Regional Port of Anchorage

Master Plan

FINAL REPORT

September 30, 1999

Vickerman • Zachary • Miller
a division of
TRANSYSTEMS CORPORATION
180 Grand Avenue, Suite 400
Oakland, CA 94612
510.835.2761 FAX 510.835.9839

In association with:
Tryck Nyman Hayes, Inc.
Northern Economics
Leeper, Cambridge and Campbell
The Boutet Company
Ogden Beeman Associates

TRANSYSTEMS CORPORATION

September 24, 1999

Mr. Richard Burg, P.E.
Assistant Port Director
Port of Anchorage
2000 Anchorage Port Road
Anchorage, Alaska 99501

PORT OF ANCHORAGE MASTER PLAN – FINAL REPORT

Dear Mr. Burg:

We at VZM/TranSystems are pleased to present this Final Report of the Master Plan for the Regional Port of Anchorage. The report includes an Executive Summary, which presents a brief overview of the scope, methods and findings of the Master Plan. Detailed information and recommendations for each major element of the study is presented in the body of the report.

On behalf of our excellent team of engineering and economic specialists, we greatly appreciate the strong participation and leadership provided by Port staff, which added both to the value of the study, and to the enjoyment of the process. We also wish to acknowledge the comprehensive participation of Port stakeholders throughout the study. These included Port tenants, neighbors, municipal, ARRC and military representatives who offered their valuable time and guidance with obvious enthusiasm for the future success of the Port.

As we enter the new millennium, we look forward to working with you over the years to assure that the future will unfold as successfully as possible for the Port of Anchorage. This Master Plan will serve as a road map guiding the Port toward long-term success and supporting the growth of regional, Alaskan and national economic vitality.

Sincerely,

David Vandeveer
Project Manager
Vice President of Maritime Planning

DV/cjm
g:\general\980730\final report 9-24-99\letter.doc

180 Grand Avenue, Suite 400 • Oakland, California 94612 • Phone: (510) 835-2761 Fax: (510) 835-9839

Regional Port of Anchorage Master Plan

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Master Plan Fact Sheet

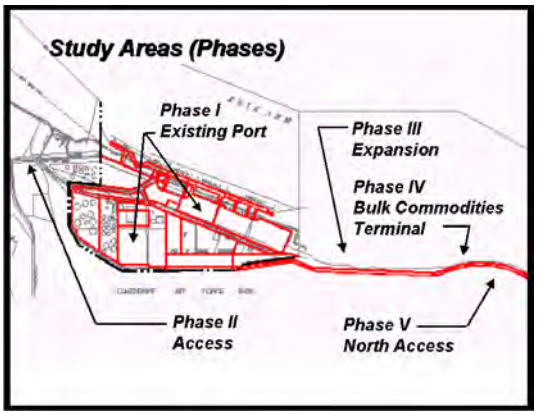
The Regional Port of Anchorage is a key transportation asset for Alaska. To maintain this vital resource and to accommodate new growth, the Port must continue to respond to existing needs as well as changing market conditions.

To meet this challenge, the Port of Anchorage commissioned a team of maritime and marketing experts, led by VZM/TranSystems, to develop this Master Plan. This Master Plan study envisions a phased development to accommodate the Port's existing and future users through the year 2020.

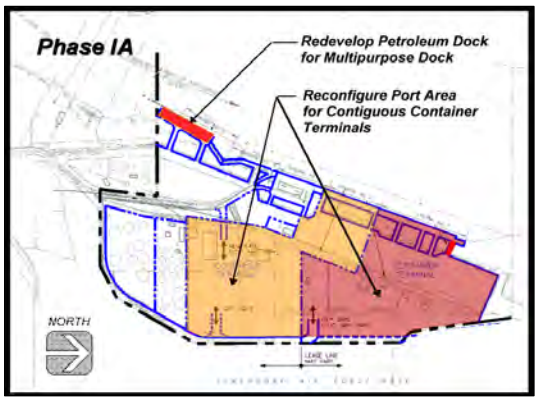
Key Findings:

- The Port of Anchorage is Alaska's Regional Port, serving 80% of the State's population and contributing an estimated $725 million annually to Alaska's economy.
- In 1998, the Port of Anchorage throughput included 1.5 million short tons (360,000 TEU's) of containerized cargo. The medium forecasts for containerized cargo is equivalent to a compound annual rate of 2.5%.
- Market opportunities include growth in domestic and international container traffic, automobile and bulk cargoes as well as cruise activities.
- Recommended improvements include enhancement and reconfiguration of existing facilities, redevelopment of a petroleum dock into a multipurpose dock, an increase in available draft at the Port, as well as the phased development of container and bulk facilities at the North Tidelands area.
- Landside access improvements must be made by state and local transportation agencies to safely and efficiently accommodate over 1,000 design hour vehicles by the year 2020.

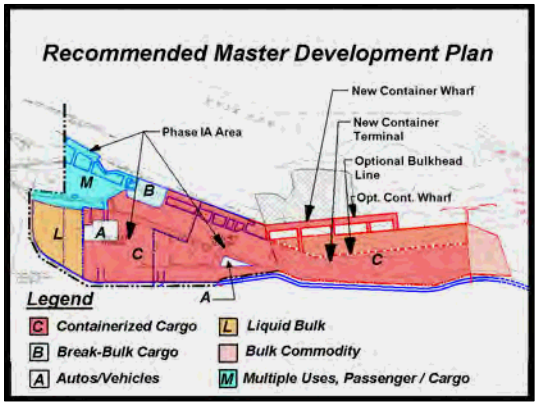
Master Plan Study Areas (Phases)



Recommended Phase IA



Recommended Master Development Plan



Regional Port of Anchorage Master Plan

Overview

The Regional Port of Anchorage represents the major gateway for Alaska's waterborne commerce and plays a vital role in the regional economy. The Port's influence is felt throughout the locality, the State, and the Pacific Northwest. The Port's steady growth though the last decade is expected to continue into the next century. However, the Port is also faced with decisions that affect the ability to capitalize on new opportunities. In response, the Port commissioned a team of maritime planning specialists, led by VZM/TranSystems, to undertake this Master Plan.

The goal of this Master Plan is:

To provide a market driven Master Plan through the year 2020 for the Regional Port of Anchorage which will guide a pragmatic, environmentally sound program to stimulate and accommodate economic development, employment opportunities and an efficient transportation element serving Alaska.

This Master Plan consists of four major elements organized in the following manner:

- Strategic Marketing Plan
- Facilities Plan
- Access Plan
- Implementation Plan

The methodologies, findings and recommendations of each element are presented in greater detail within the body of the Final Master Plan Report. A brief overview of the key issues of each major element is presented in this Executive Summary.

Strategic Marketing Plan Summary

The Strategic Marketing Plan provides a snapshot of the existing conditions and describes a marketing strategy to use as a guide for the next 20 years.

The state has experienced an annual growth rate of 1.5 percent annual since 1990. The University of Alaska Institute of Social and Economic Research (ISER) projects population growth rates through 2025 of 0.5 percent for a low-growth scenario, 1.4 percent for a medium-growth scenario, and 2.4 percent for a high-growth scenario. These population growth rates have been used to develop forecasts for inbound cargo movements that are driven mainly by population growth.

The Port of Anchorage (POA) serves about 80 percent of the state's population. It is the dominant terminal for inbound and outbound containerized freight in Alaska. Most of this freight originates in Tacoma, Washington, which is the terminal for both Totem Ocean Trailer Express, Inc., and Sea-Land Service Inc. The POA accounts for the largest volume of refined petroleum imports in Alaska and is an exporter of refined petroleum products. The Port of Valdez is the

largest port in Alaska in terms of tonnage, due to crude oil exports. The Port of Seward is the primary port for bulk exports of coal and forest products from Interior Alaska. The Port of Homer currently ships more forest products than any other port in Southcentral Alaska. The Port of Whittier serves as an ice-free port for fish and general freight by way of two commercial barge carriers. In the past, it also had several summer calls by major cruise ship lines.

Approximately 1.9 million short tons (ST) of inbound domestic cargo and 0.6 million ST of inbound foreign cargo moved through the Port in 1997. In the same year, outbound cargo totaled about 0.8 million ST, for total cargo volumes of about 3.3 million ST. Total cargo tonnage decreased to 2.9 million ST in 1998 because of an expansion of in-state refining capacity and a subsequent 25 percent decrease in petroleum imports through the POA. The decrease in petroleum imports resulted in an 11 percent decrease in total cargo tonnage, even though general cargo increased by 4.1 percent between 1997 and 1998.

Total cargo tonnage has increased about 12 percent in the past 5 years (1993-1998), an annual growth rate of about 2.4 percent. Tonnage for domestic vans, flats, and containers has grown approximately 10 percent in the same time, an annual growth rate of about 1.9 percent.

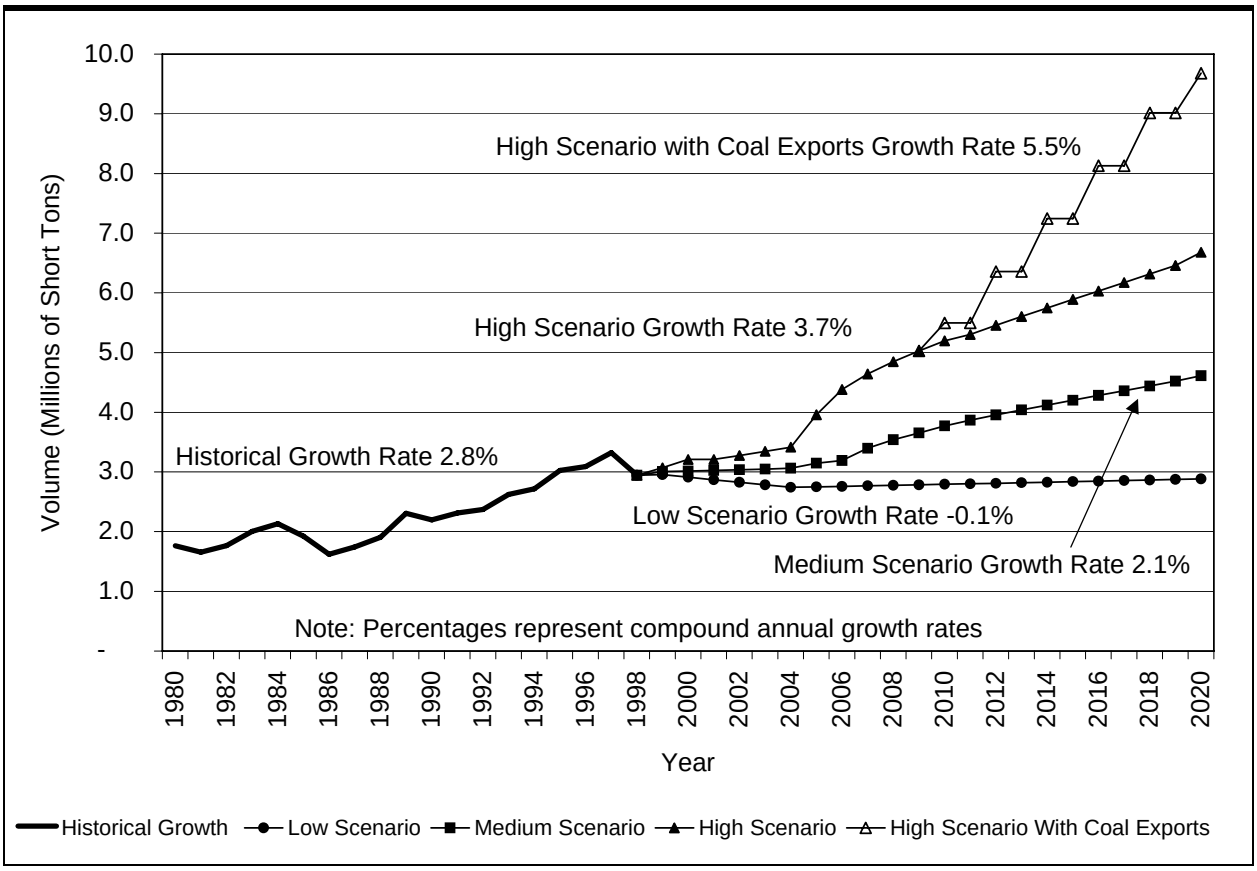
A number of opportunities may emerge in the future and affect cargo volumes through the POA. These include:

- Transshipment of containers for both domestic and international cargoes may increase cargo volumes.
- Bulk- coal-carrying ships configured to carry containers (conbulkers), for the backhaul leg of the Asia-to-Anchorage trip could positively affect international cargo volumes at POA.
- The emerging role of Anchorage International Airport (AIA) as a hub for air cargo shipments between Europe, the U.S., and Pacific Rim countries will require maintaining inventories in these distribution centers using ocean carrier delivery from the Lower 48 and Asia.
- Cargo flows that will emerge when new international distribution facilities are created in Anchorage and the planned seafood processing plant becomes operational will begin to generate the type of international cargo flows that can justify direct service.
- Value-added forest products such as containerized log homes are another possible cargo that could use liner service.
- There may be a market for smaller U.S.-flagged cruise vessels to use Anchorage as a homeport because of its excellent airport connections.
- Anchorage could become the center for expedition-like seasonal Arctic cruises.
- Future coal volumes could increase and the opportunity exists to accommodate some of these volumes in Anchorage.
- If coal exports move through a POA facility and the facility is able to accommodate more than one type of product, other dry-bulk commodities might become economically viable for export.
- A North Tidelands facility with an accompanying north access route to Anchorage military bases could offer a safe, cost-effective port for munitions shipments to these military bases.

- A bulk export facility could also provide a seasonal, full-tide barge dock for customers.

Figure ES-1 shows the total cargo volumes projected to move through the POA during the next 20 years. Two high-case forecasts are represented. One is based on the assumption that coal will not be accommodated at Anchorage. The second assumes that a coal export facility producing 3.1 million tons per year will be developed at the North Tidelands in the POA. The projected reduction in petroleum cargoes moving across the docks at the POA will result in total tonnages stabilizing or even declining for a few years before resuming the historic growth pattern.

Figure ES-1: Historical and Forecasted Total Cargo Volumes for the Port of Anchorage, 1980–2020



In addition, the following chart, Figure ES-2, illustrates a summary of the medium forecast for each commodity type in thousands of units per year for the same 20-year period. The medium forecast was used to determine the future needs for the Port of Anchorage over the course of that time frame.

Figure ES-2: Summary of Medium Forecast (in units per year in thousands)

Commodity Type	Units in 1,000's	1998	2005	2010	2020	Equivalent CAGR
Container	Short Tons	1,572	1,906	2,139	2,697	2.5%
Container	TEU's	359	449	520	687	3.0%
Break-Bulk	Short Tons	-	15	30	45	7.6%
Autos/Vehicles	Units	37	44	49	62	2.4%
Liquid Bulk	Short Tons	1,280	1,120	1,489	1,742	1.4%
Dry Bulk	Short Tons	96	106	113	130	1.4%
Passenger	Passengers	13	4	14	27	3.4%

Coal exports could be the catalyst needed for the POA to develop its potential for cargo transshipment and distribution, building on its locational assets and a mutually beneficial relationship with the AIA global air cargo hub. It should be recognized, however, that the coal exports shown for the POA, and other bulk commodity exports, could move through other ports if those ports build the necessary infrastructure to handle the projected volumes.

The marketing strategy presented for the POA depends upon development and promotion of a highly efficient facility with improved access to the state's principal highway and rail arteries. The POA and others must continue to support development of an intermodal system that achieves that goal and accommodates all users. If sufficient coal export volumes are routed through the POA, the potential exists for direct container service from Asia and transshipment of additional cargo. This opportunity could bring significant benefit to the Municipality of Anchorage and the state as a whole. The POA should work with other organizations in pursuit of this goal. A coal export facility at the North Tidelands would also benefit other potential export commodities, and the POA should support efforts by these industries to participate in global markets. The POA should develop a multipurpose dock suitable for passenger movements and participate with economic development agencies to market this facility to expedition cruise operators and other potential users.

Facilities Plan Summary

The Facilities Plan for the Regional Port of Anchorage began with an assessment of the existing marine terminals and facilities in operation during 1998. The assessment is based on an inventory of the existing maritime facilities in operation as of December 1998. Both Port of Anchorage property and non-Port of Anchorage properties are included in the inventory, **however the focus of this Master Plan is on the Port-owned areas.** The non-Port of Anchorage facilities are included in the inventory as a means of providing a comprehensive understanding of the maritime activities in Anchorage.

The following Figure ES-3, summarizes the approximate acreage, by cargo type (including passenger/cruise use), based on Port of Anchorage and Non-Port of Anchorage property:

Figure ES-3: Summary of Inventory of Existing Facilities

Cargo / Use Type	Port of Anchorage Land - in Approximate Acres	Non-Port of Anchorage Land - in Approximate Acres
Container	82.7	9.3
Break-Bulk	12.1	15.8
Autos/Vehicles	5.0	0.0
Liquid Bulk	19.9	52.1
Dry Bulk	0.0	6.8
Passenger	0.4	0.0
Intermodal Rail	0.0	27.4
Total	**120.1**	111.4

Note :
1. Totals do not include internal Port circulation areas of approximately 15%

Utilizing the Inventory data, we analyzed the throughput capacities of each terminal by cargo type using VZM/TranSystems' computerized cargo-handling models. These models analyzed containerized cargo, break-bulk/neo bulk, automobiles, liquid bulk, dry bulk and passengers/cruise activities. The models compared the following six key facility components that are related to maritime terminal throughput capacity:

- Vessel arrival and berth availability.
- Cargo transfer at the wharf apron.
- Apron-to-storage transfer.
- Storage yard and dwell time.
- Storage-to-inland transfer.
- Gate processing.

The models were applied to each terminal to identify the average "maximum practical capacity" for each terminal cargo type**. The term "Maximum Practical Capacity" (MPC) refers to estimated throughput volumes that are at the high end of a realistic operating scenario. However, operations at MPC may be uneconomical or unsafe. Therefore, for planning purposes, we use the "Sustainable Practical Capacity" (SPC) throughput, which is factored at approximately 75%-85% of the terminal's MPC.**

Each model also has the ability to utilize monthly throughput data to identify peaking characteristics and other requirements for berthing, storage and retrieval systems that are typical of modern container, break-bulk/neo bulk, automobiles, liquid bulk and dry bulk facilities. Given the Port of Anchorage's unique environment, i.e., ice conditions, extreme high and low tides, etc., specialized seasonality and operational peaks (that are typical of all maritime-related businesses) were directly incorporated into each model.

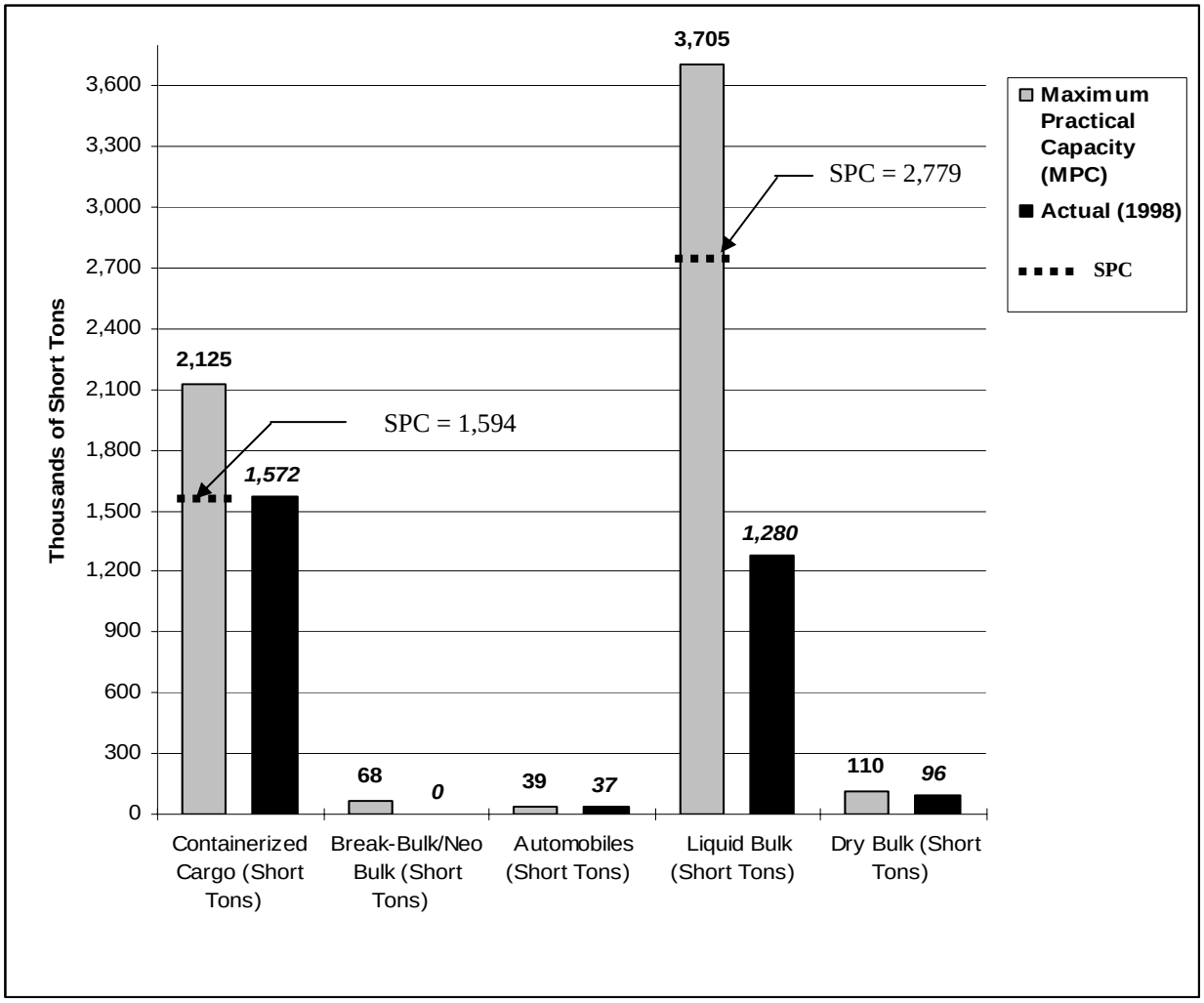
Summaries of the capabilities for each cargo type are presented in Figure ES-4

Figure ES-4: Summary of Throughput Capacity Analysis – By Cargo Type

Commodity Type	Maximum Practical Throughput (MPC)	Units
Containerized Cargo	2,125,043 (485,170)	Short Tons/ (TEU's)
Break-Bulk / Neo Bulk Cargo	68,079	Short Tons
Automobile Cargo	39,281	Autos/Year
Liquid Bulk Cargo	3,704,835	Short Tons
Dry Bulk Cargo	107,817	Short Tons
Passenger / Cruise	17,354	Passengers

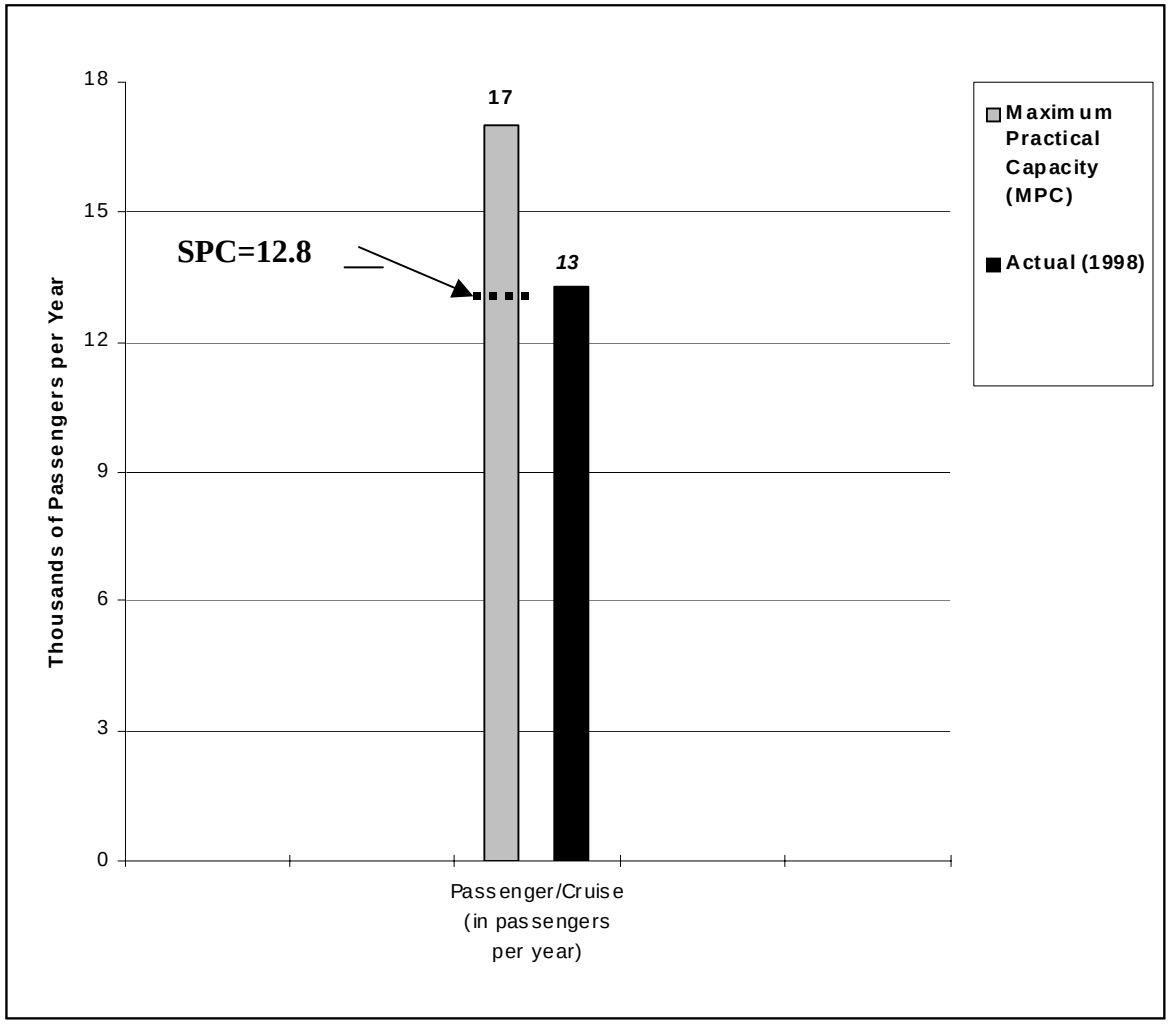
A summary of the Regional Port of Anchorage's actual 1998 cargo throughput versus the estimated Maximum Practical Capacity Throughput (MPC), in TEU's, Short Tons and Autos/year, for 1998 is presented in Figure ES-5.

