from air to roadway transport of mail and other goods assumed.

[14] Congress could end the bypass mail system, which would adversely affect the convenience of using parcel post and add to the total cost of moving goods (though not the postage rates themselves). Congress could also require that all postage rates reflect the cost of provision, but that would affect communities in every state and would probably not be politically feasible regardless of Alaska. Congress could not selectively change rates for Alaska alone.

PART 2. FREIGHT TRANSPORT DEMAND FORECASTS

Described in this section is the methodology developed to forecast freight transport demand for Southwest Alaska. Forecasts were developed for Petroleum Products, Fish Products, and "Other" Products, including Mail.

FREIGHT FORECASTS FOR PETROLEUM PRODUCTS

To forecast petroleum freight moved, several variables were tested statistically to determine which of them produced the best "fit" in predicting freight volumes. The best and final model includes population, and a variable to indicates the type of airport and marine facilities at the community (either only a community services port, a commercial services port or airport HUB, or both a commercial services port and an airport HUB). For the purpose of the forecast it is assumed that the types of marine or airport facilities at a community will be the same in the year 2010 and 2020. This model is as follows:

$$\text{Tons of Petroleum Shipped} = (2.443375)(\text{Population}) + (27778.04)(\text{Port Types})$$

The "goodness of fit" or R^2 coefficient for this model was poor, about 0.286, indicating that only about 29% of the variation in petroleum shipped can be explained by population and marine and airport types. This model is based on a limited data set of only 11 records. Only a limited data set is available because confidentiality requirements. To help improve the accuracy of the model, forecast volumes were adjusted.[15]

Petroleum shipments are forecast to stay about the same at most communities in Southwest Alaska. Petroleum shipments, however, are forecast to decrease at Cold Bay for the low, base, and high 2010 and 2020 scenarios. Shipments are also forecast to decrease slightly at several other communities in the low and base 2010 scenarios, and in the low 2020 scenario. These forecast decreases in petroleum movement are related to projected population decreases in the corresponding communities. The complete results of this analysis can be found in "Southwest Alaska Transportation Plan Travel Demand Forecasts," (September 1998).

FREIGHT FORECASTS FOR "OTHER" CARGO, INCLUDING MAIL

To forecast freight movement for "Other" cargo, including mail, several variables were tested statistically. The model that proved most effective in mathematically replicating existing freight movement relied on a single variable: population. This model is as follows:

$$\text{Tons of Other Cargo Shipped} = (36.21088203)(\text{Population})$$

At 0.95, the "goodness of fit" measure for this model, otherwise known as the R^2 coefficient, was quite high. This indicates that about 95% of the variation in "Other" cargo shipped can be

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[15] Forecast volumes were adjusted by comparing initial modeling output to known, existing volumes. That is, volumes 'forecast' by the model for the existing year, based on current conditions, were compared to the actual volume reported. The ratio between existing year volumes "forecast" and the actual volume reported was then applied to future forecasts.

predicted on the basis of population. However, this model is based on a limited data set of only 16 records. Therefore, it improve its accuracy, forecast trips were adjusted.[16]

Other cargo shipped are forecast to increase at most communities in Southwest Alaska. However, shipments are forecast to decrease at Cold Bay for the low, base, and high 2010 and 2020 scenarios. This decrease corresponds to the forecast for a decreasing population in Cold Bay through the year 2020. In the low and base 2010 scenarios, shipments are also forecast to decrease at Chignik. Shipments are also forecast to decrease at several other communities for the low scenario only for 2010 and 2020.

FREIGHT FORECASTS FOR SOUTHWEST ALASKA COMMUNITIES

A limitation of the freight forecasts at the level just described is that they only project freight volumes for a relatively small number of Southwest Alaska communities—the communities for which primary source data are available. However, only about 40% of Southwest Alaska's residents live in these communities. To fill in this gap in the forecasts, another analytical step was taken. To provide community-specific freight movement forecasts for all Southwest Alaska communities, freight movement values were imputed.

A straightforward process was used to impute freight movement values to Southwest Alaska communities. First, the region's 2020 freight movement forecasts (base case) were totaled and then divided by the 2020 base population forecast for the region as a whole. Separate calculations were applied to Petroleum Products and "All Other." Note that Fish and Fisheries Products movements were not allocated among the communities.[17]

Note too, that Unalaska, which experiences by far the region's highest freight per capita, was excluded from this averaging process. This is because the vast majority of Unalaska's freight movement is attributable to two of its unique roles in the region: (1) its role as a major fish processing location; and (2) its role as a transshipment point for international freight lines bound for Asia. Had Unalaska not been excluded from the equation, then the resulting per capita freight movement estimate would have been grossly inflated. It would not have been as good an approximation of freight moved through the rest of the region's communities, which do not serve as major fish processors or transshipment nodes. For similar reasons, Kodiak's freight movement and population were excluded from the average. In essence, the goal of this exercise was not to develop the most accurate average, in terms of per capita freight movement in the region, but rather, to develop a reasonable proxy measure with which to predict consumption-based cargo flows to specific communities. The exclusion of Unalaska and Kodiak from the regional average helped meet this objective.

This averaging process produced a value of 2.7 tons per person for petroleum products, and 4.05 tons per person for "Other" cargo. These values were multiplied by the 2020 base case

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[16] Forecast volumes were adjusted by comparing initial modeling output to known, existing volumes. That is, volumes "forecast" by the model for the existing year, based on current conditions, were compared to the actual volume reported. The ratio between existing year volumes "forecast" and the actual volume reported was then applied to future forecasts.

[17] The reasoning for not imputing fish value is as follows. Fish and Fisheries products are overwhelmingly *exported out* of Southwest Alaska, and the largest producers appear to be represented in the primary source data that are available. It is reasonable to impute freight values for Petroleum Products and "All Other" because consumption of food, fuel, and clothing, all of which must be imported to the region, can safely be assumed. However, any assumption that every community in the region exports fish products or serves as a transshipment point would be far more tenuous, and in some cases, would run contrary to what is known about regional freight movement.

population forecasts for each community. The result was an "imputed" 2020 freight movement forecast total for each community. The results of this process for affected Southwest Alaska communities are compiled in Table 11.

Once the volume of freight movement, roughly categorized by type, had been established for each affected community, it finally became possible to "cost out" the price of moving the forecast volumes under selected scenarios. The process used to establish approximate rates currently paid to move freight to Southwest Alaska, along with estimated rates under different circumstances than currently exist; i.e., under the alternatives proposed as part of this regional transportation planning effort—is described in the following section.

Table 11.
2020 Freight Movement by Southwest Alaska Community

	2020 Population Forecast	2020 Petrol Forecast (tons)	2020 "Other" Forecast (tons)	Total (tons)
Chigniks	377	1,018	1,527	2,545
Dillingham and Aleknagik	2,943	7,946	11,919	19,865
Egegik	167	451	676	1,127
Igiugig	68	184	275	459
Iliamna and Newhalen	346	934	1,401	2,336
Ivanof Bay	27	73	109	182
Kakhonak	207	559	838	1,397
King Salmon and Naknek	1,372	3,704	5,557	9,261
Levelock	139	375	563	938
Nondalton	317	856	1,284	2,140
Pedro Bay	45	122	182	304
Perryville	116	313	470	783
Pilot Point	115	311	466	776
Port Heiden	158	427	640	1,067
South Naknek	165	446	668	1,114
TOTALS	6,562	17,717	26,576	44,294

PART 3. DEVELOPMENT OF A FREIGHT ASSESSMENT METHODOLOGY

ESTIMATING EXISTING RATES

Having established a means of predicting freight movement volumes for each community, the next step in the analysis was to develop a framework with which to understand two facets of regional freight movement: (1) how much it would cost to move predicted volumes under an unchanged regional transportation network; and (2) how much it would cost to move predicted volumes if specified improvements in the regional transportation network were implemented. The improvements of interest are implementation of the Trans-Peninsula Roadway System in its entirety, as well as implementation of one element of that system, rehabilitation of the Williamsport to Pile Bay Road. Separate modal rates for the movement of "household goods" for each affected community were eventually established, under both existing conditions and the proposed alternatives.

Rate establishment was one of the most challenging tasks in developing this freight movement assessment methodology. There is no single, convenient source of shipping rates, which in any case vary by mode. Different shippers serve different communities within Southwest Alaska. Many shippers insist on keeping their actual rates confidential since much freight movement in Southwest Alaska is negotiated on a contract basis among competitors. Other shippers are reluctant to reveal their contract rates for fear that their publication will result in accusations of price gouging.

Aside from these complications, establishment of a single set of rates for analytical purposes was also complicated by the very nature of the multiple industries that transport goods. The rate that is ultimately paid to move goods from one point to another depends on complex interactions among many variables, including those listed below. Shipping rates among goods, among modes, and among times of the year—can and do vary tremendously.

- **Mode**. It is generally more expensive to ship goods by air than by sea. For bulk commodities, it is often less expensive to ship goods by sea than by land.
- **Handling**. The amount of handling required. It is relatively inexpensive to move petroleum products, for example, because they can be pumped directly in an out of dedicated storage facilities. They do not have to be assembled, wrapped, unloaded by hand, etc.
- **Special handling requirements**. Goods that require refrigeration or freezing are more expensive to haul than those that do not require this special treatment. Hazardous materials command a premium. In some cases, certain modes are precluded from even carrying the goods.
- **Spatial dimensions**. The dimensions of goods and or their packaging have a bearing on shipping costs. Bulky goods that take up a lot of space are more expensive, per pound, to ship than those that are more compact.
- **Backhaul**. The opportunity for backhaul is a factor. When a shipper can bring a load of goods to a point, and then fill up the vehicle, vessel, or aircraft with goods for the return journey, costs are much lower than if the shipper were to return to home base with an empty container.

- **Port facilities**. Characteristics of marine ports have a bearing on marine shipping costs. Ports with shallow water, such as Ivanof Bay, are more expensive to serve than deep-water ports, such as Chignik.
- **Volume**. Related to the backhaul factor is volume. All other things equal, rates will generally decrease with increased volume on a per trip basis. In addition, frequent shippers will generally enjoy lower rates than infrequent shippers.
- **Distance** between ports is a factor, insofar as longer distances entail higher fuel and labor costs.
- **Season**. This factor has to do with the region's extreme and challenging weather. It is much more expensive to move goods during the winter than during the summer. This is because some ports are not accessible by any mode other than air during the winter. Whereas communities around Lake Iliamna can be reached by moving barges up the river when the river water is high enough, and when it is not frozen (roughly three months per year), the rest of the year, goods, including petroleum products, must be flown in.
- **Natural navigational features.** Freight movement rates are affected by natural limitations to the size and efficiency of vessel that can be used to transport goods. The size of vessel that can currently be used to supply the communities of Iliamna Lake via the Kvichak River, for instance, is limited by the river. Only small barges, in the neighborhood of 150' by 45' are used in this area.
- **Competition** between shippers is a factor. Where two or more shippers compete to haul the same cargo, prices would ostensibly be lower than if one shipper held a monopoly.

Current and forecast rates were developed separately for Petroleum and "All Other" products.[18] Ultimately, distinction of petroleum from "all other" cargo is only possible because the US Army Corps of Engineers separates out petroleum in its Waterborne Commerce Statistics. As desirable as it would have been to provide this level of specification of "Other" commodities, the underlying data upon which the analyses in this report are based do not support that level of detail.

Because there is no way to know what is being shipped by air (absent a major new commodity flow study for Southwest Alaska), and because even the available primary source data are not available for points beyond the region's cargo hubs, a proxy had to be used to represent freight flows. Based on input from shippers, "household goods" were used as a proxy for "Other" freight.

