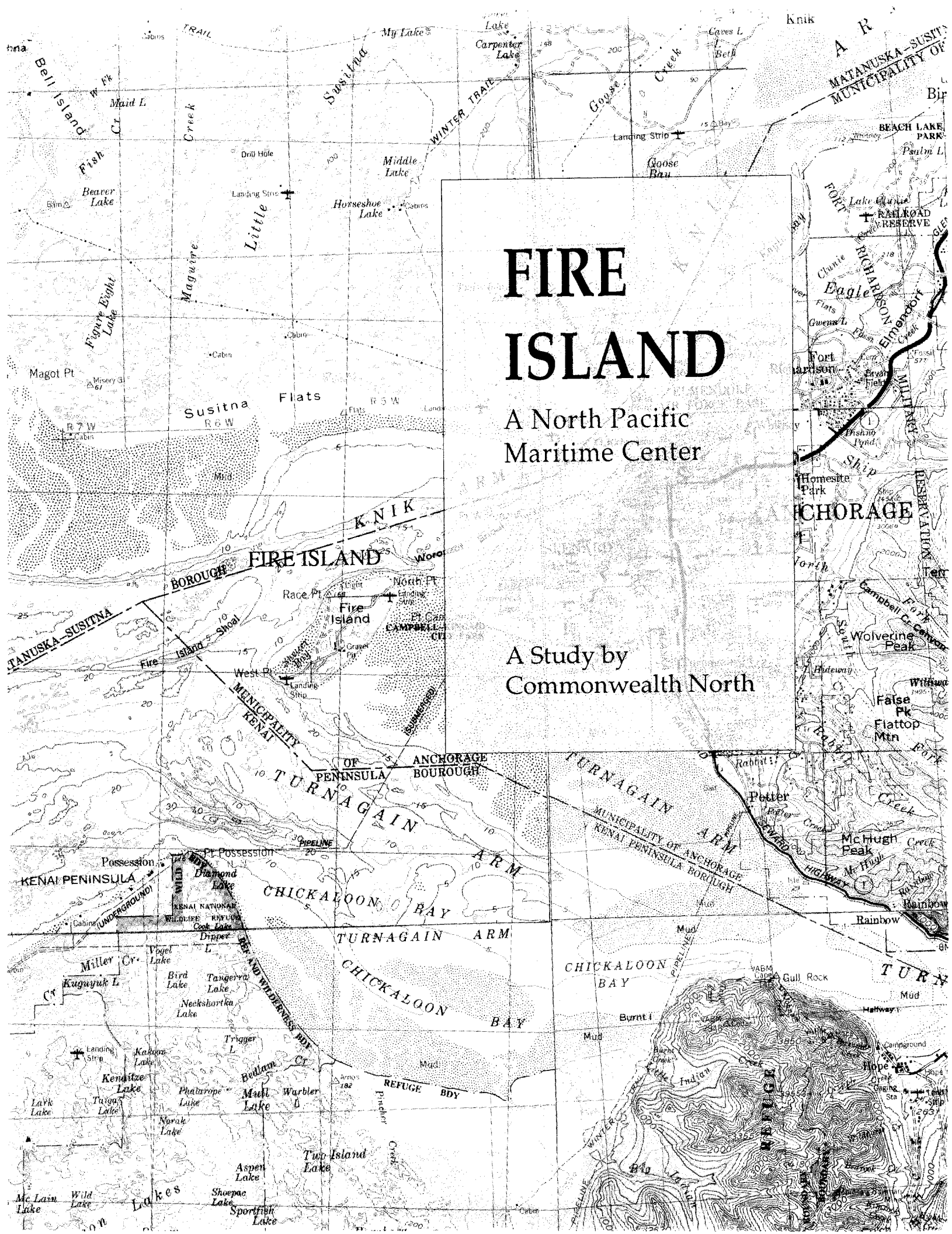

FIRE
ISLAND
A North Pacific
Maritime Center
A Study by
Commonwealth North
FIRE ISLAND
BOROUGH
KNIK
MATANUSKA-SUSITNA
TURNAGAIN ARM
CHICKALOON BAY
KENAI PENINSULA
ANCHORAGE
Susitna Flats
Fire Island
Race Pt
North Pt
West Pt
Pt Possession
Possession
Magot Pt
Beaver Lake
Horseshoe Lake
Middle Lake
Carpenter Lake
My Lake
Maid L
Bell Island
Fish Cr
Creek
Susitna
Little
Maguire
Figure Eight Lake
Goose Creek
Goose Bay
Caves L
Beth
Landing Strip
Drill Hole
WINTER TRAIL
Knik
MATANUSKA-SUSITNA MUNICIPALITY OF
BEACH LAKE PARK
Psalm L
FORT
RAILROAD RESERVE
Lake Clarice
RICHARDSON
Eagle
Elmendorf
Fort Richardson
MILITARY
Fishhook Pond
Homesite Park
ANCHORAGE
RESERVATION
Campbell Creek Canyon
Wolverine Peak
Hideaway
False Pk
Flattop Mtn
Rabbit Creek
Potter
Creek
McHugh Peak
Mt McHugh
SEWARD HIGHWAY
Rainbow
Rainbow Creek
MUNICIPALITY OF ANCHORAGE
KENAI PENINSULA BOROUGH
PIPELINE
Diamond Lake
KENAI NATIONAL WILDLIFE REFUGE
Cook Lake
Dipper L
Vogel Lake
Miller Cr
Kuguyuk L
Bird Lake
Tangerine Lake
Neckshartka Lake
Trigger L
Kenditze Lake
Kakuon Lake
Bedlam Cr
Mud Lake
Warbler L
Phalarope Lake
Taiga Lake
Lark Lake
Norak Lake
Aspen Lake
Two Island Lake
Mc Lain Lake
Wild Lake
Lakes
Shoepac Lake
Sportfish Lake
Pincher Creek
WILDERNESS BDY
REFUGE BDY
Gull Rock
Burnt I
Hallway I
Campground
Hope
Indian
Bird Creek
Turnagain Arm
Mud
Cabin
Landing Strip
Drill Hole
Misery Bl
Fish Dishno Pond
Ship
Fossil
Gwenn L
Flats
Fire Island Shoal
Graver Pit
Pt Campbell
CAMPBELL CR
SUBMERGED
(UNDERGROUND)
Mud
Flats
R 7 W
R 6 W
R 5 W

Fire Island, A North Pacific Maritime Center
March 1991

Executive Summary	**$5**
Full report	**$10**

COMMONWEALTH NORTH
FIRE ISLAND COMMITTEE

Evan (Joe) J. Griffith, Jr., Chairman
Executive Manager, Finance and Planning
Chugach Electric Association

Stan Brust
Civil Engineer
Alaska District, Corps of Engineers

Bruce E. Carr
Manager, Financial Services
Alaska Railroad Corp.

Glen Chambers
President, Yukon Equipment Corp.

Darrell Chambers
Project Accountant, ARCO Alaska Inc.

Col. Robert D. Clark
Vice Commander 11th Air Force
United States Air Force

Mark Dawson
President, Underwater Construction

Larry Dinneen
Co-Chair, Ports Alaska
Former Director of Port of Anchorage

Robert M. "Rick" Erickson
Director of Construction
Teamsters Local 959

Fred Ferrara
President, Alaska Valuation Services

John Gant
Hartig Research Fellow, Commonwealth North

Glen Glenzer
Director, Port of Anchorage

Roger Graves
Intergovernmental Affairs, Port of Anchorage

Joe L. Hayes
Former Speaker
Alaska House of Representatives

Roger Henderson
Attorney, Houston & Henderson

Tyler Jones
Transportation Project Director
Anchorage Economic Development Corp.

Bryce Klug
Architect
ECI Hyer

Pete Leathard
President, VECO Inc.

Hank Lind
Project Manager
Anchorage Economic Development Corp.

Ed McMillan
Director, Department of Public Works
Municipality of Anchorage

James Muller
Associate Professor
University of Alaska Anchorage

Dennis Nottingham
President, Peratrovich, Nottingham & Drage

Duane Oliphant
Purchasing Agent/Warehouse Manager
Anchorage School District

David Orr
Arctic Strategist

David Parker
Supply and Distribution Manager
Mapco Alaska Petroleum, Inc.

William D. Phifer
Manufacturing, Warehousing and
Distribution Specialist

Malcolm B. Roberts
Executive Director
Commonwealth North

James Rockwell

Brandt Schmidtmann
Manager, KPMG Peat Marwick

Ron Sheardown
President, Greatland Exploration

Jerry Strang
Wednesday Roundtable

Jules V. Tileston
Environmental Specialist
JMM Consulting Engineers

Steve Wells
Internal Auditor, Dept. of Transportation
State of Alaska

TABLE OF CONTENTS

Fire Island

The Challenge Facing Alaska

This is a study of the viability of a major maritime center at Fire Island.

The question is: Will an expanded port attract enough new facilities, services and industries to justify the public investment required for construction?

A study team of more than 30 Alaskans met bi-weekly for the past 18 months gathering, reviewing and debating the hard questions related to the feasibility of a port at Fire Island:

What are the costs?
What are the benefits?
Who benefits? / Who pays?
What are the environmental problems?
What are the engineering problems?

The conclusion is that a Fire Island Maritime Center will attract new facilities and services, which in turn will stimulate growth in industries such as modular construction and transportation related businesses. An expanded port will encourage further development in the processing and export of timber, coal, gravel and other bulk minerals and open the way for new opportunities in marine-based industries.

Fire Island Maritime Center will be one of the centerpieces in Alaska's economic portfolio–an important part of the answer to the challenge facing the state: the need to diversify our economy. As Prudhoe Bay oil fields are depleted and revenues taper off, Alaska must expand existing industries and encourage more economic opportunities.

Fire Island Maritime Center will be a critical component of a strategic plan to expand Alaska's role in international trade and transportation. Alaska's equidistance from the Far East, Europe, and the Lower 48 positions the state to become an international trade and transportation hub. If Alaska is to benefit from its strategic Pacific Rim location, it must have modern air/sea transportation facilities.

Existing port facilities in Anchorage are inadequate even for today's demands. There are space, environmental, and aesthetic constrictions that limit uses and inhibit expansion. The new Maritime Center will be built on about 1,500 acres of unused land at Fire Island's Race Point where the waterfront is deep and the tidal currents prevent shoaling.

The study includes substantial data on the cost of building a causeway to link Fire Island with Point Campbell including necessary utilities and rail facilities. Cost of the causeway and port are estimated at $226 million, about evenly divided between the causeway itself and rail and port facilities. The engineering analysis suggests no extraordinary problems complicate the construction of the causeway or location of the port.

The Benefits of a Fire Island Maritime Center

The study data leads to the conclusion that the new economic activities could provide almost 3,000 new jobs with payrolls of about $100 million annually.

ACTIVITY	JOBS CREATED
Modular Construction	**1,523**
Timber	**1,083**
Sea-Air cargo	**43**
Coal	**90**
Limestone	**83**
Gravel	**18**
Port operations	**9**
Total	**2,849**

The large industrial area has the potential to attract other new enterprises, such as:

- Fish processing
- Trade and commerce with the Soviet Union
- Marine vessel servicing
- Educational and research activities
- Ocean related environmental businesses

The port will complement the waterfront redevelopment the Municipality has already undertaken. The island would become the industrial base of the community, convenient to both airport and downtown, and without the environmental and aesthetic implications of other areas.

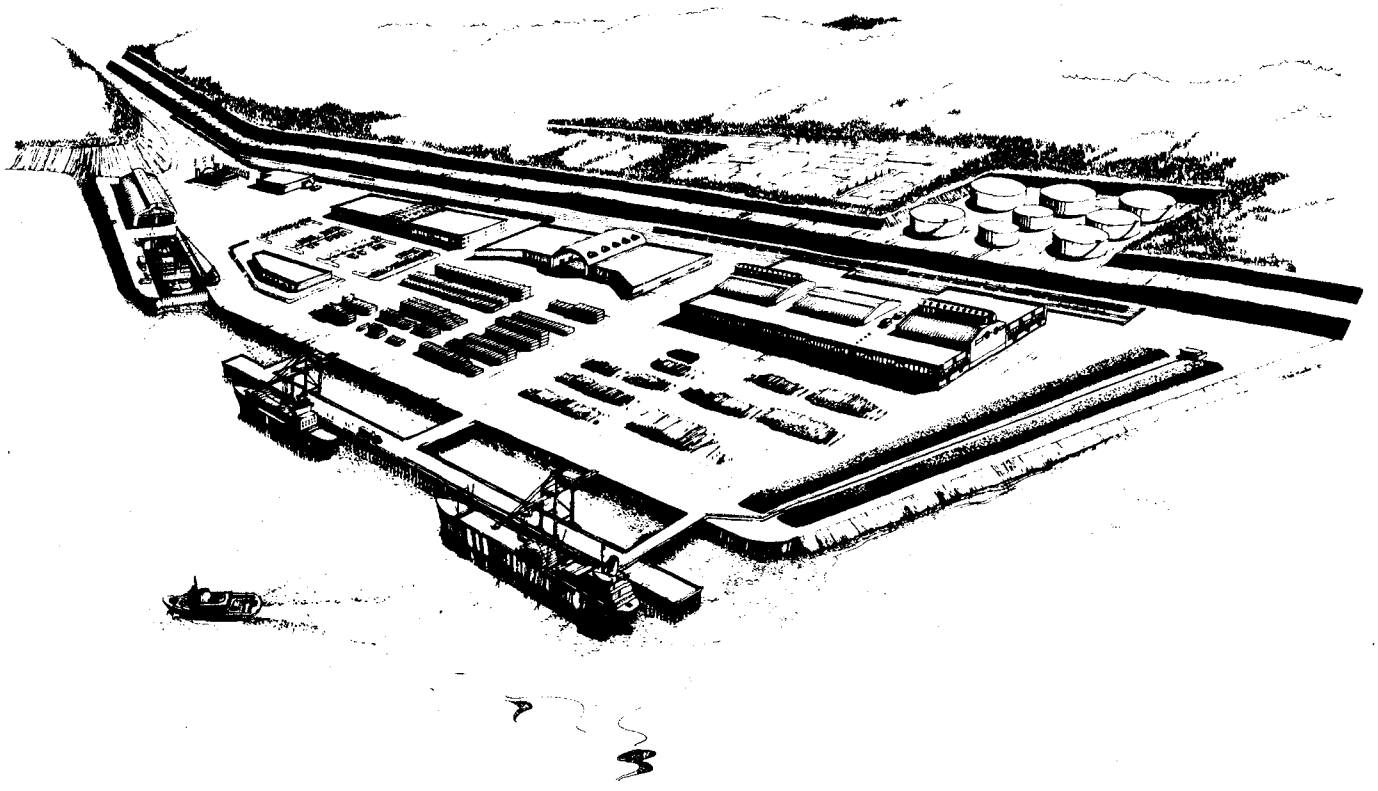
When the causeway is built, substantial areas of new tidal wetlands will be created for the benefit of recreation and environmental concerns. These lands might serve as a "bank" for future statewide developments under the no-net-loss policy.

Benefits from these economic developments will accrue to the cities and towns of the Southcentral and Interior Alaska where about 85 percent of the population lives.

In summary, the benefits of the new Maritime Center at Fire Island include:

- **New economic opportunities and activities**
- **Improved accessibility to Pacific Rim markets**
- **Increased intra-Alaska trade and commerce**
- **More jobs for Alaskans**
- **Enhancement of Alaska's strategic location with the possibility of becoming the headquarters for firms operating on the Pacific Rim.**
- **Increased recreational opportunities**
- **Creation of new wetlands**

ARTIST'S RENDITION OF THE PORT AT RACE POINT



Financing and Development

Financing for this $226 million project should be a joint venture between the public and private sector. The owners of Fire Island, from whom the port acreage must be acquired, might well participate in the financing of the project. They will benefit handsomely from the appreciation of the rest of the island's land area.

The government must be a partner in the development process but a third party should be in charge. This could be accomplished by utilizing existing development organizations or creating a new public/private entity.

Inasmuch as so many communities in Alaska will be impacted by the benefits from the new port and related activities, it would be appropriate to consider the eventual creation of a regional port authority to own and operate ports and airports in the area.

To realize tomorrow's potential requires decisions and actions today. The promising prospects identified with access to Fire Island warrant an aggressive assessment and marketing of these opportunities.

Without continued economic growth, Alaska's greatest export will be its youth. Fire Island gives good prospects for new jobs and broadens the range of port/airport economic activities not now possible at the existing port.

Fire Island

Findings and Conclusions

1. *Alaska needs a port for the growing world of trade:*

In order to strengthen the economy of Alaska, a port is needed of sufficient size and efficiency to become a player in the growing world of trade in a global economy. The current Port of Anchorage is limited to 110 acres, which is about 10% of the space needed for a world class facility. Bulk commodity export does not and cannot take place in the current port because of a lack of space and facilities and proximity to residential and downtown areas.

2. *Industrial port activities need a new home:*

Industrial port activities, and eventually the tank farm, should be moved to Fire Island. Well planned and designed, a Fire Island port-related industrial center can fulfill the needs of the Southcentral region for the foreseeable future.

3. *A major investment will be required:*

The cost of building a causeway and a port at Fire Island is estimated in the range of $226 million. These costs can be financed in a variety of ways involving both the public and private sector.

4. *Fire Island is an excellent location:*

Fire Island, the site of a natural deep water port, is an excellent location for port expansion, the best in South-central Alaska. Soils tests and engineering designs conducted to date demonstrate the viability of the site. Expensive dredging, currently required, will not be needed at Fire Island. Many other benefits will accrue to the community, including expanded wetlands and waterfowl habitat.

5. *The benefits to the community and state will be substantial:*

Upwards of 3,000 jobs could result from the opening of the Fire Island port. These jobs would bring in as much as $100 million annually to the state's economy.

6. *There is a better use for the Ship Creek area:*

New tourism, recreation, retail and non-polluting light industrial businesses should be encouraged at the mouth of Ship Creek, initially to the south of petroleum tank farm, and later to incorporate the current land area of the Port of Anchorage. Eventu cally, the Alaska Railroad should move

most of its facilities now located in the Ship Creek basin. This will also enable the railroad to expand and upgrade its freight and passenger services to the community and state.

7. *Certain environmental changes will occur:*

Increased recreational opportunities and a growth of coastal wetlands will result through the creation of a parkway to Fire Island. Certain environmental impacts will occur as the uninhabited nature of the island will be disturbed.

8. *The community and state must decide:*

The purpose of this study is to identify potential benefits and costs of this investment—economic, environmental and aesthetic. The community of Anchorage and the leadership of the state must examine these costs and benefits and decide how the project should proceed.

9. *There is an urgency for action:*

Alaska's oil production decline has already started. It is vital to Alaska's continuing economic health that we we use some of the oil money available now to build those few public facilities that will attract new industries, businesses and jobs to the state in the future. The Fire Island Maritime Center will be an investment that returns its cost many times over.