Figure ES-5: Port of Anchorage Annual Cargo Throughput – Maximum Practical Capacity versus Actual 1998 Throughputs



Likewise, a summary of the Regional Port of Anchorage's actual 1998 passenger/cruise throughput versus the estimated Maximum Practical Capacity Throughput (MPC), in thousands of passengers per year, for 1998 is presented in Figure ES-6.

Figure ES-6: Port of Anchorage Annual Passenger/Cruise Throughput – Maximum Practical Capacity versus Actual 1998 Throughputs



Building on the inventory and throughput modeling, the future facility demands for the Regional Port of Anchorage were developed. The Sustainable Practical Capacities (SPC's) of the existing facilities, for each cargo type, were subtracted from the cargo forecasts to identify possible shortfalls (or over-capacities). The quantity of the shortfall was divided by the appropriate capacity for the associated new facilities to identify the required acres for each future terminal type. This exercise was performed for both the medium and high forecast for the years 2005, 2010, 2015 and 2020. Figure ES-7 summarizes the acres required for the medium forecast. Figure ES-8 summarizes the acres required for the high forecast.

Figure ES-7: Amount of New Terminal Acres Based on Medium Forecast

Cargo / Use Type	2005	2010	2015	2020
Containerized Cargo	19.4	35.6	43.1	63.9
Break-Bulk / Neo Bulk Cargo	0.0	0.0	0.0	0.0
Automobile Cargo	3.9	5.2	6.0	7.6
Liquid Bulk Cargo	0.0	0.0	0.0	0.0
Dry Bulk Cargo	0.2	0.2	0.2	0.3
Passenger / Cruise	0.0	0.0	0.3	0.7
Totals	**23.5**	**41.0**	**49.6**	**72.5**

Figure ES-8: Amount of New Terminal Acres Based on High Forecast.

Cargo / Use Type	2005	2010	2015	2020
Containerized Cargo	30.3	53.2	69.0	98.8
Break-Bulk / Neo Bulk Cargo	1.0	1.0	1.8	2.9
Automobile Cargo	3.2	5.1	6.8	9.3
Liquid Bulk Cargo	0.0	0.0	0.0	0.0
Dry Bulk Cargo	0.1	0.2	0.3	0.4
Dry Bulk Cargo - with Added Coal	3.1	6.1	8.6	11.5
Passenger / Cruise	0.0	0.4	0.7	1.1
Totals	**38.6**	**66.0**	**87.2**	**124.0**

The next step in the Master Plan was to develop an overall Phased Development Plan and a series of new terminal development alternatives. The macro phases are as follows:

Phase I Improvement of infrastructure on existing Port terminal areas.
Phase II Improvement of existing access infrastructure.
Phase III Container terminal development in the North Tidelands area (Adjacent to Port).
Phase IV Bulk commodity terminal development in the North Tidelands area.
Phase V North corridor preservation and access development.

It is anticipated that some of the additional needed new acreage can be achieved by effective reconfiguration of the existing Port area (such as conversion of existing roads to container storage areas), and possible use of nearby areas such as the Defense Fuels area. The net result is that most of the new non-container may be accommodated in areas other than the North Tidelands. Therefore, approximately 54 acres plus 7 acres circulation (medium forecast) to 89 acres plus 11 acres circulation (high forecast) will be needed for new container facilities in the North Tidelands area (Phase III). The average of the 61 and 100 acres is 80 acres. This is the target that was used for the development of a series of 12 Alternatives for North Tidelands container terminals. Approximately 10 to 12 acres will be needed for the bulk commodities/coal terminal if that scenario in the high forecast were to be achieved.

Phase I consists of reconfiguration of the current Port of Anchorage container operations and the realignment of the access roads to these facilities. In addition, POL 2 will be renovated to an enhanced multi-use facility and other wharf, building and civil improvements will be undertaken over the next 10 years. Phase II and V improvements will occur over a longer period as guided by the Access Plan element of this Master Plan. Phase III and IV improvements represent the major new land development projects over the next 20 years. Therefore, a series of Phase III alternatives was developed to ensure a comprehensive study of feasible options.

Alternatives 1 through 12 represent the Phase III options to accommodate 80 acres of new container facilities. The following table lists a brief description of the 12 Alternatives with rough order-of-magnitude costs for the container terminal developments only. Figure ES-9 presents the order of magnitude cost estimates for each alternative in 1999 dollars. These estimates are intended to be used in conjunction with a full array of other considerations, such as wharf access, efficiency of terminal configuration, etc. For all of the Alternatives, the adjacent bulk commodities/coal facility was not included in the any of the cost estimating.

Figure ES-9: Order of Magnitude Cost Estimates – Alternatives 1-12

Alternatives	**Order of Magnitude Cost Estimate** (Based on Conceptual Plan)
Alternative 1 - Low Fill – w/Remote Yard	$104 M
Alternative 2 - Medium / Low Fill	$111 M
*Alternative 3 - Medium Fill	$134 M
Alternative 4 - Medium Fill – Pile Supported Backlands	$306 M
Alternative 5 - Large Fill	$157 M
Alternative 6 - Medium Fill, Slight Jog	$131 M
Alternative 7 - Medium Fill, Medium Jog	$138 M
Alternative 8 - Very Low Fill – w/ Remote Yard	$89 M
Alternative 9 - Cut Into Bluff	$94 M
Alternative 10 – Fill West of Existing Wharves	$194 M
Alternative 11 – Develop South of Existing Port–ARRC Prop.	$220 M
Alternative 12 – Other Locations such as Cairn Point	N/A

*****Recommended Alternative

The consulting team in association with the Port staff performed an evaluation process of the 12 Alternatives. It was determined that three Alternatives merited further review and refinement. The three Alternatives were: Alternative 1, Alternative 2 and Alternative 3. These three Alternatives were chosen because they best meet the challenges of the key project criteria and because of critical cost and other significant planning issues. After further detailed evaluation, Alternative 3 emerged as the recommended Alternative. It can be built with a modest fill program while still meeting the needs of the Port's future throughput capacity requirements. Alternative 3 also provides maximum flexibility and expandability which is necessary in order to

be responsive to the 'market driven' approach that the consulting team has embraced throughout the course of the Master Plan. The Recommended Master Development Plan is presented in Figure ES-11 at the end of this Executive Summary.

Recommended Master Development Plan

The Master Development Plan Phasing was developed to be highly flexible and expandable, from both a Master Plan and individual terminal perspective, to allow for future variations. The Recommended Master Development Plan has been divided into the five major Phases listed above. These five Phases have also been further broken down into sub-phases, each with a conceptual budget estimate in 1999 dollars. A summary of sub-phased and budget estimates is presented in Figure ES-10.

Figure ES-10: Order of Magnitude – Cost Estimate by Phase

Phase	**Order of Magnitude Cost Estimate – By Phase** (Based on Recommended Master Development Plan) **in Millions**
Phase I-A	$28 M
Phase I-B	$15 M
Phase II	See Access Plan
Phase III-A	$55 M
Phase III-A Optional	$45 M
Phase III-B	$13 M
Phase III-C	$24 M
Phase IV	$60M (See note 1)
Phase V	See Northern Access Corridor Reconnaissance Study, May, 1998

Notes :

1. See North Tidelands Coal Terminal Study, December, 1997

Access Plan Summary

This portion of the Executive Summary provides the key findings of the Access Plan element for the *Regional Port of Anchorage Master Plan.* This study considers the existing and future landside transportation facilities and traffic related to the low, medium and high forecasts.

The following are the key access objectives:

- Access Efficiency
- Mobility and Connectivity
- Integration and Safety

An overall goal of the Access Plan was to provide input for use in future transportation planning processes. The volume of Port related traffic for future conditions was analyzed and presented in the body of the Access Plan.

Agency Transportation Planning Objectives

The planning of the following agencies were considered as part of this study:

- Federal Planning Objectives
- State Planning Objectives
- Municipal Planning Objectives

Key Access Plan findings and conclusions are as follows:

- There are capacity deficiencies on the primary roadways that convey Port-oriented traffic.
- Locations of concern include the Whitney/Ocean Dock Road intersection, the Central Business District and the A/C viaduct ramps.
- Extension of Ingra-Gambell to provide a direct connection to the Port would substantially improve levels of service on Port area roadways and facilitate the Municipality's Comp Plan objective of diverting truck traffic out of the Central Business District.
- Development of a North Port Access will also improve reserve capacity on Port area roadways and support key local and statewide economic development objectives. This Access would also provide an additional route between the Port and the National Highway System.

Key Access Plan recommendations are as follows:

- The Port should continue to vigorously support the public transportation process with the objective of elevating the priority of Port access improvements.
- Use the Ship Creek Transportation Study and the AMATS model to further refine future traffic volumes and identify roadway impacts in the Port Area.
- Provide planning and engineering assistance to the Ingra-Gambell Extension effort.
- Provide planning and engineering assistance to the AMATS Long Range Transportation Plan and related program documents.
- Continue to pursue corridor preservation and environmental documentation for a North Port Access.

Implementation Plan Summary

In this element, specific steps for each of the previous elements are summarized. Key implementations steps are presented below.

Implementation Program - Strategic Marketing Plan

- Foster Improvements for Existing Tenants
- Support In-State Distribution
- Pursue Asian Container Shipping
- Pursue Natural Resource Opportunities for Coal
- Pursue Natural Resource Opportunities for Timber

- Pursue Opportunities for Seafood Products
- Initiate New Terminal Expansion Program
- Pursue Cruise Line Opportunities
- Negotiate with DOD for Additional Opportunities
- Seek Alternative Funding Sources

Implementation Program - Facilities Plan

• Phase I-A, Existing Facilities Improvement	2000	2005
• Phase I-A, Existing Facilities Improvement	2005	2010
• Phase III-A, Northern Tidelands Expansion	2000	2005
• Phase III-B, Northern Tidelands Expansion	2010	2015
• Phase III-C, Northern Tidelands Expansion	2015	2020
• Phase IV, Natural Resources Facility	2010	2020
• Phase V, North Access Improvements Program	2010	2020
• Annual Maintenance	2000	2020

Implementation Program - Access Plan

- Pursue Internal Port Circulation Recommendations
- Support Public Transportation Planning Process
- Elevate Priority of Port Access Improvements
- Coordinate with Ship Creek Transportation Study
- Coordinate with Final Update of AMATS Model
- Assist in Planning Ingra-Gambell Extension effort
- Pursue Corridor Preservation for North Access

Economic Impact Overview

An overview study estimating the economic impact of the Port of Anchorage was undertaken as a portion of this Master Plan. This brief study compared known national performance data with conditions related to the current and potential future Port of Anchorage cargo activities. Key elements of this study include a consideration of the direct, indirect and induced impacts for the immediate port industry, the port users and the capital improvement projects for the Port. By comparing known national data as provided by the Maritime Administration (MARAD) to known conditions at the Port of Anchorage, order-of-magnitude impacts have been estimated.

The key findings of this study are:

The estimated current beneficial economic impact of the Port of Anchorage to the state of Alaska Gross State Product (GSP) is approximately $725,000,000 per year. This impact may more than

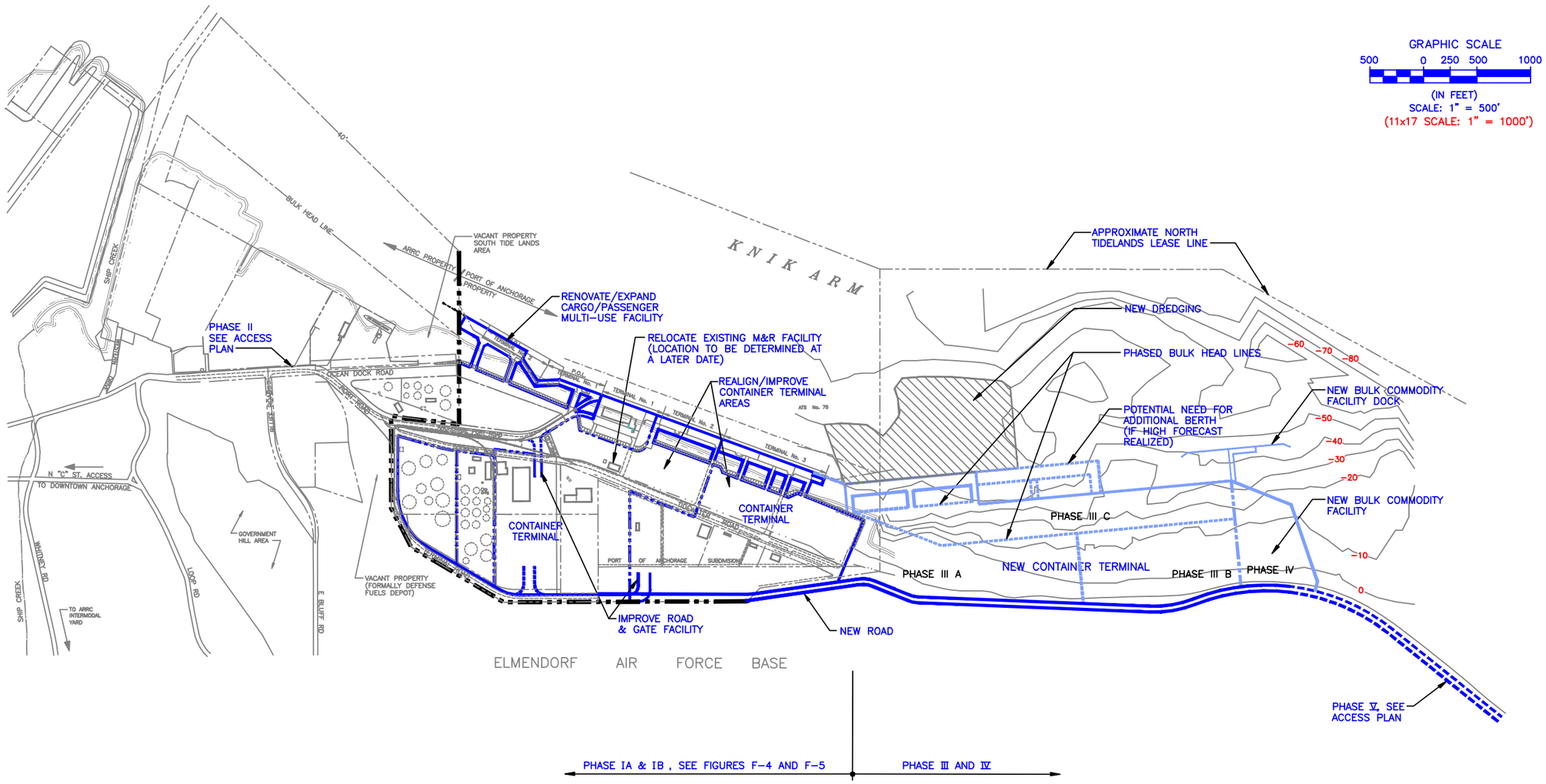
double over the 20 year planning horizon. The Port of Anchorage also supports a significant number of jobs in Alaska.

Since the Port of Anchorage is more important to Alaska than the typical port in the lower 48 states, this rough estimate may, in fact, be conservatively low. A future study could be undertaken to provide a more detailed estimation of these impacts.

Master Plan Summary

The following points summarize the key findings of the Regional Port of Anchorage Master Plan:

- The Regional Port of Anchorage is, and will continue to be, an essential and significant element of Alaska's economic vitality.
- The Port should prepare for growth at a rate which matches or exceeds the population growth and **may double** by 2020.
- Opportunities to be vigorously pursued by the Port include: growth in domestic and international container traffic, automobile and neo-bulk cargo, bulk commodities and cruise activities.
- Facility improvements required to accommodate this growth include enhancements and reconfiguration of existing Port lands, renovation of POL 2 and a phased development of the North Tidelands area for container and possible bulk commodity expansion.
- Access improvements, including elimination of internal roads, coordination with and support of public transportation and support of corridor preservation for North Access, are essential in order to meet this growth expectation.
- The anticipated growth will also create a substantial increase in the number of jobs, taxes and other revenue sources for the region.
- It is equally essential that the Port's on-going and future maintenance program be funded and implemented in order to preserve infrastructure and access vital to the Port's success.
- Improved port facilities and rail and road transport systems could lead to different outcomes than those projected in previous studies and improve the viability of certain projects.
- Preliminary estimates indicate a potential for 2.2 million to 2.6 million tons of coal to be shipped out of the Healy and Palmer area mines yearly, which would support a new coal facility in Cook Inlet.
- Availability of alternative cruise ship ports-of-call would have favorable impact on expansion of the tourism market in Southcentral Alaska by providing access to different areas of the state.



RECOMMENDED MASTER DEVELOPMENT PLAN

NOTE

BATHYMETRY IS APPROXIMATE AND BASED UPON INFORMATION PROVIDED BY PORT.

NORTH

FIGURE ES-11

Vickerman•Zachary•Miller
a division of TransSystems Corporation
Planning Architecture Engineering
180 Grand Avenue, Suite 400
Oakland California 94612-3741
phone 510-835-2781 fax 510-835-9839

THE REGIONAL PORT OF ANCHORAGE

MASTER PLAN

REVISIONS / ISSUES

NO.	DATE	BY	APP'D

TRYCK NYMAN HAYES, INC.
911 W. 8TH AVENUE, SUITE 300
ANCHORAGE, AK 99501
TEL: 907-279-0543 • FAX: 907-278-7679

FILE:	J:\980730\FINAL-AU099\F10-ES1
SCALE:	1" = 500'
DESIGNED BY:	DV/JF
DRAWN BY:	HAD/EAC
CHECKED BY:	JF
APPROVED BY:	DV
DATE:	9/30/99
PROJECT NO.:	V980730

FIG-ES-11.DWG User: eacastillo
09/28/99 11:38:57 XRef Files: J:\980730\n-xbdr.dwg

Regional Port of Anchorage Master Plan

INTRODUCTION

As the major gateway for Alaska's waterborne commerce, the Regional Port of Anchorage plays a vital role in the regional economy. The Port is currently presented with an array of opportunities and challenges to foster and accommodate future growth. In response, the Port commissioned a team of maritime planning specialists, led by VZM/TranSystems, to undertake this 20-year Master Plan.

VZM/TranSystems was supported by an excellent team including:

- Tryck Nyman Hayes, Inc. — Local project management and civil design
- Northern Economics — Strategic Market Study leadership
- Leeper, Cambridge and Campbell — International Market Study support
- Boutet Company — Access Plan leadership
- Ogden Beeman — Economic and Port document review support

Throughout the process, the Port staff participated in a hands-on leadership role helping to assure a successful and focused study. The project also greatly benefited from the strong participation by representatives from Port tenants, adjacent Port area neighbors, as well as municipal, ARRC and military representatives. A number of stakeholder meetings and individual interviews were held to assure that the input and guidance of local expertise was fully utilized in the analysis and development of solutions which will maximize the future success of the Port of Anchorage.

The Master Plan has consisted of a comprehensive effort to define future marketing opportunities, analyze current strengths and challenges to the Port, and define a course of action that will serve as a road map to future success. For a brief overview of the methods and findings of the Master Plan, an Executive Summary is presented at the beginning of this report. The balance of this report is organized around the four major elements listed below. Each of these elements was undertaken sequentially and presented as a stand-alone report prior to inclusion in this overall Final Report. Each previous element is now represents the four major Elements (numbered I through IV) of this report.

This Master Plan consists of four major elements organized in the following manner:

I. Strategic Marketing Plan
II. Facilities Plan
III. Access Plan
IV. Implementation Plan

The methodologies, findings and recommendations of each element are presented in greater detail within the body of the Final Master Plan Report. A series of appendices is presented at the end of this report to provide important supporting material, detailed calculations, bibliographies and a glossary of key terms.

Throughout the course of the project, a project goal and related objectives were repeatedly reviewed to assure that the results were focused on issues of key importance for future Port success. **The overall project goal is:**

To provide a market driven Master Plan through the year 2020 for the Regional Port of Anchorage which will guide a pragmatic, environmentally sound program to stimulate and accommodate economic development, employment opportunities and an efficient transportation element serving Alaska.

To support this goal, a series of key objectives were defined. The Master Plan was focused to be:

1. **Market driven** and responsive to competitive commercial and economic forces, opportunities and constraints.
2. **Environmentally and aesthetically responsive** to the existing, planned and potential assets of the region.
3. **Balanced** to accommodate growth in local, Alaskan and international trade.
4. **Integrated** to optimize an efficient water, land and air transport network.
5. **Cost effective and defensible**, with maximum utilization of existing assets, at reasonable world's best practice levels, prior to relying on expensive new developments.
6. **Achievable and pragmatic** with realistic early phases which can grow to accommodate long-term needs.
7. **Flexible and expandable**, on both Master Plan and terminal levels to allow for future variations.

Abbreviations

A full glossary of Maritime Terms is presented in the Appendix of this report. However, terms specifically related to this Strategic Marketing Section are presented below for easy reference.

ADOL	Alaska Department of Labor
ADOR	Alaska Department of Revenue
ADOT&PF	Alaska Department of Transportation and Public Facilities
AIA	Anchorage International Airport
AMHS	Alaska Marine Highway System
APR	Asian Pacific Rim
ARRC	Alaska Railroad Corporation
ASI	Alaska Seafood International

bcf	billion cubic feet
BEA	U.S. Bureau of Economic Analysis
bpd	barrels per day
COE	U.S. Army Corps of Engineers
CWF	coal-water fuels
DCED	Alaska Department of Commerce and Economic Development
DOD	U.S. Department of Defense
DWT	dead weight ton
EERC	Energy and Environmental Research Center
FAA	Federal Aviation Administration
FTZ	Foreign Trade Zone
IMS	Institute of Marine Science
ISER	Institute of Social and Economic Research
KEPCO	Korean Electric Power Company
LNG	liquefied natural gas
LO/LO	lift-on/lift-off
LRC	low-rank-coal
LRCWF	low-rank coal-water fuel
MLLW	mean lower low water
MOA	Municipality of Anchorage
MT	metric ton
NGL	natural gas liquid
NOS	not otherwise specified

OFE	Office of Fossil Energy
PND	Peratrovich, Nottingham & Drage, Inc.
POA or Port	Port of Anchorage
POL	petroleum, oil, and lubricants
RO/RO	roll-on/roll-off
Sea-Land	Sea-Land Service, Inc.
ST	short ton
TEU	20-foot equivalent unit
TOTE	Totem Ocean Trailer Express, Inc.
VFCTOTE	vans, flats and containers Totem Ocean Trailer Express, Inc.

I. STRATEGIC MARKETING PLAN

A. BACKGROUND

This section provides the strategic marketing plan for the *Regional Port of Anchorage Master Plan*. The purpose of the Master Plan is to update the previous master plan for the Port of Anchorage (POA or the Port). This new Master Plan will serve as a guide for port area decision-making and development.

There have been numerous changes in technology and in the shipping industry since the 1983 Master Plan was issued that need to be assimilated and accommodated. The strategic marketing plan provides a snapshot of the existing conditions and builds a foundation to use as a guide for the next 20 years. A description of subsequent sections follows.