The consultant team is grateful to the many individuals and organizations who provided input and information for the rate establishment task. The data gathering for this task included multiple interviews with overland, marine, and air shippers in the region. The following organizations and individuals provided input into the rate estimation and forecasting process:

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[18] It is much less expensive, on a unit basis, to move petroleum than most other commodities because petroleum, a pumped product, requires so little labor and handling.

Alaska Airlines	FS Air Services
Bush Consolidators	Harkness Enterprises
Carlile Transportation	Iliamna Transportation Company
CAT Transport	Lake and Peninsula School District
Coastal Freight and Salvage	Northland Services
Coastal Marine Services	PenAir
Crowley Marine	Reeve Aleutian Airlines
Crowley Petroleum	Samson Tug and Barge
ERA Air Cargo	Sea-Land
Everts Air Fuel	Orson Smith, Ph.D., University of Alaska
Neal Fried, Economist, State of Alaska	Reeve Aleutian Airlines

Listed in Table 12 and Table 13 are separate rate estimates for petroleum and "Other" cargo movement under existing conditions. Communities in the Iliamna Lake area are presented separately.[19] Ultimately, existing shipping rates will be compared to projected rates under the assumption of a changed infrastructure. This comparison will allow us to assess the economic impacts of the Trans-Peninsula Roadway; as they relate to freight movement in particular. This analysis and comparison will call upon the freight movement forecasts described earlier in this report. Rates under the existing infrastructure and projected rates under the improved infrastructure will be multiplied against forecast freight volumes to derive overall cost savings. In evaluating the alternatives, these costs or benefits will be weighed against the capital and maintenance and operations costs associated with the proposed alternative.[20]

19 The Iliamna Lake communities are accessible via either Bristol Bay or Cook Inlet; shipping rates for each point of access are distinct. As such, separating the Iliamna Lake communities from the others makes it easier to understand to the rate tables.

20 This comparison will be documented in the course of carrying out the evaluation process.

Table 12.
Existing Freight Rates for Selected Southwest Alaska Communities

	MARINE			AIR			
	Petroleum Marine ($/gal)	Petroleum Pound Price Equiv ($/lb)	Other Marine ($/lb)	Petroleum Air ($/gal)	ANC-KS ($/lb)	KS- ($/lb)	AIR TOT ($/lb)
Chignik	$0.250	$0.038	$0.250	NA	$0.420	$0.560	$0.980
Chignik Lake	$0.500	$0.076	$0.500	NA	$0.420	$0.560	$0.980
Chignik Lagoon	$0.600	$0.091	$0.600	NA	$0.420	$0.560	$0.980
Egegik	$0.500	$0.076	$0.510	NA	$0.420	$0.250	$0.670
Ivanof Bay	$0.270	$0.041	$0.700	NA	$0.420	$0.670	$1.090
King Salmon and Naknek	$0.300	$0.046	$0.510	NA	$0.420	$0.000	$0.420
Perryville	$0.300	$0.046	$0.600	NA	$0.420	$0.650	$1.070
Pilot Point	$0.520	$0.079	$0.540	NA	$0.420	$0.360	$0.780
Port Heiden	$0.350	$0.053	$0.510	NA	$0.420	$0.450	$0.870

*Air rates in this table are based on a 500-pound shipment. Note that marine rates to Chignik are relatively low, compared to Chignik Lake and Chignik Lagoon. Chignik has a year round, ice-free port, which makes its access relatively easy (and inexpensive). In contrast, a premium must be paid by the residents of Chignik Lake and Chignik Lagoon to import freight from Chignik. It is also notable that although Naknek is much farther from cargo destination points than Chignik, it is not much more expensive to get goods to Naknek than to Chignik. This is in part a function of the volumes carried. Goods transported to Naknek are also transported to the relatively large market of Bristol Bay communities, including Dillingham.

Table 13.
Existing Freight Rates for Iliamna Lake Communities

	MARINE						AIR				
	From Naknek			From Williamsport							
	Petroleum Marine	Petroleum Pound Price Equiv	Other Marine	Petroleum Marine	Petroleum Pound Price Equiv	Other Marine	Petroleum Air	Petroleum Pound Price Equiv	ANC-ILI	ILI-	AIR TOT
	($/gal)	($/lb)	($/lb)	($/gal)	($/lb)	($/lb)	($/gal)	($/lb)			
Igiugig	$0.800	$0.121	$0.765	NA	NA	$0.370	$0.961	$0.146	$0.390	$0.250	$0.640
Iliamna	$0.800	$0.121	$0.765	NA	NA	$0.370	$0.961	$0.146	$0.390	$0.000	$0.390
Kokhanok	$0.800	$0.121	$0.765	NA	NA	$0.370	$0.961	$0.146	$0.390	$0.200	$0.590
Newhalen	$0.800	$0.121	$0.765	NA	NA	$0.370	$0.961	$0.146	$0.390	$0.000	$0.390
Nondalton	$0.800	$0.121	$0.765	NA	NA	$0.370	$0.961	$0.146	$0.390	$0.000	$0.390
Pedro Bay	$0.800	$0.121	$0.765	NA	NA	$0.370	$0.961	$0.146	$0.390	$0.200	$0.590

Marine shipping rates for petroleum via Williamsport are not provided because petroleum is not currently shipped via Cook Inlet, primarily because of the difficulty of meeting hazardous materials regulations (Rick Harkness, Harkness Enterprises, personal communications, November 1999).

Freight Movement to Iliamna Lake Communities

It bears mentioning that waterborne freight reaches the communities of Iliamna Lake via two routes. The primary route, which accounts for some 80% of Iliamna Lake communities' waterborne cargo, is via Naknek, where barges originating in the Seattle-Tacoma area offload onto much smaller barges that navigate the Kvichak River during its brief season of navigability. This season, during which the river is both ice-free and high enough to support even shallow-draft vessels, generally runs from early August to late November (Rick Harkness, personal communications, November 1999). The rate charged to lighter the goods from Naknek to Iliamna Lake communities is approximately 50% over and above the cost of getting the goods from Seattle to Naknek (Coastal Marine). Via Naknek, petroleum shipment runs $0.80 per gallon, while "Other" cargo runs about $0.77 per pound.

Although reliance on air shipment in the region is atypically high, this route is very important to Iliamna Lake communities because it is the only way to bring in particularly heavy and or bulky equipment, which can neither be flown in nor barged-trucked via Williamsport because of that route's width, height, and weight limitations. The fact that heavy equipment can only be transported for a brief period of the year (and some years not at all, if the river remains low) is thought to have expensive repercussions for area construction costs. The reason for this is that contractors realize that they may have to keep an expensive capital asset, a piece of heavy machinery—in the area for months in which it is not in use. For this reason, it is thought that contractors add a substantial margin to their bids on construction projects to cover their costs and asset depreciation.

The other marine route to Iliamna is via Williamsport, which accounts for some 20% by volume of the cargo surface shipped to Iliamna Lake communities (Rick Harkness, Harkness Enterprises, personal communications, November 1999). Despite Williamsport's navigational challenges (it is shallow, muddy, and strewn with boulders), barges operated by Coastal Freight and Salvage call on this port from Homer from June until November. The limiting seasonal factors are both ice on the lake, and the road's passability due to snow. Upon arrival at Williamsport, barges are offloaded onto a truck operated by Ray Williams' outfit, the Iliamna Transportation Company—which has been in existence since 1938. Upon completion of the road trip, at Pile Bay, cargo may be distributed to its ultimate destination in two ways:

- Some consumers sail their own vessels to Pile Bay to pick up shipments.
- A licensed operator on Iliamna Lake picks up the shipments and distributes them among the Iliamna Lake communities in his vessels.

The rate breakdown, according to area operators, is as follows:

Homer to Williamsport (barge)	$0.12/lb
Williamsport to Pile Bay (truck)	$0.10/lb
Pile Bay to Ultimate Destination (barge)	$0.15/lb
TOTAL	**$0.37/lb**

This rate is considerably lower than the $0.77 per pound rate estimated for shipment via Naknek. However, route is arduous, for several reasons, including Williamsport's shortcomings as a port. Shallow water restricts barge deliveries to about two tides per month, each of which lasts about five days (Otto Kilcher, Coastal Freight and Salvage, personal communications, November 1999). Once transferred to the truck, there are other obstacles, including the washed out bridge on the road at Chinkelyes Creek, which requires that the truck ford the stream. This is hard on vehicle transmission and bearings, and on some cargo in particular, such as sheetrock and cement. Moreover, it poses safety hazards for operators (Ray Williams, Iliamna Transportation Company, personal communications, November 1999).

ESTIMATING RATES UNDER PROPOSED ALTERNATIVES

Having established freight shipment rates under existing conditions, the next analytical task was to project freight shipment rates under two separate scenarios related to alternatives proposed as part of this regional transportation planning effort. Two scenarios were explored: implementation of the Trans-Peninsula Roadway as a complete system, and implementation of the Williamsport to Pile Bay Road as a stand-alone project. While projecting rates for the Williamsport to Pile Bay Road was relatively simple, insofar as it had been studied previously (US Army Corps of Engineers, 1995), projecting rates for the larger project, the Trans-Peninsula Road was more complex.

This task required interface with area shippers, most of whom were reluctant to speculate on what they perceived as an extremely remote possibility. Most of those contacted expressed skepticism that the populations and volumes of freight to be served would justify the projects' large capital and maintenance costs. Ultimately, however, they were persuaded that their educated guesses as to the freight cost impacts of the proposed alternatives would be superior to those of anyone without firsthand experience with shipping in Southwest Alaska.

Modal rate estimates for affected communities were developed by breaking the journey from cargo origin to destination into its constituent modal links or elements. Unit costs were used where possible. Three sets of rates were developed:

- Petroleum Rates Assuming that the Trans-Peninsula Roadway System is Implemented;
- "Other" Cargo Rates Assuming that the Trans-Peninsula Roadway System is Implemented;
- "Other" Cargo Rates Assuming that the Williamsport to Pile Bay Road is Implemented as a Stand-Alone element.

For reasons to be discussed, separate petroleum rates under the Williamsport to Pile Bay Roadway as a stand-alone element were not projected.

Estimated Petroleum Movement Rates (Whole Road Built)

To project what it would cost to transport petroleum products to selected communities if the Trans-Peninsula Road were built, estimates for the barge portion of the trip, as well as the trucking portion of the trip, were elicited from Crowley Petroleum and from several trucking companies now operating in Alaska.

While multiple marine shippers have long served the communities, regional-scale trucking operations on the Alaska Peninsula are nonexistent because Southwest Alaska has so little

roadway infrastructure. Several firms that operate on the Alaska roadway network were therefore contacted.

Upon discussions with shippers, it was determined that a logical delivery pattern for petroleum products, under the assumption that the Trans-Peninsula Roadway is built, would be for a barge to make separate stops in both Williamsport and in Chignik. This is due to the fact that the trucking portion of the trip could be accomplished less expensively by choosing a closer port.

Per gallon barge costs were estimated at 12 cents per gallon from Anchorage to Chignik, and at 10 cents per gallon from Anchorage to Williamsport. Trucking costs were estimated at $6.75 per mile. Trucking cost estimates were developed on the basis of input by Carlile and CAT, trucking firms that now operate in Alaska, but outside of Southwest Alaska. Both firms were quick to point out the speculative nature of their estimates. They pointed out that rates would be sensitive to volume, start-up costs (regarding which there is considerable uncertainty), and unusual maintenance and operations costs attributable to Southwest Alaska's remote and challenging natural environment. In providing their estimates, the trucking companies assumed that the road would be paved, maintained, and designed to AASHTO standards. For the purposes of this analysis, a tanker truck with a 7,500 gallon capacity was assumed.