Fire Island

Questions and Answers

QUESTION — *Isn't the existing Anchorage port adequate for our future needs?*

ANSWER — **No, the 110-acre Anchorage port is far too small to accommodate industrial growth.**

QUESTION — *If Fire Island is such a viable location, why hasn't a port already been built there?*

ANSWER — **The engineering aspects of a Fire Island port have been studied for years, but the question of what economic activities would and could reside there has never been seriously reviewed.**

QUESTION — *If this is a good idea, why doesn't the private sector do it?*

ANSWER — **Traditionally, major transportation infrastructure programs are public projects or supported by public money. Only in very few and limited cases has the private sector been able to provide the front-end costs.**

QUESTION *Isn't this just another Delta barley or Point Mackenzie dairy proposal?*

ANSWER **Not at all. These two projects attempted to create a whole new industry. The financial success of Fire Island will depend on the expansion of existing economic activities and opportunities.**

QUESTION *Aren't we talking about major environmental impact to develop Fire Island?*

ANSWER **Fire Island is already minimally developed. Certain environmental changes will occur, including the creation of additional wetlands, cleaning up of the Ship Creek area and eventually the mid-town industrial area.**

QUESTION *Would this development be a subsidy and windfall to the corporation that owns the island?*

ANSWER **It could be; however, we recommend that the owners share the risk of development with the public.**

QUESTION *Why do we need Fire Island if the trans-Alaska gasline and ANWR happen?*

ANSWER **The three projects are complementary. A Fire Island Maritime Center could serve as an Alaskan base for the construction phase for both TAGS and ANWR.**

QUESTION *Why is there such an urgency to undertake this proposal?*

ANSWER **The much heralded Prudhoe Bay decline is upon us but the state is experiencing a short-term spike in oil revenues. We will continue to have a greater and greater need for a new port: We will not continue to have the capital dollars to build it. The time to move is now–when the dollars match the need.**

QUESTION *Why shouldn't the money for this project be used for social and educational programs?*

ANSWER **A valid question and one which must be debated in the halls of the Legislature. The question is one of meeting, to the extent possible, all of our quality of life needs now and in the future. To do that we must be willing to make prudent investments in projects that will give us a continuing strong economy. The Fire Island Maritime Center is one of those projects.**

The Board of Directors wishes to thank the following individuals and companies for their generous contribution to the layout and graphics in this report.

Scott Worthington, USKH
Charles "Chip" Bannister III, Kumin Associates, Inc.
Ed Musgrove & Bryce Klug, ECI Hyer
Dennis Nottingham, Peratrovich, Nottingham & Drage
Ken Pendleton, Land Design North
Ken Maynard, Maynard & Partch
John Burns, BCV Architects
Tom Brennan, Brennan & Brennan Public Relations

COMMONWEALTH NORTH

Fire Island

Background and Design of the Study

In 1987, the Administration of Anchorage Mayor Tom Fink solicited a state grant for studies to prepare the way for development of a Fire Island port. In the same time period, the Commonwealth North Railroad Committee produced a short report entitled "Fire Island: A Maritime Center for the North Pacific."

Unfortunately, the effort to obtain funds for Fire Island studies foundered. Public officials were hesitant to proceed. A determination was needed of what value Fire Island could be to both the economy and the quality of life of Anchorage and Alaska. The Anchorage Assembly asked for a clear answer to the question of whether the construction of a Fire Island causeway and port facility would be a wise and profitable investment for the community.

Nearly two years passed with little progress. This hiatus caused the Commonwealth North Board to re-examine the issue. The Board concluded that the missing element in the decision-making process was a determination of if and how Fire Island could strengthen Alaska's economy. To address this need, the Board created a committee to conduct such a study. Their charge was to examine both the economic and environmental potential of Fire Island in the context of the wider waterfront.

Design of the Analysis

At the outset, the Fire Island Committee was divided into 18 subcommittees. Each researched an aspect of the concept. The question was whether a completed port facility at Fire Island would attract enough new facilities, services and industries to justify the public investment required for construction. The subcommittees were asked to address related issues such as the anticipated level and duration of economic activity and the number of jobs that would be created.

Environmental and engineering problems were reviewed and evaluated. Initial cost of construction of the new port, utilities and access was estimated, and potential financing options were investigated.

During periodic meetings in the data-gathering phase, the entire committee met to review progress, hear subcommittee reports and provide a reality-check for concepts under evaluation. As the effort progressed, several economic activities/pursuits revealed high potential, while others faded. In the end, five main categories of incremental economic activity were found to be candidates for using a port facility at Fire Island:

A. The inter-modal shipment industry—the sea-air link
B. Ship replenishment and marine service center
C. Light manufacturing (modular construction)
D. Value added and export
E. Bulk export (coal, gravel and other minerals, wood products)

Several lesser-category economic benefits of a facility at Fire Island were addressed and their contributions to the economy in terms of jobs created were estimated. An economic multiplier of 1.5 was factored into all primary benefits to recognize secondary effects in the economy. Goldsmith, *The Alaska Economic Multiplier* (1985).

Condition of Existing Port/Ship Creek Area

As a starting point, the strengths and weaknesses of the existing port/Ship Creek area were considered. Technological changes and a vastly expanded economy have left the Alaska Railroad and the Port of Anchorage with overcrowded lands and obsolete facilities. The Port of Anchorage is small, with no place to expand. Revenues and business opportunities are missed and ships on occasion queue up in the channel due to a lack of pier space, cargo handling and storage facilities. Ships loaded with imports are often forced to wait for dock space, and outbound cargoes are diverted to other regional ports due to the lack of storage and handling facilities. As important as the revenues from the port are to the community, they are but a fraction of the potential that could be realized through a modern maritime center with both modern facilities and space to expand.

Presently, railcars loaded with exports await room at the port to unload. Coal cars from Healy rumble through the entire length of the city on their way to Seward because the Port of Anchorage has no dock space, storage or loading facilities for this commodity. The neighboring acreage to the east of the port, bordering a potentially scenic Ship Creek, currently harbors antiquated railyards, shops and numerous industrial sites. Instead of a showplace for residents and visitors, necessities of the past have left the community with an industrial environment on premium land in the heart of downtown Anchorage.

The vital services and industrial facilities associated with the current port and railroad can and should be moved to a new location where there is room to expand to full potential in the next century. They need to be located where modern facilities can be established and where new businesses are encouraged which can tap into the global economy.

An Alternative: Fire Island

In the Anchorage area there is only one alternative for the existing port's shortcomings—Fire Island—an ideal site with natural deep water. Race Point on the northern tip of the island is just three miles across the flats from Point Campbell, and within minutes of Anchorage International Airport and its existing air cargo facilities which serve much of the world. With 4,240 acres of undeveloped land, Fire Island offers the community of Anchorage a chance to relocate and reposture its transportation services, while reclaiming some of its most strategic lands for higher and better uses. At the same time, important new recreation and scenic attractions can be developed on the island.

Fire Island

Ship Creek Recreational Area: A Complement to a New Maritime Center

The role of Ship Creek and the Port at Fire Island

The redevelopment of the Ship Creek area is already in the planning stages and is an important part of any decision about constructing a new Fire Island port. The Commonwealth North study team reviewed the development plans for Ship Creek to see if an expanded port at Fire Island would be necessary if the Ship Creek plans were completed. The conclusion was that the new Ship Creek waterfront and a new maritime center at Fire Island complement each other. Each serves a distinctly different purpose and in fact, if new industrial space is not made available at Fire Island, it will be difficult for Ship Creek to become the recreation/tourist center envisioned.

Why Ship Creek is Important

Ship Creek–right in the heart of downtown–is an important opportunity for Anchorage.

It is the only spot in the city where a fisherman can drive to and fish for salmon.

It is the only spot in the city where visitors can walk to see salmon rushing upstream to spawn.

The three-phase development plan underway for Ship Creek indicates a potential for an additional 300 jobs and $10 million in payroll when the project is completed.

Development plans are being produced which will enhance the Ship Creek basin area for recreation, education, and the opportunity to serve a growing tourism market.

Phase I of the Development

Phase I consists of the construction of the Glacier Brewery Micro-Pub, which will produce micro-beer for the local market as well as for its own period pub. This innovative project is a joint effort between private enterprise, the Municipality of Anchorage, the Alaska Railroad and the Anchorage Economic Development Corporation. The Municipality of Anchorage will improve access to the area and assist in developing a tourist attraction centered around the current Ship Creek fish ladder. The Alaska Railroad will donate several historical buildings to serve as a fishermen's market, covered fair grounds, and other activities which today have no place to go. Further, the Railroad will provide the land for the construction of the brew pub.

The Alaska Railroad Corporation will also build, at its own expense, fishermen's trails along the banks of Ship Creek, access lands, and parking areas, and will improve the existing railroad bridge across Ship Creek for use by the public.

The micro-pub itself will create the equivalent of 20 full-time, year-round positions. Some of these jobs will be in the highly technical area of micro-brewing and others will be in retail food service.

The brew pub and upgraded fish ladder viewing area will provide the eastern anchor of the Ship Creek development. Plans call for continued growth toward Ship Creek Point during Phase II.

Phase II of the Development

Phase II development is seen as the beginning of light industrial and commercial activities, centered on maritime support industries. They will entail the maintenance and repair of removable ship components such as radar and radio equipment. They would also serve the shipping and boating needs of the local market.

This development could generate as many as 150 additional jobs in the professional, technical and sales-related fields.

Phase II development includes the western anchor to the Ship Creek Development. One of the primary features of this area will be the Alaska Petroleum Visitors Center, located northwest of the current Alaska Railroad depot.

The Alaska Petroleum Visitors Center will provide a short-term tour destination, with which tourists can fill in the gaps in their travel plans. The average tourist does not have the opportunity to see what the petroleum industry means to Alaska. Few visitors or even Alaskans have had the opportunity to tour a drilling rig or to travel to Prudhoe Bay to visit the massive oil operations on the North Slope.

The Center will provide educational exhibits, working exhibits of actual oil-related activities, and even a cold room where visitors can experience the thrill of drilling

for oil in the minus 60 degree weather experienced by crews on the North Slope. Another possible element of this center is a planetarium. During the long winter nights in Alaska, few tourists are here to see the magnificent night sky and northern lights that Alaska has to offer. The Center may be able to provide them the opportunity to do this in the comfort of a planetarium. Additionally, these exhibits and activities will provide a valuable addition to the educational opportunities available to Alaska school children and contribute to the year-round character envisioned for the Ship Creek area.

This phase could add upwards of 20 additional jobs.

Ship Creek Point

In 1986 the Municipality entered into a long-term lease with the Alaska Railroad for access to some 90 acres of tidelands located at the Ship Creek waterfront. The principal goal of the project is to enhance public access and economic development opportunities at the waterfront. Projects include the following activities: (1) reinforcement of the maritime role of the site within the city by accommodating cruise ship and charter vessel mooring, fish loading and unloading, all-tides boat launching, boat storage, and additional marine support activities; and, (2) enhancement of public access to the waterfront, through the extension of the popular Coastal Trail along the water's edge.

The Ship Creek Development Plan also contemplates the construction of additional hotel space. A 250 room hotel would provide year-round full-time employment for 120 employees. Such a facility would add another dimension to the Ship Creek area and help expand the downtown area beyond the current narrow core.

These developments complement the projects already underway along Ship Creek. When they are completed, visitors and Alaskans alike will have ready access to the expanded downtown waterfront area and will enjoy the many unique and exciting attractions available on a year-round basis.

Relocation of the Alaska Railroad

Commonwealth North has previously supported the concept that the Alaska Railroad relocate its downtown railyards to a more efficient location (*Redesigning the Front Door to Anchorage,* 1988). The railroad currently has reserved approximately 300 acres in the Eagle River area for just such a move. This acreage, however, is covered with a mountain of gravel and soil which must be removed.

The railroad says that relocation of the Anchorage railyards is a ten to fifteen year proposition. The cost may approach $100 million, since new shops , warehouse, and maintenance facilities will need to be constructed. This cost, to a degree, will be offset by the anticipated increase in value to the real estate left behind in the Ship Creek area. In addition, the railroad will be able to expand its freight capacity which it cannot do at the existing site.

The move would enhance the value of the Ship Creek waterfront by expanding the area available for new uses by approximately 300 acres. Currently the Port of Anchorage is prevented from servicing customers who wish to export bulk resources by its lack of adequate storage areas. The additional space provided by the relocation of the railyards to Eagle River would be adequate to handle such bulk storage until the port at Fire Island can come on line.

The Alaska Railroad depot would remain in place, continuing its focal point as a rail passenger center. Additionally, it would serve as the transition point from the current downtown to the newly created Ship Creek Recreational Area. The depot is a historical building and could be a visitor center, with additional retail activities complementing and enhancing the attractiveness of the area for tourism.

Based on current estimates for employment anticipated in the Ship Creek Development Plan, another 100 to 200 jobs can be expected to result from this expansion.

Port of Anchorage

The port is the focal point for two-thirds of all freight coming into the state of Alaska. However, as has been pointed out, it is severely restricted in its ability to expand. Access to land critical to its expansion is blocked on the north by state ownership and to the east by uplands owned by the federal government. Further, even if this land is available, there is not sufficient area to serve the projected shipments of bulk resources.

The Port of Anchorage, however, must continue to meet the incremental requirements of its current customers. These demands include the establishment of a new petroleum unloading facility to handle large bulk petroleum barges, improvements to the current berthage area, and other facility upgrades to improve the handling of fish resource exports.

This expansion, though, will only meet the short-term needs of a growing Alaska economy. Without Fire Island, Anchorage will be cut off from the economic benefits of serving the Pacific Rim.

Current Leaseholders

There are many companies conducting business in the immediate Ship Creek area. The port waterfront is dominated by a tank farm, which handles bulk petroleum reserves, and land needed for the operation of Sealand and TOTE. The storage needs of the bulk petroleum industry in the port area are satisfactory for the next few years. As the economic activity surrounding the new municipal dock and Fire Island grow, however, the need to relocate or build new storage areas will require the movement of these tanks. Fire Island is a logical place for a new tank farm. A tank farm at Fire Island will open up lands for further development in the light industrial and maritime support industries at the current port.

The TOFC/COFC (trailer on flat car/container on flat car) traffic brought through the Port of Anchorage provides a vital service for the people of Anchorage and Alaska. Most likely, this traffic will continue at the port of Anchorage and not move to Fire Island in the foreseeable future.

Estimated Jobs resulting from Ship Creek Development:	300
multiplier effect @ 1.5	150
	450

Fire Island

Environmental Enhancement Opportunities and Potential Environmental Concerns

A Fire Island port will create several environmental enhancement opportunities for the Anchorage area. These include the opportunity:

- to replace some heavy industrial uses with open-space and light industry in the lower Ship Creek area as well as in South Anchorage;
- to create a recreation resource along the Fire Island Parkway and around the Fire Island shoreline;
- to create tidal wetlands.

Ship Creek

The Ship Creek waterfront area currently is an opportunity for the public to view beluga whales closely during their annual visits to the Knik Arm. It provides an in-town location for salmon fishing, bird watching, and interpretation of the marine environment created by the large tidal fluctuations in Knik Arm.

An extension of the existing Coastal Trail system along Knik Arm will be another key component of the Ship Creek waterfront. At the terminus of a proposed pedestrian bike-way will be a 3,500 square foot promontory for viewing Knik Arm, the Chigmit Mountains, and downtown Anchorage. This will complement the existing viewpoint at Captain Cook's statue at Resolution Park.

The open-space focus of the Ship Creek waterfront development concept will be significantly enhanced as some of the heavy industrial complex and associated traffic surrounding the existing port are shifted to the Fire Island Port. Private development of additional hotel, retail, and restaurant space in the waterfront area likewise would be enhanced as the existing heavy industrial setting is moderated.

In the winter months, the Ship Creek area will shift its focus from visitors to local residents. The organizers of Fur Rendezvous, a marvelous winter festival, may be interested in relocating there, and community groups have brainstormed other uses and facilities—such as an outdoor speed skating oval, a ski jump and the start or finish line for cross country ski races using the Coastal Trail.

Fire Island Port Access Road

Kincaid Park lies at the end of the proposed Fire Island port access road. In addition to the Coastal Trail, Kincaid Park has 25 miles of trails with associated parking and picnicking facilities. A former missile facility has been converted into an attractive center for group and family activities. During the summer an average of 300 bikers and joggers per day use this segment of the Coastal Trail. An additional 150 people use the other trails and picnic facilities within the park. During the winter, the principal focus of recreational activity in the park is the use of its world class cross-country ski trail network. The overall visual setting of the park is natural, but the park's location at the end of the Anchorage International Airport east-west runway provides a noisy background.

The parkway connecting Fire Island with the mainland in the vicinity of Pt. Campbell has several significant environmental enhancement opportunities to complement those existing at Kincaid Park. These include extension of the Coastal Trail to Fire Island and bird watching.

Extension of the Coastal Trail across the tidal flats at Pt. Campbell to Fire Island will provide a distinctive and special opportunity to view the unique marine environment of upper Cook Inlet. The crossing area is exposed at low tide except for a tidal channel located near the shore at Pt. Campbell and a tidal channel near the eastern shore of Fire Island. Neither channel provides a continuous waterway at low tide. The extension of the Coastal Trial will greatly enhance the variety of trails at Kincaid Park. The present use of trails is predominantly by family groups and picnickers in the inland portions of the park, with the primary user of the Coastal Trail being more oriented towards vigorous activity such as hiking, walking, biking, and jogging. The Fire Island extension of the Coastal Trail will be a destination attraction, since there will be no other similar opportunity in the Anchorage area. The extension also will provide a change of scenery for the vigorous user of the Coastal Trail and a short turn-around trail for the other trail users of the park.

Up-close bird watching opportunities will be especially important. Many of the shore birds follow the advancing and retreating tide line and therefore are only seen close-up at high tide. The causeway will provide a continuous link between water and accessible land during much of the tidal range, increasing the length of time shore birds will be in close proximity to viewers.

New Tidal Wetlands

The Fire Island Causeway will cross the Anchorage Coastal Wildlife Refuge that comprises the near shore tidal flats, from the vicinity of the end of the Anchorage

International Airport north-south runway southward to Potter Marsh. The Refuge extends away from the mainland about two-thirds of the distance to Fire Island.

The parkway will intercept a portion of the silt and suspended sediment load of the upper Cook Inlet waters. As the tidal current is reduced, the sediment load will be deposited along the causeway. This deposition of sediment, depending upon the design and placement of the causeway, could create several hundred acres of new marine wetlands. In fact, depending upon the final design, there is an opportunity to create both marine and freshwater wetlands.

These new high value wetlands will have substantial value for wetland dependent birds and animals in the Anchorage area and for migratory waterfowl in the spring and fall. These new wetlands also could serve as a wetland bank to support future development in the Anchorage Bowl.