- **Section B** establishes current market conditions including selected socioeconomic indicators of the state, such as population concentration and growth, employment and wage rates, and education levels. This section also discusses Alaska's natural resource industries—including oil, coal, minerals, forest products, seafood products, and tourism—in terms of current and projected production levels that may require POA facilities and services.
- **Section C** describes Alaska's marine transportation, including ports that provide services for the vessels. Alaska ports, other U.S. West Coast ports, and Pacific Rim links are discussed to further illustrate the POA's role as Alaska's regional port.
- **Section D** provides a detailed description of current POA inbound and outbound cargo flows.
- **Section E** identifies new market opportunities and markets in which current operations could be expanded. Potential resource development sites and opportunities are also identified. Cargo and passenger projections are presented as a reference for future planning. Forecasts have been made for 2005, 2010, and 2020.
- **Section F** presents a marketing strategy for the POA by identifying various opportunities for POA in services, commodities, and markets. The future role of the POA is also discussed.

Information presented in this strategic marketing plan was developed from previous reports involving potential cargo movements through the POA and studies that directly pertain to the POA. Personal interviews were also conducted to establish current and projected cargo flows from major stakeholders in Port operations.

B. EXISTING MARKET CONDITIONS

The following section discusses historical and projected demographics for Alaska—with focus on Southcentral and Interior Alaska, as well as historical and projected production levels of Alaska's natural resources. Population and economic growth are primary indicators for the demand for maritime shipping.

The material presented in this section is background for the POA cargo forecasts presented in Section E. The data presented from Alaska Department of Labor (ADOL), Research and Analysis Section; U.S. Department of Commerce, Bureau of Census; and U.S. Department of Commerce, Bureau of Economic Analysis (BEA), are offered as historical references. The population and per capita projections from the University of Alaska Anchorage, Institute of Social and Economic Research (ISER) provide low-, medium-, and high-growth scenarios from 1996 through 2025. These projections are used as independent predictors for the POA cargo forecasts because they are the most recent projections available.

B.1 Demographic and Socioeconomic Profile of Alaska

The following subsections describe the population, employment, wage rates, and educational attainment of Alaska residents. Figure B-1 displays Alaska borough and census area populations from 1990 through 1998, as estimated by ADOL. The following observations are summaries of historical population trends in Alaska.

- The state as a whole has experienced steady growth in population—1.5 percent average per year—during the last 8 years, from 550,000 in 1990 to 621,000 estimated for 1998.
- The statewide population booms of the 1970s and 1980s are modest increases from a historical perspective. The long-term trend suggests moderate statewide population growth.

Figure B-1: Populations of Alaska Boroughs and Census Areas, 1990–1998

	Population by Year (Thousands)								
Borough or Census Area	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998[a]**
State of Alaska	550.0	569.3	587.1	597.7	601.6	602.9	607.3	611.3	621.4
Aleutians East Borough	2.5	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2
Aleutians West Census Area	9.5	9.6	9.8	9.4	5.9	5.7	5.8	5.4	5.4
Bethel Census Area	13.7	14.0	14.3	14.5	14.9	15.3	15.3	15.6	16.0
Bristol Bay Borough	1.4	1.5	1.6	1.6	1.3	1.2	1.3	1.3	1.3
Denali Borough	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.9
Dillingham Census Area	4.0	4.2	4.2	4.3	4.3	4.4	4.5	4.5	4.7
Fairbanks North Star Borough	77.7	80.7	81.4	83.1	83.0	81.8	82.3	82.3	83.9
Haines Borough	2.1	2.2	2.2	2.3	2.3	2.3	2.4	2.4	2.5
Juneau Borough	26.8	27.6	28.1	28.1	28.3	28.7	29.3	29.8	30.2
Kenai Peninsula Borough	40.8	42.1	43.2	43.3	44.8	46.1	46.9	48.1	48.8
Ketchikan Gateway Borough	13.8	14.3	14.5	14.5	14.6	14.8	14.7	14.6	14.2
Kodiak Island Borough	13.3	13.0	14.5	14.4	15.0	14.6	14.1	13.5	13.8
Lake and Peninsula Borough	1.7	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.9
Matanuska-Susitna Borough	39.7	41.8	44.1	46.0	47.4	49.0	50.7	52.4	54.5
Municipality of Anchorage	226.3	235.7	244.8	251.5	254.8	253.4	254.2	254.8	258.8
Nome Census Area	8.3	8.5	8.8	8.8	8.9	8.9	9.1	9.2	9.4
North Slope Borough	6.0	6.2	6.5	6.6	6.8	6.9	7.1	7.3	7.4
Northwest Arctic Borough	6.1	6.2	6.5	6.5	6.6	6.6	6.5	6.7	6.8
Prince-of-Wales Outer Ketchikan Census Area	6.3	6.6	6.6	6.7	6.7	6.8	7.0	6.9	6.9
Sitka Borough	8.6	8.9	9.0	9.0	8.9	8.9	8.7	8.7	8.8
Skagway-Hoonah-Angoon Census Area	3.7	3.7	3.8	3.8	3.8	3.7	3.8	3.8	3.7
Southeast Fairbanks Census Area	5.9	6.0	6.1	6.2	6.3	6.5	6.3	6.4	6.4
Valdez Cordova Census Area	10.0	10.0	10.2	10.3	10.3	10.5	10.5	10.4	10.4
Wade Hampton Census Area	5.8	6.1	6.3	6.5	6.6	6.6	6.7	6.9	7.1
Wrangell-Petersburg Census Area	7.0	7.2	7.3	7.2	7.2	7.2	7.2	7.2	7.2
Yakutat Borough	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8
Yukon-Koyukuk Census Area	6.7	6.7	6.8	6.6	6.4	6.4	6.4	6.4	6.5

Source: ADOL Research and Analysis Section, Demographics Unit, *Alaska Population Overview 1998 Estimates*, June 1998, available http://www.labor.state.ak.us/research/pop/ca1.htm.
[a]1998 figures are ADOL provisional estimates.

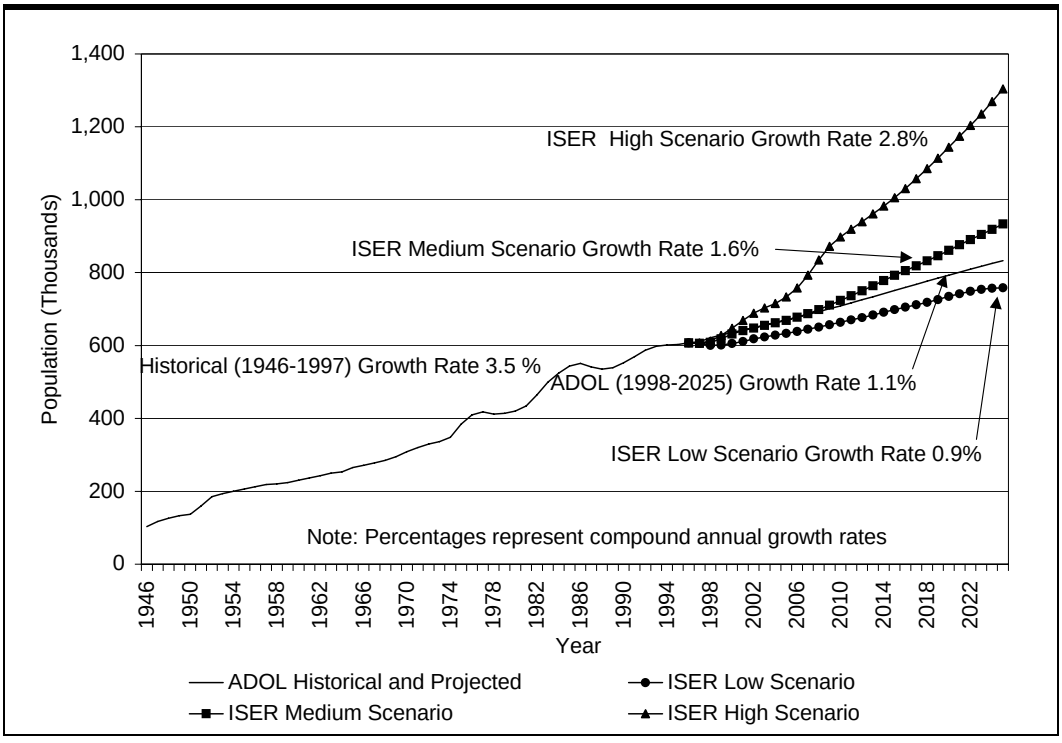
B.1.1 Population Concentration Within Alaska

The land area of Alaska covers 570,374 square miles, for which the population density is about 1 person per square mile. However, more than 70 percent of Alaska's population is considered to live in areas designated as "urban," which means that 7 out of 10 people live in areas with populations of 2,500 or more. Anchorage contains 42 percent of the state's population, but only 0.3 percent of the land area. More than 76 percent of Alaska's population is contained in the following group of areas with heavy urban concentrations: the Municipality of Anchorage (MOA), the Fairbanks North Star Borough, the Matanuska-Susitna Borough, the Kenai Peninsula Borough, and the Juneau Borough.[1]

B.1.2 Population Size and Growth

Alaska's 1946 population of 103,000 more than doubled by 1959—the year in which Alaska became a state. Since then, the state has continued to grow, and population reached 621,000 in 1998. The compound annual growth rate for population was 3.5 percent for 1946 through 1997. ADOL projects a 1.1 percent compound annual growth rate for population from 1998 through 2025. ISER projects population growth rates through 2025 of 0.9 percent for low growth, 1.6 percent for medium growth, and 2.8 percent for high growth, as shown in Figure B-2.

Figure B-2: Alaska Population, 1946–2025



Source: ADOL Research and Analysis Section, Demographics Unit, Alaska Economic Trends, October 1998, and ISER, Economic Projections: Alaska and the Southern Railbelt 1996-2025, September 1996.

[1] ADOL, *Alaska Population Overview 1996*, June 1997.

Figure B-3 displays projected populations in 5-year increments, beginning with 1995.

Figure B-3: Alaska Population, 1995–2025

Population Estimate Source	Compound Annual Growth Rate Projection (Percent)	Population by Year (Thousands)						
		1995	2000	2005	2010	2015	2020	2025
ADOL	1.1	603	635	670	709	751	793	833
ISER (low)	0.9		605	633	664	699	735	758
ISER (base)	1.6		632	669	724	792	861	934
ISER (high)	2.8		647	733	898	1,005	1,144	1,304

B.1.3 Employment Distribution

The average annual numbers of individuals employed in various nonagricultural wage and salary industries in Alaska between 1990 and 1998 as estimated by ADOL are displayed in Figure B-4. The following remarks pertain to 1990 through 1997, and do not reflect the 1998 estimates shown in the table, which are obtained averages for January through September of that year.

- The general merchandise and apparel industry showed the largest increase (57.6 percent) in number of employees.
- Other industries that showed increases in employment are health services and water transportation, with 40 and 42.9 percent increases, respectively.
- Although transportation, as a whole, experienced an annual average increase of 2 percent, water transportation had an average annual growth rate of 4.8 percent. In 1990 1,400 jobs were held in the water transportation industry statewide. That figure had grown to 2,000 by 1997.
- The pulp mill industry experienced the greatest employment decline, a loss of 77.8 percent. The next largest decrease, 15 percent, occurred in legal services. Overall, employment in Alaska increased by an average of 7.4 percent.

Figure B-4: Average Annual Alaska Employment by Industry, 1990–1998

Industry	Average Employment by Year (Thousands)								
	1990	1991	1992	1993	1994	1995	1996	1997	1998[a]
Goods-producing	**39.2**	**40.3**	**38.7**	**39.0**	**39.6**	**39.7**	**38.4**	**38.0**	**40.1**
Mining	11.5	11.9	10.5	10.3	10.7	10.0	9.9	10.0	10.4
Oil and gas extraction	10.3	10.7	9.2	9.2	9.5	8.9	8.5	8.3	8.8
Construction	10.5	10.4	10.2	11.5	12.3	12.8	12.6	12.7	13.1
Manufacturing	17.2	18.0	18.0	17.1	16.6	16.9	15.9	15.4	16.6
Lumber and wood products	3.9	3.4	2.3	2.3	2.3	2.2	1.9	1.9	1.6
Seafood processing	13.3	14.6	11.2	10.6	10.3	10.4	9.8	9.6	11.1
Pulp mills	9.5	10.6	0.9	0.8	0.1	0.5	0.5	0.2	
Service-producing	**198.9**	**202.5**	**208.4**	**213.9**	**219.8**	**222.3**	**225.2**	**230.3**	**235.3**
Transportation	20.6	21.8	22.6	22.9	23.3	22.9	22.9	24.0	25.3
Trucking and warehousing	2.4	2.6	2.6	2.5	2.6	2.7	2.8	2.8	2.9
Water transportation	1.4	1.5	1.7	1.8	1.9	2.0	1.9	2.0	2.2
Air transportation	6.9	7.3	7.7	7.8	7.9	7.8	7.6	8.3	8.8
Communications	3.3	3.5	3.7	3.7	3.8	3.7	3.8	4.0	4.3
Electric, gas and sanitary utilities	2.4	2.4	2.4	2.5	2.4	2.4	2.3	2.3	2.4
Trade	**46.0**	**46.8**	**47.8**	**49.0**	**52.7**	**54.1**	**54.6**	**55.6**	**56.8**
Wholesale trade	8.1	7.8	8.0	8.0	8.3	8.7	8.7	8.8	8.9
Retail trade	37.9	39.0	39.9	41.0	44.4	45.5	45.9	46.7	47.9
General merchandise and apparel	5.9	6.2	6.7	7.1	8.8	9.1	9.0	9.3	9.3
Food stores	6.6	7.0	7.0	7.0	7.2	7.1	7.0	7.0	7.1
Eating and drinking places	13.2	13.3	13.5	13.9	14.7	15.0	15.3	15.7	16.4
Finance-insurance and real estate	**10.3**	**10.6**	**10.7**	**11.2**	**11.9**	**11.7**	**11.9**	**12.1**	**12.4**
Services and miscellaneous	**50.9**	**51.7**	**54.1**	**56.2**	**58.0**	**60.8**	**62.9**	**65.4**	**67.9**
Hotels and lodging Places	5.5	5.4	5.5	5.6	6.3	6.4	6.4	6.5	7.0
Business services	6.8	6.8	6.8	7.2	7.2	7.5	8.0	8.5	8.8
Health services	10.5	11.1	11.7	12.0	12.7	13.2	13.8	14.7	15.1
Legal services	2.0	2.0	2.0	2.0	1.8	1.7	1.7	1.7	1.7
Social services	5.4	5.5	5.7	5.8	5.9	6.3	6.6	6.9	7.1
Engineering and management services	5.9	6.0	6.4	6.7	6.6	7.3	7.3	7.3	7.6
Federal government	**18.7**	**18.9**	**19.6**	**20.0**	**18.7**	**17.6**	**17.3**	**17.3**	**17.3**
Local government	**30.8**	**31.3**	**32.1**	**33.1**	**33.5**	**33.7**	**34.2**	**34.5**	**34.5**
State government	**21.5**	**21.4**	**21.7**	**21.5**	**21.6**	**21.5**	**21.5**	**21.4**	**21.1**
Total nonagricultural wage-and-salary	**238.1**	**242.8**	**247.2**	**252.9**	**259.3**	**262.0**	**263.6**	**268.3**	**275.4**

Source: ADOL Research and Analysis Section, Industry Employment Estimates—Alaska Statewide, available http://www.labor.state.ak.us/research/emp_ue/ak95prs.htm and ak9094.htm.

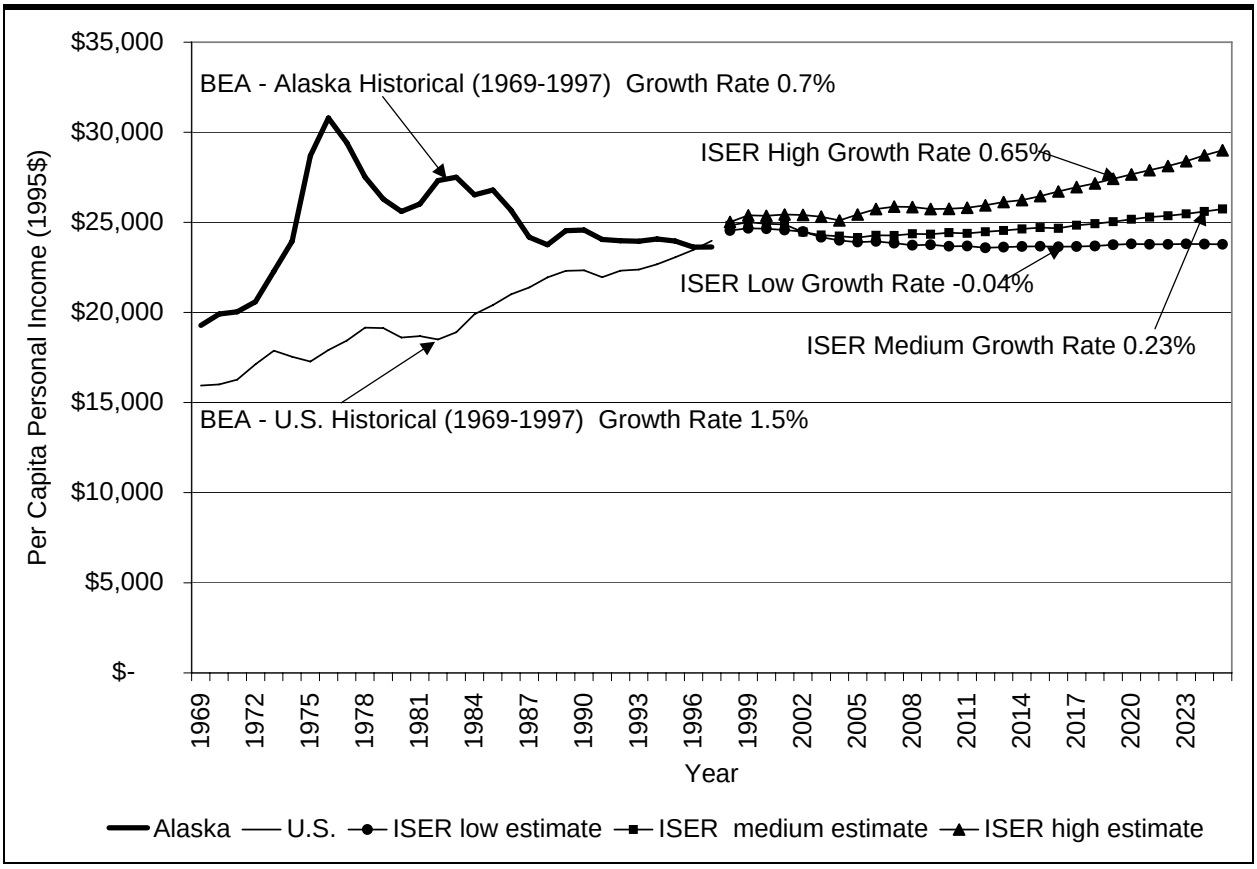
[a]1998 is an obtained average of January through September.

B.1.4 Wage Rates and Income

Figure B-5 displays historic and projected per capita income levels for Alaska from 1969 through 2025, using ISER and BEA data. The BEA data exhibit a more or less steady climb from 1969 through 1996, with an average annual growth rate of 6.6 percent. This trend reflects the higher wages associated with natural resource industries, particularly oil and gas. The per capita income

projections made by ISER in 1996 for low-, medium-, and high-growth scenarios have growth rates of –0.04 percent, 0.23 percent, and 0.65 percent, respectively.

Figure B-5: Alaska Railbelt Per Capita Income, 1969–2025



Source: BEA, Alaska Total Personal Income and Per Capita Personal Income, available http://www.bea.doc.gov/bea/dr1.htm and ISER, Economic Projections: Alaska and the Southern Railbelt, 1996-2025, September 1996.

The transition that is occurring from high-wage, resource-based jobs in a resource-based economy to an economy with a larger share of retail and service jobs in lower-paying industries portends a plateau of statewide per capita income. In undergoing this transition, the Alaska economy is also coming to more closely resemble the national economy.

B.1.5 Education Levels

Educational attainment statistics are available only from U.S. Census data. Figure B-6 displays the average educational attainment levels for Alaska and the U.S. as a whole. In 1990, the percentage of the Alaskan population that did not attend school beyond ninth grade is half the national average. Almost 58 percent of the Alaskan population have attained at least some college education; 45 percent of the national population has attained the same level. Businesses

and industries seek a well-educated citizenry with moderate wage expectations for successful growth—Alaska is well-suited for growing businesses and industries.

Figure B-6: Educational Attainment by Percent of Population Age 25 and Older, 1990

Highest Level of Education Attained	Alaska	U.S.
Less than 9th grade	5.1	10.4
9th-12th grade (no diploma)	8.2	14.4
High school graduation	28.7	30.0
Some college (no degree)	27.6	18.7
Associate degree	7.2	6.2
Bachelor's degree	15.0	13.1
Graduate or professional degree	8.0	7.2

Source: U.S. Bureau of the Census, Decennial Census, Minority Economic Profiles, unpublished data, available http://nces.ed.gov/pubs/d96/D96T011.html

B.2 Alaska's Natural Resource Industries

The following subsections identify Alaska's natural resource industries, the commodities they produce, and historical and potential volumes of these commodities for the foreseeable future. The resources discussed in this section are natural gas, crude oil, coal, minerals and aggregates, forest products, agricultural products, and seafood products. Tourism has also been included as a natural resource industry because Alaska's natural beauty is the attraction tourists seek. Future development of resources will affect economic conditions and outbound cargo movements in the state. The volumes identified were derived from discussions with industry experts or from market studies completed by project sponsors. In most instances, the projects or activities that would produce these volumes have not been subjected to a feasibility study to determine their viability. Therefore, the volumes that actually materialize in the future may be different from those projected in the market studies.

Improved port facilities and rail and road transport systems could lead to different outcomes than those projected in previous studies and improve the viability of certain projects. In the foreseeable future, commodities will continue to move through the state, but there is a great deal of uncertainty about the amount of such movements and when they would occur. The following paragraphs describe each commodity and provide a range for the volumes that may move through Alaska in the future.

B.2.1 Crude Oil and Natural Gas

No crude oil or natural gas moves through the POA currently, and none is expected for the near term. These natural resources are discussed in this market study for several reasons. First, refined petroleum products represent a significant volume of cargo moving across the POA dock. Some of this refined petroleum product is from in-state refiners and some is imported from foreign and

domestic U.S. refiners. The volume of crude oil produced in the state affects local refiners that supply the market.

There is discussion about the amount of natural gas reserves available for consumption to residents of Southcentral Alaska. Projected declines in Cook Inlet natural gas reserves could result in substantial imports of petroleum products or liquefied natural gas (LNG) toward the end of the study period, unless new supplies are found or a new natural gas pipeline is constructed from the North Slope. The North Slope and Cook Inlet are the two main regions within Alaska that produce oil and natural gas. These two products are discussed below.

Crude Oil—Cook Inlet oil production, which peaked at 230,000 barrels per day (bpd) in 1970, declined to 33,000 bpd in 1997 and is estimated to decline to 7,000 bpd by 2003. In 1997 the North Slope produced 1.4 million bpd of oil and natural gas liquid (NGL).[2] This volume is estimated to decline to 435,000 bpd by 2019.[3]

BP Exploration, Inc., is continuing development at the Milne Point unit and Badami and is actively exploring for oil and gas in the Point Thompson area. Prudhoe Bay oil field operators have completed a facility-sharing agreement for an enlarged enhanced oil recovery project. Kuparuk River unit owners have implemented a large-scale enhanced oil recovery project using a miscible injectant, and Endicott and Point McIntyre operators are studying miscible injectants at those fields. Heavy oil development is under way at both the Kuparuk River and Milne Point units. In addition, satellite field development is under way at the Prudhoe Bay and Kuparuk River units.

New oil field development at Alpine, Northstar, and the Prudhoe Bay and Kuparuk satellite fields will result in an increase in oil production, reaching a peak in fiscal year 2003 of 1.175 million bpd. Alaskan oil production is projected to decline over the long term, by roughly 6.7 percent per year.[4]

Currently all North Slope crude oil is shipped out of the Port of Valdez and transferred there through the Trans-Alaska Pipeline. Movement of primary products from the oil fields is expected to continue through Valdez and is not expected to occur through the POA.