Mileage between each affected community and the ports of Chignik and Williamsport was calculated based on specifications provided in an earlier deliverable, "Southwest Alaska Description of Alternatives Technical Memorandum." Total petroleum shipment rates for each affected community represent the sum of the barge and trucking related costs. Tables 14, 15 and 16 contain the resulting rate estimates. Table 14 calculates rates under the assumption that Williamsport serves as the intermodal transfer point. Table 15 calculates rates assuming that Chignik serves as the intermodal transfer point. Finally, Table 16 lists the lowest rate for each community, based on marine port of call.

Table 14.
Cost Analysis for Petroleum Movement (Williamsport as Transfer Point)

	Existing Conditions	Estimated Rates Assuming that the Trans-Peninsula Roadway is Built				
	Current Price	Price per gal ANC to Williamsport	Road Distance from Williamsport	Trucking Price Total at $6.75/mi	Trucking Price per gal at 7,500 gal/load	Total Price (barge+road)
	($/gal)	($/gal)	(mi)	($)	($/gal)	($/gal)
Chignik	$0.250	$0.10	466	$3,146	$0.419	$0.519
Chignik Lagoon	$0.500	$0.10	462	$3,119	$0.416	$0.516
Chignik Lake	$0.600	$0.10	450	$3,038	$0.405	$0.505
Egegik	$0.500	$0.10	262	$1,769	$0.236	$0.336
Igiugig	$0.800	$0.10	109	$736	$0.098	$0.198
Iliamna	$0.800	$0.10	53	$358	$0.048	$0.148
Ivanof Bay	$0.270	$0.10	516	$3,483	$0.464	$0.564
King Salmon and Naknek	$0.300	$0.10	184	$1,242	$0.166	$0.266
Nondalton	$0.800	$0.10	69	$466	$0.062	$0.162
Pedro Bay	$0.800	$0.10	26	$176	$0.023	$0.123
Perryville	$0.300	$0.10	506	$3,416	$0.455	$0.555
Pile Bay	$0.800	$0.10	15	$101	$0.014	$0.114
Pilot Point	$0.520	$0.10	317	$2,139	$0.285	$0.385
Port Heiden	$0.350	$0.10	404	$2,727	0.364	$0.464

Table 15.
Cost Analysis for Petroleum Movement (Chignik as Transfer Point)

Anchorage to	Current Price ($/gal)	Price per gal ANC to CHIGNIK ($/gal)	Road Distance from Chignik (mi)	Trucking Price Total at $6.75/mi ($)	Trucking Price per gal ($/gal)	Total Price (barge+road) ($/gal)
Chignik	$0.250	$0.12	0	$0	$0.000	$0.120
Chignik Lagoon	$0.500	$0.12	12	$81	$0.011	$0.131
Chignik Lake	$0.600	$0.12	16	$108	$0.014	$0.134
Egegik	$0.500	$0.12	204	$1,377	$0.184	$0.304
Igiugig	$0.800	$0.12	357	$2,410	$0.321	$0.441
Iliamna	$0.800	$0.12	413	$2,788	$0.372	$0.492
Ivanof Bay	$0.270	$0.12	50	$338	$0.045	$0.165
King Salmon and Naknek	$0.300	$0.12	269	$1,816	$0.242	$0.362
Nondalton	$0.800	$0.12	429	$2,896	$0.386	$0.506
Pedro Bay	$0.800	$0.12	440	$2,970	$0.396	$0.516
Perryville	$0.300	$0.12	40	$270	$0.036	$0.156
Pile Bay	$0.800	$0.12	451	$3,044	$0.406	$0.526
Pilot Point	$0.520	$0.12	149	$1,006	$0.134	$0.254
Port Heiden	$0.350	$0.12	62	$419	$0.056	$0.176

Table 16.
Least Cost Petroleum Rates

	Current Price ($/gal)	Assumes Community Served from	Total Price (barge+road) ($/gal)
Chignik	$0.25	Chignik	$0.12
Chignik Lagoon	$0.50	Chignik	$0.13
Chignik Lake	$0.60	Chignik	$0.13
Egegik	$0.50	Chignik	$0.30
Igiugig	$0.80	Williamsport	$0.20
Iliamna	$0.80	Williamsport	$0.15
Ivanof Bay	$0.27	Chignik	$0.17
King Salmon and Naknek	$0.30	Williamsport	$0.27
Nondalton	$0.80	Williamsport	$0.16
Pedro Bay	$0.80	Williamsport	$0.12
Perryville	$0.30	Chignik	$0.17
Pile Bay	$0.80	Williamsport	$0.16
Pilot Point	$0.52	Chignik	$0.25
Port Heiden	$0.35	Chignik	$0.18

Estimated Petroleum Movement Rates (Williamsport Improvements Alone)

Although, as will be seen in subsequent analysis, it is clear that building the Trans-Peninsula Roadway in its entirety would produce significant petroleum movement cost savings, it is not obvious that rehabilitating the Williamsport to Pile Bay Road alone would do so. Part of the reason for this is that fuel is transported relatively cheaply by plane. According to Everts Air Fuel, petroleum can profitably be flown in at a rate of about $0.96 per gallon (personal communications, November 1999). This rate is comparable to the $0.80 per gallon rate that it costs to move petroleum up the Kvichak River from Naknek.

Also detracting from potential cost savings is the fact that two transfers would be required if only the Williamsport to Pile Bay segment of the Trans-Peninsula Roadway were improved. The first transfer would be from Cook Inlet barge to truck; the second would be from truck back to Iliamna Lake vessel. Because of the labor and coordination they require, transfers are costly.

For these reasons, petroleum shipping rates under the assumption of rehabilitating the Williamsport to Pile Bay Road as a stand-alone element were not developed.

Estimated "Other" Cargo Movement Rates (Whole Road Built)

Although rates to move "Other" cargo were projected in much the same way as were petroleum rates, there were a couple of differences in the methodology. First, whereas Alaska has multiple oil refineries, from which point products can be shipped directly to Southwest Alaska, most "Other" cargo originates in the lower 48, specifically, in the ports of Seattle and Tacoma. As

such, the cost projections for the barge portion of the transport of "Other" cargo originate in Seattle rather than Anchorage. This assumption is based on shippers' input indicating that very little of what is shipped to Southwest Alaska originates within the state--for two main reasons. First, manufacturing and agricultural production in Alaska are very limited. Second, Alaska cities' ability to serve as transshipment points is limited by a lack of warehousing and storage facilities (Terry Hart, Sea-Land, Alaska Northbound Marketing Manager, personal communications, October 1999).

Another difference is in the type of truck used to transport the goods along the road. Whereas a 7,500-gallon tanker truck was assumed to be used to deliver petroleum products, a 35-foot van is assumed to deliver "Other" cargo. A 35-foot van can carry about 22,750 pounds of cargo.[21] The same $6.75 per mile rate is assumed for both petroleum and "Other" cargo transport.

As was done for petroleum rate projections, the barge portion of the transport costs for "Other" cargo was simply added to the truck-related costs for a single per-pound total. Again, rates are calculated using both Williamsport and Chignik as the transfer point from marine vessel to truck (Table 17 and Table 18). Meanwhile, Table 19 compiles the lowest rate for each community based on which port of call is used for the intermodal transfer.

[21] To estimate the freight-carrying capacity of a van of a given length, the assumed number of feet (35') was multiplied by 650 for total pounds. This 650-pound figure is based on the suggested equivalency found in *Transportation Research Board, Special Report 223-Providing Access for Large Trucks*, 1989, p. 177.

Table 17.
Cost Analysis for "Other" Cargo (Williamsport as Transfer Point)

Seattle to	Barge Cost ($/lb)	Road Distance from Wmsport (mi)	Trucking Cost at $6.75/mi ($)	Total Trucking Cost ($/lb)	Total Cost ($/lb)
Chignik	$0.27	466	$3,146	$0.138	$0.408
Chignik Lagoon	$0.27	462	$3,119	$0.137	$0.407
Chignik Lake	$0.27	450	$3,038	$0.133	$0.403
Egegik	$0.27	262	$1,769	$0.078	$0.348
Igiugig	$0.27	109	$736	$0.032	$0.302
Iliamna	$0.27	53	$358	$0.016	$0.286
Ivanof Bay	$0.27	516	$3,483	$0.153	$0.423
King Salmon and Naknek	$0.27	184	$1,242	$0.055	$0.325
Nondalton	$0.27	69	$466	$0.020	$0.290
Pedro Bay	$0.27	26	$176	$0.008	$0.278
Perryville	$0.27	506	$3,416	$0.150	$0.420
Pile Bay	$0.27	15	$101	$0.004	$0.274
Pilot Point	$0.27	317	$2,140	$0.094	$0.364
Port Heiden	$0.27	404	$2,727	$0.120	$0.390

Table 18.
Cost Analysis for "Other" Cargo (Chignik as Transfer Point)

Seattle	Price per # Sea to Chignik	Road Distance from Chignik (mi)	Trucking Price Total at $6.75/m	Trucking Price per Pound	Total Price (barge+road)
Chignik	$0.22	0	$0	$0.000	$0.220
Chignik Lagoon	$0.22	12	$81	$0.004	$0.224
Chignik Lake	$0.22	16	$108	$0.005	$0.225
Egegik	$0.22	204	$1,377	$0.106	$0.280
Igiugig	$0.22	357	$2,410	$0.122	$0.326
Iliamna	$0.22	413	$2,788	$0.015	$0.342
Ivanof Bay	$0.22	50	$338	$0.080	$0.235
King Salmon and Naknek	$0.22	269	$1,816	$0.127	$0.300
Nondalton	$0.22	429	$2,896	$0.130	$0.347
Pedro Bay	$0.22	440	$2,970	$0.119	$0.350
Perryville	$0.22	40	$270	$0.134	$0.339
Pile Bay	$0.22	451	$3,044	$0.018	$0.34
Port Heiden	$0.22	62	$419	$0.044	$0.238

Table 19.
Least Cost "Other" Rates

Seattle to	Current Price ($/lb)	Assumes Community Served from	Total Price (barge + road) ($/lb)
Chignik	$0.250	Chignik	$0.220
Chignik Lagoon	$0.600	Chignik	$0.224
Chignik Lake	$0.500	Chignik	$0.225
Egegik	$0.510	Chignik	$0.280
Igiugig	$0.765	Williamsport	$0.302
Iliamna	$0.765	Williamsport	$0.286
Ivanof Bay	$0.700	Chignik	$0.235
King Salmon and Naknek	$0.510	Chignik	$0.300
Nondalton	$0.765	Williamsport	$0.290
Pedro Bay	$0.765	Williamsport	$0.278
Perryville	$0.600	Williamsport	$0.339
Pile Bay	$0.765	Williamsport	$0.274
Pilot Point	$0.540	Chignik	$0.264
Port Heiden	$0.510	Chignik	$0.238

Estimated "Other" Cargo Movement Rates (Williamsport Improvements Alone)

To estimate freight movement cost savings that could be achieved by dredging the channel at Williamsport, along the existing road and its bridges, the elements of current freight delivery to the region were considered. Operators of each of the modal links that is now required to move goods from Homer to the communities of Iliamna Lake via Williamsport were contacted and interviewed. Their estimates of the per pound cost for each modal link of this journey are noted below. Current total costs, that is, under existing conditions, are estimated at $0.37 per pound. These shippers, like others contacted in the course of this research, had a difficult time predicting the impact of channel dredging and road reconstruction. They put the savings achievable by making these improvements in the neighborhood of 20%, as did shippers who now operate out of Naknek. However, the US Army Corps of Engineers (USCOE), in its 1995 study, estimated a much larger shipping cost savings under this scenario—in the neighborhood of 56%. In attempt to reconcile this difference, the approach taken in this assessment is more conservative than the USCOE's, but more optimistic than the shippers': A cost savings rate of 35% was applied to the existing rate, as calculated below.