As a wetland bank, the creation of new wetlands has the potential to expedite and facilitate the final federal decision processes on development projects throughout the Anchorage Bowl. This account of new wetlands could be used for those developments that, after applying the existing standards of avoidance and minimizing any wetland disturbance, still require wetland conversion.

National Economic Development Values for Recreation

The Federal Water Project recreation Act of 1965 requires that full consideration be given to the opportunities that water projects afford for outdoor recreation and associated fish and wildlife enhancement. Under the procedures used by the U. S. Army Corps of Engineers, it is possible to evaluate the recreation gains and recreation losses associated with a project such as the Fire Island Port. These estimates reflect the socioeconomic characteristics of the market area, the qualitative characteristics of the existing and future recreation resources attributable to the Fire Island Port, and the willingness of the recreation user to pay.

This committee's preliminary analysis strongly suggests that the overall quality of the enhanced recreation opportunities that will be created are of a higher quality than what exists today and will increase the diversity of outdoor recreation use and education opportunities significantly in the Ship Creek and existing port waterfront, Kincaid Park, Coastal Trail, and Fire Island Causeway areas.

Accurate estimates of outdoor recreation use in these land-water environments is dependent upon the location and design of the basic facilities. They will depend upon the willingness of the Anchorage residents to fund additional recreational facilities. It is reasonable to predict that the enhanced recreation opportunities are significant, positive, and would be near the top end of the range of values assigned to a day of recreation.

Environmental Concerns Needing Special Attention in the Design and Location of the Fire Island Causeway

The following should be examined by the responsible developing agency:

- The effects (both positive and negative) on the Anchorage Coastal Wildlife Refuge.
- The possible effects of industrial traffic on users of Kincaid Park.
- The neighborhood quality for residents and businesses along the route to and from the parkway.
- The migration of fish and whales, including the possibility of whale stranding.
- The set net sites on Fire Island.
- The effects on migratory bird habitats (especially at North Point), wildlife viewing and duck hunting.
- The effects on air quality, especially insofar as the project might diminish viewing of Mt. Susitna (while improving views of Mt. McKinley) from the Anchorage Bowl.
- The effects on water quality, especially sediment transport and the effect, if any, on the mixing zone for the Point Woronzof Treatment Plant, and the effect of sediment transport on existing and planned port facilities caused by changes in tidal circulation patterns.
- The source and quality of fill material for causeway construction.
- The size and purposes of a wetland bank from acreage surplus to the Fire Island Port project.

Some of these topics are addressed in the chapter on *Engineering and Environmental Feasibility* in this report and would need to be fully explored in the project environmental impact statement.

Environmental Benefits

No attempt has been made to quantify the environmental value of the Fire Island port and Ship Creek development projects though the benefits appear substantial, including:

- Potential correction of environmental ills in the Ship Creek area;

- Creation of additional wetlands;
- Increased values associated with restaurants, shops, and light industry such as a marine repair service in the Ship Creek waterfront;
- Improved quality of the recreation experience;
- Increased number of recreationists and tourists who would use Ship Creek and the Parkway/Fire Island complex;
- Enhanced environmental quality of the visit due to relocation of heavy industry to Fire Island;
- Habitat values of newly created tidal wetland/marsh complex adjacent to the causeway.

Fire Island

History and Physical Setting of Fire Island

Native legend refers to it as "hagi", the basket island, and later as Nutul'ly or Fire Island. (*Shem Pete's Alaska*). The Russians called it Mushukhli, and in 1794, Capt. George Vancouver named it Turnagain Island. In 1971, 4, 000 acres of Fire Island was placed under the care of the Federal Aviation Administration. In 1983, the FAA declared all but 576 of those acres as excess, upon which Cook Inlet Region, Inc. (CIRI) laid claim to that acreage under the Alaska Native Claims Settlement Act.

Fire Island is no newcomer to review and study. A recent MOA bibliographic study identified 67 documents dating from 1948 which relate to Fire Island or contain information on the island.

Fire Island is located approximately three miles offshore from the Anchorage mainland, almost due west of the Anchorage International Airport. It is 5.3 miles in length, 2.2 miles across and contains 4,240 acres (6.63 square miles). Fire Island's historical development has been limited to seasonal fish camps and a small scale FAA installation. There are no ground transport links to the island. The perimeter is characterized by steeply rising bluffs ranging in height from 80 to 300 feet above tide level. Water depths range from 60 feet off West Point to 80 feet in the inlet channel one mile north and west of North Point.

Fire Island is ringed by extended mud flats at low water levels. On the east side, these flats extend to Point Campbell on the mainland. The narrowest point, a possible location for a causeway, is 15,000 feet wide (2.84 statute miles). This area is unnavigable, cut by tidal channels and comprised of water-saturated silt and fine-grained sand.

Ice, Tides, Shoals

"The inlet is ice free from about May to November." U. S. Dept. Commerce, 9 *Coastal Pilot* (1989), 125. During four winter months, the upper Cook Inlet experiences substantial ice coverage. Floe ice ranges in thickness from one to 15 feet in mid-channel; however, the upper Cook Inlet is navigable year-round by non-ice strengthened ships. Usually ice begins forming in late November with little floating

ice left by April. On an average winter day, 85 percent of the water surface surrounding Fire Island is covered with floe ice. Burns, *Anchorage Coastal Resource Atlas, Fire Island* (1982), 2.

During winter ice months, traffic does not stop. Port of Anchorage vessel arrival activity reports for 1989 show a total of 417 arrivals. During ice-free months, the average monthly arrivals were 45; for the six winter months, the average was 24. The *Coastal Pilot* is cited by the Southwest Pilots Association to demonstrate that ice conditions do not interfere with winter shipping.: "Upper Cook Inlet rarely, if ever, freezes solid because of the enormous tidal range. Vessels can navigate Cook Inlet in the winter, but reinforced hulls are recommended; screws can sustain serious damage unless properly protected." *Coastal Pilot*, 125, cited in Capt. A. J. Joslyn, Southwest Pilots' Association, "*Marine Terminal at Nikiski, Alaska*" (undated, unpublished), 2. Other studies have found that the Cook Inlet is navigable year around in both strengthened and non-strenghthened vessels. *Anchorage Coastal Resource Atlas, Fire Island, ibid.* There are other well-established and practiced procedures for ice conditions: Winter rules for operation and berthing apply at many ports in the Inlet. In addition, "pilotage . . . is compulsory for all vessels navigating the inside waters of the State of Alaska." *Coastal Pilot*, 125. Tugs are usually on-site at Anchorage. *Ibid.* "Ballasting down or loading to a deep draft of 30 feet as well as filling forepeak tanks are always good recommended measures." *Marine Terminal at Nikiski, Alaska*, 2.

The conclusion of a recent study is that winter ferry operation in Cook Inlet needs to be tested because of the presence of ice and wind, but year around operation is feasible. Belyea, Sorenson & Associates, with Elliott Bay Design Group, VEI Consultants, Peratrovich, Nottingham and Drage, *Economic Evaluation and Planning of a Cook Inlet Marine Transportation System* (1990), 15.

As recently as 1988, the U. S. Army Corps of Engineers examined the adequacy of port facilities, including navigation aids, considering the Inlet's tides, currents, shoals, and ice, and concluded that no added aids were essential for port activities. *Anchorage Deep Draft Interim Technical Report, "Summary"* (1988).

Fire Island tides are not as pronounced as in Anchorage, with mean high tide at 27 feet, mean tide at 14.2 feet, and low, low tide at minus 6 feet. *Anchorage Coastal Resource Atlas, Fire Island, ibid.*

Two shoals present a potential hazard to navigation in the upper Cook Inlet--the Knik Arm and Fire Island shoals. The Knik Arm shoal is located approximately three miles north of Fire Island just west of Point Woronzof. The Fire Island shoal is located approximately 3.5 miles west of Shelter Bay and rises to a minimum depth of 31 feet MLLW (mean lower-low water). This shoal could pose a hazard to ships proceeding to Fire Island. Ibid. (For further discussion on ice, tides and shoals, please see chapter on *Engineering and Environmental Feasibility*).

Fire Island's Race Point

A deep water port on Fire Island has the possible combination of both tidal ebbs and floods and of ice accumulation. In any port design, dock siting must account for current alignment, wind, and the nature of the accompanying ice forces and formation. Nottingham and Drage, *Design of Port and Coastal Structures for Ice Forces* (1982), 2.

Race Point, at the northwest corner of Fire Island, is in the path of a natural strong flow in and out of the Upper Cook Inlet region. The *Coastal Pilot* refers to the current in the western area of Fire Island at Shelter Bay as strong throughout the flood but weak or slack at other times. *Ibid*, 123. Studies have predicted that the maximum tidal current velocity could be 2.6 feet/second. *Anchorage Coastal Resource Atlas*. *Ibid*. At least one expert in the field observes that the natural current at Race Point equals six to seven feet/second, and must be considered in operations and siting dock faces, since building a dock out into the current would restrict and increase the flow of current.

There are two available options that are solutions to the challenge. Along with dock-siting considerations, one approach is to extend and create a break or angle in the dock face to make a buffer and change flow to avoid hampering berthed vessels and operations. This option may increase the capital cost of the dock by an estimated 10%.

The other solution increases operational but not capital costs. Instead of a structural barrier, a vessel could be berthed upstream from port activities to act as the deflector during heavy flow and ice periods.

Ice and flow concerns at Race Point can be met with these operational or capital increments.

Fire Island

Enough Land for the Future

The study team concluded that the current Port of Anchorage has insufficient space for the kinds of economic activity that will result in the next ten years. Even the current development of Ship Creek Point and future development of the Port of Anchorage will not be sufficient to encourage the participation of Alaska in world trade or to make Anchorage a North Pacific maritime center.

To prepare Anchorage for the 21st century, the creation of a port at Fire Island is a concept deserving public support. Like any project of this nature, real estate implications must be identified, potential uses and users must be considered and the expected return on the development must be considered.

Real Estate Implications

The current conceptual plan for the Fire Island port envisions an area of approximately 1,500 acres. This acreage is divided into a 100-acre staging area immediately adjacent to the 2,000 foot platform dock and 700-foot graving dock. This area will have road and rail access providing for easy loading and off-loading of vessel traffic, trailer loaded goods and the servicing of vessels during berthage.

An additional 50 acres is estimated for road access and associated port support service buildings. This leaves approximately 1,350 acres for additional sea support services, marine light industrial development, bulk storage yards, office buildings and other projects. This acreage is extensive. To put it into perspective, the current port is located on just 110 acres and the entire Alaska Railroad terminal reserve in the Ship Creek area is only 900 acres. The Tacoma Port is approximately 1,400 acres.

Development of real estate at Fire Island should have little impact on real estate in the Anchorage bowl since Fire Island will be used as an industrial region, bulk facility, marine support service area, and other port-related activities. Because of the development time, the demand for Fire Island real estate will come from a new type of user. Rather than compete with the current small industrial park owners and lessees, Fire Island will address additional land and facilities needs. This has implications for the value of land in the Anchorage area as well as on Fire Island.

This demand will also determine what type of incentives the Municipality may choose or need to offer lessees at the new port.

Uses and Users

Fire Island is geographically located in the center of a circle which includes Europe, Pacific Rim Countries, and the "Lower 48". As a result, Fire Island can become a center for trade among all these areas. Southcentral and Interior Alaska timber, coal, gravel, and limestone can be exported to the Far East. Containerized goods from the lower 48 bound for Europe now move either cross country to the U. S. east coast for transshipment or pass through the Panama Canal on their way to Europe. These products could be shipped/transshipped from a Fire Island port. The emerging "superbloc" of the European Common Market will begin to explore the possibility of trade with the Far East countries needing European products which could be moved through Fire Island.

The Arctic great circle trade route cuts ten days off the travel time between Europe and the Far East. This provides an opportunity for Alaska and Fire Island to act as a transshipment point between the three geographic areas. Containerized traffic could be quickly transloaded from vessels with ice breaking capacity to more plentiful warm water vessels. (For more on this concept, please see section on *The Soviet Connection*).

To compete in the international market for natural resources, Fire Island must be able to handle large oceangoing vessels of the Panamax type. These vessels require efficient, economic loading facilities as well as support services including bulk storage sufficiently large to accommodate their shipping capabilities. Fire Island is the best and most accessible area in Cook Inlet to meet these requirements.

Value of Fire Island Land

Fire Island is currently valued for its use as a recreational area accessible only by air or water. While this value is not to be minimized, without a causeway it is not and never will be a prime area for such use. The creation of a port on Fire Island will greatly enhance the use and value. Access, utility, and road infrastructure are the prime ingredients in improvement of land value, and Fire Island is sure to benefit.

The commercial value of the Fire Island port area is substantial. Obvious uses such as light industrial, marine support services, bulk storage areas and commercial office buildings are but a few. Public uses of the land might include recreational areas, a site for a new correctional facility, or a site for relocation of the Alaska Psychiatric Institute to allow for the expansion of the UAA campus, to cite only a few.

As a point of reference for land values, Tacoma's port lands lease for $9 to $10 per square foot for prepared, level sites with all utility infrastructure and $4 to $5 per square foot for typical industrial sites away from the port.

The Municipality has the opportunity to use the land value as an incentive to encourage investment in the Fire Island port without significant impact on the current Anchorage real estate picture. Assuming there will be a three to five year development period for Fire Island, land in Anchorage will also gradually increase in value through a natural growth process. This can only enhance the value of Fire Island land.

Fire Island

Engineering and Environmental Feasibility of the Fire Island Site

Developing a port on Fire Island presents the same challenges of currents, ice, winds and navigational problems that were presented to the engineers designing the present Anchorage Port. It is, in reality, the same environment with significant attributes that are an improvement over the Ship Creek location. Deep water close to shore eliminates the necessity for the dredging of channels and a mooring basin. The presence of excellent embankment materials can contribute to economical building of necessary facilities.

The geological origin of Fire Island is identical to that of Point Campbell and was formed at the same time. The irregular terrain left by receding glaciers found in Anchorage is also evidenced on Fire Island.

The tideland marine environment between Fire Island and Point Campbell is generally deficient of biological activity. Anadromous fish undoubtedly swim through the area and shore birds are observed feeding at the water's edge during periods of high tide, but the scouring action of strong tidal action and winter ice buildup severely reduces the substrate's ability to support vegetation or habitat conducive to resident marine life.

Over the years, the concept of building a causeway has raised many questions to engineers largely because of the unknown foundation conditions. Exploration work has now been completed, and an understanding of the geology provides assurance that engineering technology is capable of providing this crossing (Harding Lawson and Associates, 1989). A crossing, if carefully accomplished in concert with the wildlife refuge, could, in fact, provide substantial enhancement to our wildlife habitat and even become a major focal point for wildlife viewing as Potter Marsh is today.

Environmental Analysis

Geology

The complex geology of the Cook Inlet area includes sedimentation, uplift, deformation, intrusion and glacial and marine erosion. The McHugh Complex of late Jurassic or Cretaceous age underlies the Anchorage bowl and Fire Island. The Kenai Formation, poorly consolidated non-marine sediments of Tertiary age, overlies the McHugh Complex. Five Pleistocene glaciations with marine erosion and sedimentation created the surficial deposits found on the Anchorage bowl and Fire Island (Miller & Dobrovolny, 1959).

For the most part the Fire Island geology consists of unconsolidated, interbedded sand, gravel, clay and silt of Pleistocene age which extend at least 15 meters below sea level. Sand dunes up to 40 meters thick occur along the southeast shore which is receding at a rate of about two feet per year. The large glaciodeltic deposits were probably derived from the Knik glaciation through subsequent meltwater deposition in an impounded lake formed by glaciers blocking Cook Inlet. Nonglacial Holocene deposits on Fire Island include sandy beach and dune deposits along the shore, silt and fine grained sand lagoonal, or older tidal, deposits at the northeast point, and four areas of pond and peat deposits of silt, organic silt and peat. (Anchorage Coastal Resource Atlas, Vol. 4, 1982).

A preliminary geophysical/geotechnical investigation between Fire Island and Point Campbell revealed two distinct layers. The top layer contains loose to medium fine grained silty sand and nonplastic silt deposited by the tides. This layer extends from 0 to 140 feet below mean sea level. The underlying layer is composed of dense to very dense gravelly sand and sandy gravel which was probably a glacial fan delta (Harding Lawson and Associates, 1989). The observed layers are consistent with references to the geologic history of the area.

Vegetation

Vegetation on Point Campbell is characterized by a mixed coniferous/deciduous forest. Near the proposed project alignment to the south of the Anchorage International runway, the vegetation basically consists of a deciduous forest with open areas and areas of shrubs (Anchorage Coastal Resource Atlas, Vol. 1, 1980). The vegetation on Fire Island is similar. In the hilly to steep areas of the southern and central island the prevalent vegetation consists of a paper birch, white spruce and cottonwood forest. In the rolling areas of the northern and far southern parts of the island, the vegetation consists of paper birch and white spruce. The vegetation in flat poorly drained areas is mainly mosses, sedges, shrubs and scattered forests of black spruce. (Anchorage Coastal Resource Atlas, Vol. 4, 1982).

Wetlands

The Anchorage Wetlands Map shows two small preservation wetland areas in the vicinity of Little Campbell Lake. The proposed alignment from Raspberry Road will not impact these wetland areas. U.S.G.S. maps and aerial photography show a small lake and narrow coastal wetland along the toe of the Point Campbell bluff. The area

adversely impacted by the crossing will be small and mitigation through the creation of an equivalent area of new wetlands associated with the crossing design is within the technical and economical limits of the project.

The Anchorage Coastal Resource Atlas for Fire Island shows a salt water wetland that is mapped as ecologically sensitive with a very high rating at North Point. The atlas also shows a salt water wetland along the Shelter Bay coastline which is mapped as ecologically sensitive with a high rating. A fresh water wetland with a high ecological sensitivity rating is mapped around the largest lake in the center of the island. The alignment of the proposed access road and port development at Race Point will not impact these sensitive areas (Anchorage Coastal Resource Atlas, Vol. 4, 1982).

There are other limited wetlands in flat poorly drained soils of the central and northern island area. From aerial photography, they appear to be of the patterned open complex type in the advance age of bog development with an infilling of black spruce at the bog-forest interface (MOA, CIRI, 1981).

Fish and Wildlife

Because of cold temperatures and glacial silt, the waters of upper Cook Inlet are relatively unproductive. In samples taken between Point Campbell and Point Woronzof, the only benthic algae was Vaucheria Longicaulis. Few invertebrates have been found in the intertidal sediments. The diversity of estuarine and marine fishes is also low. Threespine and ninespine sticklebacks are common in tidal pools and species of marine fish include English sole, Pacific tom cod, and larval herring and halibut. Populations are assumed low compared to less hostile waters. Anadromous fish passing Point Woronzof include king, coho, sockeye, chum and pink salmon; humpback whitefish; and eulachon (Fish & Game, 1990). Commercial fishing is conducted along the west coastline of Fire Island (Anchorage Coastal Resource Atlas, Vol. 4, 1982).