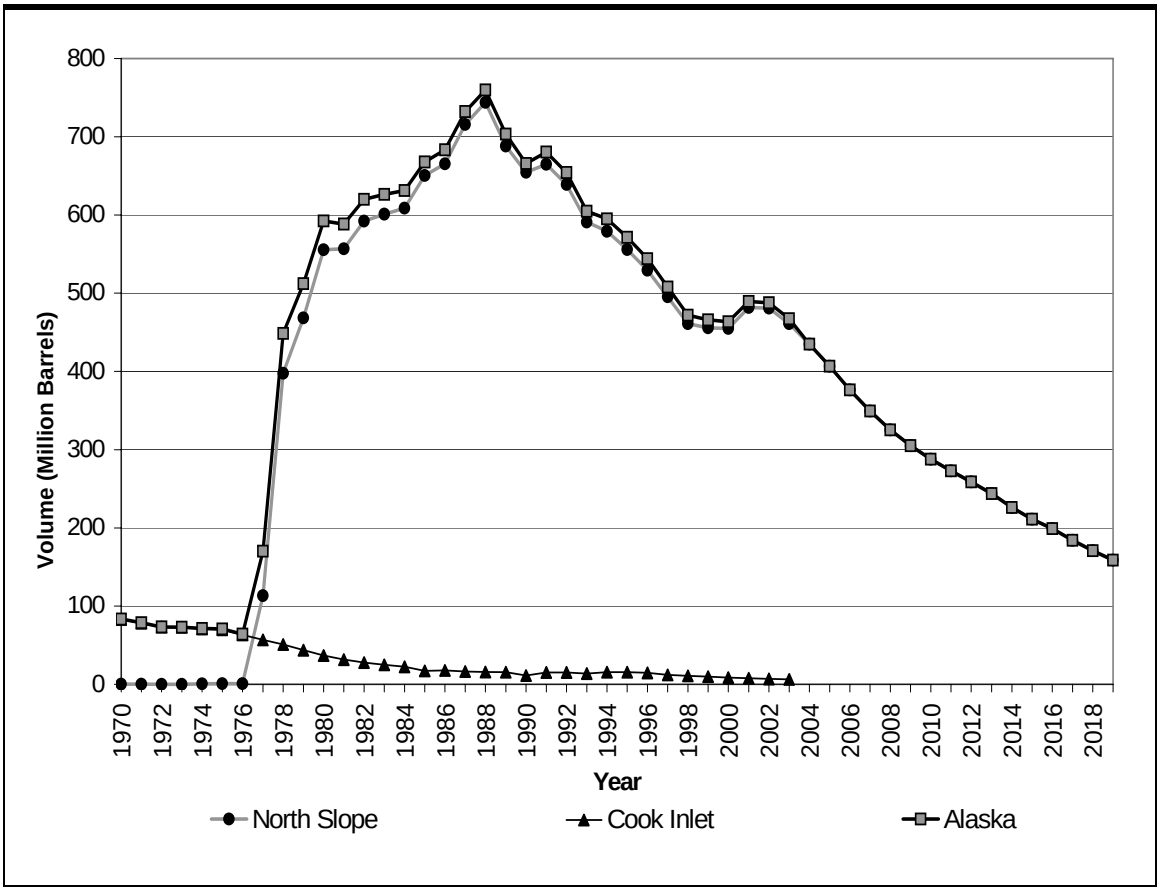
Figure B-7 displays historical and forecasted production levels of crude oil and natural gas in the state from 1970 through 2020, as reported by the Alaska Department of Revenue (ADOR).

[2] NGLs are shipped through the oil pipeline to market.

[3] State of Alaska, *Historical and Projected Oil and Gas Consumption*, April 1998.

[4] ADOR Oil and Gas Audit Division*, Revenue Sources Book Forecast and Historical Data*, Fall 1998.

Figure B-7: Historical and Forecasted Production Levels of Oil and Natural Gas in Alaska, 1970–2020



Source: ADOR Oil and Gas Audit Division, Revenue Sources Book Forecast and Historical Data, Fall 1998.

These estimates are projections of production histories of existing fields and the expected production from to-be-developed fields, and include planned and probable field developments. Exploration is ongoing, and technological developments in the industry may increase the probability that new sites will be found and that additional oil and gas may be extracted from existing sites. The price of oil is of equal importance to future oil exploration; low market prices tend to limit exploration.

Natural Gas—In 1997 Cook Inlet produced 238 billion cubic feet (bcf) of LNG[5] overall, with the Nikiski plant producing 215 bcf, or 90 percent of Cook Inlet LNG. Also in that year, 35 percent of Cook Inlet natural gas production volume was exported to Japan as LNG. Current contracts with Tokyo Electric Power Company, Inc., and Tokyo Gas Company, Ltd., call for annual delivery of 64.4 bcf of gas. That delivery volume requires about 78 bcf as feedstock for liquefaction and boil-off during shipping. Sales may be

[5] LNG is natural gas that has been liquefied by compression. LNG moves through a pipeline separate from the oil pipeline and is shipped to market.

permitted for an additional 6 percent above the contract quantities.[6] The slowdown in the Japanese economy was blamed for the drop in 1997 to 74.5 bcf, and Japanese buyers may have bought at the minimum contracted levels in 1998.[7]

North Slope fields are so isolated that the only economic use for the natural gas recoverable there is fuel for the region's oilfield equipment and operations. In 1997, North Slope fields produced 3.1 trillion cubic feet of gas, 92 percent of which was reinjected into oil reservoirs. There has been discussion about liquefying the gas and sending it south by gas pipeline, but the project is still in a speculative stage.

Cook Inlet fields probably will continue to produce well into the next century, but the ADOR Division of Oil and Gas makes output projections only through 2003 because regional production depends on economic factors that cannot reasonably be estimated beyond then. Possible new sources of gas consumption from Cook Inlet range from the emergence of new industrial plants to projects aimed at transporting LNG to coastal areas. Although such ventures are discussed often each year, few, if any, bear fruition. An exception in this history is the transporting of LNG to Fairbanks. That project is well advanced, and some gas will be consumed for that purpose in 1998. Through the period ADOR has forecasted, the price of this gas at the burner tip is expected to keep the Fairbanks market confined to industrial use, with small increases in response to growth in the industrial sector. Except for the Fairbanks project, no new uses are included in the forecast.

Residential utility gas consumption grew steadily in Southcentral Alaska through the 1980s as gas service became available to areas previously unserved. Although there has been publicity about some projects to extend gas service to Homer and Seward, and even to ship LNG to coastal communities, no extension of gas to additional Southcentral areas is assumed at this time.

Natural gas used for generating electrical power can be separated into two categories: military and public utilities. Total annual military use of natural gas for power generation has not changed appreciably for 20 years. Nonmilitary electric power generation contributes to an intertie that serves an area from the Kenai Peninsula to the south, the MOA, and communities along the Alaska Railroad to the Fairbanks North Star Borough. Natural gas service has extended into communities where many households previously used electricity for space heating. Consumers responded by connecting to the newly available gas service and substituted a gas furnace to replace electric heaters. This trend has abated in recent years, and the trend in power generation is expected to follow the Southern Railbelt population growth trend of 1.5 percent per year.

[6] Philips Alaska Natural Gas Corporation and Marathon Oil Company, *Application To Amend Authorization To Export Liquefied Natural Gas*, 1996.

[7] *Petroleum Intelligence Weekly*, January 1998.

B.2.2 Coal

There are many coal deposit sites in Alaska that have the potential to be developed, given low transportation costs and willing markets. Alaska's estimated coal resources total more than 5 trillion tons.[8] This subsection describes several coal deposits and their current situations.

Healy— Between 700,000 and 800,000 metric tons (MT) of coal from the Usibelli Coal Mine Healy coal deposits are exported to Korean Electric Power Company (KEPCO) every year through a coal loading facility in Seward. Future prospects for Healy coal in the Asian Pacific Rim (APR) will depend on the continued growth of APR economies, the ability of Alaska coal producers to secure contracts in APR countries, and the use of subbituminous plants in the APR. Because most Alaskan coal contracts in APR countries are for between 100,000 and 300,000 MT of coal per year, future contract volumes of 700,000 to 800,000 MT appear unlikely. The comparatively small number of coal plants in Asia designed (or under design) for burning subbituminous coal may further constrain potential sales of Healy coal to the APR.[9]

Wishbone Hill—The Wishbone Hill coal deposit near Palmer contains approximately 15 million tons of high-rank coal. John Sims, marketing director for Usibelli Coal Mine, indicated that this unexploited deposit might yield an initial rate of roughly 200,000 tons per year.[10] Production in subsequent years was estimated at between 500,000 and 800,000 tons annually. Wishbone Hill coal may be used in the development of a new coal product consisting of a mixture of Wishbone Hill coal with lower-Btu Healy coal (800,000 tons from Wishbone and 1 million tons from Healy).

Nerox/Evan Jones (Jonesville) Deposit—Representatives of the Nerox/Jonesville Mine near Palmer could not be reached at the time of writing. Consequently, exact data on the deposit size and expected annual harvest from the deposit were not available. Dick Swainbank, minerals development specialist for the Alaska Department of Commerce and Economic Development (ADCED), Division of Trade and Development, estimated that the mine contains approximately 37 million tons of mineable coal and that the deposit might be harvested at around 1 million tons per year.[11]

Broad Pass—The Broad Pass deposit near Chulitna contains an estimated 100 million tons of low-rank coal.[12] Estimates of mineable reserves were not available at the time of writing.

---

[8] University of North Dakota Energy and Environmental Research Center (EERC), Power Generation from an Alaskan Low-Rank Coal-Water Fuel (Little Tonzona Creek Coal), Available http://www.eerc.und.nodak.edu/9395bien/p160.htm, January 1998.

[9] Ogden Beeman & Associates, Inc., *South Central Alaska Coal Transportation Study*, 1993.

[10] John Sims, Usibelli Coal Mines, Inc., personal communication with Northern Economics, October 1998.

[11] Dick Swainbank, ADCED Division of Trade and Development, personal communication with Northern Economics, November 1997.

[12] Chuck Hawley, personal communication with Northern Economics, November 1997.

Beluga—The Beluga area is bordered by the Beluga River, Nikolai Creek, and Cook Inlet, and is about 75 air miles from Anchorage. The mineable coal reserves of the area are expected to exceed 1 billion tons.[13] When coal is harvested from Beluga/Western Cook Inlet deposits, it is expected to be shipped from port facilities at Tyonek on the western shore of Cook Inlet.

Low-rank coal-water fuel (LRCWF)—Almost all coal deposits of immediate significance are close to year-round ports or to the Alaska Railroad and are low-rank coals (LRCs). Pilot-scale tests at the University of North Dakota Energy and Environmental Research Center (EERC) established that premium coal-water fuels (CWFs) could be made from hot-water-dried subbituminous coal from Alaska's Beluga coalfield. LRCWF is simply coal particles suspended in water.[14] According to *Focus on Alaska Coal 1993*, utility boilers in Japan, Taiwan, and Korea consumed about 200 billion barrels of high-sulfur, heavy oil in 1990.[15]

LRCWF is designed to replace heavy oil in utility and industrial boilers. In APR countries, LRCWF would compete in the heavy oil market rather than the coal markets. The LRCWF project is still in an experimental stage, so it is not possible to predict the volume of potential shipments of the product through the POA. However, if the product is successful in penetrating the APR heavy oil markets, significant shipments of LRCWF out of Southcentral Alaska are possible.

Preliminary estimates indicate a potential for 2.2 million to 2.6 million tons of coal to be shipped out of the Healy and Palmer area mines yearly. If this quantity of coal were mined, a new coal port would likely be developed in Cook Inlet or Whittier to avoid the high rail transportation costs between Portage and Seward. If adequate storage and transportation facilities are developed at the POA, the coal could be shipped from Anchorage. Continued growth in demand for energy in the APR could result in additional coal production in the future. The success of the LWCRF project could significantly increase the volume of coal-based products shipped out of Alaska.

B.2.3 Minerals and Aggregates

Most U.S. bulk natural resources—for example coal, gravel, and sand—are priced competitively relative to alternate foreign supply sources.[16]

Potential bulk limestone shipments through the POA were assessed on the basis of discussions with Jim Caswell of Caswell Lime near Cantwell and Chuck Hawley, a consulting geologist. Mr. Hawley estimated that there is several hundred million tons of limestone in Southcentral and

[13] Cook Inlet Region, Inc., and Placer Amex, Inc., *Coal to Methanol Feasibility Study, Beluga Methanol Project*, September 1981.

[14] EERC, January 1998.

[15] University of Alaska Fairbanks, Mineral Industry Research Laboratory, *Focus on Alaska Coal 1993*, 1993.

[16] Mike Code, Hawaiian Cement, personal communication with Northern Economics, November 1997.

Interior Alaska.[17] Although limestone has multiple uses, neither Mr. Caswell nor Mr. Hawley was able to identify any outstanding export markets for these limestone deposits. Both identified a potential demand for limestone within the state for use in gold mining operations. Mr. Hawley indicated that Tyonek is closer than Anchorage to Southcentral and Interior limestone deposits and therefore might be a better port for shipping limestone.

The potential volume of Southcentral and Interior metal concentrates that might be shipped through Cook Inlet ports and terminals was assessed by Chuck Hawley. According to Mr. Hawley, the maximum annual shipment of copper concentrates from the Caribou Dome copper deposit near the Denali Highway would be around 140,000 tons per year. Copper concentrates probably would be exported to a foreign smelter for processing—for example, in Bangladesh or Korea. No other significant sources of Southcentral and Interior metal concentrates were identified.

Summit Paving barged 300,000 short tons (ST) of gravel in 1995 from Point Mackenzie to the Anchorage area. This type of material has not moved through the POA in the past. The company expects to ship 500,000 ST annually by the year 2000, with increases of 10 to15 percent per year after that.

Other minerals shipped from Alaska are zinc and lead-zinc. Red Dog Mine, near Kotzebue, is the world's largest zinc mine, and all of its shipping is handled nearby by the DeLong Mountains Transportation System. Lead-zinc mines, specifically the Faro mine near Ross River, operate in the Yukon Territory and truck ore to the deepwater port at Skagway. However, because of low base metal prices, the Faro mine is no longer operating.

B.2.4 Forest Products

According to POA statistics, the volume of logs and lumber shipped out of Anchorage during the last decade was very small. For instance, since 1986, the highest reported volume of logs and lumber shipped out of the POA was 6,727 tons in 1988. In 1994 and 1995, no shipments of logs and lumber out of the POA were reported.[18]

The Anchorage Customs District, which encompasses the state of Alaska, reported total 1996 log exports at 187,162,000 board feet, or roughly 628,000 ST. According to Mark Harlan of Anchorage-based Harlan Resources, nearly all Southcentral Alaska forest product shipments currently take place from either the Port of Homer or the Port of Seward.[19] Mr. Harlan reported that roughly 200,000 tons of wood chips had been shipped out of Homer each year for the last few years. Most of the chips were taken from white spruce stands harvested on a combination of private, Native, and state land south of Kasilof in the southern Kenai Peninsula. Approximately 80 percent of the harvest is taken from beetle-kill areas. The chips are transported to Homer by truck.

[17] Chuck Hawley, November 1997.

[18] POA, personal communication with Northern Economics, November 1997.

[19] Mark Harlan, Harlan Resources, personal communication with Northern Economics, November 25, 1997.

Mr. Harlan estimated that each year about 10 million board feet of logs and lumber from southern Kenai Peninsula sources are shipped out of Homer and 5 million board feet from Railbelt area sources are shipped out of Seward. He indicated that additional shipments of forestry products out of Homer might occur when a new sawmill is completed near Ninilchik.

Mr. Harlan said timber shipments out of the POA currently are limited by a lack of adequate facilities for storing and transporting bulk forestry products. However, he suggested that bulk timber shipments out of the POA are possible if adequate port facilities are developed. For instance, he said the Japanese market alone could absorb up to 1 million tons of white spruce chips per year from Interior sources, and Korea and Taiwan are also significant potential markets for the products.

The POA, if properly equipped for storing and loading the chips, would be a natural shipping port for interior forestry products. Mr. Harlan also indicated that between 400,000 and 500,000 tons of other birch products could be marketed through the POA. The source areas of these products would include the Matanuska-Susitna Valley and the Interior. The startup time for either project was estimated at 18 to 24 months (assuming development of adequate storage and transport facilities at the POA).

Despite the tremendous potential market for Alaskan wood products in the APR, the success of Southcentral and Interior timber operations is partially constrained by several factors. The Southcentral and Interior forestry industry is far less developed than its sister industry in Southeast Alaska.

Capital investments in enhanced port facilities and sawmills would improve export possibilities to the APR. Additionally, the varying quality of Southcentral and Interior timber resources will require the development of diversified export markets for both high-grade and low-grade products.

The forest products industry is very volatile. Southcentral and Interior Alaska are high-cost producers. In a typical commodity cycle, such regions are typically the last to expand and the first to close down in response to market demand. As a result, it is difficult to finance port facilities in Southcentral Alaska for forest product exports. Potential timber shipments out of the POA currently are limited by facilities that are not very suitable for storing and transporting bulk forestry products.

B.2.5 Agricultural Products

According to the Alaska Department of Natural Resources, Division of Agriculture, in recent years, 97 percent of the agricultural goods produced in the state has been consumed within the state, and the other 3 percent has been sent to the Lower 48 and on to Russia and China.[20] Most products, such as potatoes and dried jerky, are not time-sensitive, and are exported in containers

[20] Doug Warner, Development Specialist, Alaska Department of Natural Resources, Division of Agriculture, personal communication with Northern Economics, November 23, 1998.

on barges from Anchorage. However, neither state nor federal agencies record the tonnage of agricultural goods or make projections about them.

B.2.6 Seafood Products

Alaska Seafood International (ASI) will open a 303,000-square-foot secondary fish processing plant in Anchorage in June 1999. Plans are for the plant to reach full capacity within 2 years (by 2001). Several million pounds of frozen fish blocks[21] and flatfish,[22] as well as some surimi[23] from Alaskan processors, will mostly likely come into Anchorage by barge. ASI representatives expect to ship about 125 million pounds of fish product annually when the plant is at full capacity. This estimate includes 100 million pounds (50,000 ST) of finished product to be shipped by marine transportation (most likely in containers) and 25 million pounds (12,500 ST) of fresh, value-added product to be shipped by air.

Current movement of seafood products is within containers and trailers. Some seafood products are moved south on the ALCAN Highway.

B.2.7 Tourism

Tourism is a growing industry throughout Alaska. The number of cruise ship passengers increased 16 percent from 1996 to 1997.[24] However, growth in the Alaska cruise markets has slowed because of a lack of available berths in Southeast Alaska. In response, a number of ports are upgrading their facilities to meet this need. Availability of alternative cruise ship ports-of-call would have favorable impact on expansion of the tourism market in Southcentral Alaska by providing access to different areas of the state.[25]

Cruise ships crossing the Gulf of Alaska are a small but potentially large market for the POA. Seward and Anchorage currently serve as "turnaround" ports[26] for the cruise ships in Southcentral Alaska. In 1998, Seward accounted for 110 vessel calls and the POA had 12.

A limiting factor for cruise ship traffic into the POA is that travel between Vancouver, B.C., and Anchorage currently takes 10 days. Less than 5 percent of cross-gulf passengers are interested in trips more than 7 days in length, so the ability of Anchorage to capture a large share of the cross-gulf cruise ship market is limited.[27]

In 1998 there were 10 cruise ship visits to POA that brought 13,259 visitors. Only two cruise

---

[21] Pollock and Pacific cod filets, skinless and boneless, frozen into 40- to 50-pound blocks

[22] Headed and gutted, frozen in boxes weighing less than the frozen fish blocks

[23] Frozen fish protein paste

[24] Alaska Visitors Association, *News.* Vol.34, No. 6, June/July 1998.

[25] Peratrovich, Nottingham & Drage, Inc. (PN&D), *Seward Port Feasibility Study*, May 1998.

[26] Turnaround ports are used to embark and disembark passengers, and provision and supply the ship at the end of a voyage.

[27] Cruise Lines International, *The Cruise Industry, An Overview*, January 1988.

ship visits are expected in 1999.[28] It is reasonable to expect that a niche tourism industry may develop that would offer ecotourism or expedition cruise packages to Prince William Sound, Kodiak, or the Aleutian Islands. The ecotourism cruises may be on small vessels (with 50- to 100-passenger capacity) and offer 7- to 10-day trips from Anchorage.

[28] Denis Mayberry, Alaska Maritime Agencies, personal communication with Northern Economics, October 1998.

C. ALASKA'S MARINE TRANSPORTATION SYSTEM

The following sections contain data collected from Alaska Maritime Agencies, Alaska Marine Highway System (AMHS), and the U.S. Department of Commerce to describe the POA's role in Alaska's marine transportation system. There are 95 ports and harbors in 60 different locations—with more than 10,700 saltwater mooring slips—spread along Alaska's more than 33,000 miles of coastline, according to the Alaska Department of Transportation and Public Facilities (ADOT&PF). An estimated 80 percent of the state's total population lives in Central and Southcentral Alaska. The vast majority of waterborne consumer goods received by these residents come through the POA, with the remainder primarily coming through other facilities in Anchorage and the Port of Whittier.[29] Alaska's marine transportation system also involves many vessels originating in West Coast ports and ports in the APR.

C.1 General Description

Marine transportation in Alaska is provided by tankers, freighters, barges, cruise ships, and ferries. The following is a summary of the type of vessels calling at Alaskan ports.

- Liquid bulk carriers (tankers) move cargo such as oil, LNG, and ammonia in and out of several Alaskan ports. ARCO Marine is planning to have a new generation of double-hull crude oil tankers calling at the Port of Valdez, with the first ship put into service early in the year 2000. The new tankers are being constructed to transport crude oil from Alaska to the ARCO refinery near Bellingham, Washington. Referred to as "millennium-class," the new ships will meet or exceed state, federal, and international safety requirements.[30] Specialized ships transport LNG from Nikiski to Japan, and ammonia also moves from Nikiski to domestic and foreign ports in ships or barges with special tanks.
- Container ships are responsible for the movement of containers (both roll-on/roll-off (RO/RO) and lift-on/lift-off (LO/LO). The number of containers that move through the POA has increased a result of shippers placing a greater portion of total cargo in containers and of increases in population in the state. Almost all general cargo and consumer goods demanded by the state's growing population are now transported in containers.
- Several Alaskan and Washington-based tug and barge lines serve communities along the Alaskan coastline.
- Refrigerated vessels ship fish products from fish processors along the Alaskan coastline to other areas of the state, to the Lower 48, and to foreign countries.
- Bulk carriers move coal, logs, wood chips, and urea.[31]
- As mentioned in section B.2.7, 34 cruise ships from 17 different cruise lines called on Alaskan ports in 1996.

[29] Alaska Business Publishing Company, Ports Alaska 1998/1999, A Guide to the 49th State's Ports and Maritime Services, 1998.

[30] Arco Products Company, Public Affairs, Arco to Build Third Millennium Class Crude Oil Tanker for its West Coast Routes, press release, September 1998.

[31] Alaska Maritime Agencies, personal communication with Northern Economics, January 1999.

- The AMHS is a fleet of nine state-owned ferries that provide scheduled ferry service throughout Southeast and Southwest Alaska, and south to Prince Rupert and Bellingham, Washington. The system connects communities with each other, with regional centers, and with the continental road system. AMHS service is divided into two major systems: southeast (from Bellingham north to Skagway) and southwest (from Cordova west to Unalaska).

C.2 Foreign Pacific Rim Links

In 1997, Alaska generated nearly $970 million in foreign exports, a decrease from the high of more than $1 billion in 1992. The decreased value of exports for those years is associated primarily with a general global decline in commodity prices. Between 1995 and 1997, Alaska exported to 114 countries. Its principal trading partner was Canada, which registered a 56.1 percent increase in imports from Alaska during those years. In 1997 Canada accounted for $305 million, or 31 percent of the total, Alaskan exports. Figure C-1 shows the top 10 importers of Alaskan products for 1997. These top 10 countries account for approximately 95 percent of total Alaskan exports in that year.

Figure C-1: Top 10 Importers of Alaskan Products, 1997

Rank	Importing Country	Value of Alaskan Imports (U.S. Dollars)
1	Canada	305,418,644
2	Japan	259,163,458
3	Republic of Korea	97,357,841
4	Belgium	92,397,755
5	United Kingdom	55,430,386
6	Netherlands	44,932,105
7	Germany	30,745,321
8	Taiwan	18,376,578
9	China	11,576,788
10	Russia	7,849,007

Source: U.S. Department of Commerce, *Freight Transportation in Alaska*, 1996.

After Canada, Alaska's strongest foreign export links are with countries of the APR, which account for 58 percent of total exports. By comparison, APR countries take in 30 percent of exports for the U.S. as a whole.[32]

During the past several decades the Alaska economy has developed close ties with the economies of certain Asian countries. Japan and Korea account for most of Alaska's Asian exports, 55 percent and 26 percent respectively. Exports to Asia represent 2 percent of the Alaska's gross state product. The three Alaskan industries most dependent on exports to Asia are crude petroleum and natural gas, metallic ores and concentrates, and paper products.

[32] U.S. Department of Commerce, Bureau of Transportation Statistics, *Freight Transportation in Alaska*, 1996.