Homer to Williamsport (barge)	$0.12/lb
Williamsport to Pile Bay (truck)	$0.10/lb
Pile Bay to Ultimate Destination (barge)	$0.15/lb
Existing Conditions Total	$0.37/lb
Estimated Cost Savings with Project:	
$0.37 - ($0.37 * 0.35) = $0.24	$0.24/lb

As pointed out by the USCOE and the shippers themselves, freight movement savings can be anticipated stemming from several sources:

- Reduced damage and wear and tear to transport vessels and vehicles, which should reduce shippers' capital and maintenance and operations costs;
- Reduced operating (and possibly capital) costs due to the elimination of the tide-related barge delays that are now frequently experienced;
- Removing the obstacles to freight shipment along this corridor would likely increase volumes of goods shipped, reducing unit costs;
- Insofar as volumes shipped would increase, new operators may be attracted to the area, thus creating competitive price pressure.

PART 4. RESULTS

The final step in the assessment of the freight movement impacts of the proposed alternatives brings together the three analytical elements just described:

- Freight volume forecasts, by study are community
- Modal rate estimates under existing conditions
- Modal rate estimates under specified transportation improvements

To assess the cost savings achievable by making the transportation improvements proposed, one simply multiplies the forecast volume of goods for the 2020 design year by rates under existing conditions and by rates under the proposed alternatives. Put simply, the difference between these totals represents the freight movement savings achievable by implementing the proposed alternatives. Three sets of probable impacts are provided:

1. Petroleum movement impacts assuming that the "whole road" (the Trans-Alaska Roadway) is implemented;[22]

2. "Other" cargo impacts assuming that the whole road is implemented as a coherent system;

3. "Other" cargo movement impacts assuming that the existing Williamsport to Pile Bay Road and its bridges are rehabilitated, and that the Williamsport channel is dredged, as a stand-alone improvement.

ASSUMING THAT THE TRANS-PENINSULA ROADWAY IS BUILT

Petroleum Movement Cost Savings

Substantial savings in petroleum movement costs can be anticipated if the Trans-Peninsula Roadway System is built. Petroleum movement rates are much decreased from communities that are now particularly inaccessible, such as Chignik Lake, where the shipment rate is projected to fall from $0.60 to $0.13 per gallon. Savings are even greater in Iliamna Lake communities, such as Iliamna, where petroleum shipment costs are anticipated to fall from $0.80 to $0.15 per gallon, a greater than a five-fold reduction. The road would have the greatest freight movement cost savings for those communities that are now hardest to reach—i.e., those surrounding Iliamna Lake.

Modest savings, in contrast, are anticipated in Naknek and King Salmon. Naknek is already served directly by relatively frequent barge service, as part of the larger Bristol Bay market, which also includes communities to the north, such as Dillingham. According to this analysis, the cost of petroleum movement to Naknek is projected to fall only a few cents—from $0.30 to $0.27 per gallon.

In all, 2020 cost savings due to petroleum movement alone are estimated at $755,000 per year. Actual savings could be higher or lower, based on factors including deviations from the population base forecast; the extent to which the improvements encourage competition, which

[22] For reasons already discussed, petroleum movement impacts under the third scenario were not analyzed.

could further lower rates; and the extent to which the improvements foster other forms of economic development, such as tourism. Volume increases spurred by such development could further reduce rates. By the same token, rates could be higher than forecast if significant operating costs faced by shippers have not been taken into consideration; if operating conditions on the proposed roadway prove more difficult to manage and maintain than anticipated; and if other economic mainstays in Southwest Alaska falter, reducing both population levels and the demand for goods shipment.

Beyond the shipping cost savings suggested by this analysis, other economic and social benefits would accrue through implementation of the road, in terms of petroleum shipment alone. Currently, according to Lake and Peninsula School District administrator, Dennis Niedermeyer, the higher cost of shipping petroleum in winter months (when it must be flown into inland communities, and to Bristol Bay communities) effectively forces Southwest Alaska residents to "stock up" during the periods when petroleum can be barged in. However, communities are hard pressed to find storage capacity for all of the fuel needs, which can vary significantly by the harshness of a given winter. In his view, overtaxing fuel storage facilities creates problems in and of itself, such as fuel leaks and spills, whose cleanup is costly—both environmentally and financially. Another of the road's advantages would be reduced dependence on air shipment of petroleum products, which has safety drawbacks.

PETROLEUM MOVEMENT COST SAVINGS SUMMARY

Total petroleum freight movement cost savings achievable if the Alaska Peninsula Roadway is built are estimated at $755,200 annually (Table 20).

Table 20.
Estimated Petroleum Movement Cost Savings (Whole Road Built)

	2020 Forecast Consumption(gal)	Current Rate ($/gal)	Estimated Rate with Road* ($/gal)	Assumes Product Shipped through	2020 Cost Estimate Using Existing Rates ($ paid)	2020 Cost Estimate Assuming Road is Built ($ paid)	2020 Savings Achievable ($ saved)
Chignik	82,787	$0.25	$0.12	Chignik	$20,697	$9,934	$10,763
Chignik Lagoon	81,967	$0.50	$0.13	Chignik	$40,984	$10,738	$30,246
Chignik Lake	145,082	$0.60	$0.13	Chignik	$87,049	$19,441	$67,608
Egegik	136,885	$0.50	$0.30	Chignik	$68,442	$41,065	$27,377
Igiugig	55,556	$0.80	$0.20	Williamsport	$44,444	$11,000	$33,444
Iliamna	283,546	$0.80	$0.15	Williamsport	$226,837	$41,965	$184,872
Ivanof Bay	22,465	$0.27	$0.17	Chignik	$6,066	$3,707	$2,359
King Salmon and Naknek	1,124,590	$0.30	$0.27	Williamsport	$337,377	$303,639	$33,738
Newhalen	178,810	$0.80	$0.16	Williamsport	$143,048	$28,985	$114,063
Nondalton	259,563	$0.80	$0.16	Williamsport	$207,650	$42,049	$165,601
Pedro Bay	37,037	$0.80	$0.12	Williamsport	$29,630	$4,556	$25,074
Perryville	95,325	$0.30	$0.17	Chignik	$28,597	$15,964	$12,634
Pilot Point	94,262	$0.52	$0.25	Chignik	$49,016	$23,565	$25,451
Port Heiden	129,508	$0.35	$0.18	Chignik	$45,328	$23,311	$22,017
TOTALS					**$1,335,165**	**$579,919**	**$755,247**

*This cost estimate assumes that a tanker truck with a 7,500-gallon capacity is used.

"Other" Cargo Movement Cost Savings

Cargo movement savings achievable by building the Trans-Peninsula Roadway are anticipated in two major areas. The first, and the primary focus of this assessment, is the savings that can be achieved in moving goods and commodities to communities in Southwest Alaska. The second, has to do with savings achievable by providing the region's gillnet fishers a more viable route between their fishing grounds in Bristol Bay, and Cook Inlet, where many store their vessels during the off-season, and where many have repair and maintenance done. These impacts are explored separately.

COMMODITIES MOVEMENT IMPACTS

Listed in Table 21 is a summary of estimated cost savings in commodities movements based on the rate calculations, and port call assumptions earlier discussed. This analysis suggests that around $5.96 million per year could be saved in freight costs in terms of moving "Other" cargo alone, if the Alaska Peninsula Roadway System were built. Note that cargo shipment mode shifts under the proposed infrastructure improvements had to be taken into account in this analysis. These mode shift assumptions are documented in Table 21. These mode shift assumptions under both existing conditions and under the assumption that the Alaska Peninsula Roadway System is built are based on primary source data and area shippers' input.

A few explanations regarding the Iliamna Lake communities are needed to interpret Table 21. First, a weighted average was used in calculating the marine shipment rate under existing conditions for Iliamna Lake communities. This weighted average takes into account the percentage shipped, and rates paid, for marine freight via Naknek and Williamsport, respectively. In terms of projected rates, this analysis assumes that if the Trans-Peninsula Roadway is built, that most waterborne cargo will be shipped to Iliamna Lake communities via Williamsport.

GILLNET FLEET TRANSPORT IMPACTS

In its 1995 economic assessment, the US Army Corps of Engineers (USCOE) pointed out another area of savings that could be realized if these improvements were made. They point to the many gillnet vessels that each year make the trip from Cook Inlet to the fisheries in Bristol Bay and back. Some vessels are transported because they spend the off-season in Cook Inlet; others make the trip periodically for repairs and maintenance purposed. In all, about 825 gillnet boats are estimated to make the round trip each year.

Of these, the vast majority (about 785) sail around the Alaska Peninsula, a 1,100-mile trip that takes three days, and is estimated to cost $1,800. A small contingent (about 40), however, makes the trip via Williamsport, which is almost a thousand miles shorter and is estimated to cost about $1,233 per vessel. Although this trip is less costly in terms of both time and dollars, it is arduous, risky, and can only be undertaken during narrow time windows. Moreover, many gillnet vessels cannot be transported via this route because they are too wide to pass through existing bridges.

According to the US Army Corps of Engineers' detailed analysis, savings in the neighborhood of $1,082,500 could be achieved on the part of gillnet vessel movement alone if the Williamsport Channel were dredged, and if the existing Williamsport to Pile Bay Road and its bridges were

rehabilitated.[23] Accordingly, these estimated savings are added to the freight movement savings estimated earlier.

"OTHER" CARGO MOVEMENT COST SAVINGS SUMMARY

Total "Other" freight movement cost savings under the assumption that the Alaska Peninsula Roadway is built are estimated at $7,802,300. Of this total, $1,082,500 attributable to gillnet vessel transport savings. To these savings can be added $755,000 in petroleum movement savings, along with $5,964,600 in "Other" commodity movement savings (Table 22).

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[23] According to the USCOE, the number of gillnet vessels taking the Williamsport route would increase from 40 to 747 round trips per year (*Navigation Channel Feasibility Report and Environmental Assessment, Williamsport*, US Army Corps of Engineers, Alaska District, December 1995).