Beluga whales in Cook Inlet are a geographically isolated population of the species. Sightings confirm that beluga whales are found in the inlet year-round. Beluga whales winter in the lower inlet and move into the upper inlet during the summer months. Although Belugas are thought to be sensitive to industrial noises under some circumstances, Cook Inlet belugas appear to have habituated to these noise sources. As many Anchorage residents can confirm, Belugas are found close to the Port of Anchorage, at the mouth of rivers with small boat traffic, near oil platforms and near commercial fishing operations (Morris, 1988).

The extensive tidal marshes bordering Cook Inlet are a major nesting, feeding and molting area in the spring and fall months for a variety of ducks, geese, swans, cranes and shore birds. A major migration route passes through the area impacting the wetlands habitat with large numbers of waterfowl during the migration season (Anchorage Coastal Resource Atlas, Vol. 4, 1982). The lake and associated wetland near the center of Fire Island appear to be a concentration area for swans (Alaska Habitat Management Guide, 1985).

Common raptors in the project area include northern harrier and great horned owl. Bald eagles and peregrine falcon are seen during the spring and fall migration, but are not known to nest in the project area. Shorebird populations include northern phaloraopes, yellowlegs, dowitchers, and least, western and semipalmated sandpipers. Mew, glaucous-winged and Bonaparte's gulls and arctic terns frequent the area. Tree and violet-green swallows are the most abundant of the numerous songbirds in the area (Fish & Game, 1990).

Large mammals such as moose and coyote are sometimes seen in the project area. Red squirrels and snowshoe hares are common; least weasels are also relatively abundant. Known small mammals include the masked and vagrant shrew, red-backed and meadow vole and the meadow jumping mouse (Fish & Game, 1990). According to the Bureau of Land Management, moose coyote and fox inhabit Fire Island (Anchorage Coastal Resource Atlas, Vol. 4, 1982).

Air Quality

The Municipality of Anchorage has some air quality problems with measured levels of carbon monoxide and total suspended particulate (TSP). The source of carbon monoxide is primarily automobile emissions. The proposed activity on, and leading to, Fire Island is not expected to generate significant vehicular traffic. Naturally occurring wind-blown glacial dust contributes to the TSP problem and this can be expected on Fire Island. The primary source of human caused particulates is vehicle traffic on unpaved roads (School of Engineering, 1986). Proposed roads on Fire Island will be paved. The proposed development will have little, if any, impact on the ambient air quality in the Anchorage area.

Noise

Noise impacts calculated during planning for the International Airport in 1981 indicated noise levels of 30 to 35 NEF could be expected on Fire Island from airport operations. Industrial use is compatible with levels up to 40 NEF, and there doesn't appear to be a problem for the proposed port site (CIRI & MOA, 1981). Because of the separation from existing population centers, industrial activity on Fire Island will not have an adverse impact on the noise level in the rest of Anchorage.

Climate

The Anchorage climate is transitional between maritime and continental patterns. Streams and lakes generally remain frozen from November to April. Monthly mean climate data is summarized in Table 1. The highest rainfall occurs between mid-July and mid-October. Rainfall intensity is low; a one-hour, 10-year recurrence storm at the Anchorage International Airport is 0.33 inches. The maximum 24-hour rainfall measured at the airport was 4.12 inches in August 1989.

Climatological data was taken at Race Point on Fire Island and at Elmendorf Field between January 27, 1948, and April 15, 1948. The mean minimum temperature was somewhat warmer for Fire Island than for corresponding temperatures measured at Elmendorf Field. The mean maximum temperature for Fire Island was somewhat

cooler. The precipitation total during the recording period for Fire Island was 1.19 inches compared to 1.54 inches at Elmendorf.

Table 1. Anchorage International Airport Mean Monthly Climatological Data

MONTH	TEMPERATURE (°F)	PRECIPITATION (INCHES)	SNOWFALL (INCHES)
January	12.8	0.83	10.4
February	17.7	0.83	12.0
March	23.7	0.65	9.6
April	35.0	0.56	5.3
May	46.1	0.58	0.5
June	54.2	1.13	0
July	57.9	1.99	0
August	55.8	2.27	0
September	47.9	2.49	0.3
October	34.9	1.63	6.6
November	21.6	1.05	10.2
December	13.7	1.05	14.9
Annual	35.1	15.06	69.8

The prevailing wind is southerly with winter surface winds from the north. Winds are not generally strong, but sharp pressure gradients between Cook Inlet and Prince William Sound can result in strong winds of two types. Northerly winds of 35-50 knots with gusts of 80 to 90 knots can occur in the winter. Southeasterly winds which can reach a velocity of 90 knots can occur at any time of year. The significant southeasterly winds are stronger at Fire Island than at Anchorage International Airport because the island is more exposed. The high bluff along the shore shelters the proposed Race Point dock site from these southeasterly winds (Corps of Engineers, 1948).

Marine Conditions

Fresh water flows into this region of Cook Inlet range from over 43,000 cubic feet per second in July to near 1,000 cubic feet per second in March. During the summer, salinities in Knik Arm range between six and 15 parts per thousand. Salinities increase in the winter to a nearly constant level of 20 parts per thousand. Suspended sediment concentrations range as high as 2,000 milligrams per liter. The fresh water inflows produce a net advective flow out of Knik Arm. (Britch, 1976)

Generally there is a well established channel in the section of Knik Arm between Fire Island and Point Cairn with channel depths up to 160 feet below mean lower-low water. Typical intertidal areas in this section of the arm are less than 1/2 mile wide and covered with silt. Some deeper channels have gravel or cobble bottoms. The tidal range is extreme with the range at Fire Island being smaller than Anchorage. Tidal information for Anchorage and for Fire Island is shown in Table

2. The extreme tides produce high tidal currents. Bore tides have been observed in upper Knik Arm (Britch, 1976).

Table 2. Tidal Heights Above Mean Lower Low Water (Anchorage Coastal Resource Atlas, Vol. 4, 1982)

LOCATION	MEAN HIGHER HIGH WATER	MEAN HIGH WATER	MEAN TIDE LEVEL	MEAN LOWER LOW WATER	EXTREME LOW WATER
Anchorage	29.0	28.3	15.3	0.0	-6.5
Fire Island	27.0	26.4	14.2	0.0	-6.0

Maximum velocities are generally found within five feet of the water surface. At Point Woronzof the peak incoming tide velocity peaks at approximately 5.0 feet per second. The peak ebb tide velocity for this location is approximately 4.3 feet per second. An eddy forms on the flood tide east of Point Woronzof and a similar eddy forms southwest of Point Woronzof on the ebb tide. The average velocity within these eddies is approximately one foot per second (Britch, 1976).

LaBelle et al. (1983) reports that the first significant ice typically forms in Cook Inlet in late November and that the inlet is typically ice-free by the middle of April. The amount and duration of the ice cover, however, is highly variable. In the period from 1969 to 1982, the date of the first significant ice ranged from October 17 to December 17 and the ice-free date ranged from March 10 to May 15.

Ice tends to move out of the inlet at a rate between three and eight kilometers a day, but much of the ice in Knik and Turnagain Arms forms and decays near its point of origin (LaBelle et al., 1983). Depending on the winter, floe ice varies between two and four feet. Shore ice, which is formed by successive flooding and freezing of the tide flats, occurs in thicknesses of approximately 15 feet. On occasion the shore ice will break loose and be carried into the inlet (Britch, 1976).

The Corps of Engineers (1948) observed that ice dispersion was greater around Fire Island than around the Anchorage port. The area immediately adjacent to the shore, however, was similar to the Anchorage dock and the difficulty of winter shipping was considered essentially the same at both sites. The maximum ice speed they observed near Fire Island was six miles per hour which compares to an observed ice speed of eight miles per hour near the Anchorage port.

Two shoals are of concern to shippers. The Knik Arm Shoal, which is located about two miles west of Point Woronzof is 11 feet at MLLW. The controlling depth of the Fire Island Shoal, which is located west of Fire Island, is 31 feet. The area between the Fire Island Shoal and West Point has had three feet of shoaling in seven years (Corps, 1987). Between 1941 and 1982 the Fire Island shoal moved eastward at a rate of about 160 feet per year. In that time the shoal has declined in length, width and

volume. The shoal volume above the 42-foot contour decreased from approximately 92 million cubic yards in 1960 to 40 million cubic yards in 1982. The decreasing volume and increasing steepness of the leading edge indicates the shoal will reach an equilibrium condition and become stationary (Ott, 1985).

Archaeology

A significant archaeology site was discovered between Point Campbell and Point Woronzof. The State archaeologist located in the Department of Natural Resources has additional information with respect to the site. There are no known archaeology sites on Fire Island, but investigations have not been conducted for this area. If federal or state funds are used for the project there may be a need to conduct an archaeological investigation within the project boundaries.

Site Analysis

Point Campbell

Elevations at Point Campbell vary from sea level to about 300 feet. The surface soils, approximately 20 feet thick, consist of interbedded layers of very loose to very dense silt and sand. The underlying soils are a very dense gravelly sand and sandy gravel. These underlying soils extend to the depth of boring at 62 feet below the surface in a recent test hole (Harding Lawson, 1988). Much of the material that is excavated for construction of the approach road on Point Campbell will be usable for construction of the causeway. Information in the State of Alaska Department of Transportation files indicates that over a million cubic yards of high quality gravel could be mined from untapped sources on state land holdings at Point Campbell.

Much of the Point Campbell land is included in Kincaid Park which is a popular recreational area. The area north of Kincaid Park is occupied by Anchorage International Airport. One of the proposed access routes is an extension of Raspberry Road that follows the boundary between park and airport land uses. The intertidal area west of the Point Campbell bluff is within a wildlife refuge. The state legislation that created the Anchorage Coastal Wildlife Refuge provides for a transportation corridor for access to Fire Island.

Causeway

Point Campbell and Fire Island are separated by about three miles of intertidal flats. Elevations in the intertidal area range to minus 17 feet below mean sea level with most of the proposed transportation corridor between minus 6 and minus 10 feet. Most of the area is exposed at low tide (Harding Lawson, 1988).

The intertidal currents result from the filling and emptying of the area with the tides. The currents appear to be in the form of sheet flow across the area without any direct influence from the main channel currents of Turnagain and Knik Arms. With four feet of water on the ebb tide, measured currents at mid-depth were between 2.0 and 2.5 feet per second. With four feet of water on the flood tide, measured currents at mid-depth were between 1.4 and 1.6 feet per second. Observed

channels appear to result from the water velocities inherent in the tidal action (Ott Engineers, 1988).

As noted, preliminary geotechnical investigation showed that the crossing soils consist of two basic layers. The surface layer, consisting of silty sand and sandy silt, is loose to very loose at the surface and becomes dense with increasing depth. The underlying material is a very dense gravel which extends the full width of the crossing (Harding Lawson, 1988). The soils will support construction of a stable causeway (R&M, 1989).

Fire Island

Steep bluffs, from 80 to 300 feet high, form the perimeter of the island except for low areas at North Point and West Point. The island was formed geologically by the same processes that formed Point Campbell and the soils are similar. For the most part a silty till forms the surface of the island. There are sand dunes along the east and southeast bluff and a gravel covered surface at the northeast end of the island. The soils underlying the surface till in the Race Point area near the proposed port site consist of a medium sand (Miller & Dobrovolny, 1959).

Two soils reports by the Corps of Engineers (1958a & 1958b) show between two and 10 feet of till with an underlying 10 to 15 feet of clean sandy gravel. The available information indicates that there is sufficient high grade gravels for construction of the causeway and the proposed port on the island.

Observations in 1948 indicated that currents on the easterly side of Fire Island are parallel to the shore with a maximum velocity of 3.5 miles per hour. Flood tides create strong currents along the west shore south of Race Point, but ebb tides create very little velocity. Tidal Currents off West Point are strong in both directions. An eddy forms on the ebb tide in the area of Shelter Bay. (Corps of Engineers, 1948). From the observation of ship pilots, the currents appear to be parallel to the shore for both the ebb and flood tides at Race Point. The observed currents are typical of other areas of the inlet and based on discussions with ship pilots the currents do not offer any unusual problems for the proposed port site.

A conceptual land use plan has been developed for Fire Island by Cook Inlet Region, Inc. The conceptual plan proposes approximately 1,500 acres of the total 4,500 acres for residential development. Open space is included to protect the coastal marsh at North Point, the eastern shore line and the two larger lakes and their associated wetlands. The remainder of the island is proposed for port, industrial and commercial development. This plan is conceptual and could change significantly, but it does provide an adequate basis for projecting traffic needs for island development (Department of Public Works, 1989).

Engineering Knowledge to Date

The Island

As noted earlier, there have been several studies of Fire Island. The Corps of Engineers evaluated the island as a possible port site in 1948. At one time the Federal Aviation Administration housed a small population on the island to operate and maintain navigational facilities for Anchorage International Airport. The Dow-Shell Group evaluated the island as an industrial site and an engineering evaluation of the island as a site for a correctional facility was completed in 1986.

Fire Island, as well as the whole Anchorage area, is located in one of the most active seismic areas of the world. The island may be exposed to high intensity earthquakes and structures on unconsolidated sediments could experience damage. However, the available soils information indicates that most of the island consists of consolidated material for which the potential for seismically induced ground failure is minimal. The engineering evaluation for a proposed correctional facility for 960 inmates concluded that the site was suitable for supporting the necessary building foundations (School of Engineering, 1986).

Ground water on the island appears to be unconfined with a water table elevation a few feet above sea level. Of four wells drilled to supply water to the FAA station, two wells had to be abandoned because of high salinities and production of the third was restricted to reduce chloride concentrations. The fourth well produced usable water at a rate of approximately 80 gallons per minute, or 115,200 gallons per day. The recommended levels of manganese and iron were exceeded in all wells (School of Engineering, 1986). There appears to be insufficient water on the island to support locally the proposed port and related commercial and industrial activity. Fortunately, the Eklutna Water Project provides enough excess capacity to meet those needs.

In addition to the need for an extension of water from Point Campbell, development of Fire Island will also require wastewater facilities with adequate treatment for disposal to the inlet. Whether this is to be accomplished by treatment on the island or by piping the effluent to the existing Point Woronzof treatment plant will depend on a cost analysis based on the overall development plan for the island and the rate at which this plan is to be implemented. Other utilities needed for port and related industrial development include extension of electric, telephone and natural gas from Point Campbell. There has been consideration of routing a second electrical intertie from Pt. Possession to Fire Island, then across the causeway to tie into the Anchorage power grid. Extension of utilities will be incorporated in the design for the proposed causeway.

The proposed port site at Race Point has the advantage of deep water near the existing shoreline which eliminates the need for expensive dredging. An initial development plan proposes the construction of a 1,000 foot long sheet pile bulkhead wall face with a toe at -50 feet mean lower low water and a deck elevation of +40 feet MLLW. Fill behind the bulkhead to the bluff along the Fire Island shore line would

create a 40 acre dock site. An alternative platform dock is also considered and may be more feasible depending on a more detailed engineering analysis of the site (R&M Consultants 1989b).

Causeway Work to Date

Utilizing joint funding by the Municipality of Anchorage, the State of Alaska and Cook Inlet Region, Inc., the Municipal Department of Public Works prepared a preliminary engineering investigation of the proposed crossing to Fire Island. As a part of this effort, Ott Water Engineers, Inc. met with regulatory agencies and Point Campbell land owners to identify the project issues. As noted, Harding Lawson Associates conducted a preliminary geophysical/geotechnical investigation of the crossing corridor. R&M Consultants, Inc., conducted initial modeling of marine wave heights, proposed a causeway design section based on their wave modeling and the Harding Lawson soils information, and prepared unit cost estimates for the proposed causeway improvements.

The Municipal Department of Public Works investigated five possible alignments to connect the proposed causeway to the existing Anchorage road system. Public hearings will be required before selection of a final alignment. The Department of Public Works favors an extension of Raspberry Road along the the boundary between Kincaid Park and Anchorage International Airport as the most technically feasible based on collected data. A preliminary traffic analysis indicates that a two-lane facility will handle the anticipated traffic of 16,000 vehicle trips a day until 25 percent of the total island development is accomplished (Department of Public Works, 1989).

Ott Engineers (1988) identified some general design issues for the proposed Raspberry Road extension. A final design will have to resolve possible conflicts with an existing FCC antennae field adjacent to the airport. A crossing of the existing coastal trail will have to be incorporated into the design and the road will have to be kept clear of existing runway clear zones. Also related to airport operations, the alignment approach to the causeway needs to curve to the south to avoid confusion with existing navigational aids for the east-west runway. These issues do not present any significant technical design problems.

The Department of Public Works (1989) discussed extension of the railroad with the Alaska Railroad. Four options were considered. Option one, an extension of the tracks along the coast line from the Ship Creek area, would conflict with the coastal trail and shoreline neighborhoods. The second option, extension of the existing airport spur around the north end of the north-south runway, would conflict with airport land use, the coastal trail and proposed airport guidance equipment.

A third option, extension of the existing airport spur around the south side of the airport, would require a crossing of International Airport Road and would conflict with existing neighborhoods, preservation wetland areas and Kincaid Park. Although the fourth option, extension of the existing airport spur under the north-south runway, has some adverse impact on airport land use, this alternative has the

least impact on road crossings, wetlands, parks and residential areas. From a technical overview, option four appears to be highly feasible.

Based on discussions with the regulatory agencies, the only environmental concern identified for the causeway structure and alignment is the affect of the proposed causeway on inlet sedimentation patterns. Additional modeling is necessary to define possible impacts on shore lines, existing shoals and shipping channels and on the causeway structure itself.

There is little information about the bird population on Fire Island and a bird inventory will be necessary to obtain project permits. There is also concern with respect to anadromous fish and a fish tagging study will be necessary. If the study confirms the presence of anadromous fish in the project area, properly designed causeway breaches will be required. These issues do not significantly impact the proposed project and funds have been included in the project cost estimates for the necessary studies and structures.

R&M Consultants (1989) computed estimated wave heights to set the roadway elevation and to size the required armor stone. A proposed elevation of 26.0 feet was selected for a full service road on the basis of keeping the causeway open during a 50-year recurrence interval wave event. Their proposed section includes extra armoring at the toe to reduce erosion scour of the embankment and reinforcing geogrid to resist deformation as the fill settles. The proposed section is also designed to withstand major seismic activity without a failure that would isolate the island. The roadway consists of two 12-foot lanes with 8-foot paved shoulders.

A section which incorporates the development of a wetland along the southern side of the proposed causeway has also been proposed (Department of Public Works, 1989). The wetland concept would cost more than the conventional embankment proposed by R&M Consultants, but a properly executed development of wetlands could incorporate the crossing as a visual amenity and increase the value of the Anchorage Coastal Wildlife Refuge.

The new wetland area could also be used as a mitigation bank for other projects in the Anchorage area. The State Department of Fish and Game which has authority over the Refuge, has conditionally stated that they would be willing to discuss the wetland concept if there were enough study of the local environment, vegetation, water requirements, nutrient requirements and wildlife needs to show that the result would be a productive wildlife habitat. Further work is needed to determine the viability of the wetland design, but the potential for environmental improvements makes this an exciting concept.