The financial crisis currently afflicting Asian economies is having an impact on Alaska. For instance, Alaska exports in the first quarter of 1998 were down 7 percent from the first quarter of 1997. In addition, renewals of key contracts for coal movement to Korea through the Suneel Alaska, Inc., terminal in Seward are in question. The U.S. departments of Commerce and Treasury recently released an analysis of the impact of the Asian economy on individual U.S. states. For Alaska, the report concluded "…the financial crisis in Asia is likely to have a real impact on the lives of Alaska's residents and businesses." [33]

Most economists see the Asian financial crisis as a cyclical occurrence that will be corrected in the long term. In fact, a recent forecast by Keiser & Associates for the Anchorage International Airport (AIA) projected a buoyant 8 percent annual growth rate for North American-Asian air freight through the AIA through the year 2001.[34] Airfreight has a high component of consumer goods exports from Asia to the North American mainland, which will undoubtedly increase with lower Asian costs. Asian consumption of Alaskan products, on the other hand, will likely continue to decrease until the Asian economies regain their momentum.

The POA is not served by direct liner service to any Asian ports, so the Asian financial crisis will affect cargo flows only to the extent that it may slow the Alaskan economy and reduce consumer spending for merchandise cargo received from the U.S. However, this impact on cargo flows, if it does occur, should not be a factor in long-term growth.

Alaska's strong and continuing relationships with key APR trading countries—Korea, Japan, and Russia in particular—should offer opportunities to increase trade, which could include direct service from selected ports. A Federal Aviation Administration (FAA) ruling made in late 1996 changed a regulation that prohibited foreign carriers from using Anchorage as a cargo transfer point. Removal of this regulatory obstacle to commerce has resulted in Anchorage emerging as a favored location for distribution services because the AIA is the closest North American airport to Asia and much of Europe.

Opportunities to further develop APR links should be enhanced with the completion of the Alaska Seafood Center by ASI in a $120-million joint venture with Taiwanese investors.

C.3 Southcentral Alaskan Ports

The following subsections briefly describe Southcentral Alaska ports that are important to POA operations.

C.3.1 Port of Anchorage

The POA was created as a public enterprise in 1961, when it opened with a 600-foot berth and terminal on the waterfront of Anchorage. As the leading general cargo port of the state, its growth has followed the growth of the MOA and the state as a whole. Anchorage is served

[33] U.S. Department of Commerce, Bureau of Transportation Statistics, 1996.

[34] Keiser & Associates, *Anchorage International Airport, Preliminary Air Cargo Forecast,* 1998.

regularly by two major containerized cargo carriers that bring four to five ships weekly from the Pacific Northwest. Petroleum tankers supply jet fuel for airport operations, barges on-load petroleum products for western Alaska and ships from Japan and Korea call frequently, transporting pipe, drilling mud, construction materials and automobiles. The limited commodities passing through Whittier and Seward complement those passing through the POA rather than representing competition. The POA is a landlord port, providing administration and facility maintenance to lessees and operators at the port terminal.

The present POA facilities include the following:

- One main cargo dock, which consists of a 2,535-foot pier that includes a bulk petroleum terminal and 3 general cargo terminals. The general cargo terminals are used for container, RO/RO, bulk cement and break-bulk operations.
- One T-dock bulk petroleum terminal south of and adjacent to the main cargo dock.
- Two bulk petroleum terminals, each with four 8-inch discharge/loading hoses with delivery rate capabilities of 2,000 barrels per hour per hose.
- A petroleum valve yard facility, which provides pipeline interconnectivity among 6 petroleum users, 2 bulk petroleum terminals, and other facilities.
- One main dock petroleum terminal, which contains a bulk cement discharge pipeline.
- Three rail-mounted container cranes, 2 with 30-long-ton and 1 with 40-long-ton capacity. (Portable general cargo cranes up to 100 tons and 30-ton forklifts are available upon request.)
- A cargo staging area that totals 52 acres within the 130-acre POA complex.
- A 27,000-square foot transit shed.
- 400 acres of developable tidelands.

The POA is open year-round, and is dredged annually to a water depth of –35 feet mean lower low water (MLLW).

The POA also provides real estate management of the 129 acre Port Industrial Park, in which parcels totaling approximately 81 acres are leased to private tenants. Approximately 14 acres of property adjacent to the Industrial Park and leased from the federal government were developed to provide additional staging and Industrial Park area.

Additional information regarding cargo movements through the POA is provided at http://www.ci.anchorage.ak.us/Services/Departments/Port/ and in Section C.5.

C.3.2 Port of Seward

The Port of Seward is the southern terminus of the Alaska Railroad and a major port of call for cruise ships. Cruise ships are the largest users during summer, with an average of five vessels per

week.[35] AMHS also calls at the Port of Seward and provided service to 5,144 passengers and 2,207 vehicles in 1994.[36]

Barges, fishing vessels, and small vessels also call at the Port of Seward. The port supports modest bulk fuel storage and transfer, exports of Healy coal to Korea, and fish product transfer. The Port of Seward handled 877,000 ST of cargo during 1996, which is a 26 percent decline since 1991, when 1,181,000 ST moved through the port.[37]

The Port of Seward facility includes one deep-draft dock, three medium-draft docks, four shallow-draft docks, and a small boat harbor with the following characteristics.

- The Alaska Railroad Corporation (ARRC) dock provides 1,250 feet of berthing space with alongside depths to –35 MLLW. The dock is used by cruise ships and bulk carriers and is being expanded to accommodate AMHS ferries.
- The Seward Coal dock has water depths to –58 feet MLLW in its mooring basin. The dry-bulk loader, used primarily for coal, has a capacity of 1,000 tons per hour.
- The municipal pier, city pier, and Seward Fisheries wharf provide a combined berthing space of 1,000 feet and alongside water depths of –13 to –15 feet MLLW. Fishing vessels and Seward Fisheries are the primary users.
- The University of Alaska Institute of Marine Science (IMS) dock provides 150 feet of berthing space and alongside depths to –40 feet MLLW. The IMS dock has fuel, electricity, and a 5-ton gasoline mobile crane, with a 16-foot boom available for all research vessels using the wharf.
- The Seward Marine Services dock has a 250-foot face and alongside depths to –14 feet MLLW. The dock is used primarily for receipt of herring.

ARRC owns 299 acres in the Seward marine terminals area and uses 235 of those acres for tracks, storage, buildings, railroad dock, and unloading and loading areas. Of the remaining 64 acres, 47 are under lease. The major lessee is the Suneel Alaska coal unloading and storage facility. The remaining 17 acres are available for lease and development.

Two docks used for general cargo are within the Seward Marine Industrial Center at Fourth of July Creek. One provides 350 feet of berthing space and alongside water depths to –25 feet MLLW. The second has 450 feet of berthing space and water depths to –25 feet MLLW.

C.3.3 Port of Whittier

The Port of Whittier in Prince William Sound (60 miles by rail from Anchorage) is one of 3 ice-free ports in Southcentral Alaska served by the Alaska Railroad. There is regularly scheduled

[35] PN&D, 1997.

[36] Marine Facilities Engineering, Shore Facilities Design and Construction, *1994 Shore Facilities Condition Survey Report*, prepared for ADOT&PF, 1994.

[37] COE, *Waterborne Commerce of the United States Part 4 – Waterways and Harbors Pacific Coast, Alaska and Hawaii*, 1996.

AMHS service in summer, and during the 1994 season, 19,337 passengers and 4,598 vehicles embarked and disembarked at Whittier.[38] In the past, cruise ships called at Whittier in summer, but they have not done so for several years. The planned opening of a tunnel for vehicle access to Whittier is anticipated to result in cruise ships returning. Principal cargoes through the Port of Whittier are fish and general freight by way of two commercial barge carriers.

The Port of Whittier facility includes two medium-draft docks, two shallow-draft docks, a railroad car barge facility, and a small boat harbor, with the following characteristics:

- The U.S. Army's DeLong Pier has a 425-foot face and alongside depths to –40 feet MLLW.
- The 1,000-foot-long ARRC wharf has alongside depths to –30 feet MLLW. The dock has limited load capacity because of deterioration.
- The Whittier Ferry Terminal, owned and operated by the State of Alaska, provides 200 feet of berthing space and alongside depths to –18 feet MLLW.
- The City of Whittier dock provides 82 feet of berthing space and alongside depths to -20 feet MLLW. This dock is used for handling supplies and equipment and as a runway for a 30-ton, diesel hydraulic mobile boatlift.

Deep-draft capabilities are possible at the head of Passage Canal, to the west of the town. ARRC owns 236 acres and uses 136 of those acres for tracks, storage, buildings, the Marginal Wharf, a barge ramp, and unloading and loading areas. Of the remaining 100 acres, 57 acres are under lease. The major lessee is the State of Alaska, for the small boat harbor and ferry terminal. The City of Whittier has negotiated an agreement with AARC to lease and develop land not directly required for rail operations. The only remaining large waterfront property available for lease is at the head of the bay near the U.S. Army tank farm.

C.3.4 Port of Valdez and Valdez Marine Terminal

The Port of Valdez in Prince William Sound serves cruise ships and AMHS. During 1994, AMHS had 29,843 passengers and 6,402 vehicles embark and disembark in Valdez.[39] Principal cargoes through this port are petroleum products, passengers, and general freight.

The Port of Valdez general cargo and container wharf provides 1,200 feet of total berthing space and alongside depths of –50 feet MLLW. The port's container terminal provides 21 acres of lighted direct open storage, 1,000 acres of remote open storage, nine 522,000-barrel grain silos, two 125-ton crawler cranes, and three 30-ton forklifts, as well as 10-ton and 3-ton forklifts.

The Valdez Marine Terminal, operated by Alyeska Pipeline Services Company, is across Valdez Arm from the Port of Valdez. The Valdez Marine Terminal is at the southern terminus for the Trans-Alaska oil pipeline, where supertankers operate in the deep, ice-free waters of Valdez and can transport more than 1.5 million barrels of crude oil a day. The total tonnage moved through the Port of Valdez and the Valdez Marine Terminal in 1996 was about 77 million ST, a

[38] Marine Facilities Engineering, 1994.

[39] Marine Facilities Engineering, 1994.

23 percent decline in total tonnage from the 99 million ST handled in 1991.[40] The vast majority of this tonnage is shipped from the Valdez Marine Terminal.

The Valdez Marine Terminal provides four deep-draft berths. Three 5,750-horsepower tugs and two mooring launches are available for docking and undocking, and one 9,000-horsepower tug can be used for towing.

C.3.5 Port of Cordova

The Port of Cordova on the southeastern edge of Prince William Sound principally handles cargoes of salmon and general freight. AMHS makes scheduled stops at the municipal dock, Cordova's main commercial port, and provided service for 13,195 passengers and 4,206 vehicles in 1994.[41] The port is the supply and distribution point for numerous outlying fishing localities, with a small boat harbor that can handle 864 vessels up to 75 feet in length. The Port of Cordova handled 16,000 ST of cargo in 1996. Totem Ocean Trailer Express, Inc. (TOTE), has a business arrangement with the owner of the barge *Skilak,* which offers service between Whittier and Cordova. The barge can accommodate up to six 53-ft containers. The service operates typically twice per week, although it has operated 5 days per week during peak periods.[42]

C.3.6 Port of Homer

The Port of Homer, an ice-free port 225 road miles south of Anchorage, is on the north side of Kachemak Bay at the southern end of the Kenai Peninsula. The principal cargoes handled are fish, logs, and wood chips. AMHS and smaller coastal ferries provide service to the nearby fishing villages of Halibut Cove and Seldovia. AMHS provided service to 12,347 passengers and 4,528 vehicles in 1994.[43] The port's small boat harbor contains more than 750 stalls in a 60-acre area.

C.3.7 Port of Point MacKenzie

Knik Dock Co. operates a private dock near Point MacKenzie, which is across the Cook Inlet from POA, and offers a heavy-lift barge slip and tug service. Summit Paving currently moves gravel from Point MacKenzie to the POA area by barge. The Matanuska-Susitna Borough has plans for port development at an adjacent location. Plans for the proposed Port MacKenzie include an access road, port fill and dock (to –20 MLLW), upland development with electricity, and eventually a deep-draft dock and railroad spur access. The two main likely future uses for the port are export of forest products and passenger service between Anchorage and Point MacKenzie.

[40] COE, 1996.

[41] Marine Facilities Engineering, 1994.

[42] Josh Lucca, TOTE, personal communication with Northern Economics, February 11, 1999.

[43] Marine Facilities Engineering. 1994.

C.3.8 Other Southcentral Marine Terminals

Two Cook Inlet communities are sites of some of the largest marine facilities in Southcentral Alaska, but are privately managed and owned. These facilities are at Tyonek and Nikiski.

The Tyonek marine facilities are on the North Foreland, 1.5 miles north of Tyonek Village. The Beluga Coal Company considers the 1,466-foot-long, T-head, bulk-loading facility its preferred site for a coal facility. The 174-foot dock face, with alongside depths to –34 feet MLLW, has only shallow-draft capabilities because of shoaling. A trestle extension (roughly 700-foot) to the dock would give it deep-draft capabilities.

Tyonek is being considered as a potential terminal for a proposed, new natural gas pipeline.

Nikiski is an unincorporated Kenai Peninsula community on the eastern shore of Cook Inlet. The community is very dispersed, but the marine facilities in the area are 12 to 15 miles north of the City of Kenai. The Nikiski marine facilities are some of the largest industrial docks in the state and include wharves for Unocal Chemicals and Minerals Division, Phillips Petroleum Company, Kenai Pipeline Company, and Crowley Marine Services.

The Unocal facility has approximately 1,135 feet of berthing space with 40-foot water depth and is used for shipping and receiving anhydrous ammonia and dry-bulk urea. The Phillips dock is used for shipping LNG from the Kenai LNG plant. The facility has 1,050 feet of berthing space with 40-foot water depth.[44]

The Kenai Pipeline wharf is used primarily by Tesoro Petroleum Company for receipt of crude oil and shipment of petroleum products. The wharf has 1,310 feet of berthing space with 42 feet of water depth. The Crowley Marine Services facility, also known as the rig tender dock, is primarily used by vessels servicing the offshore oil and gas platforms in Cook Inlet. The dock has 600 feet of berthing space with water depths of 32 feet.

C.4 Pacific Northwest Ports

U.S. West Coast ports are of particular importance to Anchorage as transshipment links to the Lower 48. For example, the Port of Tacoma in Washington is the principal reciprocal port to Anchorage because it serves as the southern terminus for both TOTE and Sea-Land Services Inc. The following subsections describe the Port of Seattle, Port of Tacoma, Port of Portland, Port of Oakland and the Port of Vancouver, B.C., in Canada.

The Port of Vancouver is included in this section because of its importance to the tourism industry in Alaska. Commodity categories defined by the U.S. Army Corps of Engineers (COE) and presented in Section C.4 figures include petroleum and petroleum products, chemicals and

[44] COE, *The Ports of Southwest and Western Alaska,* 1994.

related products, crude materials (inedible except fuels), primary manufactured goods, food and farm products, and all manufactured equipment (machinery and products).[45]

C.4.1 Port of Tacoma

In 1996 the total weight of commodities shipped through Tacoma's port facilities was 21,491,000 ST. Figure C-2 shows the amount of each commodity, including petroleum and petroleum products, chemicals and related products, crude materials (inedible except fuels), primary manufactured goods, food and farm products, and all manufactured equipment (machinery and products).[46] The Port of Tacoma handles more than 13 million ST of this volume.[47]

The port has more than 2,400 acres of land available, and its FTZ covers 919 acres of the total area. Within this acreage, there are 25 berths at shipping terminals. The Port of Tacoma has 6 container terminals that provide berths for 9 container ships. These vessels are serviced by 14 container cranes. The Port of Tacoma is the sixth-largest container port in North America and among the top 25 container ports in the world.[48]

Figure C-2: Cargo Shipped Through Tacoma Harbor, 1996

	Volume Shipped (Thousands of Short Tons)		
Commodity	**Foreign**	**Domestic**	**Total**
Coal	27	-	27
Petroleum and petroleum products	657	3,538	4,195
Chemicals and related products	380	247	627
Crude materials (inedible except fuels)	5,126	1,735	6,861
Primary manufactured goods	792	95	887
Food and farm products	5,663	1,071	6,734
All manufactured equipment (machinery and products)	1,559	547	2,106
Unknown or not elsewhere classified	31	22	53
Total	**14,236**	**7,255**	**21,491**

Source: COE, *Waterborne Commerce of the United States Part 4 – Waterways and Harbors Pacific Coast, Alaska and Hawaii*, 1996.

The Port of Tacoma also has 16 berths used for general cargo and bulk/break-bulk shipping. Associated facilities include grain storage for more than 3 million bushels, 3 million cubic feet of cold storage, and a cool room with a capacity of 50,000 boxes. The port is served by two railroads and has two dockside intermodal yards.[49]

[45] COE, 1996.

[46] COE, 1996.

[47] Port of Tacoma, *Port of Tacoma's Economic Impact*, 1998.

[48] Port of Tacoma electronic web page, available http://www.portoftacoma.com/tacoma/port/facilities/summary/html. 1999.

[49] Port of Tacoma, 1999.

The Port of Tacoma considers itself the "Gateway to Alaska," handling more than 70 percent of all waterborne cargo moving from the Lower 48 to Alaska.[50]

C.4.2 Port of Seattle

The Port of Seattle in Washington is a natural deepwater harbor with 20 commercial marine terminals, including 6 container terminals. The terminals encompass nearly 400 acres, with 22 container cranes serving 16 berths, an on-dock intermodal rail facility, and a 150-acre break-bulk/neo-bulk complex with nearly 202,000 square feet of on-dock cold storage. (Neo-bulk is shipload lots of a single commodity, such as logs or steel.)

The Port of Seattle also owns and operates Fishermen's Terminal, a major homeport for North Pacific fishing fleets, and Shilshole Bay Marina. The marina offers first-class, full-service moorage for 1,500 pleasure craft.

This port serves as a warehousing and distribution center, with more than 1.5 million square feet of warehouse storage space for handling both cleared and bonded cargo and hundreds of acres for outdoor storage and handling areas.

The port's Foreign Trade Zone (FTZ) encompasses much of the port's marine and aviation operations. The rail yard that serves the terminal can handle 185 rail cars with switching by remote control. The port provides berthage at 5 terminals for barge operations, including rail barge.

The port serves passenger vessels as well as cargo ships. Pier 48, the former southern terminus of the AMHS for 25 years, has been upgraded for cruise operations, with capacity for vessels 700 feet or longer. Clipper Navigation operates the *Victoria Clipper* service out of Piers 48 and 69, offering car and passenger ferry services to various Puget Sound destinations and Victoria, B.C.[51]

In 1996 the total weight of commodities shipped through Seattle Harbor was 23,547,000 ST. Figure C-3 shows the amount of each commodity shipped through the harbor.

[50] Port of Tacoma, 1998.

[51] Port of Seattle electronic web page, available http://www.portseattle.org.

Figure C-3: Cargo Shipped Through Seattle Harbor, 1996

Commodity	Volume Shipped (Thousands of Short Tons) Foreign	Domestic	Total
Coal	6	-	6
Petroleum and petroleum products	98	2,569	2,667
Chemicals and related products	696	73	769
Crude materials (inedible except fuels)	4,218	2,146	6,364
Primary manufactured goods	2,508	498	3,006
Food and farm products	6,947	408	7,355
All manufactured equipment (machinery and products)	2,498	833	3,331
Unknown or not elsewhere classified	47	3	50
Total	**17,017**	**6,530**	**23,547**

Source: COE, *Waterborne Commerce of the United States Part 4 – Waterways and Harbors Pacific Coast, Alaska and Hawaii*, 1996.

C.4.3 Port of Portland

The Port of Portland in Northwestern Oregon has five marine terminals, four airports, seven business parks and the Portland Ship Yard. The port's maritime operation exports more wheat than any other port in the U.S. It is the second-largest grain-exporting center in the world. Among U.S. ports, Portland is ninth in total tonnage handled, the fifteenth-largest container port, and fifth-highest in auto volume handled.[52]

The leading exports (by weight) from the Port of Portland are wheat, soda ash, barley, and potash, which are sent to Japan, Korea, Taiwan, and Pakistan as the leading export trade partners. The leading imports (also by weight) are alumina, limestone, cement, and salt, which come in from Japan, Korea, China, and Australia as the leading importers.

In 1996 the total weight of commodities shipped through the Port of Portland was 29,734,000 ST. Figure C-4 shows the amount of each commodity, including petroleum and petroleum products, chemicals and related products, crude materials (inedible except fuels), primary manufactured goods, food and farm products, and all manufactured equipment (machinery and products).[53]

[52] Port of Portland electronic web page, available http://www.portofportlandor.com/ABOUTPOR.HTM.

[53] COE, 1996.

Figure C-4: Cargo Shipped Through the Port of Portland, 1996

	Volume Shipped (Thousands of Short Tons)		
Commodity	**Foreign**	**Domestic**	**Total**
Coal	1	0	1
Petroleum and petroleum products	438	6,228	6,666
Chemicals and related products	2,570	328	2,898
Crude materials (inedible except fuels)	2,522	2,445	4,967
Primary manufactured goods	1,366	630	1,996
Food and farm products	9,060	3,424	12,484
All manufactured equipment (machinery and products)	582	124	706
Unknown or not elsewhere classified	11	6	17
Total	**16,548**	**13,186**	**29,734**

Source: COE, *Waterborne Commerce of the United States Part 4 – Waterways and Harbors Pacific Coast, Alaska and Hawaii,* 1996.

C.4.4 Port of Oakland

The Port of Oakland in California is a historical transportation and distribution hub. Located on the mainland shore of San Francisco Bay, and one of the great natural harbors of the world, Oakland was among the first ports globally to specialize in the intermodal container operations whose advantages have revolutionized international trade. The Port of Oakland occupies 19 miles of waterfront on the eastern shore of San Francisco Bay, with 665 acres devoted to maritime uses. The seaport ranks among the top 5 in the nation and twentieth in the world in terms of annual container traffic.

Oakland's 29 deepwater berths and 31 container cranes, 12 of which are post-Panamax[54] in size, are backed by a network of local roads and interstate freeways, warehouses, and intermodal rail yards. In calendar year 1995, Port of Oakland marine facilities handled the equivalent of 1,549,887 twenty-foot containers, a 4 percent increase over the1994 container volume.

About 66 percent of Oakland's trade is with Asia. Europe accounts for 10 percent; Australia, New Zealand, and South Pacific Islands about 3 percent; and other foreign areas about 7 percent. About 17 percent of Oakland's trade is domestic (Hawaii and Guam) and military cargo.[55] In 1996 the total weight of commodities shipped through Oakland Harbor was 19,878,000 ST. Figure C-5 shows the amount of each commodity, including petroleum and petroleum products, chemicals and related products, crude materials (inedible except fuels), primary manufactured goods, food and farm products, and all manufactured equipment (machinery and products).[56]

[54] The term “post-Panamax” denotes ships constructed after the Panama Canal was built and too large to navigate the canal.

[55] Port of Oakland electronic web page, available http://www.portofoakland.com/facts.html.

[56] COE, 1996.

Figure C-5: Cargo Shipped Through the Port of Oakland, 1996

	Volume Shipped (Thousands of Short Tons)		
Commodity	**Foreign**	**Domestic**	**Total**
Coal	55	-	110
Petroleum and petroleum products	44	662	750
Chemicals and related products	776	71	1,623
Crude materials (inedible except fuels)	1,568	441	3,577
Primary manufactured goods	921	89	1,931
Food and farm products	3,601	784	7,986
All manufactured equipment (machinery and products)	1,654	510	3,818
Unknown or not elsewhere classified	31	24	86
Total	**8,649**	**2,580**	**19,878**

Source: COE, *Waterborne Commerce of the United States Part 4 – Waterways and Harbors Pacific Coast, Alaska and Hawaii*, 1996.

C.4.5 Port of Vancouver, B.C.

The Port of Vancouver in British Columbia is Canada's largest port, and the top North American port for foreign export tonnage. The Port of Vancouver handles more than 70 million metric tonnes of cargo annually and facilitates trade with more than 100 nations.

As the most diversified port on the west coast of North America, the port encompasses container, bulk, and general cargo terminals. It is also the homeport for the Vancouver-Alaska cruise—one of the world's most popular cruises. In 1997, there were 407,834 revenue passengers who disembarked in Vancouver and 408,703 who embarked. The total number of individuals moving through the Port of Vancouver on 298 voyages was approximately 650,000 in 1997.[57] Figure C-6 displays the amount of inbound and outbound cargo through the Port of Vancouver in 1997.

[57] Port of Vancouver electronic web page, available http://www.portvancouver.com/frames/worldwide/a3.html.