Table 21.
Estimated "Other" Cargo Cost Savings (Whole Road is Built)

	MODE SPLIT AND RATES UNDER EXISTING CONDITIONS					MODE SPLIT AND RATES ASSUMING THE TRANS-PENINSULA ROAD IS BUILT				RESULTS		
	Current Mode Split					Projected Mode Split		Rates				
	Marine	Air	Marine	Air	2020 Freight Volume Estimate	Barge/ Road	Air	Barge/ Road	Air	Freight Costs Paid in 2020 Assuming No Change	Freight Costs Paid in 2020 Assuming Road is Built	Savings Possible due to Road
	%	%	($/lb)	($/lb)	(lbs)	%	%	($/lb)	($/lb)	($)	($)	($)
Chignik	95%	5%	0.250	0.980	818,000	95%	5%	0.220	0.980	$234,357	$211,044	$23,313
Chignik Lake	10%	90%	0.500	0.980	1,434,000	95%	5%	0.225	0.980	$1,336,488	$376,784	$959,705
Chignik Lagoon	60%	40%	0.600	0.980	810,000	95%	5%	0.224	0.980	$609,120	$212,058	$397,062
Egegik	80%	20%	0.500	0.670	1,352,000	90%	10%	0.280	0.670	$721,968	$431,288	$290,680
Igiugig	60%	40%	0.686	0.390	550,000	90%	10%	0.302	0.390	$312,180	$170,940	$141,240
Iliamna	60%	40%	0.686	0.390	1,036,000	85%	15%	0.286	0.390	$588,034	$312,458	$275,576
Ivanof Bay	90%	10%	0.700	1.090	218,000	95%	5%	0.232	1.090	$161,102	$59,928	$101,174
King Salmon and Naknek	85%	15%	0.510	0.420	11,114,000	85%	15%	0.300	0.420	$5,518,101	$3,534,252	$1,983,849
Nondalton	60%	40%	0.686	0.390	2,568,000	85%	15%	0.287	0.390	$1,457,597	$776,692	$680,905
Pedro Bay	60%	40%	0.686	0.390	364,000	90%	10%	0.276	0.390	$206,606	$104,614	$101,993
Perryville	90%	10%	0.600	1.070	940,000	95%	5%	0.230	1.070	$608,180	$255,680	$352,500
Pilot Point	75%	25%	0.520	0.780	932,000	90%	10%	0.264	0.780	$545,220	$294,139	$251,081
Port Heiden	70%	30%	0.510	0.670	1,280,000	90%	10%	0.238	0.870	$791,040	$385,536	$405,504
TOTALS					23,416,000					$13,089,993	$7,125,412	$5,964,581

Table 22.
Freight Movement Cost Savings Summary
(Whole Road Built)

Trans-Peninsula Roadway (Whole)	
Petroleum	$755,200
Gillnet Fleet	$1,082,500
Other Cargo	$5,964,600
TOTAL	$7,802,300

RESULTS ASSUMING THAT WILLIAMSPORT IMPROVEMENTS ALONE ARE IMPLEMENTED

By implementing only select elements of the Trans-Peninsula Roadway system, some significant freight movement cost savings could still be achieved. These savings are assumed to be experienced by the communities of Iliamna Lake.[24] To recap, the freight flow under this scenario would be as follows: barged or shipped into Williamsport, where it would be offloaded onto a truck; trucked across a much wider, completely bridged 15.5-mile roadway; then transferred to another vessel at the road's terminus at Pile Bay for final distribution.

If the Williamsport to Pile Bay Road were rehabilitated, in tandem with navigational improvements at Williamsport, it is estimated that most of the Iliamna Lake-bound cargo now barged up the Kvichak River from Naknek would shift to the Williamsport route. In addition, since marine transport under this scenario would be viable from June through November (a much larger portion of the year than is now the case) it is also assumed that a portion of the cargo now flown into Iliamna Lake communities would be barged, trucked, and then shipped again via Williamsport. Whereas the mode split for Iliamna Lake communities is currently estimated to be 48% marine via Naknek, 12% marine via Williamsport, and 40% air; under the proposed element of the alternative, cargo volumes are assumed to shift to 5% marine via Naknek; 65% marine via Williamsport; and 30% air.

It is estimated that these improvements would lower the cost of moving cargo to Iliamna Lake communities (via a surface route) from 37 to 24 cents per pound. When the assumed mode shift and rate values are applied to the cargo forecast volumes for the 2020 design year, savings attributable to the project can be calculated, as shown in Table 23. In all, freight movement savings achievable under this scenario are estimated at $2,170,300 per year. Because these improvements' value would be comparable to that of building the entire Trans-Peninsula Roadway system in terms of allowing gillnet fleet passage across the Alaska Peninsula, the same yearly savings can be assumed for this stand-alone element. Accordingly, $1,082,500 in gillnet fleet savings can be added to the $2,170,300 figure for "Other" cargo, for a grand total cost savings estimate of $3,252,800 per year (Table 24).

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[24] Area shippers do not believe that the benefits of this element would extend as far west as Bristol Bay, for two primary reasons. First, the Kvichak River's navigability for cargo bearing vessels is a limiting factor. In good years, the period in which the River can be navigated by even small barges is limited to the narrow window between August and October. Although the Kvichak by necessity serves traffic from Bristol Bay to Iliamna Lake, its navigational limitations preclude its utility as a route *to* Bristol Bay. Second, it is relatively cost effective to barge goods to Naknek and other Bristol Bay communities. This is because the population of Bristol Bay communities is large enough to support sizable barge shipments, which lowers unit costs. Moreover, service directly to Bristol Bay communities does not require the extra intermodal transfer that would be required if goods were to shipped by a subsequent, smaller barge down the Kvichak.

Table 23.
Estimated "Other" Cargo Cost Savings (Williamsport Improvements Alone)

	2020	Under Existing Conditions				Assuming that Road and Bridges are Rehabilitated and Channel Dredged				
	Forecast "Other" Cargo (lbs)	Marine via Naknek	Marine via Wmsport	Air	TOTAL Freight Costs Paid	Marine via Naknek	Marine via Wmsport	Air	TOTAL Freight Costs Paid	Savings Attributable to Road
Igiugig										
Mode Split	550,000	48%	12%	40%	$367,180	5%	65%	30%	$212,438	$154,743
Rate		$0.765	$0.370	$0.640		$0.765	$0.240	$0.640		
Iliamna and Newhalen										
Mode Split	2,558,000	48%	12%	40%	$1,707,721	5%	65%	30%	$988,028	$719,693
Rate		$0.765	$0.370	$0.640		$0.765	$0.240	$0.640		
Nondalton										
Mode Split	2,566,000	48%	12%	40%	$1,713,062	5%	65%	30%	$991,118	$721,944
Rate		$0.765	$0.370	$0.640		$0.765	$0.240	$0.640		
Pedro Bay										
Mode Split	364,000	48%	12%	40%	$243,006	5%	65%	30%	$140,595	$102,411
Rate		$0.765	$0.370	$0.640		$0.765	$0.240	$0.640		
Kokhanok										
Mode Split	1,676,000	48%	12%	40%	$1,118,898	5%	65%	30%	$647,355	$471,543
Rate		$0.765	$0.370	$0.640		$0.765	$0.240	$0.640		
							SAVINGS GRAND TOTAL			$2,170,334

Table 24.
Cargo Movement Cost Savings Summary
(Williamsport Improvements Alone)

Williamsport to Pile Bay Road Only	
"Other" Cargo	$2,170,300
Gillnet Fleet	$1,082,500
TOTAL	**$3,252,800**

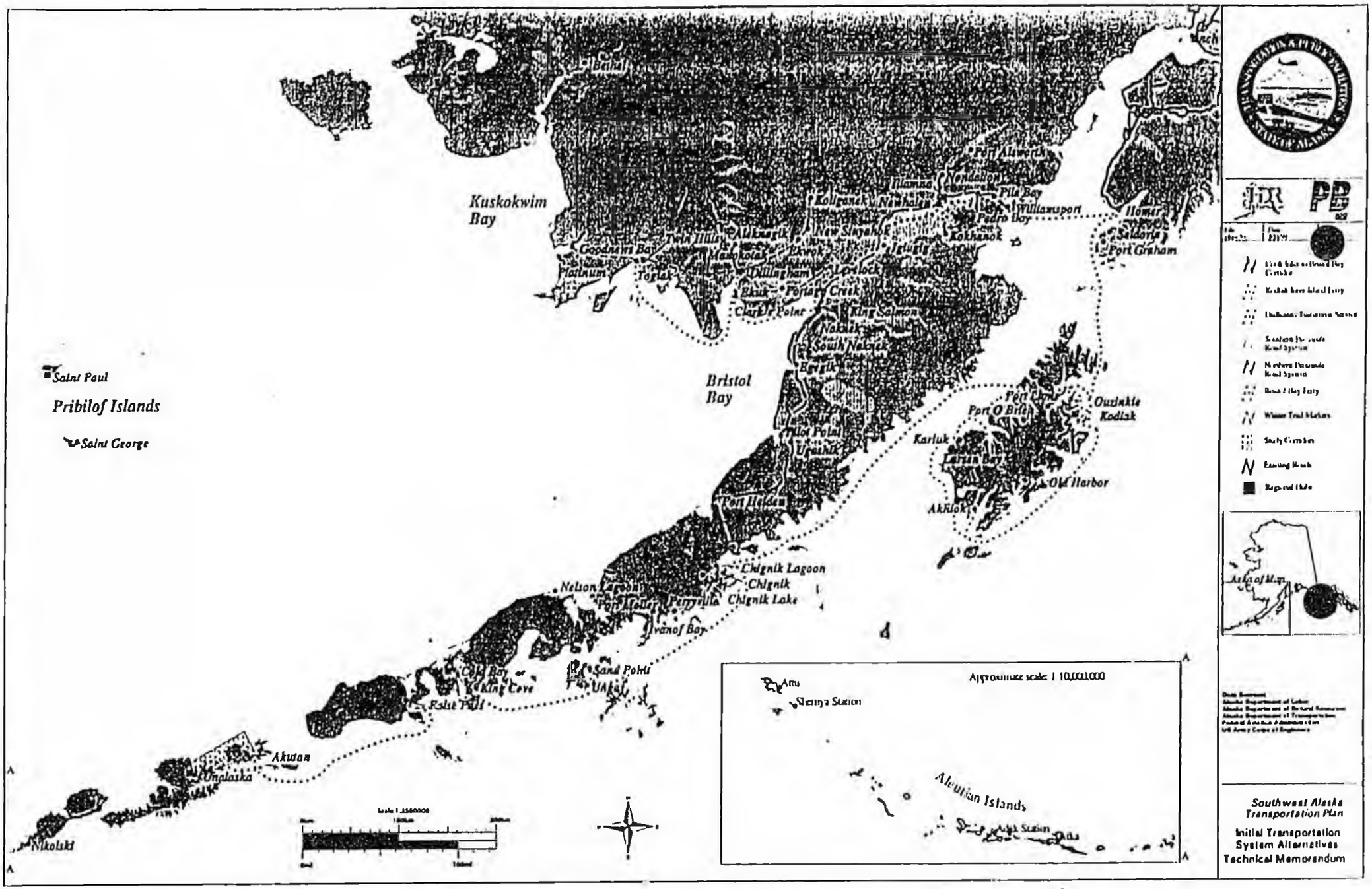
2. COOK INLET TO BRISTOL BAY CORRIDOR ALTERNATIVE, OVERLAND

This alternative would provide a surface transportation link between Cook Inlet and Bristol Bay. In so doing, this alternative would improve mobility and access for many communities in the study area, including Pedro Bay, Nondalton, Iliamna, Newhalen, Igiugig, Levelock, Naknek and King Salmon – providing them for the first time a well developed surface transportation link to the Kenai Peninsula, Anchorage, and the state's primary roadway network. This alternative also has significant potential for improving the efficiency of regional freight movement and economic development.

Explored in this alternative are four separate options for traversing the roughly 250 miles between Homer and Bristol Bay (Table 10). Two of the options provide an uninterrupted set of roadway links – one via King Salmon, the other via Naknek. Meanwhile, the other two options provide a roadway connection until Iliamna, but then traverse the rest of the distance by either a shallow-draft landing vessel, or hovercraft.