A reduced section has been proposed for an initial crossing improvement to provide service only to the proposed port site (Department of Public Works, 1989b). Based on a 10-year recurrence interval wave height, the roadway elevation is reduced to an elevation of 23.0 feet. The road section is also narrowed to two 11-foot driving lanes with four-foot paved shoulders. The embankment design and armor stone details

of the full service section are incorporated in this reduced section. Use of the smaller section reduces the required initial investment for the crossing by approximately $35 million.

An alternate section that utilizes sheet pile cells for the causeway has also been proposed. A preliminary evaluation of the alternate section indicates that its cost is comparable with the more conventional embankment structure (R&M Consultants, 1989b). There may, however, be some advantages to a sheet pile structure which need to be evaluated as the design is developed. From an environmental perspective, less of the intertidal area would be covered by the proposed causeway. Less fill would be required for the causeway which would reduce the mining, transportation and construction activities associated with gravel placement. In addition, the modular design of the cells could be used to increase the number of openings with smaller span breaches which could result in some cost savings for the project.

The Fire Island project can be constructed with standard practice engineering efforts. From the available information, the Department of Public Works estimates that the cost of developing a port with road and railroad access to the existing transportation facilities in Anchorage will be between $175 million and $225 million. When compared to the cost of extending the Minnesota Bypass from Anchorage International Road to the New Seward Highway $40 million (1983) and the 1988 DeArmoun Road/Rabbit Creek Road interchanges ($23.4 million), the cost of developing the Fire Island port site appears to be a reasonable financial investment in Anchorage's future.

Note: Please see Chapter 8 *Costs of Fire Island Development* for the estimate by the authors of this report.

Fire Island

Economic Benefits: What Works at Fire Island

A. Modular Construction: Putting It Together In Alaska

For oil development alone, expenditures by the oil industry in Alaska have been close to $30 billion. Of that, 9.6% or $2.9 billion has been spent on modular manufacturing. The great majority of this work is done outside of Alaska.

Modular Construction Added Activities:

Covered construction complex
Open site assembly yard
Graving dock

Equipment/Utilities Needed:

Water, power for construction site
Compressed air, overhead cranes in work bays

Space Required:

Covered construction - 2 to 5 buildings, 60 x 200 square feet.
Assembly Yard - 30 to 40 acres with stable pad for module assembly.

Benefits:

New jobs at Fire Island:

Construction work force 30 to 2,000
New Off-site jobs: 15 to 1,000
Total 45 to 3,000

Modular construction is a necessary part of capital expenditure in Alaska development. This method allows for construction under less remote and rigorous conditions, where labor and associated costs are lower and supplies are more readily available. Modular construction allows initial assembly in a construction yard. Then modules are transported, by truck or barge, to final sites for assembly and commission as plants, processing facilities, even as hotels.

Alaska should receive more of the benefits of the development of its natural resources such as mining, forestry, fishing and tourism. One of the ways is to allow Alaskans to participate in this major manufacturing activity.

Creating a modular construction site means relocating jobs to Alaska for facilities that will be assembled in Alaska for the development of Alaska resources and industry.

Products:

The Module Concept

In basic terms, modules are building units which are sections of a total facility. The major modules designed and built for oil companies consist of a structural steel floor, insulated walls, and roof panels covering a structural steel frame. Inside is a complete plant including the required heavy equipment vessels, all interconnecting piping for handling process and utility fluids, electrical, and control systems necessary to run the plant. This kind of process plant is manufactured, painted, insulated, tagged, labelled, functionally checked out and, in many cases, actually commissioned before it is loaded for shipping.

There are two distinctly different module concepts currently being implemented by the oil companies--truckable (or smaller) and barged (mid or large size) modules. While a truckable module may put 30 people to work, a major 1,500 ton project may mean 1,000-2,000 jobs.

The reasons oil company representatives give for building these modules in a location other than the final site such as for the Red Dog and Green's Creek mines, North Slope oil fields, or the Clarion Hotel are:

- Lower wage rates;
- Travel expense for work force;
- Logistics and supply;
- Amenable working conditions and climate.

Truckable projects will neither support nor detract from Fire Island. The work is already being done at sites around town.

The Advantages of Fire Island

Fire Island holds an advantage over the Northwest. It is closer to the fields by 7-8 days sea passage.

The best way for Fire Island to demonstrate its support capability is to get started -- to begin with small projects until supply modes become well established. All goods and services are as available or as accessible in Anchorage as in Portland. Any process or project that is new to an area has a certain inherent lag time during start-up.

Weather
Infrastructure and support are less decisive factors than weather. At Swan Island in Portland, where ARCO built its latest modules (GHX-1), rain had a negative impact upon productivity, but it did not mean a lost day, while snow resulted in some days of lost work.

Outside corporate leaders may think of Alaska as a cold, desolate place where normal working conditions do not exist. But Anchorage has weather conditions as favorable as and, in some cases, better than many other large industrial communities throughout the world. Generally, there is much more industrial activity in cooler climates of the world than in the hot regions.

Snow is nevertheless a crucial factor, in part because of checkplate flooring, common in modules. There are answers. Inflatable building shelters are used in cold weather construction even for large structures. Or, some contractors' work can be scheduled so modules are self-encased by snow season, although there is a need to keep sides off structures until large manifolds, turbines, and process equipment are brought inside. Finally, adequate covered space for materials and equipment is a necessary requirement for Fire Island modular construction.

Workforce
There were over 1,700 employees for GHX - 1 at Swan Island. Of these, 1,500 were craft workers, 160 were supervisors, 40 were ARCO representatives, 30 are functional check-out people.

Generally the skills of workers for GHX - 1 were the same as workers in place on the North Slope. Wages range from $14.06 for labor to $20.66 for electricians. There are 13 unions represented at the site.

These numbers raise the question of the adequacy and depth of the Anchorage labor pool. The 1986 recession in Alaska resulted in transfers of many workers. Not surprisingly, many of the workers on GHX - 1 were Anchorage residents. These people can be attracted back and the labor pool strengthened as the resource industry revitalizes itself with local initiatives.

Payroll
Module projects vary in scope. Small truckable module projects employ 25 to 50 people and normally take only three months to complete. Larger projects employ in excess of 2,000 people and take over two years.

In addition to the direct jobs on the module manufacturing site, there can be at least an equal number of indirect spin-off jobs associated with module manufacturing. People who benefit will be vendors who handle building supplies, welding supplies, industrial gasses. And businesses such as local fabrication or machine shops, equipment rental, insulation manufacturers and suppliers, electrical suppliers, computer and communications support, freight and transportation companies, and other local support services will be part of the spin-off.

A tax incentive may be a necessary cost of getting modular construction started at Fire Island. VECO is currently manufacturing modules in the Anchorage area, but contracts were won by VECO on a competitive basis with lower 48 bidders only because VECO, in order to demonstrate modules can be built here, subsidized its own costs.

There are those who argue that the investment for modular construction at Fire Island will not pay back. These critics stress that weather is the final, decisive issue. In some estimates, weather is said to have increased costs by 30%. They point out that, even assuming an enclosure could be provided for construction and materials, it would need to be a structure or set of structures the size of the largest buildings in Anchorage.

Because of the Valdez oil spill, the oil industry suffers from pessimism about planning the future. There are few spoken optimistic predictions. Alaskans know, however, that less than 10% of Alaska has been explored. Even increasing the current pace of exploration 10 times would mean 65 years of activity. Likewise, there is increased staffing of the Yukon-Pacific office in Anchorage, which may foreshadow the development of TAGS. And looking beyond to the Arctic National Wildlife Refuge, increased energy exploration in Alaska may be only a question of time.

When these projects begin, billions of dollars of modules will be needed. Much of this work can be done at Fire Island if the state, the city and the port work with the oil industry to create an adequate modular construction site and support system.

Economic Benefits: What Works at Fire Island

B. Wood Products: A State-of-the-Art Value-Added Facility

Concept
A first class, high-tech forest products complex at Fire Island.

The size of the resource
There are 27 billion board feet of commercial timber on the Kenai Peninsula and in the Susitna and Tanana River basins. Of this amount, 5.4 billion board feet are immediately accessible by existing water or road/rail infrastructure. Much of this resource has been infested with spruce bark beetles and, unless it is harvested, will soon lose its commercial value.

The market
The international demand for wood products has never been stronger and promises to stay that way well into the future.

Incremental activities as a result of a Fire Island port

A. Marshalling yard for sorting round logs
B. Sawmill
C. Value-added facility for plywood, compositeboard, cardboard, veneer, chopsticks or pulp
D. Covered storage for lumber.
E. Space for wood chips

Space required

Marshalling yard, sawmill and value-added facility: 50 to 70 acres

Benefits

New jobs at Fire Island:	
Sawmill	66
Value-added facility	96
Support activitities	240
New jobs in forests:	120
New jobs in research, education, government and reforestation:	200
Multiplier @ 1.5	361
Total	1,083

The Market

Demographic factors and growth in Pacific Rim economics suggest a strong demand for Alaska wood products now and in the future. (Frank Seymour, forestry specialist, Department of Commerce and Economic Development).

The market is strong and will stay strong, especially for old growth timber. (John Sturgeon, Koncor Forest Products).

The price is moving up rapidly. The conclusion of the November 1989 Timber Supply Conference was that demand for wood is going "through the roof." (State Forester Bob Dick). The Pacific Northwest and British Columbia have overcut their forests and spotted owl issues may reduce old growth forest harvests by up to 30% in the Northwest U.S. National and international paper demand is increasing—computer and fax paper as well as millions of direct mail catalogues are a few examples of greatly expanded uses. Japanese consumption of paper and paper-board is expected to increase 34% annually through 1995.

The Japanese drive the wood products market. They are the largest importers of wood in the world and are prepared to pay for quality. As an example, log exports from North America to Japan rose 31% in the first quarter of 1989 over the same quarter of 1988.

Products

Round logs do not have strong potential in Southcentral, Alaska. There are not enough quality logs. Only 30% of Interior timber is of export quality and average diameter is only 11-12". The future is in value-added processing and/or manufacturing within the state. (Seymour)

High grade lumber - cabinet making material, veneer, chopsticks, furniture stock from birch, aspen and black cottonwood have potential.

Soft wood lumber - Alaska white spruce is highly regarded in the Japanese market.

Wood chips - the principal market is Japan and Korea where the value is very high. Also, chips could be shipped to Finland or Sweden over the Arctic route more cheaply than they can be produced in those countries. A cubic foot of wood chips in Finland costs $1.60. In the Pacific Northwest, it costs $0.88. (T. Brady)

Pulp - more valuable than chips. Beetle killed spruce is fine for pulp except where there is stem decay (Holsten). Pulp is used for reconstituted woods, fiberboard, panels, paper, fluting.

Value added

A multi-product manufacturing facility on Fire Island could combine a sawmill with the manufacturing of plywood, reconstituted wafer board or a variety of other products. With this approach, raw material is not wasted in the production of only

one product. For example, low value logs and chips can be used for pulp or plywood while the better grade timber is used for lumber, chop sticks, veneer, etc.

Capacity of current port
The existing port discourages wood and lumber export. No marshalling yard is available, and the current docks are not configured correctly for loading logs and lumber. Lost opportunities because of inadequate port space and facilities cost the community many millions of dollars each year. Five days a week, Tote and Sealand have preferential use of the dock space.

Facilities and utilities needed
Loading facilities will be needed. Chips are loaded with large blowers. Very little public investment will be required since the private sector will provide this equipment. Also needed are a marshalling yard for sorting round logs, covered storage for lumber, and space for wood chips, which are stored in stacks 40 feet high.

Low cost electrical power used by a value-added facility must be available for the plant to be competitive.

Jobs and Payroll
Job creation as a result of a sawmill and a value-added facility at Fire Island can be estimated by using the annual federal study of the harvest in the Tongass National Forest. In the Tongass, two jobs in logging are created for every one million board feet (mbf) that are harvested. Sawmills create 1.1 jobs/mbf and processing (pulp) plants 1.6 jobs/mbf. (Wheeler). The estimate used for the Fire Island study is 60 mbf per year, a conservative figure based on the Chugach Forest Products Sawmill in Seward, which has a target of 80-100 mbf.

The Seward sawmill will employ 100. It will also generate 150 jobs in logging, ranging from fallers and heavy equipment operators to engineers, truck drivers, mechanics and quality control personnel. A value-added plant would hire another 150 and generate an additional 100-150 logging jobs.

Wages in the Alaska forest products industry in 1988 averaged $37,400 (Alaska Dept. of Labor). 722 new jobs will mean increased payroll of $27 million per year in the Anchorage area.

Size of Investment
Private investment in a state-of-the-art sawmill will be $30 million and a processing plant another $40 million. Additional private investment in waterfront development of dock and ship loading facilities will be another $15-20 million.

Applied Forest Research and Regeneration
In addition to the jobs directly involved with harvesting and manufacturing forest resources, modern forest management necessitates a total program firmly anchored in quality higher education and applied research. Only through sophisticated forest genetics directly tied to reforestation programs and tree nursery operations can

Southcentral Alaska ensure a future forest of superior trees that are healthy, vigorously growing, and relatively free from forest insect and disease problems. Jobs in research, higher education, genetics, habitat improvement, nursery operations and tree planting could exceed 200 in the Cook Inlet area alone. Superior trees, especially hardwoods, would greatly improve overall forest values in the second growth forest; and major gains in habitat enhancement for wildlife of all types could also be acheived.

Other users

A. Seward

The new Chugach Forest Products Sawmill in Seward began operation in March 1990. Its target is to produce 80-100 mbf of lumber per year, plus chips. The owners estimate that they have a seven-year supply of timber from Native lands from Prince William Sound to Kodiak. They do not see a Fire Island sawmill as a threat to their investment.

B. Mat-Su Port:

In spite of an unfavorable vote on a proposed bond sale, Mat-Su community leadership remains committed to construction of a port at Point Mackenzie. This port, if constructed, will be closer to the timber resources in the Tanana and Mat-Su areas.

Public opinion

The recent controversy over the proposed Mat-Su timber sale demonstrates the volatility of public opinion on timber harvesting. A telling statistic regarding public attitudes and state policy is as follows: In 1977 there were nearly 800 million boardfeet under contract on state lands throughout Alaska. In 1990 there are less than 50 million boardfeet remaining under contract in the entire state. During this same period, actually from 1982 to 1989, over 10 billion boardfeet of mature spruce were killed by bark beetles. Nearly all of this remains unsalvaged--an economic opportunity of major proportions.

The State of Alaska, with leadership from the governor, must make a commitment to manage its lands properly. Many other states have done this. Michigan is an especially good model for Alaska. In that state, known for its beauty and recreation values, 21 million acres of commercial forest lands create a total employment of 145,500 and timber and value-added values of $4 billion annually.

Source of Timber

Timber from private lands in the Cook Inlet area could provide a readily available source of product in the near term for the facilities proposed in this study. The key to a long-term healthy wood products industry in Southcentral Alaska is a stable supply of state and federal timber resource. This depends on leadership and public attitude.

We could double our output per acre if we managed these forests [in Southcentral]. Current production is 5,000 boardfeet per acre. This could be 10,000 to 15,000. In the

Southeast, they produce 28,000 to 30,000 per acre. In the Pacific Northwest, in the second growth forest, they produce 25,000 to 50,000. (George Hollett, Deputy Director, State Division of Forestry).

In addition to healthier forests, careful harvesting can result in the improvement of wildlife habitat, including moose browse. (Lassard).

Amount of wood available:

Susitna River Basin:	1,091	million cu. ft. on timberland
	1,052	million cu. ft. on marginally operable land
Tanana River Basin:	2,270	million cu. ft. on timberland
	341	million cu. ft. on marginally operable land
Kenai Peninsula:	835	million cu. ft. on timberland
	500	million cu. ft. on marginally operable land
Total	6,089	million cu. ft. or 27 billion board feet

These totals include Native, state, and federal lands. (Source: Timber Resource Statistics, USFS).

Note: Not all of this resource is accessible by water or current road/rail infrastructure. USFS uses a rule of thumb of 20% in this part of Alaska, i.e., 5.4 billion board feet are currently available and accessible.

Economic Benefits: What Works at Fire Island

C. The Sea-Air Link: A True Inter-modal System

The sea-air cargo link, especially from the Far East to Europe, is experiencing the highest growth in the cargo industry worldwide–six percent per annum.

High value, lighter density goods are being shipped by sea from Asia to the U..S West Coast where they are then flown to Europe. The items being shipped are mainly electronics, fashion goods, pharmaceuticals, and consumer goods. Nearly 80% of these products originate in Japan although South Korea, Taiwan, and Hong Kong also contribute.

In the spring of 1990 , the Port of Anchorage and the Anchorage International Airport hired the Manalytics Consulting firm, based in San Francisco, to study how and if Anchorage could become a player in this industry.

The findings of this study are summarized in this section. (See the *Potential for Sea-Air Movements through Anchorage*, Manalytics, Inc. August 1990).

Manalytics estimates that over 270,000 short tons of ocean cargo are susceptible to sea-air transport between the Far East and Europe. These represent the top five percent of the cargo being moved in terms of value (i.e., $9.70 per pound or above). This freight will translate into a maximum of 100 to 135 containers per week within the next three to five years. In ten years, this may increase to 150 containers. It takes only six containers to fill one Boeing 747 craft, which carries a maximum load of 70 tons.

Anchorage is a potential sea-air transshipment location. First of all, it is much closer to the Asian producers than competing US ports. To move freight by water from Yokohama to Frankfurt, through the Suez Canal, requires 11,200 miles of sailing. Using the sea-air approach through Anchorage, the miles are reduced to 7,363. That is 1,300 miles shorter than through Sea-Tac and 2,500 miles shorter than through Los Angeles.

The second plus for Anchorage is that the current US West Coast sea-air hubs, such as Vancouver and Sea-Tac, have an airlift shortage. Products arriving from the Far East are often unable to find space on aircraft for the air leg to Europe. As a result, 40 percent of this high value freight is shipped to non-adjacent airports, such as

Chicago and even Miami because of the shortage of airlift. Most of this on-land transfer takes place by truck.

Anchorage, however, has an abundance of airlift capacity. The airport currently has 13 weekly non-stop flights to Europe and has authority for an additional 131. The establishment of the major Federal Express hub at the Anchorage International Airport and the recently announced plans of UPS to do the same is greatly increasing Anchorage's airlift capacity.

According to Manalytics, Anchorage is cost competitive with other North American sea-air hubs in handling the containers, breaking them down, and loading their contents on aircraft, . It compares favorably in terms of the cost of ocean container discharge and dispatch, draying from port to airport, and de-vanning. Only in the area of air container build-up does one competitor, Sea-Tac, have a cost advantage on Anchorage, mostly because of its experience in this process. It is assumed that as a trained work force is developed, Anchorage can reduce its cost in this phase of the operation. In addition, the Anchorage International Airport provides a congestion-free environment for the growth of this industry.