Figure C-6: Cargo Shipped Through the Port of Vancouver, B.C., 1997

Commodity	Volume Shipped (Thousands of Short Tons)			
	Domestic Inbound	Foreign Inbound	Domestic Outbound	Foreign Outbound
Animal feed				1,075
Chemicals (miscellaneous)	295			1,968
Coal				28,477
Food products		381		966
Fuel oil	275	375		
Gasoline	517		276	
Grain				12,323
Lumber				1,993
Metal ores/concentrates		495		783
Petroleum distillates	281			
Phosphate rock		1,069		
Potash				4,281
Salt		328		
Sand and gravel			1,350	
Sulfur				5,510
Wood pulp/chips	59		271	2,657
Others	313	2,238	534	4,440
Total	**1,740**	**4,886**	**2,436**	**64,473**

Source: Port of Vancouver electronic web page, available http://www.portvancouver.com/frames/worldwide/a3.html

C.5 Current Role of the Port of Anchorage

Located on the eastside of Knik Arm in upper Cook Inlet, the POA is owned and operated by the MOA. Although it is municipally owned, the POA has become Alaska's regional port—linking rail, road, and air cargo from Dutch Harbor to Prudhoe Bay. Accordingly, it serves 80 percent of Alaska's populated areas, excluding Southeast Alaska, and is the gateway for about 90 percent of all merchandise cargo consumed in the Southcentral and Interior Alaska. The economies of scale realized at the POA, the technologies the Port employs, and the companies that operate at its docks provide cost-effective services and reduced transportation costs for many Alaska residents. Lower transportation costs improve the quality of life for residents and make other economic development projects possible.

The port is a multi-use facility that accommodates a full range of maritime commodities including container, trailer, break-bulk, dry bulk, and liquid bulk cargoes. The port is modern and well equipped to meet the demands of its customers. The POA also administers the granteeship of FTZ No. 160. At the Port there are paved, fenced, and lighted areas for use in storing and manipulating goods outside the customs territory of the U.S.

The POA is a municipal agency, with a seven-person Anchorage Port Commission. The Commission has general oversight over operations, tariffs, and terminal rules and regulations. The Mayor of Anchorage receives recommendations from the Port Commission and Municipal Manager for appointing the Port Director and maintains line authority and responsibility over the Port. The Port is managed by a six-member professional team composed of the Port Director, the Assistant Port Director/Port Engineer, the Manager of Finance and Administration, the Manager of Operations/Maintenance, the Manager of Governmental and Environmental Affairs, and the Manager of Business Development. The Port also employs 3 administrative, 10 operations-and-maintenance, and 2 Port supervisory workers.

The mission statement of the Port is as follows:

> "Provide a modern, safe and efficient Regional Port that stimulates economic development and the movement of goods into and out of Southcentral Alaska. Expand and maintain existing property, facilities and equipment to meet growth in established marine trade, to encourage natural resource exports, and to create employment opportunities by attracting new industry and new cargo movement. Support and assist increases in cargo movement that will aid and stimulate domestic and international business activities throughout the Railbelt and other areas of the state serviced by the Port."

The current role of the POA is to serve as Alaska's primary marine transportation link to the outside world for the receipt of merchandise, building materials, and consumables. It serves a secondary role as an export facility for selected Alaska commodities such as forest products and refined petroleum. In the future the POA may develop an expanded role through its FTZ for promoting the region as an international distribution center. It may also assume a greater role in statewide economic development.

Since the POA's inception in the 1960s, its role has evolved from limited, city-based responsibility into a larger, statewide focus. Inevitably, there are some management challenges associated with maintaining compatibility (or congruence) between the Port's statewide responsibilities and its policy direction, which rests in the hands of the Mayor of Anchorage. Very few ports in the U.S. operate as municipal departments with advisory commissions.

D. PORT OF ANCHORAGE CARGO FLOWS AND VOLUMES

In 1998, the POA was primarily a bulk and container/trailer port. The utilization of the port by commodity type by tonnage is displayed in Figure D-1. Petroleum makes up the majority of the Port's business, and freight not otherwise specified (NOS), classified as neo-bulk/break-bulk, makes up very little of the POA's total tonnage.

Figure D-1: Port of Anchorage Utilization by Commodity, 1998

Commodity	Percent of Total Tonnage
Liquid bulk (petroleum)	51.7
Vans, flats and containers	45.4
Dry bulk (cement)	2.8
Neo-bulk/break-bulk (freight NOS)	0.1

Source: Data provided by POA, October 1998.

The following subsections describe the commodity movements in terms of inbound foreign and domestic and outbound foreign and domestic.

D.1 Inbound Cargo

The POA is principally a receiving port, with the tonnage of inbound cargo typically more than twice as large as outbound cargo. In 1998 inbound receipts exceeded outbound shipments by 1,498,408 ST. In 1998 the Port had 1,733,958 ST of inbound domestic cargo (from other points in Alaska or the Lower 48) and 724,617 ST of inbound foreign cargo. Inbound cargo flows for 1998 are shown in Figure D-2.

Between 1994 and 1998, inbound domestic cargoes at the POA decreased by about 115,000 ST, or about 6 percent from the 1.8 million ST experienced in 1994. Inbound foreign cargoes increased from about 150,000 ST to 490,000 ST during the same period, for a total increase of about 220 percent.

During the past 5 years (1994-1998), cargo volume for domestic flats, vans, and trailers grew from about 1.3 million ST to 1.4 million ST. Total tonnage has increased from 2.0 million ST in 1994 to more than 2.2 million ST in 1998. Inbound petroleum bulk tonnage has shifted from a situation in 1994 in which domestic shipments accounted for the vast majority of tonnage, to the 1998 situation, in which foreign shipments account for the majority of tonnage.

Figure D-2: Port of Anchorage Inbound Cargo, 1998

Type of Cargo	Volume Shipped (Thousands of Short Tons)		
	Inbound Domestic	Inbound Foreign	Total Inbound
Vans, flats, and containers [a]			
Short tons	1,413	0	**1,413**
Twenty-foot equivalent units (TEUs)	201	0	**201**
Break-bulk/neo-bulk (freight NOS)			
Short tons	0	0	**0**
Automobiles/vehicles [b]			
Units	22,000	0	
Liquid bulk (petroleum)			
Short tons	288	426	**714**
Barrels [c]	1,895	2,803	
Dry bulk (cement)			
Short tons	33	63	**96**
Total			
Short tons	**1,734**	**489**	**2,223**

Source: Data provided by the POA, January 1999.
[a] Includes all vehicles in containers and RO/RO as reported by Sea-Land and TOTE.
[b] Auto tonnage and TEUs are accounted for in the "Vans, flats, and containers" total tonnage
[c] 6.58 barrels per ST

D.2 Outbound Cargo

In 1998, outbound cargo totaled 724,617 ST, of which 78 percent was bulk petroleum. This volume represents a decrease of 92,620 ST or 11.3 percent from 1997 total outbound cargo. Figure D-3 shows outbound cargo flows for the POA in 1998.

In the 5 years from 1994 to 1998, outbound domestic vans/flats and containers (including trailers) have increased from 130,943 ST to 154,760 ST, for an annual rate of growth of 3.4 percent. During that same period there has been very sporadic movement of outbound foreign vans, flats, and containers (VFC), and freight NOS.

Figure D-3: Port of Anchorage Outbound Cargo, 1998

Type of Cargo	Volume Shipped (Thousands of Short Tons) Outbound Domestic	Outbound Foreign	Total
Vans, flats, and containers [a]			
Short tons	159	0	**159**
TEUs	158	0	**158**
Break-bulk/neo-bulk (freight NOS)			
Short tons	0	0	**0**
Automobiles/vehicles [b]			
Units	15,000	0	
Liquid bulk (petroleum)			
Short tons	566	0	**566**
Barrels [c]	3,724	0	**3,724**
Dry bulk (cement)			
Short tons	0	0	**0**
Total			
Short tons	**725**	**0**	**725**

Source: Data provided by the POA, January 1999.
[a] Includes all vehicles in containers and RO/RO as reported by Sea-Land and TOTE, and 4,038 ST of petroleum, NOS.
[b] Auto tonnage and TEUs are accounted for in the "Vans, flats, and containers" total tonnage.
[c] 6.58 barrels per ST

D.3 Handling Methods

The POA maintains a lighted Port Industrial Park of approximately 110 acres. This area includes a 27,000-square-foot heated storage area and cargo staging area to serve nonscheduled port users. The POA has developed into the most active and flexible general cargo port in Alaska.

Three cargo terminals are dredged annually to –35 MLLW. The POA's liquid bulk terminals can handle more than 3 million tons of bulk liquid per year. The terminals are connected to all major petroleum storage areas in Anchorage, including military bases and the AIA. For loading and unloading refined petroleum products, a hose tower consisting of four 8-inch petroleum hoses supported by tide-compensating reels exists at each POA petroleum, oil, and lubricants (POL) terminal. Each hose can pump 84,000 gallons per hour.

Petroleum, primarily refined product, is in liquid form and is pumped on and off vessels. Cement is an inbound commodity and is unloaded and transferred with pneumatic handling equipment. Containers move through the Port in both inbound and outbound directions, with full containers predominantly moving inbound. Containers are loaded and unloaded from cellular container ships with shoreside container cranes. Trailers and chassis-mounted containers are towed to and from RO/RO vessels by using yard tractors. Freight NOS can be in the form of break-bulk, neo-bulk, and vehicles (when vehicles are not in containers). Freight NOS is transferred with shoreside container cranes or ship's gear.

E. IDENTIFICATION OF NEW OPPORTUNITIES

This section discusses evolving conditions that may represent opportunities in Alaska's maritime transportation industry, with specific attention to implications for POA planning. The statistics that appear in this section and in Section F represent information already cited in previous sections, information from the additional sources listed in Subsection E.1 below, and information gathered from confidential interviews with industry sources.

E.1 Previous Studies

A number of studies have been completed during the past two decades that examine the POA and the maritime transportation industry that serves Southcentral Alaska. New opportunities for the POA have been cited in previous planning reports. Those reports include the documents listed and discussed below.

- *Strategic Marketing Plan for Port of Anchorage Element 1 Report.* Booz-Allen & Hamilton. 1981.
- *The Potential for Sea-Air Movements Through Anchorage.* Manalytics, Inc. 1990.
- *Fire Island Market Assessment.* Manalytics, Inc. 1991.
- *Port of Anchorage North Tidelands Market and Facilities Analysis.* Manalytics, Inc. 1992.
- *Southcentral Port Development Project.* Peratrovich, Nottingham & Drage, Inc. 1992.
- *Port Area Transportation Analysis.* Reid Middleton, Inc. 1993.
- *Southcentral Alaska Coal Transportation Study.* Ogden Beeman & Associates, Inc. 1993.
- *Port of Anchorage North Tidelands Coal Terminal Study.* Dahl et al. 1997.
- *AIA Air Cargo Update (Draft).* Keiser & Associates. 1998.
- *Deep Draft Navigation Reconnaissance Report, Cook Inlet, Alaska.* COE. 1993.
- *Fire Island Deep Water Port Facility Constructability Analysis, Market Potential, and Economic Feasibility Analysis.* CH2M-HILL. 1991.
- *Port of Anchorage – Traffic Flow Study.* Vickerman·Zachary·Miller (in association with HDR).

The Booz-Allen & Hamilton marketing plan report of 1981 recommended an industrial development initiative focused on the aluminum and petrochemical industries. The petrochemical industry was the subject of several major feasibility analyses in the mid-1980s but was not viable at the time. To the consultants' knowledge, the aluminum industry has not been the subject of study with regard to Alaska since the Booz-Allen & Hamilton report. The aluminum industry was considered an industry with potential to locate in Alaska because of its requirement for relatively inexpensive energy and the abundant supply of relatively inexpensive natural gas in Cook Inlet. Several studies have been undertaken to examine the feasibility of using this natural gas to make iron carbide briquettes. Neither of the plans for iron carbide plants has proven feasible to date.

In the 1981 marketing plan report, expanded coal export through the port was considered but not recommended because "its minor contribution in employment and economic benefit to the community is outweighed by the demand it places upon the port area in terms of land, service and ports usage. By pursuing coal exports, the port of Anchorage greatly limits its ability to attract the other higher value industries and their accompanying benefits."

The report also examined the concept of using the POA as a transshipment point for cargoes moving from Asia to the U.S. West Coast. This concept assumes that bulk carriers transporting coal or other bulk cargoes from Alaska will backhaul cargoes to Anchorage, using marginal cost pricing. These backhaul cargoes would then be transshipped at the POA as backhaul cargo aboard liner vessels to the Lower 48. The lower marginal cost pricing that is assumed for both backhaul legs could provide compelling rates for shippers. The report concluded that high cargo-handling costs would preclude the transshipment of break-bulk commodities, but that there was potential to transship containers.

Manalytics, Inc., prepared several studies in the 1990s that evaluated potential markets for the POA. These studies included an assessment of the potential for sea-air movements through Anchorage, a market forecast for a proposed port site at Fire Island, and a market assessment for bulk cargoes through the North Tidelands. Major volumes of coal and timber exports were deemed essential to make sea-air movements and North Tidelands development feasible. The feasibility analysis prepared by CH2M-HILL for the proposed Fire Island port site found that the anticipated freight volumes were not sufficient to support amortization of the estimated capital costs.

The Reid Middleton 1993 report focused on landside access and estimated potential freight volumes for the POA. The report suggested potential growth in timber, coal, and petroleum cargoes for the POA.

The 1992 *Southcentral Port Development Project* report prepared by Peratrovich, Nottingham & Drage (PN&D) included results of a market analysis for all potential maritime cargo movements in Southcentral Alaska. No specific market estimates were made for the POA or other ports. The study indicated that POA could become a bulk export port if capital costs for a rail extension could be reduced and additional land area were available.

At about the same time, Ogden Beeman & Associates prepared an analysis that evaluated the optimum location for coal exports from Southcentral Alaska. The study only investigated potential export volumes up to 1.5 million tons. At this level, the capital costs of a new terminal at POA or Port MacKenzie outweighed the higher rail shipping costs to Seward. Larger coal export volumes were not specifically analyzed, but the report does state that larger volumes would alter these results.

In 1993, the COE prepared a feasibility report on dredging the Fire Island shoal in Cook Inlet for deep-draft ships. The report did not include coal or timber exports in its forecast because the COE believed that the potential for these exports was too speculative.

Several engineers in Anchorage prepared an analysis of the proposed North Tidelands dock in 1997 as part of a class project for a University of Alaska Anchorage class titled "Design of Ports and Harbors." The report investigated limestone, sand and gravel, copper, forest products, and coal. According to the report, coal is the "primary export and driving economic force behind the North Tidelands Terminal proposal."

The AIA commissioned an air cargo forecast for Anchorage in 1998. The forecast does not include any traditional sea-air movements (for example, by ship from Asia to Anchorage and by air from Anchorage to Europe), nor does it include any estimates for warehousing and distribution activities from Anchorage. The forecast does include in-state mail and cargo movements, including by-pass mail. A significant portion of in-state by-pass mail originates from large discount stores in Anchorage that receive their goods by marine transport.

The POA initiated a study for a proposed access route that would enter the port area from the north. The study identified a number of potential exports (for example, coal, timber, and mineral concentrates) and the volume that might move through the POA. No attempt was made to determine whether these export opportunities were feasible.

E.1.1 Forecasts from Previous Reports

The previous studies cited have projected cargoes at varying rates of growth. For example, the 1981 Booz-Allen & Hamilton report projected four scenarios: baseline (medium), diverted baseline (low), modified project (medium/high), and full project (high). The baseline forecast was based on population growth in Anchorage and Southcentral Alaska. The diverted baseline (low) forecast assumed that cargo is diverted from Anchorage to other ocean terminals. The full project (high) forecast assumed new capital projects such as the gas pipeline by 1985. The modified project assumed only selected projects. The low projection used a 3 percent annual growth rate for the 15-year period between 1985 and 2000 for containers. The high scenario used a 4.7 percent grow rate for containers. Neo-bulk was projected at 1.9 percent per year under the low scenario and 3.3 percent for the high projections. Dry bulk was projected at 1.3 percent for low and 2 percent for high. The overall general cargo rate (containerized/neo-bulk) was 2.9 percent for the low forecast and 4.5 for the high growth rate. Petroleum products were predicted to decline in all scenarios.

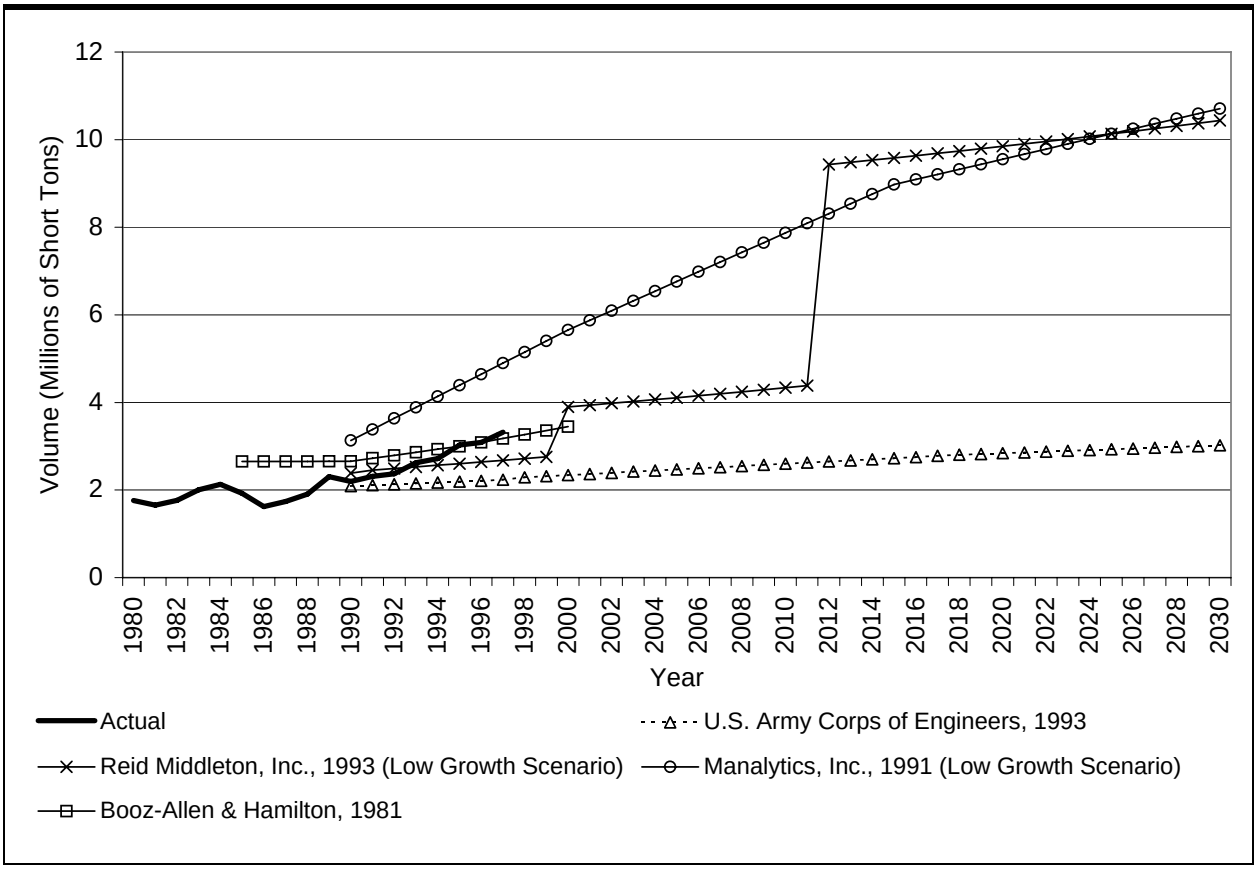
The Booz-Allen & Hamilton baseline forecast overestimated the general cargo flows (container/break-bulk and neo-bulk.) Instead of the predicted 1,811,900 ST for 1995, actual general cargo registered 1,504,164 tons. Instead of 2.9 percent growth from 1980 to 1995, the actual growth rate was 1.8 percent. Cement was predicted to be 98,300 ST by 1995 in the baseline forecast, but the actual recorded volume was 89,593 ST. Petroleum was forecasted to be only 1,089,400 ST, and the actual recorded volume was 1,433,726 ST.

The 1993 Reid Middleton report used a growth rate of 1.5 percent for the low projection for petroleum and general cargo and 3.0 for the high projection. Significant increases were anticipated in the future, initially with timber, and later with coal exports. The 1993 COE

estimate included general cargo and petroleum products and was based on a growth rate of less than 1 percent for total personal income in the Anchorage metropolitan area.

Figure E-1 presents the forecasts from several selected studies for total cargo volumes through the POA. Actual cargo volumes for the period 1980 through 1997 are also shown.

Figure E-1: Comparison of Actual and Forecasted Port of Anchorage Total Cargo Volumes, 1980 – 2030



In reviewing this figure, it is readily apparent that there are significant differences in previous forecasts of future cargo volumes. In all forecasts there are certain factors that influence the future outlook, and assumptions must be made about their influence. The following sections provide a discussion of some of the more important factors that will influence future cargo volumes through the POA. These factors are discussed in terms of new market opportunities and expansion of existing markets.

E.2 New Market Opportunities

E.2.1 Transshipment

Transshipment of containers at the POA, as envisioned in the Booz-Allen & Hamilton study, continues to have potential. As the study pointed out, the lower costs associated with pairing two

backhaul legs offsets the longer transit times associated with transshipment and the resulting higher inventory-holding costs. Although just-in-time transportation still dominates the thinking of most shippers and consignees in the U.S., low interest rates and the resulting lower inventory carrying costs have made longer transit times more acceptable. One scenario for transshipping containers is to use bulk ships configured to carry containers on deck, or on deck and in the hold (conbulkers), on the backhaul leg for the Asia-to-Anchorage trip, and use existing container carriers for the Anchorage-to-Tacoma trip.

Cast, the Montreal-based ocean carrier now owned by Canadian Pacific, provides an example of how a container liner service can evolve out of a shuttle bulk trade. The company started with a bulk grain service between the lower St. Lawrence River and Europe. It then added containers as deckload cargoes. Eventually the container business became dominant and the company sold the bulk ships and became a full-fledged container liner operator. There are other examples in which deckloaded containers have moved successfully for decades aboard bulk carriers shuttling between the same origins and destinations.

Transshipment business using bulk carriers through Anchorage will not occur unless a third party develops the market and interests bulk carriers in responding to the demand. Bulk carrier owners usually know virtually nothing about the container business and are not organized to market liner service or to own and keep track of an inventory of containers. They are willing to lease out deck space and shift their vessels for loading, but little else. Accordingly, for this opportunity to be realized, a third-party operator or logistics company must take the initiative, generate the business, and maintain container control.

The transshipment opportunity offers several potential benefits. First, if the volumes of transshipped cargo are large enough, the potential exists for attracting a third domestic carrier to serve Anchorage. Second, even with assumed backhaul rates between Anchorage and Tacoma, transshipment of additional cargoes will enable existing carriers to increase revenues above the levels that are possible with the existing trade. These additional revenues could result in additional profits for the carriers or in lower tariffs for cargo carried on the Tacoma-to-Anchorage trip segment. Tariffs on the Tacoma-to-Anchorage segment are currently very high because of the imbalance in cargo volumes between the two ports. There is very little freight moving from Anchorage to Tacoma, so the Tacoma-to-Anchorage cargo must cover almost all of the fixed and variable costs for the carriers.

If regularly scheduled container service can be established, there is potential for providing intermodal land-bridge service to the midwestern and eastern areas of the U.S. and Canada. Trucks currently carry produce, some household goods, and higher-value products from the Lower 48 states to Alaska. There are limited backhaul opportunities for trucks at present. Because of the potential for balance of inbound to outbound movements, trucking costs to and from the Midwest can be very competitive with marine transportation, and delivery time is much faster. For example, a vessel traveling at 16 nautical miles per hour from Asia to Anchorage arrives 58 hours earlier than a vessel traveling to Seattle. Assuming 10 hours to offload a container and deliver to the linehaul carrier, a truck traveling an average of 50 miles per hour

will arrive in Edmonton, Alberta (Canada), or Shelby, Montana, before an analogous vessel arrives in Seattle. Both Edmonton and Shelby are major intermodal (truck/rail) centers, and the container could continue by truck to its final destination or be placed on a rail car to its ultimate destination. Using either city, a container moving from Anchorage can reach a Midwest destination several days before a similar shipment would arrive from Seattle or other Puget Sound ports. Improvements in the highway system connecting Anchorage and the Lower 48 have reduced driving time, and these improvements are expected to continue reducing travel time and making the trucking industry more competitive in the future.

A substantial amount of coal or other exports would have to move through the Cook Inlet area to make conbulker transshipment a possibility. Weekly conbulker service would be a necessity for developing any substantial amount of transshipment cargo. This service could be met by exporting about 3.1 million tons of coal annually from Cook Inlet in ships with capacities of 60,000 dead weight tons (DWT).[58] This combination of volume and vessels would result in 52 ships per year calling at Anchorage. Exports of 3.1 million tons would be about 4 times current export levels and would likely require that several planned mines be brought online.

In addition to conbulkers, direct foreign container ship service could be used to further develop the transshipment option.