Table 10
Cook Inlet to Bristol Bay Corridor Alternative
Four Options

OVERLAND OPTIONS		COMBINATION OVERLAND/MARINE OPTION	
Via King Salmon	Via Naknek	Via Shallow-Draft Landing Vessel	Via Hovercraft
• Homer to Williamsport Marine Service • Williamsport to Pile Bay Roadway Link • Pile Bay to Iliamna Roadway Link • Iliamna to Igiugig Roadway • Igiugig to King Salmon Roadway Link	• Homer to Williamsport Marine Service • Williamsport to Pile Bay Roadway Link • Pile Bay to Iliamna Roadway Link • Iliamna to Igiugig Roadway • Igiugig to Levelock Roadway Link • Igiugig to Naknek Roadway Link	• Homer to Williamsport Marine Service • Williamsport to Pile Bay Roadway Link • Lake Iliamna–Kvichak River Service via Shallow-Draft Landing Vessel	• Homer to Williamsport Marine Service • Williamsport to Pile Bay Roadway Link • Lake Iliamna–Kvichak River Service via Hovercraft


Kuskokwim Bay
Bristol Bay
Saint Paul
Pribilof Islands
Saint George
Nikolski
Unalaska
Akutan
Cold Bay
King Cove
False Pass
Sand Point
Unalaska
Ivanof Bay
Nelson Lagoon
Port Moller
Perryville
Chignik Lagoon
Chignik
Chignik Lake
Port Heiden
Akhiok
Larsen Bay
Old Harbor
Port Lions
Port O'Brien
Ouzinkie
Kodiak
Karluk
Ugashik
Pilot Point
Naknek
South Naknek
King Salmon
Egegik
Clark's Point
Dillingham
Aleknagik
Manokotak
Twin Hills
Goodnews Bay
Platinum
Togiak
New Stuyahok
Koliganek
Nondalton
Iliamna
Newhalen
Pile Bay
Williamsport
Pedro Bay
Kokhanok
Port Alsworth
Homer
Seldovia
Port Graham
Scale 1:3500000
Approximate scale: 1:10,000,000
Amu
Shemya Station
Aleutian Islands
Attu Station
Southwest Alaska Transportation Plan
Initial Transportation System Alternatives Technical Memorandum

This alternative would provide several benefits to the region and to the communities along the proposed corridor, including the following:

- It would open up a shorter, less dangerous, less expensive freight route from Cook Inlet to Bristol Bay. A continuous surface route across the top of the Alaska Peninsula would mean that it would no longer be necessary to transport goods by barge all the way around the Alaska Peninsula.
- By making scenic wilderness areas, businesses, and lodges along the corridor more accessible to visitors, this alternative would support tourism in the region.
- This alternative would provide the communities of interior Southwest Alaska with greater connectivity to one another, which would promote their economic development.
- This alternative would provide communities along the corridor with a modal alternative to reaching major activity centers such as Anchorage and Kodiak by air.
- Insofar as this alternative is based in large part on the existing road from Williamsport to Pile Bay, it provides a cost-effective means of expanding the core highway system because the right-of-way for this link is already established and owned by DOT&PF.
- The project would promote the economic development of Bristol Bay fisheries. Boat repair and storage facilities are limited in Bristol Bay, requiring many boat owners to bring their boats to Homer. The overland route avoids the time-consuming and hazardous open ocean voyage around the Alaska Peninsula, thereby saving money and increasing safety. The route also saves deterioration of fishing boats not designed for extensive open ocean travel.

Baseline

A key baseline improvement programmed within the proposed corridor is completion of the Iliamna–Nondalton Road, a $9.75 million project which will complete the roadway connection between Iliamna and Nondalton by bridging the Newhalen River and constructing three final miles of roadway on the Nondalton side of the river. This baseline improvement would integrate Nondalton, a community with a 2020 base population forecast of 317 into the rest of the proposed corridor. The other baseline improvement relevant to this proposed alternative is DOT&PF's Winter Trail Marking project, which will mark 314 miles of trails – from Goodnews Bay all the way to Levelock and Naknek, communities served directly by the proposed corridor.

Element 1. Homer-Seldovia-Williamsport Marine Service

Proposed in this alternative is new marine service linking Seldovia and Homer, on the Kenai Peninsula, with Williamsport, which lies on the western shores of Cook Inlet, just off Iliamna Bay. This link would provide the first element of a surface transportation corridor linking Alaska's overland transportation system and population concentrations with the communities of the Lake and Peninsula and Bristol Bay Boroughs.

As envisioned, this marine service would not only provide a new link between Williamsport and Homer, but it would also continue to serve the linkage between Homer and Seldovia now provided by current AMHS service. In fact, as configured for planning purposes, it could provide an equal or greater level of service frequency and capacity compared to the current service provided by the *Tustumena*.

THE VESSEL

A separate alternative proposed in this document is a reconfiguration of AMHS service that would result in the dedication of the *Tustumena* to ports in the Southwest Alaska Study Area (along with connections to the Kenai Peninsula). As such, a new vessel was explored to provide the proposed service between Homer, Seldovia, and Williamsport. Given the run across lower Cook Inlet, an area noted for steep seas, strong currents, and winter ice floes, the vessel providing this service would have to be capable of navigating in high winds, seas, spray icing conditions, and sea ice.

For planning purposes, a basis vessel was chosen to illustrate this alternative. The basis vessel selected, the *M/V Nunaiq*, is a 150'-6" long, with a 47' beam, an 8' depth, a 3'-9" to 6'0" draft and a cruising speed of 9 knots. Although the basis vessel and others of this type have extensive operation experience in Alaska waters, some design enhancements, including minimum ice strengthening, expandable passenger capacity, and increased freeboard and bulwark height should be considered. The capital cost of such a vessel is estimated at $2.75 million.

SCHEDULE AND FREQUENCY OF SERVICE

Physical laws regarding the resistance of displacement vessels limit conventional monohull ferries with length on the order of 150' to speeds between 9 and 12 knots. Even at 12 knots, the 152 nautical mile trip between Homer and Williamsport would take more than 12 hours for running time alone (without allowance for port time, startup, or shutdown). Another factor in scheduling this service hinges on the shallow water and dredged channel at Williamsport, which would make it prudent to time trips to match the tide at Williamsport. As such, one round trip between Homer and Williamsport could be scheduled in any 24-hour period, but the timing of departures and arrivals would vary from day-to-day based on tides. Based on a 9-knot service speed (and allowing one half hour for morning startup and one-half hour for evening shutdown) the service day for a Homer–Williamsport round trip would be about 18 hours, which would allow six hours in any 24-hour day to adjust for the tide.

One way, the trip from Homer to Seldovia can be made in two hours, and two round trips per day, during daylight hours, are easily feasible. According to the schedule developed for this planning effort, the vessel could service Williamsport on seven days in a two-week period, and Seldovia on the other seven days.

In a 44-week service year (with ten weeks provided for annual maintenance), the vessel would call at Williamsport and Homer 154 times apiece, and at Seldovia 308 times. The proposed service concept would provide much more frequent service to Homer and Seldovia, which received 58 port calls apiece in 1997, according to the "AMHS 1997 Annual Traffic Volume Report." As configured for planning purposes, the service proposed would provide an annual passenger capacity of 15,092, compared to the *Tustumena's* 12,760.

Table 11
Seldovia Service Comparison

SELDOVIA			
	Tustumena	New Vessel	Historical Demand
Annual Trips	58	308	
Annual Passenger Capacity	12,760	15,092	2,303
Annual Vehicle Capacity	3,132	6,160	878
WILLIAMSPORT			
Annual Trips	NA	154	
Annual Passenger Capacity	NA	7,546	NA
Annual Vehicle Capacity	NA	3,080	NA

Note: Annual capacities and historical demand are stated on a one-way basis. Two-way capacities are exactly twice the one-way capacities. One-way historical demand is the larger of the historical demand values from either the Homer–Seldovia or the Seldovia–Homer trip directions.

Operating costs for the Homer–Williamsport–Seldovia marine service element of this alternative are summarized in Table 12.

Table 12
Homer–Seldovia–Williamsport Ferry Service
Operating Costs

	Minimum	Maximum
Shoreside Maintenance	$185,000	$185,000
Hull Maintenance & Pass. Services Maint.	$36,000	$44,000
Machinery Maintenance	$128,000	$156.000
Crew	$698,932	$833,152
Fuel	$159,000	$194,000
Lubricating Oil	$3,600	$4,400
Ports and Terminals O.H.	$223,176	$223,176
Management O.H.	$366,741	$366,741
Shoreside O.H.	$69	$69
Insurance	$19,000	$23,000
TOTAL: (Estimated Annual Operating Cost)	$1,819,518	$1,873,694

OPERATIONAL ISSUES

Williamsport would require substantial navigational improvements in order to accommodate AMHS service. Williamsport is located at the head of tide flats that go dry at low water. In addition, large boulders dot the shoal water approaches to Williamsport. Although shallow-draft vessels could presumably call briefly at high tide, dredging the channel would be required to service other types of vessels, including the basis vessel envisioned to provide the marine service in this alternative.

The U.S. Army Corps of Engineers (COE) completed a study exploring the feasibility of a dredging project at Williamsport in 1995. That report recommended excavation of a 2,700-meter long channel, ending at Williamsport, in Iliamna Bay. The channel bottom would be 30 meters wide at 0.5 below Mean Lower Low Water. The channel would end with a turning basin 5 meters long and 55 meters wide. The turning basin would provide access to a sheet-pile bulkhead dock and an adjacent paved, 8-meter wide launch. Capital costs for the project were estimated at $3,822,000, of which federal funding in the amount of $1,691,400 was identified as available, leaving $2,130,600 to non-federal sources. Annual M&O costs for the project were estimated at $185,000.[5]

The COE study conducted a rigorous benefit-cost analysis for the project, which determined that benefits would exceed costs at a 3.1:1.0 ratio. While the COE study determined that dredging a channel to Williamsport would be a worthwhile project, the lack of a local sponsor terminated further work on the project. However, it was noted that the project could proceed if a local sponsor, such as the State of Alaska, were secured.

Element 2. Williamsport to Pile Bay Roadway Link

Although a roadway currently exists between Williamsport and Pile Bay, it is quite primitive and in poor repair. The existing road is 15.5 miles long, consisting of one graded and drained earthen travel lane with no shoulder. In poor condition, the road is maintained only during the summer when a maintenance contractor is available. Portions of the road do not meet minimum width standards and are too narrow for current use. One of four bridges along the project corridor has washed out, and the others, all of which have sufficiency ratings below 50, are narrow and cannot accommodate oversized traffic. The major limitation restricting boat-haul traffic is the existing metal bridge across the Iliamna River, whose interior dimension of only 12 feet, is too narrow for the typical gillnet boat.

The project proposed in this link would reconstruct and widen the existing road to design standards applicable to a rural major collector traveled by 250 vehicles or less per day. The road's four bridges would be repaired, replaced, or widened, as appropriate. The road would be maintained year-round.

The road climbs 850 feet through the Chigmit Mountains in the first two miles benched on steep rock slopes. The road through this section is narrow and subject to avalanche hazards. As such, winter maintenance through this stretch would likely be difficult and expensive.

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[5] This maintenance cost includes annual grading of the dock, ramp, and staging area; annual surveys the first 4 years, then every 5 years; maintenance dredging every 5 years; replacement of fender piles, ramp concrete, and sheet-pile cathodic protection every 10 years; and replacement of the sheet pile at 30 years.

Total capital costs for this project are estimated at $14,857,500 for a paved surface, and $12,300,000 for a gravel surface. Annual M&O costs are estimated at $209,250 and $232,500 respectively. Demand as part of the full alternative is estimated at 4,200 person trips per year (Tables 19 and 21).

Element 3. Pile Bay to Iliamna Roadway Link

This roadway would complete a link from Williamsport through to Iliamna, allowing travel from Cook Inlet into the interior of the Lake and Peninsula Borough at least as far as Iliamna. The road would connect as far as Nondalton, given that Iliamna–Nondalton link has been programmed and is part of the baseline. This roadway link would provide Pile Bay and Pedro Bay access to the airport at Iliamna and would allow for a tourism circuit from Cook Inlet and potential access to Lake Clark National Park. The project would also provide the potential for interconnection of the electric power of the Tazimina Hydroelectric project.