There is one major impediment—the lack of regular sea-based shipping between the Far East and Anchorage. The best and most economical way to overcome this hurdle is for the Port of Anchorage to become a major bulk exporter. As has been well documented in this report, the current port facility is inadequate for such a role. This reality leads to the conclusion that if Anchorage is to become a player in sea-air, a high value and rapidly expanding cargo innovation, a port facility at Fire Island is required.

Manalytics explains that for the sea link to be successful, Anchorage must provide regular, reliable, "day of the week," ship cargo service. For example, a ship must arrive every Tuesday from Yokohama, 52 weeks per year. For this type of shipping operation to be feasible, cargo must be generated for the west bound leg to the Far East.

Of several strategies suggested by Manalytics, the most realistic is for bulk ships sailing from Cook Inlet with wood, coal, and other ore for Far Eastern ports. These same ships will return to Alaska carrying the high-value sea-air containers as deck cargo.

Benefits of the Activity

According to the Manalytics report, if a shuttle service between the Far East and Anchorage can be developed based on coal and wood products, a minimum of 135 up to 270 FEU (forty-foot equivalent units) containers will be handled on the vessels per week. The revenue resulting from handling a single FEU is $212 which is primarily wages. Therefore , the conservative estimate of annual revenue is:

Basic	$1,488,240
Multiplier	744,120
Total	$2,232,360

The basic benefit equates to 42.5 jobs @ $35,000 per year.

Economic Benefits: What Works at Fire Island

D. Coal: Reducing the Price of Coal Exports for World Markets

Concept
A storage and loading facility for bulk coal export closer to the mine sites.

The size of the resource
Alaska has been called the "Saudi Arabia of coal" because of the vast known coal resources within our state. At the North Slope, there are literally trillions of tons, but to date no viable transportation system has been created to move it to market.

There are three Alaskan coal fields which are potential sources of export coal for a Fire Island facility. The Nenana coal field at Healy currently ships 800,000 tons of coal a year to Korea through the Suneel shipping company terminal at the port of Seward. At the present production rate, the Nenana field could literally continue for hundreds of years. Its reserves are estimated at 400 million tons.

The Wishbone Hill field, 10 miles northeast of Palmer, will begin producing one million tons of coal a year by the end of 1992. If the cost of moving the coal from the mine to ship is reduced significantly, either by exporting from Pt. MacKenzie or Anchorage, the Wishbone Hill operators may decide to develop underground reserves which would expand the mine's potential from 15 to over 50 years. Estimated coal reserves at Wishbone Hill are 100 million tons.

The Beluga coal field, 50 miles west of Anchorage, has an enormous reserve of subbituminous coal. Placer Dome Company claims that the Beluga field contains the world's largest surface minable reserves of low sulfur coal close to tidewater and ocean shipping. Diamond Alaska Corporation hopes to export up to 15 million tons of Beluga coal a year, starting within the next three to four years. Early indications are that the company will consider barging their coal across the Inlet for trans-shipment to Panamax-size vessels if an adequate facility exists at Fire Island or other location.

The quality of the resource
Although, the BTU character of Alaska coal ranges widely, it is some of the cleanest in the world, with less than 0.2% sulfur. As pollution problems continue to worsen in the Far East, especially smog in cities such as Tokyo, Seoul and Taipei, Alaska coal will be more and more in demand.

The market

Japan's need for coal is expected to double in the next seven to eight years. As technology improves, and as the ability of industry to remove moisture and gravel from coal at more cost effective rates heightens the BTU quality of subbituminous coal, the Cook Inlet promises to become a major source of coal for the Pacific Rim, especially because of its environmentally sound, low sulfur content.

Incremental activities as a result of the Fire Island port

Storage space for transshipment center
Conveyor belts and loading facilities

Space required

Storage for Beluga coal: 8-10 acres
Storage for Wishbone Hill coal: 5 acres

Benefits

New jobs at Fire Island	60*
Multiplier effect @ 1.5	30
Total	90

Technological improvements on the horizon

A means of enhancing the marketability of subbituminous coal in the international coal market is to lower its moisture content. Such a strategy is being considered by the Usibelli coal mine. The dried coal, which would be comparable to low sulfur, bituminous coal, would be marketable in the Pacific Rim. If this project proceeds and proves to be economically and technically viable, much larger quantities of upgraded subbituminous coal could be available for export through Fire Island.

The Seward coal terminal

Although not as favorably located near the Railbelt coal fields, a coal load-out terminal already exists at the port of Seward. The Seward Coal Terminal (SCT) is owned and operated by Suneel Alaska Corporation, a subsidiary of Suneel Shipping Company Ltd. SCT's facilities have been designed for export of three million tons per year and constructed to work with a dock and loading platform which were funded with state and city monies. Private and public financing for the total facility amounts to $21 million. This facility is presently underutilized, working approximately 30% of capacity. If the Fire Island port is constructed, strong competition in the area of coal exports should be expected from SCT. This competition should be healthy and may result in greater quantities of coal exported from both locations.

---

* This estimate is based on a recent proposal to provide a facility to export Wishbone Hill coal from the Port of Anchorage. The firm estimated the creation of 60 new jobs for a separation plant and loading facility.

The Proposed "Port of Alaska" at Point Mackenzie
The Matanuska-Susitna Borough is evaluating the economic feasibility of a port at Pt. Mackenzie. If developed, this new port would provide significant transportation cost savings for Nenana and Wishbone Hill coal. The Matanuska-Susitna Borough is continuing the feasibility analysis for the port.

Coal is predominantly shipped on the ocean by Panamax-sized (60,000 - 80,000 ton dead weight) bulk carriers. These vessels are generally sluggish, underpowered and have thin hulls. Many Pacific Rim power utilities, especially those in Japan, own Panamax-sized bulk carriers. These utilities purchase coal at the port and assume the responsibility for transport to their power stations.

Recognizing the swift currents, winter ice conditions and uncertain, narrow shipping lanes and shoals within the Upper Cook Inlet, these companies and the public at large need to be reassured that it is safe and reliable to utilize one or more ports in the Upper Cook Inlet. To allay fears, the Port of Anchorage has recently undertaken a bathymetric survey. Another precaution that exporters might consider is to place bow thrusters on Panamax vessels to make them more maneuverable.

Environmental precautions
Coal dust and noise are two of the major environment concerns when designing a coal loading facility. Covered conveyer belts virtually eliminate coal dust as the resource is moved from railcars to a loading facility. The actual loading facility conveyor would not be covered, but the coal would be dampened to keep the dust at a minimal level. Noise of coal loading at the Anchorage Port would be many times more serious than at a Fire Island port.

Summary
The coal export potential through a Fire Island port lies in the following:

1. Export of Wishbone Hill coal at a savings of transportation costs to Seward of as much as $2 per ton.

2. Such a savings may encourage the Wishbone Hill operators to proceed with underground mining which would extend that project from 15 years to over 50.

3. The Diamond Alaska Corporation is considering using a shorebased storage and loading facility on the Anchorage side of the Inlet for transshipment during the initial years of their operation at Beluga. During these first years, the company expects to export approximately five million tons of coal per year. Fire Island would be an ideal location for this facility.

4. If both the Wishbone and Beluga operations utilize Fire Island, the Usibelli Coal will surely become interested in utilizing the facility for additional exports, as it is 250 miles closer than Seward. This possibility will be more likely if the company acquires technology to dry its coal, raise the BTU content and thereby

create a marketable and competitive product. Such a breakthrough would result in much more coal available for export than the Seward facility can accommodate.

Economic Benefits: What Works at Fire Island

E. Other Minerals: Limestone
A Storage, Grinding and Loading Facility for Bulk Export of Cement

Concept
Value added, in state use of limestone and coal.

The size and quality of the resource
A very large world-class reserve of pure limestone of the highest quality exists 10 miles up King River from Wishbone Hill. Test wells led to a preliminary, conservative estimate of a 33 million ton reserve. Those in the know call the reserve inexhaustible. You could work there for 100 years. (Harvey Dougherty).

History
Since the 1960's, Kaiser Industries has been interested in creating a cement plant using the limestone from King River and the waste coal from Wishbone Hill. Forty percent of the cost of cement is the energy it takes to heat the limestone, silica and iron to a temperature of 2700 degrees to create the clinkers which are then crushed into cement. The proximity of the high BTU bituminous coal at Wishbone is fortuitous.

The Market
Early reports are conflicting.

Cement is in short supply. (George Easley)

The market now is tight but in two years there will be a surplus. (Dougherty)

Korea is a large producer, but they are beginning to restrict use of limestone lands. Japan is a producer, but their agricultural interests are beginning to fight against industrial use of lands. (Dougherty)

Jobs

New jobs at the mine	20
New jobs at cement plant	15
New jobs at crusher plant	10
New jobs at Fire Island	10
Multiplier @ 1.5	28
Total	83

Environmental issues

Modern cement plants are being designed which cause little pollution. Crusher plants are so pollution free that one is currently being situated in downtown Seattle. Most of the environmental issues to be addressed will be at the mine site and cement plant rather than at the port. Mine site issues include construction and mine development, mine operation, burner emissions and transportation of coal and/or limestone to burner and crusher.

Economic Benefits: What Works at Fire Island

F. Other Minerals: Gravel
A Facility for Bulk Export

Concept
A storage facility, separating plant and ship loading/unloading facility.

The size and quality of the resource
High quality gravel, hard and uniform in size, exists both in the Matanuska-Susitna Valley and across Knik Arm from Anchorage on the western side of Cook Inlet. In the latter location, there are over 100 million metric tons of proven reserves. (Loren Lounsbury).

Matanuska-Susitna Valley has large amounts of gravel, and the Wishbone Hill mine will produce gravel as a by-product of mining coal. (David Germer).

The Market
Both Japan and Taiwan have indicated interest in importing gravel from Alaska. The current price paid for gravel delivered to Japan is $22 per metric ton. Anchorage, which has no gravel of its own, might find it less costly to import gravel from across the Inlet and move the large batching plants to the Island. This would eliminate pollution and noise from their current locations in the Anchorage bowl, making those neighborhoods more liveable while releasing valuable mid-town land for development.

Incremental Activities as a result of Fire Island port
A. Storage yard
B. Conveyor belts and loading facilities
C. Batching plants

Benefits
New jobs at Fire Island

Stevedoring	2
Batching plants	5
New jobs at gravel site	5
Multiplier effect @ 1.5	6
Total	18

Economic Benefits: What Works at Fire Island

G. A Ship Replenishment and Servicing Center

Concept

1. Fire Island can be a storage and handling facility for naval petroleum products, supplies and a vast array of other provisions needed by vessels operating in the North Pacific region.

2. It can be a highly efficient port capable of simultaneously servicing the needs of several smaller naval combatant type ships or vessels as large as an aircraft carrier and its supporting ships, a concept vigorously supported by Senator Ted Stevens.

3. As a facility which could ensure quick turn-around times for fast underway replenishment ships, Fire Island can also be a port that can readily be expanded or modified for temporary or permanent basing of icebreakers, naval replenishment ships, or naval combatants of any size or number.

4. As the geographic transportation hub of the Northern Hemisphere, Anchorage is in a unique position to become a center for disaster response teams which can respond by sea and/or air, to oil spills and natural disasters occurring in the North Pacific and Arctic Oceans.

5. In addition, Anchorage is an ideal location for the siting of an oceanographic research facility to support and monitor commercial fishing throughout the region.

A port at Fire Island, along with prime uplands for expansion and development, make such options highly feasible. In time, given that a port is developed, the homeporting option for a variety of government vessels becomes a viable option.

Potential

The North Pacific is rapidly becoming a strategically significant ocean region of the world. Trade between North America and East Asia has eclipsed volume and values traded between Europe and North America. The vast bulk of Pacific Rim trade is transported by merchant ships plying the great circle routes. These ships pass within 300 to 400 miles of Cook Inlet. During periods of national crisis, this vital merchant shipping must be protected.

The U.S. Navy recognizes the strategic importance of the region but is experiencing a dramatic budget reduction which means a smaller navy and fewer ships for coping with worldwide contingencies and missions. Because Alaska and the North Pacific are distant from the existing support infrastructure for the Navy, it is difficult and expensive to support ships operating and training at the extreme end of the resupply network. A major provisioning capability at Fire Island would greatly reduce the costs and problems associated with maintaining a fleet on-station in the region and improve work-up and transit time to the North Pacific. It would increase efficiency and resupply of ships which must constantly be in transit to support a distant fleet.

In addition to naval ships, the federal government operates numerous ships in the Alaska region, both year-round and on a seasonal basis. For example, 10 ships work in Southeast Alaska, Bristol Bay, and the Bering Sea. These ships are provisioned and repaired out of Seattle because adequate facilities do not exist in Alaska. Military Sealift Command (MSC) periodically operates ships in Alaska waters, and Military Traffic Management Command (MTMC) contracts for ships hauling cargoes both in and out of the state. Floating docks for servicing both MSC and MTMC ships would allow much greater traffic to come through the Anchorage area because large roll-on/roll-off ships could then make port calls to the area.

Large military deployments in and out of Alaska strain existing facilities at the Port of Anchorage. Sealand and TOTE have long-term scheduled reservations for pier access. Even during routine operations, loading and unloading of military supplies and equipment conflicts with these other scheduled port reservations. During national emergency or a large disaster in the state, military necessity could quickly displace civilian cargoes. Because of the limitations with the existing port, large military training operations must tailor their logistics around port inefficiencies and competing reservations for pier access.

Possible Uses

1. Logistics Support Center
   Use of commercial port facility on Fire Island to establish a naval or federal logistics center to support U.S. and allied naval ships transiting or exercising in Alaska waters.

2. Disaster Response Station
   Siting a disaster response team at the port to respond by sea or air to oil spills, natural disasters, or oil well fires along the Pacific and Arctic Rims.

3. Research Facility
   Siting oceanographic research facilities and vessels to support commercial fishing in the North Pacific.

4. Contingency Base/Homeporting
   Basing U.S. Navy combatants during contingency operations to protect sea lines of communication and to reassure allies along the Pacific Rim. Locating Naval

ships on a longterm basis as the U.S. withdraws from the Phillipines, South Korea and Japan.

The Market

Logistics Support Center

The military could use a commercial, deep-water port at Fire Island in a number of ways: bunkering ships, loading or unloading petrol, oil, and lubricants (POL), transshipment of bulk stores and ammunition, temporary berthing for countering drug operations, logistics support for exercises in the North Pacific Ocean, and for port calls to the region. Although all of these are possible uses by military forces, each presumes an existing commercial infrastructure of facilities.

Reduction in the defense budget will necessitate a re-examination of force structure. Basing issues will become part of that assessment. Existing facilities, commercial or otherwise and either built or under construction, will receive first consideration. The re-examination and attendant defense drawdown, closure of bases, and reassignment of forces, will occupy the next three to five years of political action. A port at Fire Island which could serve as a logistics center for the North Pacific and Alaska could be very important in these discussions. The Navy has an interest in using Alaska air-to-air and air-to-ground ranges as well as the Aleutian Islands to exercise naval surface and sub-surface elements. Fire Island can dramatically reduce the steaming time and distance to provision surface combatants operating in the area.

Disaster Response Station

Anchorage lies along the most traveled great circle air routes into North America and over the North Pole to Europe. It is strategically located for excursions into the Soviet Far East, the Arctic Ocean Basin, and south along the Pacific Rim. Despite longer range Boeing 747-400 equipment, Anchorage still makes shorter range aircraft cost-effective. Even without stopovers in Anchorage, all aircraft will still fly along established great circle routes. Responding to disaster in the vicinity of Alaska needs to be quickly available with the proper clothing and equipment both for the rescuers and rescued.

A port at Fire Island would be located on the northern sea line of communications that span the Pacific Rim following great circle routes. Commercial and military ships which use these routes transit rich commercial fishing grounds. A disaster at sea along Alaska's coast could be extreme in its effect on fisheries, marine mammals, and migratory birds. Again, the ability to respond quickly either by sea or air is crucial to the containment and control of spilled oil and chemical products. Anchorage is uniquely situated to provide this rapid response. It is well connected by sea and air, and has the population and support services infrastructure to augment a northern disaster response team.

As offshore oil and gas exploration continue to expand in the Chukchi, Beaufort and Bering Seas, and along the northern and eastern coasts of the Soviet Union, so does

the likelihood of a major oil well blowout or failed subsea pipeline. An acclimatized and experienced regional response team based in Anchorage could mean the difference between a real disaster and an accident that was quickly controlled. This is one of several reasons why homeporting of an icebreaker at Fire Island makes sense. Oil leaked or spilled under the ice can only be contained and controlled by the timely arrival of clean-up ships escorted into position by an icebreaker. Anchorage is two to four days shorter in steaming time to this critical area than is Seattle.

Research Facility

Alaskan waters hold some of the world's most productive fisheries, yet there are no research vessels or facilities homeported in the state. The same facilities and utilities needed for supporting naval vessels could be used by NOAA ships operating in Bristol Bay and Bering Sea areas. Additional pier space might be eventually needed depending on usage. It is likely that NOAA ships would only be based seasonally at Fire Island, but ship visits by these research vessels have considerable economic impact on the community and create further business for the port.

Contingency Base and Homeporting

With the exception of the already overcrowded facilities at Kodiak and Adak, there are no other suitable locations within Alaska for basing U.S. Navy combatant ships during a period of world crisis or during contingency operations. Concepts for homeporting frigate or destroyer type ships languish for lack of port space.

Considering the issue of homeporting and the Navy's current reduction program in numbers of ships, the most logical scenario is to base fast underway replenishment ships forward in Anchorage either on a temporary or permanent basis. Such a concept will eventually occur if Anchorage has a port capable of supporting such a ship or ships. Once support ships are based at Fire Island, it is logical to assume that other ships of a battle group such as frigates, destroyers, or a cruiser could also be based at the facility. Stationing of an icebreaker is a definite possibility as the Coast Guard must find a homeport for its newest ship which is soon scheduled for construction. Finally, with one or more ships homeported at Fire Island plus additional ship visits by the military, it is highly likely that one or two large tug boats would be required at the port.

Facility and Support Requirements

Each of the potential uses previously mentioned has infrastructure requirements, many of which could be utilized by more than one federal agency or which would simply add to the overall versatility of a port and supporting facilities at Fire Island.

Incremental Benefits of a Port at Fire Island

Jobs	6
Multiplier effect @ 1.5	3
Total	9

Economic Benefits: What Works at Fire Island

H. The Soviet Connection

Concept
The Port of Anchorage, through its membership in Ports Alaska, is promoting negotiations with the Soviet Union to achieve year-round shipping through the Arctic Ocean. Success in this endeavor will result in a savings of 12-15 days to or from Europe. This creative initiative is causing a major review of shipping policy in the United States, the Soviet Union, and Europe. The changes in policy under consideration would enhance the need for intermodal services in Anchorage and Dutch Harbor. For example, a major coal exporter has inquired about the likelihood of loading coal in Panamax vessels in the Upper Cook Inlet for shipment through the Arctic Maritime Passage to Spain. This inquiry encompasses two major questions, i.e., the availability of a transfer facility in the Anchorage area; and, the outcome of the negotiations with the Soviets on the Arctic Maritime Passage.