E.2.2 Distribution

Distribution to international markets has received considerable attention recently as an opportunity for Anchorage that is developing in coincidence with the AIA's emerging role as a hub for distribution between Europe, the U.S., and countries in the Pacific Rim. As a distribution hub, Anchorage could provide the capabilities for high-value merchandise and industrial parts and components to be held in inventory for overnight delivery. The AIA and other organizations are energetically promoting Anchorage as an international distribution center. Maintaining inventories in Anchorage distribution facilities may require ocean carrier delivery from the Lower 48 and Asia. Existing ocean carriers would be the primary recipients of benefit from movements originating in the western U.S. If products distributed from Anchorage were originally manufactured in the Midwest, trucking companies could benefit by moving freight from the Midwest to Anchorage. Conbulkers moving from Asia to an Anchorage distribution center could provide very cost-effective service for certain types of commodities.

E.2.3 International Liner Service

Direct liner service to Asia is a prospect that should remain a long-term goal of the POA. Development of international containership service would increase employment and enhance the viability of certain Alaskan exports. The cargo flows that will emerge when new international distribution facilities are created and the planned new seafood processing plant becomes operational will begin to generate the type of international cargo flows that can justify direct

[58] "DWT" represents the weight in tonnes of all material aboard a ship, exclusive of the ship itself.

liner service through Anchorage. Value-added forest products, such as containerized log homes, are another cargo that continues to be popular in Asia and supports this potential.

With the growing popularity of the highway routes to Alaska, the Port could offer an expanded service to the Midwest and East Coast from a direct foreign ship call. Trucks could shuttle to Edmonton in about 40 hours, or to Shelby in about 48 hours, for transshipment to eastbound rail container services.

E.2.4 Additional Domestic Liner Service

The potential exists, although the probability is low, for a new liner service between Anchorage and the Lower 48 to augment the service now offered by Sea-Land and TOTE. Some interviewees suggested that another operator would bring additional competition, potentially causing freight rates to go down. Matson Navigation has considered implementing additional service. The company opted against entry after concluding that the market was already served well by low-cost operators and that its own opportunity to make a profit would be limited (even though the company already had a ship in lay-up that could have served the trade). The following items present information that illustrates the low probability for an additional carrier to enter this market:

- Anchorage trade ships are small when compared with high-volume trade-route liner ships. As a result, high fixed costs must be spread over a relatively small number of containers. For instance, TOTE ships carry 820 twenty-foot equivalent units (TEUs) and Sea-Land ships carry approximately 1,500 TEUs—as compared with a standard transpacific ship, which may carry up to 5,000 TEUs. Large and small liners have virtually the same numbers of crewmembers, but crew costs are significantly higher for ships in U.S. coastal trades than for foreign ships because U.S. ships must employ U.S. citizens.
- The shipping market in Anchorage is inelastic: if ocean carrier rates were to decrease, the number of shipments would not rise proportionately. Anchorage trade is dominated by consumer merchandise, which fluctuates with population growth. If another carrier were added to the route before a situation evolved that increased cargo volume (for example, foreign liner service or conbulker service), it is possible that rates would increase because all carriers would have to share the same volume of cargo, with an increase in overall fixed costs.
- The Jones Act, which restricts the Anchorage-Lower 48 trade to U.S. flag ships, causes crew costs, capital costs, and operating costs to be higher than comparable service in a foreign trade.
- The Anchorage trade for liner vessels is essentially one-way, so an entire voyage must be paid for from revenues earned on the northbound leg.
- There is competition in the trade from barge carriers using Ship Creek, rail barges using Whittier, and motor carriers using the ALCAN Highway. U.S. Customs border crossing statistics indicate that 6,493 trucks crossed the U.S. border into Alaska's gateway in 1997 (Note: these figures are understated because of closed facilities and uncounted crossings). Other sources cite 160 loads per week (8,320 loads per year). Assuming two TEUs per load,

a total volume of one-way TEUs between 10,000 and 20,000 may be entering Southcentral and Interior Alaska annually. Motor carrier costs are reported to be approximately $1,000 higher per trailer than ocean tariffs. However, these shipments are delivered by truck in less than 50 hours from Tacoma to Anchorage (contrasted with 65 hours by TOTE) without terminal delay or drayage costs. This group of competing carriers could capture additional market share if the ocean carrier rates rose substantially.

E.3 Expanding Market Opportunities

E.3.1 Cruise Industry

Although the number of passengers served by the cruise industry in North America is growing (at an annual rate of 7.6 percent since 1980), the market potential for Anchorage continues to be constrained. The number of cruise ships calling in Anchorage annually has ranged from zero to 12 during the past decade. Anchorage, as a port of call, does not fit into the 7-day itineraries of most existing (or planned) vessels serving the Pacific Northwest-Alaska coast.

A 10-day voyage is necessary to serve Anchorage from Vancouver, B.C., or Puget Sound ports, and that segment of the market is losing share. The 1998 Cruise Lines International Association publication, *The Cruise Industry*, stated "Reflecting North America's shorter vacation patterns, the cruise industry's hottest growth category has been the 2-5 day cruise category." Approximately 10 percent of the market is represented in the 9- to 17-day cruise segment. Interviews with cruise ship operators indicated that a 10-day Alaska cruise is appealing to less than 5 percent of the passengers. In addition, interviews with cruise carriers indicated that although Anchorage is a appealing port, the companies are uneasy about bringing their new and larger vessels into the Port because of tidal variations and currents in Knik Arm, draft at the dock, and the small turning basin.

Some concepts have been advanced for using Prince Rupert, B.C., as the southern terminus for cruise itineraries that include Anchorage as the northern terminus. Prince Rupert is about 470 miles north of Vancouver, B.C., the southern terminus for most cruise ships, and this closer proximity to Anchorage may enable 7-day cruises with adjustments in the ship's itinerary. Discussions with major cruise line representatives indicated that the existing airport's 6,000-foot runway is considered inadequate for the larger aircraft that the cruise lines believe are necessary to provide sufficient number of seats for their passengers. The present runway can accommodate Boeing 727-type aircraft. Other factors identified as impeding use of Prince Rupert as a southern terminus are the additional costs to transport passengers beyond Vancouver, and the additional time required for passenger travel to and from their homes. Cruise companies using smaller ships may not find the runway and plane equipment to be a constraint and might consider Anchorage as a northern terminus. However, because most cruise passengers desire to begin and end their trip on a weekend, Anchorage would have to guarantee weekend berths to these ships before the cruise companies would seriously consider using Prince Rupert as a northern terminus. POA and Port of Prince Rupert might wish to further investigate the possibility of developing a cruise market between Anchorage and Prince Rupert.

There may be a market for smaller U.S. flagged vessels to use Anchorage as a homeport because of its excellent airport connections. Anchorage could become the center for seasonal, expedition-like Arctic cruises, much in the way Ushuaia, Argentina, serves the portion of the cruise ship industry that markets Antarctic tours.

E.3.2 Import and Export of Natural Resources

The balance of import and export of commodities in Alaska is driven by overseas markets and competitors, the statewide business climate, and the existence of cost-effective transportation facilities (rail, road, and port facilities) to get the export commodities to market. The following items briefly describe shipping-related outlooks for commodities that are expected to be most significant through the POA market study period.

Bulk cement—This commodity is offloaded at the POA and moved by pipeline to a local distributor. Cement traffic is expected to expand at rates comparable to population growth rates. Of the break-bulk/neo-bulk commodities, only cement tonnage is directly associated with population growth (similar to the relationship of population and general cargo).

Crude oil—North Slope crude oil shipped through Valdez is the largest natural resource exported from Southcentral Alaska. These shipments are not anticipated to move through Anchorage under any foreseeable circumstances.

Coal—Alaska coal will play an increasing but limited role in enabling consumers to diversify their sources of supply of subbituminous coal. For recent years, subbituminous coal accounts for the third-largest tonnage of natural resource exports from Southcentral Alaska. The Pacific Rim market will consume increasing amounts of subbituminous coal for heating and electric generation plants. However, for the near-to-mid term, most of this coal will come from Indonesia and other, lower-cost suppliers.

Coal exports are currently shipped from Seward, and shippers face high rail costs to move coal from Healy to Seward. The Seward coal terminal will be nearing the end of its useful life in 2010 if it does not undergo major refurbishment. This fact, along with the liabilities associated with increasing maintenance costs, and the need to reduce costs to remain competitive on the world coal markets, all suggest that coal shippers will seek a new terminal in Cook Inlet or Whittier within the next decade.

Whittier would be the preferred site from a marine transportation perspective because of its deep, ice-free port. With planned vehicle access to the community, however, tourism and recreational uses will dramatically increase. A coal export facility would have to compete with these uses for the only large parcel of developable land in the city. Development of a coal terminal in the city would be problematic.

In Cook Inlet, the POA and the planned Port MacKenzie are potential coal-loading port sites. The planned Port MacKenzie and the POA would require development of deep-

draft docks and rail extensions to become viable coal terminals. The POA has designated the North Tidelands area for bulk exports.

According to a previous study, coal exports from Cook Inlet would be more expensive than current exports from Seward if the coal exports must cover debt service on the capital investment of a new coal terminal.[59] State or federal grants will be required for a major portion of capital costs for a new coal terminal to make coal exports from Cook Inlet feasible, unless an opportunity arises in which another commodity or user would pay for the facility.

Coal exports from the Beluga fields on the west shore of Cook Inlet also could occur in the future. These exports would be made from docks at Tyonek, but Tyonek is not a potential export site for coals from the Healy, Jonesville, or Sutton mines. The economies of scale for coal terminals will dictate that there be one coal port in the region (excluding Beluga).

Minerals, forest products, and seafood—Minerals, forest products, and seafood represent additional market opportunities for shipping through Anchorage. Seafood will move in containers and is included in the general cargo forecasts. If the North Tidelands loading facility and dock are able to accommodate more than one type of product, other dry bulk commodities might become economically viable for export.

The viability of such exports is dependent on the type of ship loaders, bulk storage space, and the availability of rail transportation, as well as the economics of the firms operating within Alaska in these export industries. In the near-to-mid term, it is unlikely that these commodities will be large enough or stable enough to support operational costs of a bulk export terminal independent of coal.

Munitions—A bulk export facility at the North Tidelands with an accompanying north access route to the military bases would offer a safe, cost-effective port for munitions shipments to the Anchorage military bases.

Gravel—A bulk export facility could provide a full-tide barge dock for customers. Most barge facilities in the area are dry at low tide and preclude barge movements during a large part of the tidal cycle. Certain types of barge traffic would be prime candidates for North Tidelands barge facility.

This traffic would include existing gravel shipments from the Port MacKenzie area that are offloaded by front-end loader and conveyor systems at other facilities in the Anchorage area. A full-tide barge facility at the POA could provide the current operator with scheduling flexibility adequate to meet planned increases in gravel shipments into the Anchorage market without committing additional equipment.

[59] Ogden Beeman & Associates, 1993.

E.3.3 In-State Distribution

Additional opportunities exist in connection with potential expansion of in-state distribution of airfreight. The outlook is for sustained slow growth.

Barge transportation to western Alaska and the Arctic coast typically moves directly from Seattle to communities in those areas. Some freight is transshipped through Anchorage, but this freight is a small portion of the total volume shipped to those communities. Continuing improvements and lengthening of rural airports will result in additional distribution from Anchorage or, at least, additional imports into Anchorage, for ultimate distribution to smaller communities by air.

Barge operators operating on the Arctic coast recently have reduced their tariffs to compete with operators that are trucking goods from Anchorage and Fairbanks to Prudhoe Bay and then on by air to the Arctic coast communities. The continuing development of longer runways will enable air carriers to use larger planes, further reduce air transport costs to the community, and increase the volume through Anchorage of freight that was previously moved by barge to western and Arctic Alaska. These improvements will enhance the ability of Anchorage to supply the rest of the state with airfreight and mail that come through the POA.

E.4 Development Sites and Opportunities

This subsection provides a discussion of two development sites for POA expansion with relation to the foregoing market analysis.

The POA encompasses about 130 acres. The core area, which includes the existing port facilities, is utilized heavily for existing cargo operations. The POA has other lands to the north and south of the existing port facilities (the North Tidelands and South Tidelands areas, respectively).

The POA also has responsibility for Ship Creek Point, a small-boat launching facility just south of Ship Creek. A map of existing POA lands and facilities is available in a separate section of this report, the *Inventory of Maritime Facilities*.

North Tidelands—The North Tidelands is approximately 1,400 acres of tidal and submerged lands that the POA obtained from the State of Alaska in 1993. The parcel is approximately 2,700 feet wide and follows the coastline north from the POA for about 4 miles. Development of this area would eliminate the POA's land shortage problem for the foreseeable future. The North Tidelands have been envisioned as a site for break-bulk/neo-bulk facilities, and a Manalytics report stated that the most promising use of the land was for a coal loading and storage facility.[60]

South Tidelands—The South Tidelands includes tidal areas adjacent to and south of the existing POL dock. The POA has envisioned using a portion of the South Tidelands as a site for a multipurpose dock that would serve cruise ships and other vessels. Location of such a dock at the south end of the POA would reduce the interaction of cruise ship support vehicles and

[60] Manalytics, Inc., *Port of Anchorage North Tidelands Market and Facilities Analysis*, 1992.

passengers at the other terminals with the heavy trucks associated with existing cargo operations and potential export movements.

The South Tidelands area could also be a prime site for additional FTZ areas if needed at the POA. Assembly, packaging, and warehousing operations associated with distribution and sales of foreign made goods could be developed in the existing FTZ areas, starting slowly and building over the entire projected period until the South Tidelands area would be required for additional FTZ development. Such expansion would require inbound, direct ocean container service from Asia.

Ship Creek Point—The POA has responsibility for Ship Creek Point, a small-boat launching facility located just south of Ship Creek. This facility is too distant from POA operations and too small to become a significant marine transportation facility. In addition, the ARRC owns the lands surrounding the Ship Creek Point site. The ARRC has proposed a mix of commercial, office, and tourism development for these lands. Such uses would be difficult to mesh with the activities of large marine transportation facilities.

E.5 Port of Anchorage Cargo and Passenger Traffic Forecasts

In this report, cargo and passenger volumes are forecast for 2005, 2010, and 2020 under three scenarios: low, medium, and, high. The low, medium, and high statewide population projections with which these volumes are associated are based on 1996 work by ISER.

In preparing an economic forecast for the Alaska economy, ISER projected population growth rates for the state through 2025 to be 0.5 percent for the low case, 1.4 percent for the medium (base) case, and 2.4 percent for the high case.[61] A summary of assumptions for ISER's low, medium, and high forecast scenarios is presented below. ISER forecasts are commonly accepted as the standard for economic forecasts available for the state.

ISER 1996 Economic Forecast Assumptions

- The Alaskan economic base will be dominated by commodity-producing industries, tourism, national defense, and the movement of international freight.
- The Alaska economy will continue to experience localized business cycles. Under the high scenario, when a pipeline is constructed to bring North Slope natural gas to market, a construction boom would result that would be similar to, but smaller than, the Alaska pipeline built in the 1970s.
- Petroleum exports will continue at current levels. Petroleum processing will consist of the export of LNG, urea, and the refining of a small portion of the crude oil produced in the state.
- Employment in fish harvesting and processing will remain constant in the base case. The high case calls for employment expansion in processing.
- In the base case, timber is estimated to stabilize.
- Tourism is expected to register a 5 percent growth rate per year in the base case.

[61] ISER, 1996.

- Air transshipment is estimated to continue to expand.
- The number of military personnel is expected to stabilize at current levels.
- Other basic sector activity is assumed to grow with the growth of the overall economy.
- Growth in manufacturing for export, excluding fish processing, timber harvesting and petroleum processing is currently insignificant and projected to remain so.

The following forecasts use 1998 as the base year. The forecasts were developed for the years 2005, 2010, and 2020 for low, medium, and high scenarios.

The forecasts were made using commodity categories that have been developed and maintained over time by the POA. The Port has recorded historical data by short tons for the categories of cement, freight NOS, timber, steel, petroleum, transshipment cargo, VFC, and vehicles. In recent years, cargo volume data have been recorded only for cement, petroleum, and VFC. These three categories now account for 99 percent of the Port's activity.

Forecasts were made for dry bulk (cement), liquid bulk (petroleum), VFC, break-bulk/neo-bulk (freight NOS), and vehicles and passengers. The cargo forecasts were made for inbound and outbound, foreign and domestic movements. The passenger forecasts are shown as an annual total number of passengers traveling through the Port. Detailed descriptions of forecast assumptions for each commodity category are listed below.

Dry bulk—Cement is an import commodity only. Its growth roughly parallels that of the population, although its peaks and valleys are more pronounced and are associated with building cycles. Projected growth rates through 2020 range from a low of 0.5 percent to a high of 2.4 percent annually.

The emphasis will be on Asian imports, which may increase to 90 percent of the total cement imported. Shipment sizes will range between 15,000 ST and 18,000 ST. The cement importer plans to expand storage plant size by reclaiming 1 acre of ARRC-leased land in the port area.

Liquid bulk—Petroleum product moves both inbound and outbound. An expansion of refining capacity at in-state refineries resulted in an approximate 33 percent drop in petroleum imports in 1998 compared with 1997 levels. Further reductions in petroleum are predicted in 1999, after which stabilization is anticipated. In-state refiners expect outbound product movement to stabilize at 1998 levels for the foreseeable future.

The low, medium, and high scenarios assume constant outbound volumes. However, unforeseen developments such as increased or decreased military consumption or new aviation requirements could affect this movement. The low scenario forecast assumes that 1998 import levels will decrease by 50 percent between 1999 and 2005 and stabilize at 2005 levels through 2020. The medium scenario assumes that 1998 import levels will decrease by 30 percent between 1999 and 2005, then proceed to grow at the historical

logarithmic growth rate through 2020. The high scenario assumes constant import levels through 2005, after which the historical logarithmic growth rate is assumed.

In-state refiners have expansion plans to meet future population- and airport-related demand for petroleum products. Growth in petroleum products has been a major factor in the growth of total tonnage through the POA, and the plans of in-state refiners moderate the outlook for petroleum cargo growth at the Port.

Vans, flats, and containers—The VFC category currently contains virtually all general cargo that moves through the POA, and vehicles typically are counted in container movements. Although the historical average annual growth rate of container traffic through the POA has been more than twice the population growth rate in Alaska for the past 10 years, both major liner carriers serving the Port anticipate that future growth will more closely parallel population growth.

In the past, container growth has outpaced population in the U.S. in general because of two factors: high volumes of containers moving into and out of Mexico and Canada, and the growing market share that is being captured by containers. The population growth rates used to forecast VFC volumes were 0.5 percent, 2.4 percent, and 3.4 percent for the low-, medium-, and high-growth scenarios, respectively. Tonnage was forecasted and then converted to TEUs by using historical and projected ratios.

The 1981 Booz-Allen report estimated that a major capital construction project such as a pipeline would add between 25 percent and 30 percent to general cargo projections and would add 15 percent to bulk cement imports. For the high forecasts between 2010 and 2014, it was assumed that a "pipeline-type" capital project would add 300,000 ST annually to the VFC category. In the high forecasts, for the years following 2010, it was assumed that a modest foreign liner service would be introduced to serve a developing seafood processing industry and to accommodate an anticipated growth in international distribution activities.

Seafood processing is forecasted to result in an additional 50,000 ST annually starting in 2005 under the medium case, and 105,000 ST annually starting in 2005 under the high scenario.

Freight NOS—Freight NOS was used to aggregate and forecast miscellaneous cargo such as break-bulk/neo-bulk project cargo, steel, and forest products. Most break-bulk/neo-bulk cargo such as large vehicles, building materials, and steel come through Whittier, Seward, or private docks in the Anchorage port area.

This type of cargo was not part of the forecast in the low scenarios. However, in the medium and high cases after 2005, it was assumed that there would be periodic arrivals and departures of shipload lots. Under the high scenario, it was assumed that the "pipeline type" capital project would require 40,000 ST of non-container cargo starting in

2010 and continuing through 2014. Other capital projects and forest product shipments affect volumes in other years.

Vehicles—TOTE moves vehicles through the port on RO/RO ships, and Sea-Land transports vehicles in containers with a LO/LO operation. In rare cases automobile ships have come to the Port. However, in recent years only TOTE and Sea-Land have transported vehicles. Vehicle tonnages are included in the VFC category. Vehicles include automobiles, trucks, and wheeled equipment.

Passengers—Passenger traffic through the Port has been minimal in the past and is forecasted to be zero in the low-growth scenario. For the medium forecast, cruise and exploration calls are projected to increase from 2 calls each in 2005 to 10 calls each in 2020. In the high-growth scenario, these calls are forecasted to increase from 6 calls each in 2005 to 15 calls each in 2020. The passenger capacity of these vessels is also forecasted to increase over the same period. The cruise ships' passenger capacity is estimated to increase from 750 passengers in 2005 to 1000 passengers in 2020. Similarly, the expedition vessel passenger capacity is estimated to increase from 250 passengers in 2005 to 350 passengers by 2020.

Figures E-2 and E-3 show total 20-year cargo volumes projected to move through the POA. The forecasted volumes are based on the previous discussion. Two high-case forecasts are presented in Figure E-2. One is based solely on the discussion presented above; the second assumes that a coal export facility capable of shipping 3 million tons per year will be developed at the North Tidelands in the POA.

Moderation of growth in liquid bulk (petroleum) moving through the POA will result in lower growth rates than have been experienced in recent years. The non-coal total cargo forecasted growth rates range from –0.1 percent to 3.7 percent. The medium-forecast growth rate (2.1 percent) is comparable to the historical (1980-1998) growth rate of 2.8 percent.

Additional figures showing forecasts for both inbound and outbound cargo and passengers for low, medium, and high scenarios for 2005, 2010, and 2020 are presented in Appendix A.

Modest growth is foreseen for the POA unless coal exports become a reality. Coal exports could be the catalyst needed for POA to develop its potential for cargo transshipment and distribution by building on its locational assets and a mutually beneficial relationship with the global air cargo hub at the AIA. It should be recognized that the coal exports shown in the appendix tables, as well as other bulk commodity exports, could move through ports other than the POA if those ports build infrastructure to handle the projected volumes.

Figure E-2: Forecasted Total Cargo Volumes for the Port of Anchorage, 1999–2020

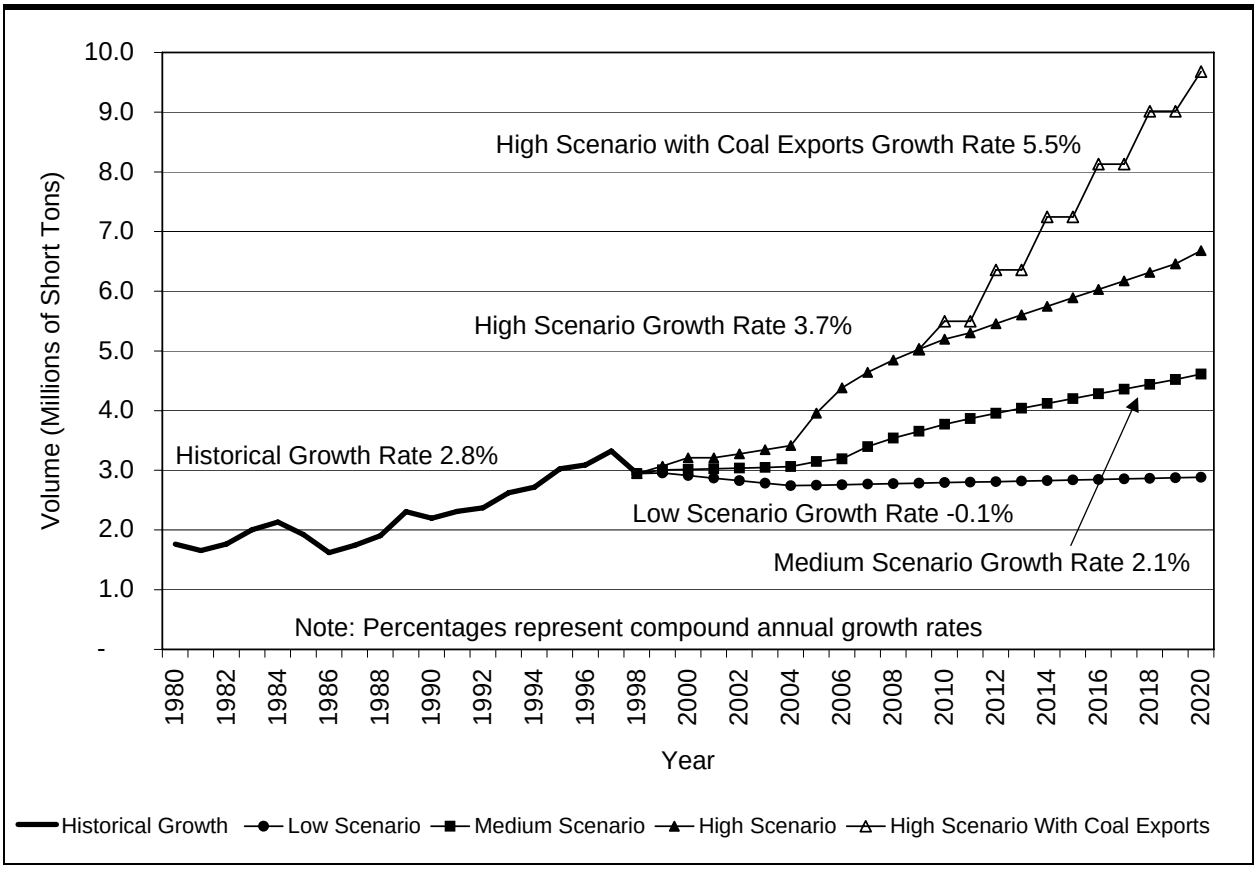


Figure E-3: Forecasted Total Cargo Volumes for the Port of Anchorage, 2005, 2010, and 2020

	Cargo Volumes (Millions of Short Tons)		
	2005	**2010**	**2020**
Low	2.7	2.8	2.9
Medium	3.1	3.8	4.6
High	3.9	5.1	6.6
High, including coal	NA	5.4	9.6

F. MARKETING STRATEGY

At the heart of the advisable marketing strategy for the POA is promotion by the MOA of a highly efficient facility with dedicated access to the state's principal rail and highway arteries. The MOA must continue to support development of an intermodal system at the POA that achieves that goal and accommodates all users.