This project would build 38 miles of new roadway between Iliamna and Pile Bay, passing through Pedro Bay. Although no road yet exists from Iliamna to Pile Bay, a 46-mile trail from Iliamna to Pedro Bay does exist, as does a 12-mile trail from to Pedro Bay to Pile Bay, denoted by the Alaska Department of Natural Resources as a RS2477 route. A likely corridor would follow the RS2477 trail route, traveling about half a mile inland from the northern shore of Lake Iliamna. As proposed, this road would cross about 15 creeks, which would require culvert placements or short-span bridges at these junctions. Like the other roadway links proposed in this regional plan, the road would be constructed to meet AASHTO design standards for a rural major collector with daily travel of under 250 vehicles per day.

The corridor envisioned consists of relatively easy terrain with numerous stream crossings. Construction would include typical fill construction techniques. No unusual construction or design issues are anticipated. Normal annual maintenance would be required for roadway upkeep. Because the area receives just over 60 inches of snow per year, plowing would probably account for the bulk of annual maintenance costs.

Total capital costs for this project are estimated at $51,870,000 for a paved surface, and $45,600,00 for a gravel surface. Annual M&O costs are estimated at $513,000 and $570,000, respectively. Demand for this roadway link is estimated at 17,900 person trips per year as an independent project and 32,400 person trips per year as a component of the alternative (Tables 19 and 21).

Element 4. Iliamna to Igiugig Roadway Link

The 56-mile road link proposed to connect the communities of Iliamna and Igiugig, which lie along the northern shores of Lake Iliamna, would cross lowlands dotted with many lakes, streams, and rivers. Bridges would be required to cross the Newhalen River, the Kvichak River, and many smaller rivers along the coast of Lake Iliamna. The 56-mile road would be built according to AASHTO design standards for a rural major collector serving 250 vehicle or less per day.

This project's major construction issues pertain to the development of bridges over the Newhalen and Kvichak Rivers. Construction materials would have to be barged in via the Kvichak River, and landings would have to be developed for staging. Permitting and land use concerns would also be an issue given the increase in traffic and the presence of structures

that may affect the fishing industry and other traditional area uses. Normal annual maintenance would be required for the bridge and roadway upkeep. Because total precipitation is 20 inches annually, including 45 inches of snowfall, snow removal would constitute the primary maintenance cost.

Total capital costs for this project have been estimated at $78,940,000 for a paved surface and $69,700,000 for a gravel surface. Annual M&O costs have been estimated at $756,000 and $840,000, respectively. Demand for this roadway link is estimated at 16,100 person trips per year as an independent project, 92,300 person trips per year as a component of the alternative, King Salmon option, and 106,100 person trips per year as a component of the alternative, Naknek Option (Tables 19 and 21).

Element 5a. Igiugig to Naknek Roadway Link

Constructing a 75-mile road between Igiugig and Naknek would provide one means of completing the proposed corridor from the Kenai Peninsula to Bristol Bay. This link would provide interior Southwest Alaska communities with ground access to the regional hub of King Salmon, where many goods and services are available.

The terrain between Igiugig and Naknek consists of coastlands and wetlands, with scattered lakes and ponds. The southwesterly route proposed along the Kvichak River would have to avoid numerous wetlands and lakes. Culverts to provide fish passage would be required at creek crossings, including Pecks Creek and Ole Creek. With the Kvichak River's turn to the south, the road alignment would parallel connecting into Hallersville from the north. The road would then be directed east and around the large mouth of the Wild and Scenic Alagnak River to an easier crossing of the river upstream. The crossing would take place approximately three miles east of Hallersville and then turn southwest toward the Kvichak River mouth. Once reaching Cape Horn, the road alignment would follow the pioneer route[6], which runs along the coast through Kvichak, Koggiung, and Libbyville before ending on the north side of Naknek.

Normal annual maintenance would be required for bridge and roadway upkeep. With total precipitation amounting to 20 inches annually, with 45 inches of snowfall, snow removal would require the bulk of the maintenance expenditure.

Total capital costs for this project have been estimated at $102,375,000 for a paved surface and $90,000,000 for a gravel surface. Annual M&O costs are estimated at $1,012,500 and $1,125,000, respectively.

Demand for this roadway link is estimated at 24,100 person trips per year as an independent project and 110,000 person trips per year as a component of the alternative (Table 21).

Element 5b. Igiugig to King Salmon Roadway Link (Alternative Route)

A 56-mile roadway between Igiugig and King Salmon would provide an alternative route to finish the overland crossing of the Alaska Peninsula connecting the Kenai Peninsula with

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[6] This pioneer route is still used to access setnet sites along the coast.

Bristol Bay. Currently, passengers and freight are moved between Igiugig and King Salmon by aircraft or by boat along the Kvichak River with a transfer by road to King Salmon. The eastern portion of the terrain between these communities is characterized by large mountains and foothills to the north of Naknek Lake. The western portion of the area comprises coastlands and wetlands with scattered inland lakes and ponds.

Beginning in the village of Igiugig, the proposed roadway alignment would travel to the south-southwest, crossing Pecks Creek and Ole Creek along with many other small crossings. Continuing south-southwest, the alignment would require crossing the Alagnak River (a Wild and Scenic River) and would navigate along the foothills of the mountains north of Naknek Lake, outside of Katmai National Park and Preserve. The roadway would be routed to the southwest, crossing many branches of Pauls Creek and take a southerly bearing toward King Salmon Creek. Once the road alignment had crossed King Salmon Creek, it would travel along the banks until it connected into the pioneer road system, built by the U.S. Air Force north of King Salmon. After following the pioneer road southwest, the road would terminate on the northwest side of King Salmon at the Alaska Peninsula Highway.

Large river crossings, each of which would require fish passage culverts, are the primary construction issue for this link. With 20 inches of total precipitation annually, including 45 inches of snowfall, snow removal would account for the bulk of maintenance costs.

Total capital costs for this project have been estimated at $76,440,000 for a paved surface and $67,200,000 for a gravel surface. Annual M&O costs have been estimated at $756,000 and $840,000, respectively. Demand for this roadway link is estimated at 24,100 person trips per year as an independent project and 95,100 person trips per year as a component of the alternative (Table 19).

Element 6. Levelock Link to the Igiugig–Naknek Roadway

Building a connection between Levelock and the Igiugig–Naknek roadway link would integrate Levelock, which lies on the north shore of the Kvichak River, to the rest of the surface transportation corridor proposed in this alternative. This would permit the village of Levelock, (2020 base population forecast = 139) access to the larger communities of King Salmon and Naknek. This link could also serve as the beginning of a future route connecting the southwestern peninsula with communities further west, such as Dillingham.

The proposed 19-mile route, which would stem from the proposed link connecting Igiugig and Naknek, would require a 400-foot bridge across the Kvichak River. In addition, the proposed alignment would encounter several creeks, including Yellow Creek and Levelock Creek.

The terrain to be crossed in this proposed link is relatively flat, with occasional creek crossings that would require accommodation of fish passage. The bridge and roadway would require normal annual maintenance, most of which would be devoted to snow removal, insofar as the area receives about 20 inches of precipitation annual, including 45 inches of snowfall.

Total capital costs for this project have been estimated at $27,435,000 for a paved surface and $24,300,000 for a gravel surface. Annual M&O costs have been estimated at $256,500 and $285,000, respectively.

Demand for this roadway link is estimated at 15,000 person trips per year as an independent project and 39,600 person trips per year as a component of the alternative (Table 21).

Marine Options

Each of the four options for linking the Kenai Peninsula with Bristol Bay is the same as far west as Iliamna, at which point they diverge into two overland and two marine options. Discussed below are the two marine options for completing the stretch from Iliamna to Bristol Bay. Initially, the consultant team explored use of a shallow-draft landing vessel to provide service from Iliamna west to Bristol Bay along Lake Iliamna and the Kvichak River. However, initial analysis revealed that such service would be constrained by two factors: (1) winter ice; and (2) seasonally low water, which, combined, would restrict the navigable season from May to October. For this reason, Hovercraft service, which can negotiate both ice and shallow water, was also explored. The results of both sets of analysis are summarized below.

Element 7. Iliamna to Naknek Via Shallow-Draft Landing Vessel

Private and commercial vessels, including barges, are already in use on this waterway system. This option proposes ferry service along Lake Iliamna and the Kvichak River. Iliamna Lake is navigable between May 1 through October 31. While the lower reaches of the Kvichak River are navigable during the ice-free season, the upper reaches of the river are subject to seasonal low water that could impact navigability for some conventional vessels.

The vessel envisioned to provide this service is a shallow-draft landing vessel about 50 feet long, with a 16-foot beam, and with a running draft of approximately 14 inches. The vessel explored for planning purposes can accommodate two loaded full-sized pickup trucks and up to six passengers. The six-passenger threshold is highly desirable because this capacity would allow, according to USCG regulations, the service to operate with just two crew, each holding a USCG boat operator's license, a relatively easily acquired credential.

It would be possible, given the distances between ports served, to operate this service on a "dayboat" concept, which provides substantial operating cost savings, insofar as operations require no more than a single crew for no more than 12 hours per day of service. This would be feasible, providing that the vessel employed is capable of traveling comfortably in excess of the peak river current by a sufficient margin to make the transit in under 12 hours. For planning purposes, we currently believe that a 15-knot vessel could provide round trip service from the western terminus on a three-day turnaround basis (with two 12-hour layovers enroute). A 25-knot vessel could provide the same service on a two-day turnaround basis (with one 12-hour layover enroute). The schedule proposed for planning purposes would have Naknek, at the route's southern terminus, as its "home" port. Table 13 shows a model high-speed, shallow-draft, landing craft schedule for a typical voyage originating in Naknek and returning to Naknek at the end of the second day. Note that one 12-hour minimum layover is required on Iliamna Lake for crew rest.

Table 13
Model Schedule
High-Speed (25 knot), Shallow-Draft Landing Craft

	Arrival		Departure		Port Time	Sailing Time
	Day	Time	Day	Time	Duration	Duration
Naknek	[illegible]	[illegible]	Monday	6:00	[illegible]	1:16
Levelock	Monday	7:16	Monday	7:46	0:30	4:56
Igiugig	Monday	12:42	Monday	13:12	0:30	1:36
Newhalen	Monday	14:48	Monday	15:18	0:30	0:14
Illamna	Monday	15:32	Monday	16:02	0:30	0:55
Pedro Bay	Monday	16:57	Monday	17:27	0:30	0:22
Pile Bay	Monday	17:49	Tuesday	5:49	12:00	1:36
Kokhanok	Tuesday	7:25	Tuesday	7:55	0:30	0:41
Newhalen	Tuesday	8:36	Tuesday	9:06	0:30	0:41
Kokhanok	Tuesday	9:47	Tuesday	10:17	0:30	0:41
Newhalen	Tuesday	10:58	Tuesday	11:28	0:30	1:36
Igiugig	Tuesday	13:04	Tuesday	13:34	0:30	1:59
Levelock	Tuesday	15:33	Tuesday	16:03	0:30	1:04
Naknek	Tuesday	17:07	[illegible]	[illegible]	[illegible]	[illegible]

Although accommodating the vessel envisioned to provide service on this link would not require extensive or particularly expensive shoreside infrastructure, some minor landing area upgrades, such as road extensions and gravel or concrete pads, would be needed. Accordingly, the costs of such improvements have been estimated at $25,000 at each of eight ports proposed for service, for a total of $200,000. In addition, navigation aids needed on the Kvichak River itself have been estimated at a cost of $50,000. Combined M&O costs for all shoreside improvements have been estimated at $6,250 annually.