Soviet ice breakers and ice-resistant vessels, as well as other sophisticated equipment, are possible visitors to Anchorage. The need is to accommodate an incremental increase in capacity in the Upper Cook Inlet to allow, at the beginning, incidental visits. This could initially be accomplished at the proposed Multi-Purpose dock, and when they are available, moved to larger facilities at Fire Island.

Other relevant examples of potential opportunities are:

A. A local large volume retailer and wholesaler is training Soviet personnel in Anchorage to become purchasing agents in their country for his operations here. The concept includes utilizing the foreign trade zone to create a base of operations for both retail and wholesale trade.

B. A local businessman and a large Native corporation have formed a joint venture with the Soviets to develop minerals in both countries and utilize the mineral processing at whichever point is better.

C. Foreign and domestic shippers are studying the interconnection of freight movement by sea between northwestern United States, Anchorage, and Dutch Harbor, with an intermodal link at Dutch Harbor for Far East, Soviet, and European traffic both ways.

D. Air shippers are considering a concurrent link between air and sea traffic.

E. A local processing firm is on contract with the Soviets to entirely process (harvest, slaughter, cure, package, and sell) their locally available animals. A local electrical and refrigeration contractor is in related construction work at the slaughterhouse locations for cold storage and packing.

F. The National Petroleum Council during the 1980's developed an extensive study of all aspects of the potential and the development schemes necessary for joint petroleum development in nearby Soviet provinces. A major firm is now negotiating with the Soviets for such development.

G. Service will begin in the Spring of 1991: Alaska Airlines will fly to Kharbarovsk, with a stop in Magadan, while Aeroflot will have rights to San Francisco. Stops for both airlines will include Anchorage.

H. An Anchorage firm is advising Far Eastern Soviets on the availability of modern communications systems.

J. Continuous interrelations occurs on fisheries issues with the Soviets.

K. The U.S. Arctic Research Commission has endorsed the concept of an interdisciplinary study on the Bering Sea which would include meteorology, oceanographic research, and reproductive biology.

All of the foregoing have contributed to increased traffic at Anchorage International Airport and Elmendorf Air Force Base and hold promise for increased air and sea activity. Any significant increase in port activity would require facilities at Fire Island.

Economic Benefits: What Works at Fire Island

I. Race Point Ferry Terminal

Concept
Some activities that may be envisioned for Fire Island are not themselves sufficient to justify the capital cost of facilities, and at this point, are only in the planning or conceptual stages. One such activity in the planning stage is a Cook Inlet Ferry System.

In April 1990, a draft report on economic evaluation and planning for a ferry system in Cook Inlet was completed for the Matanuska-Susitna and Kenai Boroughs and the Municipality of Anchorage. The northern Inlet part of the system includes routes from Anchorage to Kenai/Nikiski, Tyonek/Beluga, and Point MacKenzie for passengers, vehicles and freight.

Assessments of various vessels have been made, considering capital cost, capacity, travel time, charge per passenger or vehicle, with and without subsidies and with or without public operation.

Race Point at Fire Island is considered as one of the system's terminals.
The study found that diesel-powered hovercraft provide the best year-round service. Hovercraft are more economical for vehicular traffic and require less investment in portside dock facilities than conventional vessels. Feasible routes for vehicle traffic are from Anchorage to Point MacKenzie and from Ship Creek and Fire Island to Point Possession on the Kenai Peninsula.

Hovercraft passenger service is economically feasible for longer distance markets (i.e. Kenai/Nikiski and Tyonek/Beluga). However, the report indicates that "vehicular ferry service between Anchorage and the Kenai Peninsula will be more viable after a road is extended from Nikiski to Point Possession and from Anchorage to Fire Island which would shorten the water route."

The report recommends that hovercraft be tested for year-round operation and that Anchorage develop a suitable ramp at Ship Creek and enhance transit connections to the terminal, in the short-term, along with similar developments at Kenai and Mat-Su. There are three groups currently interested in providing service. In the long-term, access to Fire Island with ferry facilities at Race Point is recommended.

Such a terminal should be created with the necessary amenities, such as overnight parking, camping facilities, recreational vehicle storage, a visitors center and concessions.

Because the contribution of a ferry system is difficult to estimate at this early stage, an economic benefit is not stated; however, such an undertaking could only enhance economic activity at the Fire Island Port and in Kenai and Mat-Su.

Economic Benefits: What Works at Fire Island

J. Fisheries

Shipping
The logic underlying the Fire Island port concept is to create an intermodal system, with sea/air/land connections physically located at Fire Island. Incoming loaded containers that might otherwise go out empty, as is often the case now, can carry fish as cargo direct to Pacific Rim markets. Time-sensitive, fresh products can be flown to world markets.

Maintaining the fleet
Regular maintenance of boats and ships can be a part of port activity if appropriate facilities are provided and port visits become regular with processing and shipment.

Processing
Processing the catch can become part of the concept for Fire Island as a value-added facility. Without an adequate port and appropriate support facilities, there will never be a possibility that the catch will be processed in the Cook Inlet area.

Packaging
Supplying the fishing fleet with boxes is an extension of the fisheries industry and Fire Island could participate with either a sheet plant or a facility to corrugate paper stock. A sheet plant is less capital intensive, since corrugated sheets would be manufactured elsewhere, but it is also less profitable. The latter requires more investment but offers higher margins.

The scope of the industry: Alaska's contribution
"Had Alaska been an independent nation in 1988, it would have ranked eleventh in world fisheries production by volume...The seafood industry is Alaska's largest private basic industry employer, providing nearly 70,000 seasonal jobs which translated to 33,000 direct, indirect and induced year-round jobs. The total seafood industry payroll in 1987 was the largest among private basic industries, estimated at $596 million. Alaska exported $561 million in seafood during 1987, a third of all U. S. seafood exports. Japan received 95%." ACIB, "Summary", *Alaska Seafood Industry Study*, 2, 16.

The Upper Cook Inlet Fishery: "It is relatively unknown to the general public that there are fairly extensive fisheries in the Upper Cook Inlet." Port of Anchorage, *Ship Creek Concept Plan* (1988), E-2.

"The annual catch in the Upper Cook Inlet may reach [upwards of] five to seven million salmon per year, with an average of 3.3 million salmon." *Ibid.*

The role of Anchorage

Anchorage is currently a large seafood producer: "Surprisingly, Anchorage, where residents earned $31 million per annum, is the state's third most important fishing community in terms of earnings from harvesting - slightly ahead of fourth place Petersburg where residents grossed $30.6 million. Further, Anchorage businesses paid out nearly $8 million in processing wages in 1987, making it a processing center the magnitude of Seward, Ketchikan or Cordova." ACIB, *Study*, 9.

The Forecast

While the seafood industry is a strong part of Alaska's economy, upper Cook Inlet does not yet draw portside fisheries activity. Fire Island, at 175 miles from the entrance of Cook Inlet, is not near enough to the larger fisheries or the shipping lanes. As Fire Island becomes an operating multi-purpose, intermodal transportation site, the fishing fleet will be presented with opportunities that may be superior to going to other ports.

Ship repair and home-porting of the fishing fleet at Fire Island face these drawbacks:

- Nearly 75% of the large fishing boats of the fleet are owned by non-Alaskans.
- Many are already centered in Seattle.
- Anchorage is not considered as a port base by the fleet; it is many nautical miles from the fishing grounds.
- Fueling and provisioning are either done on the high seas or at ports near the fishing grounds.
- There is a lack of qualified high tech ship repair and crafts people in Anchorage.
- There are environmental difficulties associated with sandblasting and painting large vessels, and climatic conditions inhibit painting.
- There are other locations for ship repair available. The City of Seward has a relatively new, publicly-funded synchrolift system with a large land area and rail pull-out system for handling boats. The City of Ketchikan has a large, publicly-funded facility for the State Ferry system that may be used privately.
- The Ship Creek Development Plan: "The Port and Municipality...have identified the Ship Creek project as a potential location for improved fish handling facilities." *Ship Creek Concept Plan*, 19. The plan includes three five to six acre industrial pads for a maritime reserve and a Commercial Fisheries Center, enclosed in a 100,000 square foot building. *Ship Creek*

Concept Plan, 19, 33-35. In late May of 1990, the federal Economic Development Administration announced that it had awarded $1 million to assist in funding of a dock and 30,000 square foot building for repair and servicing of the fishing fleet.

Packaging

As for a carton/box industry, a study in 1988 was unable to conclude that it would be cheaper to build cartons here from imported stock than to buy finished products from Seattle. ISER, *Alaska Economic Growth and Change: Opportunities for Import Substitution* (1988), III. B. 12-13. A recent study for the Alaska Center for International Business has concluded that the potential market for boxes and cartons in the fishing industry would need to increase three to four times before import substitution of Alaska-made boxes would be feasible. (Interview with Jeff Logan about upcoming release of "Carton Substitution Study" by ACIB for Governor's Office on International Trade.)

Incremental activities

A. Processing facilities
B. Use of excess container and intermodal transport space for fish and value-added products
C. Fuel sales
D. Resupply sales (food, dry goods, hardware)

Benefits

Benefits have not been derived as estimates are difficult and the numbers very soft; however, it is believed there are possibilities in this area. Some economic benefits of this activity are accounted for in the section on ship replenishment and servicing.

Summary

Fish processing and ship repair may become part of the activities at Fire Island but will not be large enough to justify the economic investment overall. In the long-run, however, as Fire Island becomes an established port with bulk resource shipments, intermodal container transfers to and from the International Airport, and with more frequent logistic stops by governmental and defense boats and ships, the level of activity may generate sufficient demand for the investments required in utilities, a graving dock, and boat yard, for fish processing activities and ship repairs.

Economic Benefits: What Works at Fire Island

K. International Research Center

Those familiar with the work of the East-West Center, a federally supported research institute in Honolulu affiliated with the University of Hawaii, can attest to the important role that such a center can play in encouraging commerce, in enriching a university and its surrounding community, and in drawing together local and outside resources in addressing common problems and concerns.

The East-West Center focuses on the Pacific Basin; such a center in Anchorage should have a larger focus. Our location at the center of the "triad" of North America, Europe, and Asia should encourage us to focus on the common concerns of the 21st Century.

Such an institute in Anchorage, supported by federal funds and by grants and affiliated with the University of Alaska Anchorage, might be called the Polaris Institute, after the way in which mariners are guided by the North Star.

With the communist world in its twilight, and the nations of eastern Europe striving to establish democracy and free economic systems, the institute might play an important part in studying what makes democratic governments and free markets work and what inhibits them. Selected studies in current politics, recent history, statesmanship, revolutions, and comparative economic systems might constitute its core activities.

The institute would (1) draw eminent statesmen and scholars to Anchorage for presentations, longer seminars, courses, and sabbaticals, increasing international awareness both of us and among us; (2) provide consulting services to nations developing free governments and economies, and to private corporations and organizations in those nations; (3) organize activities for enriching the preparation of state legislators, commissioners and others in international political and economic issues; and (4) serve as the academic wing of a new disaster management and relief center to be established in connection with the Fire Island project.

With respect to this last point: Anchorage is geographically well-positioned, and well-endowed with the medical and other technical expertise, to move to the forefront of international crisis management (e.g., oil spills; volcano, flood, or earthquake relief; famine aid; etc.). Gathering of requisite supplies, expertise, and

airlift capability, centered around Fire Island and the international airport, would constitute the practical, hands-on side of this project, while the institute would monitor the success or failure of relief efforts with a view toward making improvements.

Since the new institute might take over facilities of Alaska Psychiatric Institute (API), adjacent to Providence Hospital and across the street from the University of Alaska Anchorage, the proposed relocation of API to Fire Island would give its founding another Fire Island connection.

Though some elements of this proposal do not specifically require the use of land on Fire Island, financial estimates have been made with respect to the proposal as a whole. Potential costs associated with moving API to new quarters are not included.

Capital costs for construction and remodeling of buildings for the new institute would be approximately $5 million; annual budget for the new institute would be approximately $1 million, exclusive of additional grant funding. Federal funding would be sought both for the capital budget and for the annual operating budget. Complementary costs associated with the practical side of disaster management would have to be estimated separately by those preparing the plan for such a center. Budgets for both would probably tend to grow with time, reputation, and outside funding and contracts.

Fire Island

Costs of Fire Island Development

In this analysis, only the costs of getting to the island, building necessary roads and infrastructure, and constructing a dock face are included as development costs. These expenses, while certainly costs to the community in that money spent on this development is not available for something else, contribute to overall economic activity and create jobs through the primary and the multiplier effects.

Costs of the project are for the initial port facility, the primary land access highway, railroad extension with necessary tunneling, power, communication, water and sewer utilities, and associated cuts and fills. A description of each of these aspects of the project with the anticipated costs follows:

Forty-Acre Port

This portion assumes that a 1,000-foot dock face would be built from a water depth of elevation minus 50 ft. mean lower-low water (MLLW) to Fire Island, with a deck elevation of plus 40 ft. MLLW. A platform dock would extend from elevation minus 20 ft. to elevation minus 50 ft., with a bulkhead from shore to elevation -20 ft. Cut material from Fire Island and from railroad and road access would supply an initial two million cubic yards of fill. Future extension of this type of port dock face would cost about $40,000 per foot of face, and would supply an additional 40 acres of adjacent upland per 1,000 feet of dock face. Future fill could come from adjacent Fire Island uplands, or from the Municipal Landfill expansion. Studies of the ice and tides on the proposed dock will be required.

Nine-Mile Primary Access Highway

For cost estimates, the subcommittee chose highway access extending from Raspberry Road to the Fire Island port. (Note: For other highway access alignments see chapter on Engineering and Environmental Feasibility.) Cut from the road section would supplement fill for both the causeway and the port. To achieve required highway and railroad grades, an estimated 2.7 million cubic yards of cut will be necessary. The highway, excluding the cuts, can be constructed for approximately $1.2 million per mile.

Eleven-Mile Railroad

A railroad spur extension from the main line would require 11 miles of new track, or track upgrade, at a cost of about $0.8 million per mile. Significant cuts, retaining walls, a 5,000-foot tunnel, and crossing of Anchorage International Airport are all a part of this portion of the project. (Note: For other rail alignments see same chapter as above.)

Railroad Tunnel and Retaining Walls

Grades on the railroad have been held at less than 1.5%. Entrance to the 5,000-foot tunnel, which would pass under airport aprons and the north/south runway, will require construction of about 2,000 feet of retaining wall, while exit on the Fire Island side could be accomplished with slope-cut construction. Road bridge crossings would be required over the railroad cut in the airport area.

Causeway Structure

The causeway would be a cellular sheet pile structure, which is the design with the best ice, wave, and earthquake resistance. Breaches through this type of structure could be made with little effort, and the cost of 500 feet of opening is included. The best source of fill would be from railroad and highway cuts near the airport, and the cost of cell fill is primarily in cut cost items. Causeway construction may be coupled with other techniques to create a coastal wetlands bank.

Cut/Fill for Highway and Railroad

Grades for both railroad and highway can be achieved between the upland elevation of +100 ft. MLLW, to the causeway or dock elevations of elevation +40 ft. MLLW, by earth cuts which will yield fill needed for the causeway and port. Assuming reasonably good soils are encountered, this economical and convenient solution is perfect for the planned construction.

Utilities

Power, gas, communications, water, and sewer are the primary utilities needed. Space can be conveniently provided adjacent to road or railroad construction for utility corridors. Costs included are for trunk utilities only; distribution costs are assumed to be borne by users.

Cost Summary

Sub Project	*Cost (Millions)*
Forty-Acre Port (1,000-foot Initial Dock Face)	$ 43
Nine-Mile Highway	11
Eleven-Mile Railroad	9
One-Mile Tunnel	15
Retaining Walls and Road Overcrossings	6
Causeway Structure and Breaches	55
Cut/Fill for Highway and Railroad	7
Utilities (Trunk Only)	20
Additional structure for ice and current	10
Subtotal	$176 Million
15% Contingency	25
15% Engineering and Administration	25
Total	$226 Million

Fire Island

Financing Alternatives

It is generally agreed that if a project is economically feasible, financing will be available. It is therefore necessary to determine the economic viability of Fire Island from a user standpoint, prior to suggesting financing of the development of the island. Nothing in this material ought to be taken to mean that only one of the following potential methods of financing should be the sole method of funding, or that there are not others.

State Funding

The legislature is constantly under pressure to make investments which will provide a return.

The analysis shows that Fire Island provides an overall return to the economy. The simplest method of financing the investment in infrastructure necessary to make Fire Island a viable undertaking would be an outright state grant of the necessary sum. As the amount (estimated to be $226 million) would be a substantial portion of the entire statewide capital program in any one year, it is appropriate to consider multi-year funding. A three-year project is reasonable with anticipated funding needs as follows:

Year 1	Design and Engineering	-	$ 30 million
Year 2	Construction	-	$ 85 million
Year 3	Construction	-	$ 111 million

As the possibility of a state grant or grants for the entire project is unlikely, other options for financing must be considered.

Bonding

One option for financing is the sale of state or municipal general obligation (G.O.) bonds. If the entire $226 million were to be G.O. bonded, annual debt service at today's rates (7.0%) over 30 years would be over $18 million—a large sum to expect municipal taxpayers to absorb. The use of revenue bonds, if the revenues are there

to support the debt service, would require annual earnings in the neighborhood of $19.0 million/year (@ 7.25% for 30 years).

Another financing option worthy of consideration is a public/private placement of bonds to be backed by revenue and the constructed facilities. Some of the major shipping firms aided by a mix of tax incentives could likely be interested in this form of financing.

Wetlands Bank

Beyond the state grants or bonding schemes for financing, creative financing options must be considered. First among these unconventional approaches would be the creation of wetlands during causeway construction and the sale of the wetlands to projects needing wetlands offset. The wetlands bank concept could serve as leverage to achieve additional financing or sold outright with the proceeds used for the project or as leverage money.

Other creative opportunities are:

Trades

Trading land on Fire Island in exchange for construction of causeway related projects may be a feasible option. In the negotiations with the owner, Cook Inlet Region, Inc. (CIRI), the Municipality of Anchorage (MOA) should bargain for suitable residential or commercial land, in excess of what the city believes is needed for the port. The excess land could then be used, in barter, for causeway construction, thereby reducing the cash cost to the Municipality of Anchorage.

Projected Cash Flow Financing

A detailed land use plan could be prepared of the proposed facilities at Fire Island. Warehouses, staging areas, cranes, docks, dry docks, tank farms, houses, office buildings, parks, recreation facilities, tourism facilities, utilities, sidewalks and streets all would be included in the plat. In essence, the project is built on paper. The plan is given a projected date of completion and marketed to the world. Letters of intent are solicited and executed with entities which have a use and a need for the proposed facilities. The letters of intent state that if the project is constructed, then the user agrees to lease or purchase a portion of it at a fixed dollar amount.

When the accumulated dollar value of the letters of intent meet the projected cash flow necessary to service the expected debt, the project becomes economically feasible. Based on the projected cash flow, private or public financing is secured, contingent only upon the conversion of the letters of intent to executed contracts.

Once contingent financing is secured, the letters of intent can be reduced to executed contracts. With the guaranteed cash flow of the executed contracts, all contingencies are lifted from the financing, a commitment is given, and construction begins.

Toll Road Financing

Creating a toll causeway would result in certain revenues for the project: A conservative 2,500 crossings per day at $1 per crossing produces a cash flow of $75,000 per month. Seventy-five thousand dollars per month will service approximately $6 million in debt, not considering collection cost. This form of revenue-generation could be used in conjunction with other sources to yield necessary front-end capital as well as for operating and maintenance expenses.

Much of the world uses toll roads as a source of roadway maintenance and financing. The negative impact on commerce should be analyzed but is beyond the scope of this effort.

The "Alaska Company"

This strategy is modeled after a concept in Idaho called The Idaho Company. Idaho had been plagued by a sluggish economy. As a catalyst to promote business and business legislation, the state's business leaders founded The Idaho Company. The Company is a private syndication, in which stock was sold.

The purposes of the Company are: 1) to promote legislation by the State of Idaho and ordinances by cities and counties that will enable Idaho to meet the competition of other states in attracting business; 2) to act as a catalyst to provide product and market feasibility studies, production market analysis; 3) to grant or take options, make loans, provide financial support for the public sector; and, 4) to take any other financial or business steps that may act as a catalyst to expand or bring business activity to Idaho, such as owning and leasing land for commercial plants and facilities.

An "Alaska Company" modeled after the Idaho Company could serve the same purpose, could involve residents financially and emotionally, and could act as a much needed catalyst for Fire Island and other statewide projects. The Anchorage Economic Development Corporation is currently involved in a similar venture in the Ship Creek area and might be interested in undertaking such an enterprise.

Joint Venture

Another approach which may be viable is a joint MOA/CIRI development effort wherein the risks and benefits of the project are shared in some predetermined ratio. This joint venture concept could be undertaken by a third party such as is discussed in the foregoing paragraph with CIRI and the MOA as principal shareholders.

Anchor Tenant

With any of the foregoing financing methods, the project managing agency should strive to identify an "anchor tenant" who agrees to locate at the site. This could be a shipper, a government agency, a manufacturer, etc.

Undoubtedly other financing options exist and simply remain to be put together by an enterprising project management team. Such is the need for this project.

Lost Opportunities

As with any situation of limited resources, if public funds should be used for this project, there will be other worthy undertakings which will be delayed or not funded. This fact should be taken into account in the allocation process.

Fire Island

A Proposed Schedule

The Fire Island project should be considered in the context of bringing all of Anchorage's waterfront area into the 21st Century. A rational schedule for its development must consider the impacts on all affected areas. With this idea as the guiding vision, a time line for action is proposed as follows.

NEAR TERM NECESSARY ACTIONS:

A. Complete a Multi-purpose Dock previously approved by the voters. This dock will accommodate cruise ships, larger fishing vessels and tenders, NOAA and Naval vessels.*

B. Complete the C Street Bridge and dedicate the southern Ship Creek (Warehouse Avenue) to tourism, retail, and fishery activities.

C. Obtain access rights to Fire Island and begin permitting process.

D. Obtain Alaska Railroad agreement to dedicate land south of Ship Creek to tourism, recreation and retail business.

E. Expand on the conclusions of this report and further define the objectives of a regional port including the development of a regional port authority concept.

F. Complete Area Meriting Special Attention (AMSA) work for the Ship Creek/port area and develop a plan of action for expanding and capitalizing on the Foreign Trade Zone (FTZ) in Anchorage.

---

* A recent municipality study indicated that the original concept of the multi-purpose dock may not be feasible. A second opinion should be solicited before canceling this program. Whatever the outcome of the dock, a practical use should be made of the lands leased by the Municipality of Anchorage on the south shore of the mouth at Ship Creek.

G. Commence preliminary design of access routes to, and facilities at Fire Island, including strategies to enhance the coastal waterfowl habitat and improved recreational opportunities.

H. Develop a Fire Island marketing plan to include a financing plan and begin marketing efforts. Commence looking for an anchor tenant.

I. Investigate the inclusion of tax incentives in the Anchorage Municipal Code to enhance Ship Creek and Fire Island development.

J. Complete negotiations with the island's owner to permit access to a sufficient quantity of land area to make the project viable from the public interest standpoint.

MID-TERM NECESSARY ACTIONS:

A. Obtain necessary additional funding for final design and initial construction on Fire Island.

B. Identify and strike agreement with the anchor tenant.

C. Start Fire Island parkway and port construction.

D. Actively market the Fire Island facility and solicit commitments for economic activities at Fire Island.

E. Establish a development agency (such as Anchorage Economic Development Corporation) as an arm or partner of the Municipality of Anchorage (MOA) to manage and conduct the development efforts at Ship Creek and Fire Island. Consider a joint venture with Cook Inlet Region, Inc.

F. Commence a study on moving the railroad to Eagle River or an alternate site.

G. Commence cleanup of the areas abandoned by industry as they move out and begin reestablishment of the green belt about Ship Creek and people amenities in the downtown waterfront area.

LONG-TERM NECESSARY ACTIONS:

A. Finalize Fire Island development and encourage movement of certain old port industrial activities, including the tank farm, from Ship Creek to Fire Island.

B. Move most of the Alaska Railroad's shops and yards to a new site.

Abbreviations and Acronyms

NOAA	National Oceanographic and Atmospheric Administration
OPEC	Organization of Petroleum Exporting Countries
TAGS	Trans-Alaska Gas System
ARCO	Atlantic Richfield Company/ARCO Alaska, Inc.
BP	British Petroleum/BP Exploration (Alaska)
ANWR	Arctic National Wildlife Refuge
API	American Petroleum Institute
MLLW	Mean Lower-Low Water
GO	General Obligation (Bonds)
CIRI	Cook Inlet Region, Inc.
MOA	Municipality of Anchorage
ANCSA	Alaska Native Claims Settlement Act
FTZ	Foreign Trade Zone
PW	Municipality of Anchorage Public Works Dept.
O & M	Operations and Maintenance
TOFC	Trailer on Flat Car
COFC	Container on Flat Car
TOTE	Totem Ocean Trailer Express
UAA	University of Alaska Anchorage
TSP	Total Suspended Particulates
NEF	Noise Equivalency Factor
FAA	Federal Aviation Administration
UPS	United Parcel Service
Sea-Tac	Seattle Tacoma International Airport
FEU	Forty-foot equivalent units
mbf	Million Board Feet
USFS	United States Forest Service
BTU	British Thermal Unit
MSC	Military Sealift Command
MTMC	Military Traffic Management Command

Fire Island

Bibliography & Sources

Ship Creek Recreational Area

Commonwealth North. Fire Island, *A Maritime Center for the North Pacific.* 1988.

Commonwealth North. *Redesigning the Front Door to Anchorage.* 1988.

Commonwealth North, *Report of Petroleum Handling Subcommittee.* Fire Island Study Committee. February 1990.

Ports Alaska. *Directory,* Fall, 1988.

Port of Anchorage, Municipality of Anchorage. *Ship Creek Concept Plan.* 1988.

Port of Tacoma, *Annual Report.* 1989.

Redwood, Susan, Department of Economic Development and Planning, Municipality of Anchorage. *Ship Creek/Waterfront Land Use Study.* July 1990.

Marvin J. Yetter, Vice President of Finance, Alaska Railroad Corporation

Philip Cowart, Manager, Real Estate, Alaska Railroad Corporation

John Burns, Partner, BCV Architects

Fred Ferrara, Owner, Alaska Valuation Services

Environmental Enhancement

Ott Water Engineers, Inc. *Draft Fire Island Crossing Issue Analysis,* for Municipality of Anchorage Department of Public Works. Sept. 1988.

Port of Anchorage, Municipality of Anchorage. *Ship Creek Concept Plan and Appendices.* Jan. 1988.

Department of Public Works, Municipality of Anchorage. *Draft Fire Island Access Study, Summary Report.* Jan. 1989.

Department of Public Works, Municipality of Anchorage. *Fire Island Minimum Port Access Road.* Apr. 1989.

U. S. Corps of Engineers. *National Economic Development Benefit Evaluation Procedure: Recreation.* ER 1105-2-100. Dec. 1989.

Tom Bacon, Department of Public Works, Municipality of Anchorage

Clint McCool, Kincaid Park Attendant

Ed McMillan, Director, Department of Public Works, Municipality of Anchorage

History and Physical Setting

Arctic Environmental Information and Data Center, *Climatic Atlas, Gulf of Alaska.* 1988.

Belyea, Sorenson & Associates with Elliott Bay Design Group, VEI Consultants, Peratrovich, Nottingham and Drage, *Economic and Planning of a Cook Inlet Marine Transportation System.* 1990.

Burns. *Anchorage Coastal Resource Atlas, Fire Island.* 1982.
Nottingham and Drage. *Design of Port and Coastal Structures for Ice Forces.* 1982.
U. S. Army Corps of Engineers. *Anchorage Deep Draft Interim Technical Report.* 1988.
U. S. Dept. Commerce. *Coastal Pilot.* 1989.

Capt A. J. Joslyn, Southwest Pilots Association
Dennis Nottingham, President, Peratrovich, Nottingham & Drage

Enough Land for the Future

Commonwealth North. *Fire Island, A Maritime Center for the North Pacific.* 1988.
Ports Alaska. *Directory.* Fall 1988.
Port of Anchorage, Municipality of Anchorage. *Ship Creek Concept Plan.* 1988.
Port of Tacoma, *Annual Report.* 1989.

Marvin J. Yetter, Vice President Finance, Alaska Railroad Corporation
Philip Cowart, Manager, Real Estate, Alaska Railroad Corporation
John Burns, Partner, BCV Architects
Fred Ferrara, Owner, Alaska Valuation Services
John Truman, SRPA, MAI, Tacoma, Washington
Edward Greer, MAI, Tacoma, Washington

Engineering & Environmental

Alaska Department of Fish and Game. *Alaska Habitat Management Guide, Southcentral Region, Map Atlas.* Juneau: State of Alaska. 1985.
Alaska Department of Fish and Game. *Anchorage Coastal Wildlife Refuge Resource Inventory.* (Draft Report) 1990.
Britch, R. *Tidal Currents in Knik Arm, Cook Inlet, Alaska.* (Master's Thesis). 1976.
Cook Inlet Region, Inc. and Municipality of Anchorage. *Fire Island Industrial Site Analysis.* 1981.
Corps of Engineers. *Anchorage Deep Draft Interim Technical Report.* Anchorage: Department of the Army. 1987.
Corps of Engineers. *Subsurface Conditions, Power Plant and Tower Locations Fire Island* AFS FY-60. 1958a.
Corps of Engineers. *Subsurface Investigation for Proposed A.C.&W. Tower, Fire Island, Alaska.* 1958b.
Corps of Engineers. *Report on Deep Sea Terminal in the Vicinity of Anchorage.* Seattle: Department of the Army. 1948.
Department of Municipal Planning, Municipality of Anchorage. *Anchorage Coastal Resource Atlas, Vol 1: The Anchorage Bowl.* Anchorage. 1980.
Department of Municipal Planning, Municipality of Anchorage. *Anchorage Coastal Resource Atlas, Vol 4: Fire Island, Alaska.* Anchorage. 1982.
Department of Public Works, Municipality of Anchorage. *Draft Fire Island Access Study Summary Report.* 1989.
Department of Public Works, Municipality of Anchorage. *Fire Island Minimum Port Access Road.* 1989b.
Harding Lawson Associates. *Geophysical/Geotechnical Investigation, Fire Island Crossing Anchorage, Alaska.* (A report prepared for the Municipality of Anchorage. 1988.
LaBelle, J., J. Wise, R. Voelker, R. Shulze and G. Wohl. *Alaska Marine Ice Atlas.* Anchorage: Arctic Environmental Information and Data Center, University of Alaska. 1983.
Miller, R. and E. Dobrovolny. *Surficial Geology of Anchorage and Vicinity, Alaska.* (Geological Survey Bulletin 1093). Washington: United States Government Printing Office. 1959.
Morris, B. *Cook Inlet Beluga Whales.* Anchorage: National Marine Fisheries Service. 1988.
Ott Water Engineers. *Fire Island Crossing Issues Analysis.* (Draft report prepared for the Municipality of Anchorage Department of Public Works). 1988.
Ott Water Engineers. *Fire Island Shoal Migration Investigation Cook Inlet, Alaska.* (Prepared for United States Army Corps of Engineers, Alaska District, Anchorage, Alaska). 1985.

R&M Consultants. *Fire Island Crossing Coastal and Geotechnical Engineering Report-Conceptual Design with Cost Estimates.* (Report prepared for the Department of Public Works, Municipality of Anchorage). 1989.
R&M Consultants and Clark-Graves. *Fire Island Development Concept Cost Estimate Comparison.* (Report prepared for the Department of Public Works, Municipality of Anchorage). 1989b.
University of Alaska, School of Engineering. *Engineering Feasibility Study of Fire Island.* 1986.

Modular Construction

AIDEA, *Healy Coal Project Study.* 1989.
Department of Revenue, State of Alaska. *Revenue Sources Book.* Spring 1990.
Atlantic Richfield Company. *Annual Report.* 1989.
British Petroleum. *Annual Report.* 1989.
21 OPEC Bulletin. January, 1990.

Department of Labor, State of Alaska
Clifford Brown, Construction Manager, Swan Island, ARCO Alaska, Inc.
John Dick-Peddie, Manager: Projects, British Petroleum
Gene Gregory, Manager Facility/Project, British Petroleum
James Lewis, Project Engineer, British Petroleum
Luke Lilly, Project Manager, Alaska Petroleum Contractors, Inc.
Robert Schacht, Alaska Construction Manager, ARCO Alaska, Inc.
John Swanson, Manager Pipeline Design, Yukon-Pacific Corp.
George Wuerch, President, Fluor Daniel
William Janda, Director Project Controls, Fluor Daniel
Eric Helzer, Construction Manager, Fluor Daniel
Peter Leathard, President, Veco, Inc.

Wood Products

State of Alaska, Department of Labor, *Alaska Economic Trends.* Oct. 1988.
U.S. Department of Agriculture, Forest Service and State of Alaska, Department of Natural Resources, *Susitna River Basin Study–Alaska, Timber and Vegetation Resources of the Susitna River Basin–Alaska Report.* (1986).
U.S. Department of Agriculture, Forest Service, Alaska Region, *Timber Supply and Demand.* 1988, 1989; *Forest Statistics of the United States,* 1987; *Timber Resource Statistics for the Fairbanks Block, Tanana Inventory Unit, Alaska,* 1970; *Timber Resource Statistics for the Kantishna Block, Tanana Inventory Unit, Alaska.* 1973; *Timber Resource Statistics for the Talkeetna Block, Susitna River Basin Multiresource Inventory Unit, Alaska.* 1979 & 1980; *Timber Resource Statistics for the Tanana Inventory Unit, Alaska .* 1971-75; *Timber Resource Statistics for the Upper Susitna Block, Susitna River Basin Multiresource Inventory Unit, Alaska.* 1980; *Timber Resource Statistics for the Upper Tanana Block, Tanana Inventory Unit, Alaska.* 1974; *Timber Resource Statistics for the Willow Block, Susitna River Basin Multiresource Inventory Unit, Alaska.* 1978; *Timber Resource Statistics for the Wood-Salcha Block, Tanana Inventory Unit, Alaska.* 1975.

David Orr, Department of Natural Resources, State of Alaska
John Sturgeon, Koncor
Frank Roppel, Alaska Pulp, Sitka
Bob Dick, Alaska State Forester
Gene Lassard, U.S. Forest Service, State and Private Lands
Ed Holsten, U. S. Forest Service entomologist
Larry Dinneen, Deputy Director, Port of Anchorage
Loren Lounsbury, International Management Group
Terry Brady, forest product consultant
George Hollett, Deputy Director, State Division of Forestry
Frank Seymour, Alaska Dept. of Commerce and Economic Development

John Hall, forestry consultant
Jim LaBau, project leader, Alaska Forest Inventory and Analysis, USFS
Mick Chittick, Chugach Alaska
Rick Feller, CIRI
Bill Van Hees, USFS
Gene Wheeler, USFS

Alaska's Role in the Intercontinental Sea-Air Cargo System
Manalytics, Inc. *Potential for Sea-Air Movements through Anchorage.* August 1990.
Glen Glenzer, Director, Port of Anchorage
Larry Dinneen, Deputy Director, Port of Anchorage

Coal
U.S. Corps of Engineers, Resource Development Navigation Study, *Analysis of Balboa Bay, Beluga, Point MacKenzie, and Lost River as Port Sites for Use by the Mineral Industry.* 1990.
Alaska Resource Industries (Hobbs Industries, Inc.). *Proposal to Export Wishbone Hill Coal for Idemitsu Alaska, Inc.* 1990.
Placer Dome Company, 1988 Report.

David Germer, McKinley Mining Consultants
John Burns, BCV Architects, consultants to Hobbs Industries and ARR
Robert Styles, Diamond Alaska Corporation
Jim Cucullu, Hobbs Industries
Glen Glenzer, Director, Port of Anchorage
Dennis Nottingham, engineer, Peratrovich, Nottingham & Drage

Other Minerals: Limestone
Harvey Dougherty, Alaska Basic Industries
Dan Dorran, Alagco
George Easley, consultant
Jim Cucullu, Hobbs Industries
David Germer, McKinley Mining Consultants

Other Minerals: Gravel
Belyea, Sorensen & Associates, with Elliott Bay Design Groups, VEI Consultants, Peratrovich, Nottingham and Drage, *Economic Evaluation and Planning of a Cook Inlet Marine Transportation System* . 1990.

David Germer, McKinley Mining Consultants
Harvey Dougherty, Alaska Basic Industries
George Easley, consultant
Loren Lounsbury, International Management Group

Fisheries
Alaska Center for International Business, *Summary,* and *Alaska Seafood Industry Study.* 1989.
ISER, *Alaska Economic Growth and Change: Opportunities for Import Substitution.* 1988.
Port of Anchorage, *Ship Creek Concept Plan.* 1988.

Shawneen Conover, Research Assistant, Alaska Center for International Business
Mark Dawson, V. P., Construction and Engineering, Underwater Construction, Inc.
Paul Fuhs, Mayor, Unalaska
Jeff Logan, Consultant, Alaska Center for International Business
Ron Miller, Research Associate, Governor's Office on International Trade
Henry Mitchell, Executive Director, Bering Sea Fishermen's Association