In addition to the shoreside improvements just mentioned, of course a new vessel would have to be acquired – at an estimated cost of $526,000. Vessel-related M&O costs, which include crew, fuel, insurance and overhead, are estimated at $318,300. The total cost breakdown for this project is provided in Table 14.

Table 14
Capital and M&O Costs for Proposed Lake Iliamna/Kvichak River Marine Link
(Shallow-Draft Landing Vessel Option)

Vessel Acquisition Cost	$481,000 F.O.B. Seattle $45,000 Delivery by barge	
Subtotal: (Acquisition Cost)	$526,000	
	Minimum	**Maximum**
Hull Maintenance	$1,500	$2,000
Machinery Maintenance	$4,000	$5,500
Crew	$144,000	$223,000
Fuel	$90,000	$110,000
Lubricating Oil	$1,200	$1,400
Berthing	$3,000	$4,000
Insurance	$22,000	$25,000
Subtotal: (Annual Operating Cost)	$265,700	$370,900

Table 15
Capital and M&O Costs
Shoreside Improvements

Landing area upgrades (road extensions, gravel or concrete pads, etc.) at eight (8) communities (Allowance: 8x$25,000)	$200,000	
Aids to navigation on Kvichak River	$50,000	
Subtotal: (Acquisition Cost)	$250,000	
	Minimum	**Maximum**
Annual Maintenance	$5,500	$7,000
Subtotal: (Annual Operating Cost)	$5,500	$7,000

Demand for this service link is estimated at 3,600 person trips per year.

Element 8. Iliamna to Egegik Marine Service via Hovercraft

Hovercraft, which can operate at speeds over 40 knots over land, ice cover, seas with up to four-foot waves, beaches, and shallow water, were also explored as a means of linking the western portion of the Kenai Peninsula to Bristol Bay corridor. Two models of hovercraft with extensive Alaskan operating experience were explored in analyzing this option: the turbine-powered LACV-30 type hovercraft and the conventionally-powered AP.1-88. Of the two, the

AP.1-88 was found to be more suitable for Lake Iliamna–Kvichak River service, due to its smaller size, lower operating costs, and lower noise impacts.[7] Like the shallow-draft landing vessel option described above, crew costs for hovercraft operations would be relatively low. It is possible that the AP.1-88 could be operated with a crew of two: a master, who would have to have a USCG hovercraft endorsement,[8] and a mate to crew the aft compartment.[9]

Using a hovercraft rather than a shallow-draft landing vessel to connect the communities along Lake Iliamna and the Kvichak River would have several advantages over the use of a shallow-draft landing vessel:

- **Longer service period**. Hovercraft operation would offer the advantage of a year-round, as opposed to May through October service season. Unlike a shallow-draft vessel, the Hovercraft would be able to operate over the winter ice of Lake Iliamna, and probably over the Kvichak River's ice. However, the Hovercraft would likely be out of service for about 20 days each for the periods of winter freezeup and spring thaw, which could be scheduled for annual maintenance. In any case, the total service period of the Hovercraft would be approximately 46 weeks compared to 26 weeks for the shallow-draft vessel.
- **Fewer shoreside improvements required.** The AP.1-88 is able to utilize an unimproved or minimally improved loading/unloading facility, unlike a shallow-draft landing vessel, which would require landing pads.
- **Freight-carrying flexibility.** The version of the AP.1-88 currently operating in Alaska is configured for 24 passengers with adjustable interior bulkhead to accommodate freight. The aft superstructure doors are wide enough to pas a full size pallet.

Some disadvantages associated with hovercraft operations have also been identified:

- **Noise.** Although the diesel-powered AP.1-88 is not as noisy as the turbine-powered LACV-30, it is relatively noisy compared to the conventional hull option. In any case, current hovercraft operations in Bethel, Alaska, on behalf of the U.S. Postal Service will provide an opportunity to assess noise impacts firsthand.
- **Limited payload.** Although the AP.1-88's 16,000-pound cargo capacity slightly exceeds that of the shallow-draft landing vessel, its deadweight capacity is modest. However, given early, planning-level demand estimates, it is thought to be sufficient.
- **Relatively high maintenance costs.** Although maintenance costs for Hovercraft are not well established, they are presumed to be higher than those for conventional hull craft, due to two factors: (1) their higher level of mechanical sophistication; and (2) wear and tear on the craft's rubber skirt. In addition, it would be necessary to wash the craft down when operating over brackish water near Naknek in order to prevent salt water damage to the air screws and other machinery.

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[7] Although other hovercraft are commercially available, most are much smaller and would not meet the projects freight and passenger load requirements envisioned in this option. In addition, two existing AP.1-88 vessels, although built in Canada, have unrestricted Jones Act waivers allowing their use in the United States.

[8] A hovercraft endorsement from the USCG can be earned upon completion of 36 hours of classroom study and 36 hours of operating time.

[9] Although the mate need not be fully qualified, he or she must have a radar rating.

MODEL SCHEDULE

The AP.1-88 hovercraft is fast enough that the highly desirable result of 12-hour dayboat operation would be achievable. In fact, Table 17 shows a model schedule based on the following operating speeds: 40 knots per hour on the lower Kvichak River, 30 knots on the upper Kvichak River, and 50 knots on Lake Iliamna. In order to maintain 12-hour service days, port calls are limited to 20 minutes. This model schedule accomplishes the daily round trip in 11 hours, allowing a half hour in the morning for startup and a half hour in the evening for shutdown. For the purposes of illustrating this schedule, Naknek serves as homeport.

The acquisition cost for an AP.1-88 hovercraft is estimated in the range of $5 to $6 million, depending on classification and regulatory requirements, outfitting, delivery costs, and acquisition scheme. A summary of estimated Hovercraft operating costs is provided in Table 18.

Table 16
AP.1-88 Hovercraft

Annual Operating Costs	
Maintenance	$1,408,000
Crew	237,250
Fuel	14,608
Lubricating oil	2,282
Subtotal	$1,662,140
Miscellaneous (4%)	66,460
Total	**$1,728,600**

The operating cost summary contained in Table 18 assumes that hovercraft service is provided five days a week except during break-up and freeze-up, for which 20 days apiece are allocated and assumed to be used for annual maintenance.

Demand for this service link is estimated at 6,900 passenger trips.

Table 17
Model Schedule
(40 kt lower river; 30 kt upper river; 50 kt lake)

	Arrival		Departure		Port Time	Sailing Time
	Day	Time	Day	Time	Duration	Duration
Naknek			Same Day	6:30		0:45
Levelock	Same Day	7:15	Same Day	7:35	0:20	1:30
Igiugig	Same Day	9:05	Same Day	9:25	0:20	0:50
Newhalen	Same Day	10:15	Same Day	10:35	0:20	0:10
Iliamna	Same Day	1[illegible]	Same Day	11:05	0:20	0:30
Pedro Bay	Same Day	11:35	Same Day	11:55	0:20	0:15
Pile Bay	Same Day	12:10	Same Day	12:30	0:20	0:50
Kokhanok	Same Day	13:20	Same Day	13:40	0:20	0:50
Igiugig	Same Day	14:30	Same Day	14:50	0:20	1:30
Levelock	Same Day	16:20	Same Day	16:40	0:20	0:45
Naknek	Same Day	17:25				

Table 18
Cost Synopsis
Cook Inlet to Bristol Bay Overland
King Salmon Option

	Annual O&M Cost	Total Capital Cost	Annualized Cap Cost @ 7% Interest	Annualized Capital plus O&M costs
Marine Elements				
Homer–Williamsport–Seldovia Marine	$1,846,606	$2,750,000	$259,581	$1,921,187
Homer–W–S shoreside	$185,000	$3,822,000	$360,770	$545,770
Roadway Elements				
Williamsport to Pile Bay				
Paved	$209,250	$14,857,500	$1,402,443	$1,611,693
Unpaved	$232,500	$12,300,000	$1,161,033	$1,393,533
Pedro Bay to Pile Bay to Iliamna				
Paved	$513,000	$51,870,000	$4,896,161	$5,409,161
Unpaved	$570,000	$45,600,000	$4,304,317	$4,874,317
Iliamna to Igiugig				
Paved	$756,000	$78,940,000	$7,451,378	$8,207,378
Unpaved	$840,000	$69,700,000	$6,579,187	$7,419,187
Igiugig to King Salmon				
Paved	$756,000	$76,440,000	$7,215,395	$7,971,395
Unpaved	$840,000	$67,200,000	$6,343,205	$7,183,205
TOTAL				
Paved Option	$4,778,856	$228,679,500	$21,585,727	$25,666,583
Unpaved Option	$5,084,106	$201,372,000	$19,008,092	$23,337,198

Table 19
2020 Annual Travel Demand Estimate
Cook Inlet to Bristol Bay Overland
King Salmon Option

	Independent*	Alternative**	System***
Marine Elements			
Homer–Seldovia		4,000	
Homer–Williamsport		4,200	
Roadway Elements			
Williamsport to Pile Bay to Pedro Bay		4,200	
Pedro Bay to Iliamna	17,900	32,400	33,700
Iliamna to Igiugig	16,100	92,300	101,300
Igiugig to King Salmon	24,100	95,100	108,300

* Demand on the link as an independent element.

** Demand on the link as part of the alternative.

*** Demand on the link assuming implementation of a Cook Inlet to Bristol Bay to Alaska Peninsula roadway system.

Table 20
Cost Synopsis
Cook Inlet to Bristol Bay, Overland
Naknek Option

	Annual O&M Cost	Total Capital Cost	Annualized Cap Cost @ 7% Interest	Annualized cap cost plus O&M Cost
Marine Elements				
Homer–Williamsport–Seldovia	$1,846,606	$2,750,000	$259,581	$1,921,187
Homer–W–S Shoreside	$185,000	$3,822,000	$360,770	$545,770
Roadway Elements				
Williamsport–Pile Bay				
Paved	$209,250	$14,857,500	$1,402,443	$1,611,693
Unpaved	$232,500	$12,300,000	$1,161,033	$1,393,533
Iliamna–Pedro Bay–Pile Bay				
Paved	$513,000	$51,870,000	$4,896,161	$5,409,161
Unpaved	$570,000	$45,600,000	$4,304,317	$4,874,317
Iliamna to Igiugig				
Paved	$756,000	$78,940,000	$7,451,378	$8,207,378
Unpaved	$840,000	$69,700,000	$6,579,187	$7,419,187
Igiugig to Naknek				
Paved	$1,012,500	$102,375,000	$9,663,476	$10,675,976
Unpaved	$1,125,000	$90,000,000	$8,495,363	$9,620,363
Igiugig to Levelock				
Paved	$256,500	$27,435,000	$2,589,670	$2,846,170
Unpaved	$285,000	$24,300,000	$2,293,748	$2,578,748
TOTAL				
Paved Option	$4,778,856	$282,049,500	$26,623,478	$31,217,334
Unpaved Option	$5,084,106	$248,472,000	$23,453,999	$28,353,105

Table 21
2020 Annual Travel Demand Estimate
Cook Inlet to Bristol Bay Overland
Naknek Option

	Independent*	Alternative**	System***
Marine Elements			
Homer–Seldovia		4,000	
Homer–Williamsport		4,200	
Roadway Elements			
Williamsport to Pile Bay		4,200	
Pile Bay to Pedro Bay to Iliamna	17,900	32,400	33,700
Iliamna to Igiugig	16,100	106,100	115,100
Igiugig to Naknek	24,100	110,000	123,200
Igiugig to Levelock	15,000	39,600	43,800

* Demand on the link as an independent element.

** Demand on the link as part of the alternative.

*** Demand on the link assuming implementation of a Cook Inlet to Bristol Bay to Alaska Peninsula roadway system.