If sufficient coal export volumes are routed through Cook Inlet for conbulkers, or if direct foreign container service is introduced, the potential exists for container service from Asia and transshipment of additional cargo. This potential represents a significant benefit to the MOA and the state; therefore, the MOA and the POA should work with other organizations in pursuing this goal. To attract expedition cruise ships, it may be necessary to develop and market a multipurpose dock suitable for passenger movements.

F.1 Future Role of the Port of Anchorage

The POA will continue to be the major distribution center for the state because of its current facilities and the fact that the Anchorage population is the largest market in the state.

For the foreseeable future, the state will continue to rely upon ocean carrier service from Puget Sound ports for most goods and materials. The POA and the MOA should actively work with other organizations to develop direct container service from Asia. This service could substantially enhance the role of Anchorage as a global distribution center and reduce the costs to state residents for certain commodities. The POA, the MOA, and a number of other organizations must be very proactive to achieve this goal, which would be beneficial to the residents of Anchorage and Alaska.

The POA has a significant economic development role in the MOA and throughout much of Alaska. The MOA must continue to improve the POA's existing terminal facilities and improve connectivity with rail and highway networks in order to reduce the cost of transportation for state residents and businesses. In addition, the MOA and the POA, in conjunction with state and federal government, must consider construction of new facilities in order to meet the needs of developing industries in the state. Transportation costs are often a major cost item for resource extraction industries. The POA could play an important role in reducing transport costs and improving the viability of emerging industries and businesses.

For example, several new, high-quality coal mines are proposed in the Palmer/Sutton area. Alaska operators cannot open a new coal mine without a sales contract, but the present sales price would have to reflect high rail transportation costs to Seward. The North Tidelands could reduce this transportation cost if sufficient volumes of coal exports are realized, or if state and federal grants are obtained for construction.

The POA needs to be positioned to take advantage of opportunities to improve its existing terminal and develop new facilities using state and federal funding. Federal legislation for funding transportation improvements now enables ports, railroads, and other nontraditional (non-

highway) sponsors to put forward projects to improve intermodal freight transportation. The MOA and the POA should investigate multiple sources for potential funding. For example, the U.S. Department of Defense (DOD) may be interested in improving the Port's ability to move munitions to its bases, and loading/offloading heavy and large cargo—particularly in times of emergency. On the basis of precedents in other locations, the DOD might participate in cost sharing for a North Tidelands facility that would offer these benefits. Such processes can take years to move through the various agency funding systems. The MOA must initiate the processes.

Ports have become significant engines of growth in other communities. Independent taxing authority often enables other ports to construct facilities although the facilities may not be capable of supporting debt service or even operating costs during initial years of operation. The POA is a department within the MOA and does not have a tax base or such autonomy. The executive and legislative branches of the MOA should evaluate possible changes within the existing system that would permit the POA to more fully realize its potential in this role and provide greater benefits to Alaska residents. Such changes might include funding new port facilities with property tax revenues or enabling the POA to retain all of its revenues for port operations and debt service. A careful evaluation would generate additional ideas for deliberation.

F.2 Commodities

Exports of Alaska's natural resource commodities are driven by world demand. Competitive forces dictate the demand for port services and development at the exporting and importing terminals. The POA's strategy for marketing its services depends upon the promotion of an efficient facility. This strategy will require substantial development in terminal facilities as well as access and egress to rail and highway transportation systems. The following paragraphs provide a brief description of a marketing strategy for each major commodity.

Coal—Movement of coal is an issue that continues to surface at the POA. Movement of coal through the existing port footprint of the POA is inappropriate. The added congestion that such exports would impose would negatively affect the Port's existing and projected commerce. If the North Tidelands area is to be developed for coal, it must have adequate access and egress before benefits to coal exporters and the POA can be realized. The POA will have to work with coal exporters to market and obtain commitments for the export volumes necessary to amortize capital costs and cover operating costs at such a facility.

Timber—The MOA and the POA should focus on value-added forest products. This effort would help attract direct foreign liner or semi-liner service. One attractive product in demand in China and Japan is pre-manufactured log homes and buildings shipped as complete units in sealed containers. The MOA and the POA will need to support marketing efforts by manufacturers of these and other value-added products in Alaska. This containerized cargo could move through existing facilities. However, substantial

exports of unprocessed logs and other low-value forest products would require development of the North Tidelands area.

Fish Products—Value-added fish products also could attract foreign liner and semi-liner vessels to Anchorage. Some of the raw product for this operation would arrive in tenders and other vessels from local fisheries. The POA could assist value-added manufacturers if efficient, low-cost systems for moving seafood through the Port are developed. This value-added cargo would move in containers and could be accommodated through existing facilities.

The POA needs to be in a position that will allow for potential bulk cargo movements of coal, forest products, and aggregate by designing and initiating development of the North Tidelands.

F.3 Services

Shipping lines are deploying increasingly larger ships in order to reduce per-container shipping cost, resulting in sizable dredging programs in many ports. Industry experts expect that about one-third of the world's containership fleet will be 4,500-TEU-capacity and larger within 15 years.[1] These ships require not only channel depths of 43 to 47 feet, but also more container handling and storage space, larger terminals, and wider turning basins. Although these larger, state-of-the-art vessels are not anticipated for the POA in the foreseeable future, the MOA and the POA must continue to plan for relatively large vessels in order to capture the associated economies of scale. In the absence of such planning and development, additional cargoes would be diverted to other ports in the state.

The present cruise industry market is limited for the POA because the trip between Anchorage and Vancouver, B.C., or Puget Sound ports requires 10 days of travel. However, the industry is continually seeking new opportunities and trips for passengers. At 60º North Latitude, Anchorage is closer to the Arctic Circle than Ushuaia, Argentina, is to the Antarctic Circle. Therefore, Ushuais' success with Antarctic cruises implies a similar potential for Anchorage with regard to Arctic tours. Anchorage also has one of the finest airports available in any of the extreme northern or southern latitudes. A high capacity airport and high frequency of airline service from around the world make Anchorage an ideal location for smaller, adventure-oriented cruises to the Arctic, the Aleutian Islands, and other locations not yet on the main tourism routes. The MOA and the POA should plan to accommodate passengers to adequately serve this market or future cross-gulf cruise ships.

The need for efficient development of the Port is indicated by population growth, demand for tourism, and demand for exports. Development of more waterfront land such as North Tidelands, South Tidelands, and Ship Creek is necessary to enable the POA to grow. The POA should be cautious in leasing its scarce, valuable land to parties unless they are directly related to the maritime industry and have access to waterfront property, or are major shippers of commodities through the POA.

[1] Moody's Investors Service, Inc., Municipal Credit Research, *Moody's Port Ratings Outlook*, June 1998.

F.4 Markets

Improvements in maritime transportation and communications are shrinking the globe, expanding markets, and facilitating international trade. In addition, the loosening or elimination of governmental trade barriers such as tariffs, quotas, and export subsidies has greatly increased Alaska's ability to import and export goods. In the future, the POA could play an expanded role in international trade and enhance the reputation of Anchorage as a global distribution center.

The POA, with support from the MOA and other organizations in the state, could become a larger factor in statewide economic development. For example, the POA, the MOA, and other organizations could promote the trucking industry and improved highways that offer fast access from Northeastern Asia to the U.S. Midwest by intermodal connections between Anchorage and Edmonton, Alberta, or Shelby, Montana. The U.S. Midwest is not a traditional market for the POA, but transportation improvements may make Anchorage a viable option for such trade.

Development of the North Tidelands could enable the POA to attract movements of munitions and other military equipment. Heavy lifts for oversized objects and the ability to accommodate barges at full tide with 24-hour accessibility at the facility would also attract business to the Port. The POA currently is not as attractive as other ports in Alaska for these shipments.

Development of a foreign liner service would reduce the cost of imported consumables in Alaska and provide competition to U.S.-flagged carriers protected by the Jones Act. A direct liner service to Asia would complement the growing role of the AIA as a distribution facility.

The POA is largely insulated from international markets. Its market currently is inelastic and moves directly with population. Encouraging value-added manufacturing and distribution services would add vitality to the market.

Alaska has the physical requisites for continued economic growth. The state possesses large quantities of high-quality natural resources, human resources, and technology. In order to take full advantage of these attributes, there must be a demand for resources. The growth of Alaska's economy requires the marketing of exportable goods to stimulate demand. The Port has the potential to stimulate economic growth in Alaska. However, enabling the POA to achieve its potential will require that local and state government agencies and the private sector be proactive in supporting the concepts and ideas outlined in the *Port of Anchorage Master Plan*.

II. FACILITIES PLAN

A. Background

This section presents the Facilities Plan, one of four major elements for the *Regional Port of Anchorage Master Plan*. The purpose of the Master Plan is to update the previous (1983) master plan for the Port of Anchorage (POA). This Master Plan will serve as a guide for the port area decision-making and development over the next 20 years.

There have been numerous changes in technology and in the shipping industry since the 1983 Master Plan was issued that need to be assimilated and accommodated. The Facilities Plan provides a snapshot of existing conditions, a computerized assessment of existing throughput capacity, a new facility demand analysis based on market forecasts that was developed in the previous Strategic Marketing Plan element of this Master Plan. Then, a series of development alternatives are presented and a recommended phased development program is selected, refined, scheduled and costed to use as a guide for the next 20 years. A brief description of each section within this Draft Report follows.

- **Section B** is an inventory of the existing marine facilities, as of December 1998. Both Port of Anchorage property and non-Port of Anchorage properties are included in the inventory. **But, the focus of this Master Plan is on the Port-owned areas. However, the non-Port of Anchorage facilities were included in the inventory as a means of providing a comprehensive understanding of all the major maritime activities in Anchorage.** This inventory then provides a foundation for the subsequent computerized throughput analysis of the Port's capacity as well as the demand analysis. It also provides the basic factual database for each of the Facility Development Alternatives and Recommended Development Plan.
- **Section C** is the analysis of the individual terminal's throughput capacity. Based on our interviews with each of the current Port tenants, and utilizing VZM/TranSystems computerized models, key data has been accumulated and analyzed by commodity type. The Maximum Practical Capacities (MPC) of each cargo type has been established. The MPC's of each cargo type (including passenger/cruise activities) were then compared to the market forecasts developed in Strategic Market Plan, and a Demand Analysis for future facilities was performed. The need for future facilities, as well as any planned improvements, then becomes the basis for the conception of a series of Facility Development Alternatives.
- **Section D**, Facility Development Alternatives, is the beginning of the real planning effort that has been based on the findings of Section C, specifically by utilizing the findings of the Future Facility Demand Analysis. We have developed 'idealized terminal modules' that were used as the basic outlines for the requirements for future facility development. The approximate acreage and throughputs of each idealized terminal module provide the basis for the planning study. However, a specific analysis of acreage and berthing needs was also performed to define a more precise level of needs for the Facility Development Alternatives. These have been established for both the medium and high forecasts for the years 2005, 2010, 2015 and 2020.

- **Section E** describes the evaluation process used to select the preferred Alternative. Key criteria are established for the development of a comparative analysis process. Using an evaluation process, each of the Alternatives was subjected to this assessment process. The criteria are weighted to reflect the importance and significance of each criterion in meeting all of the project goals and objectives. Three Alternatives were determined to merit further evaluation and scrutiny. From this analysis the preferred Alternative was selected and put through a comprehensive refinement process, which involves incorporating the best ideas and concepts from the Alternatives that were not selected. The preferred Alternative then emerged as the Recommended Master Development Plan for the Regional Port of Anchorage.
- **Section F** essentially addresses the phasing cost estimating and other requirements necessary for the implementation of the Recommended Master Development Plan. Implementation recommendations for the known aspects of the project have been provided.
- **Appendices:** Appendices have been included at the end of the Master Plan document that relate to the Facilities Plan and include the following:
  - **Throughput Model Summaries:** This Appendix section presents a one-page summary of each computerized throughput capacity model. The full computer printout has been provided to the Port under separate cover.
  - **Construction Costs by Phase:** This Appendix section presents Development Plan Construction Costs by Phase.
  - **Typical Planning Modules:** This Appendix section presents a series of idealized terminal modules with specific terminal characteristics and detailed infrastructure requirements, which can be used to guide future development.

B. INVENTORY OF MARITIME FACILITIES

B.1 Basis of Inventory

B.1.1 Introduction

This inventory consists of the Regional Port of Anchorage marine terminals and facilities in operation during 1998. It includes imminent and partially utilized planned expansions or changes, such as Tracts 4A, A and EE. As such, it can be considered a snapshot of the 1998 conditions and usages. This inventory provides a foundation for further planning and provides the basic factual database for a computerized throughput analysis of the Port's capacity and demand.

B.1.2 Properties

Both Port of Anchorage property and non-Port of Anchorage properties are included in the inventory. **The focus of this Master Plan is on the Port-owned areas. However, the non-Port of Anchorage facilities is included in the inventory as a means of providing a comprehensive understanding of the maritime activities in Anchorage.** The Alaska Railroad Corporation (ARRC) owns most of the area immediately to the south of the Port of Anchorage property. Several maritime / port related facilities are operated on these ARRC properties (via long-term leases). It is important to note that only those aspects of the ARRC tenants' operations that are dependent on the Port of Anchorage facilities are included in the capacity and demand analysis. In general there are three categories of facilities in this inventory:

1. Operators / tenants that both lease Port property and use Port wharf facilities. These include, for example, TOTE and Sea-Land. For these users, both the over the dock cargo and the various leased acreages are used in the throughput analysis of the Port's capacity.
2. Operators / tenants that use the Port wharf facilities but who pipe or convey their products to storage facilities off of Port property. This includes several liquid and dry bulk operations. These operators do not lease Port property but are included in the over the dock portion of the throughput analysis of the Port's capacity.
3. Operators / tenants that have maritime / port related facilities in the area, but who neither lease property nor use wharfage owned by the Port of Anchorage. These facilities have been inventoried to a lesser extent than the previous two categories. Operators or users under this category are indicated within the body of this inventory with an 'N' before their code number. They are not included in the throughput analysis.

In addition, there are several vacant properties not contained in the inventory. These include the recently vacated Chugach Electric property (owned by ARRC), the Defense Fuels site (owned by the military), and an un-leased portion of the south tidelands (owned by ARRC). These are shown on the site plan (see Figure B-4). These properties have the potential for various future developments and uses for maritime related activities.

B.1.3 Objectives

Property areas have been tabulated and calculated for all of the above operators. Cargo operating characteristics, etc,, have also been recorded. The intent is to provide an understanding of the functions of the maritime facilities in the area and their interface within and inside the Regional Port of Anchorage. The objective of the terminal inventory is to provide a complete summary of the Regional Port of Anchorage marine terminals and non-Port owned facilities through the following tasks:

- Obtain data for each major maritime cargo or passenger terminal as of December 1998.
- Interview key terminal operators to obtain inventory information on specific terminals.
- Work with the Regional Port of Anchorage staff to refine and verify inventory information as it relates to their understanding of the tenant's operations.
- Perform site visits to all of the major maritime terminals to gain an understanding of the operations and verify inventory information.
- Quantify the data collected and compile it in both tabular and planimetric form.
- Coordinate the data format and content to provide suitable information for subsequent modeling and master planning efforts.

B.1.4 Inventory Codes

Letter and number designators have been selected for the various users and properties. Seven basic terminal types have been used for modeling and throughput analysis purposes. They consist of:

Type	Designator
• Containerized and Ro-Ro Cargo Terminals	C
• Break-Bulk and Neo Bulk Terminals	B
• Automobile Terminals	A
• Liquid Bulk Cargo Terminals	L
• Dry Bulk Cargo Terminal	D
• Passenger Terminals	P
• Intermodal Rail Terminals	I

In several cases, more than one terminal type is applicable to a particular berth or operation. In this case, each type of cargo is evaluated separately. Also, in several cases, transit areas are grouped with the traditional user's leased properties. This is the case for TOTE and Sea-Land, both of whom have preferential use agreements for transit areas B, C, and D. For the purposes of this inventory, transit area B is treated as if it belong to (is leased to) Sea-Land. Likewise, transit areas C and D are treated as if they belong to (are leased to) TOTE. In addition, the inventory has been subdivided into two basic user types, Port of Anchorage Users (Tenants) and Non-Port Users (Tenants). Non-Port users are operations that use neither Port property nor Port wharf facilities. These non-Port users are designated with a letter N.

Port of Anchorage Users

Type	Designator
• Containerized and Ro-Ro Cargo Terminals	C1 – C6
• Break-Bulk and Neo Bulk Terminals	B1 – B2
• Automobile Terminals	A1 – A2
• Liquid Bulk Cargo Terminals	L1 – L4
• Dry Bulk Cargo Terminal	D1
• Passenger Terminal	P1

Non-Port Users

Type	Designator
• Containerized and Ro-Ro Cargo Terminals	NC1 – NC2
• Break-Bulk and Neo Bulk Terminals	NB1 – NB2
• Liquid Bulk Cargo Terminal	NL1
• Dry Bulk Cargo Terminal	ND1
• Intermodal Terminal	NI1

Each category above is shown on the Inventory of Existing Maritime Facilities – Site Plan drawing, Figure B-4. In addition, an aerial photo (see Figure B-5) is included to depict site features and the surroundings in proximity of the Port. Bold lines indicating the approximate area of each individual terminal have been utilized on the Site Plan drawing to indicate the approximate areas of their operations. These bold lines are not intended to designate the operator or user's specific lease boundaries.

It is important to note that this inventory is current as of December 1998, and that changes to the terminal configurations or leases that are currently being considered do not appear in the inventory. Rather, they are considered in the Facility Development Alternatives and Recommended Development Plan tasks of this Master Plan.

B.2 Facility Inventory Methodology

The following steps have been used to produce an accurate, comprehensive and functional database upon which planning can be based:

- Standardized terminal questionnaires were distributed to the principal Port tenants, as well as non-Port tenants, in a systematic preliminary information gathering task.
- Follow-up interviews were held on site and by telephone to supplement and confirm questionnaire data.
- Questionnaire and interview data were compiled on a series of cargo-specific data sheets.
- Existing plans were digitized to create an AutoCADD background plan of the Port.

- Published maps, navigational charts, reports and Port planning information were reviewed and compiled on the data sheets and on the background plan.

After compilation, the background plan and data sheets were reviewed for accuracy and completeness. Where conflicting information was encountered, data sources were evaluated and tenants or Port staff were contacted to confirm and/or obtain the most accurate and current information.

B.3 Facility Inventory Data

Data was collected from written questionnaires, personal and telephone interviews, site inspections, and from published documents. A complete List of Documents that were received by the consulting team is presented in Section G, Bibliography, of the Facilities Plan.

B.4 Summary of Existing Facility Conditions

The summary of existing conditions was compiled as a subsequent task, following the Inventory of Maritime Facilities, in order to recognize and document conditions in and around the Regional Port of Anchorage as of December 1998. This section is not intended as a complete or comprehensive evaluation or analysis of the existing conditions at the Port, rather it is a supplemental account of conditions that have been reported to the Port and have been fully documented in previous studies authorized by the Regional Port of Anchorage. These Reports are referenced wherever possible within this section of the Master Plan Report.

Portions of the Port are 40 years old. This fact coupled with the harsh environment and steady growth and development explains the need for a system of prioritized maintenance and upgrade projects. To meet this need the Port of Anchorage has developed an inspection program that requires each component of the Port be inspected annually. There is an ongoing aggressive maintenance program that is based on these inspections. This is based on a commitment to provide a modern, fully functional, safe and efficient facility. As a result of this commitment there is a steady stream of repair and upgrade projects ongoing at the Port.

What follows is a summary of existing conditions as well as some excerpts from recent annual inspection reports. This is intended to give the reader a sense of the types of projects undertaken by the Port's maintenance program. Where specific deficiencies are noted in an inspection report, such as cracked concrete or water ponding in a parking area, the Port will generally initiate a repair process. Currently all major facilities are fully functional and operational and the Port is in a generally excellent state of repair.

B.4.1 Docks

The Regional Port of Anchorage maintains five docks; POL 1 and South Terminal (POL 2), Terminals 1, 2, and 3. Terminal 1 was built around 1959. POL 1 was built in 1966. The building of Terminal 2 phase 1 followed this in 1969. Terminal 2 phase 2 was completed in 1970. Terminal 3 was constructed in three phases during 1974, 1976 and 1977. South Terminal (POL

2) was completed in 1992. A number of repair and retrofit projects have been undertaken in the intervals between major expansions and the construction phases of new facilities. Due to the mix of age and construction type, it is difficult to characterize the overall physical condition of the Port's docks. The following are a few selected findings from the 1997 annual inspection report[1] produced by R&M Consultants:

Fender System

> "The new fender system (Terminals 1, 2, and 3, and POL1, 1995) appears to be holding up fairly well. There are several areas where ships have gouged into the Ultra High Molecular Weight (UHMW) panels, resulting in minor damage." "Several of the UHMW plastic pads are missing connector bolts."

This new fender system was installed in 1995 at a cost of about $7 million. It is a modern energy absorbing system. The Port expects to realize significant savings in annual maintenance costs from this new system.

Piling System

> "Overall the piling system is generally in good condition. Two areas of the dock exhibit weld consumption entering into more advanced stages. These areas were between pile lines 18 to 38 under terminal 1, and 90 to 120 under terminal 3."

Several batter piles have been damaged over the years due to ice loads. The ice first builds into a massive under deck slab over the winter. In the spring, the ice melts around the contact area of the piles. When this happens, the ice is free to slide up and down the vertical piles but not the diagonal batter piles, which then take the entire load. R&M recommended repair procedures for damaged piles and the work has recently been undertaken. One possible repair method for this system is to weld small tabs onto the vertical piles in the ice buildup areas. This would insure that they continue to participate with the load sharing as the ice melts.

The port has a successful ongoing piling renovation program.

Deck Slabs

> "There has been extensive cracking from either seismic or past vessel collisions that appear to be stable. Only a few shrinkage cracks were observed distributed randomly throughout the structure. The general condition of the concrete appears to be highly water saturated." "The Port of Anchorage may eventually be required to seal full-depth cracks and construction joints using a resin from the topside and then blanket seal coat the entire deck surface to minimize water intrusion with a sealer."

In 1993, the Port undertook an extensive deck delamination repair project. This project included repair and re-grouting of the crane rails that are imbedded in the dock. Several successful deck delamination repair projects were completed in 1997 for a cost of about $400,000.00. R&M

recommended that the Port consider a study of the condition of the concrete deck with respect to chloride content and potential for corrosion of rebar.

Trestles

> "There are eleven trestles and four steel girder bridges / walkways (associated with the Port)." "Trestle 1B, West Trestle and the POL 2 Trestle show concerning signs of deterioration."

R&M recommended that Trestle 1B and POL 2 Trestle be monitored closely, and they recommended a repair procedure for the West Trestle.

The Port completed a seismic retrofit of Trestle number 2 in 1998 for a cost of about $400,000.00. They currently plan to retrofit Trestle 1B in the year 2000.

B.4.2 Transit Yards, Lease Lots and Roadways

Ocean Dock road, a part of the National Highway System (NHS), is slated for resurfacing and track realignment in 1999 by the State of Alaska Department of Transportation. A portion of this project will be through the Port area. The Port's Lot 4A is currently under construction. This lot is being paved and utilities are being installed. It will be available for lease in the spring of 1999. The Port is currently seeking ownership of tracts A and EE. The Port plans to dedicate a road right of way along the eastern portion of this property and possibly to construct a new road.

It is important to note that there are several agencies responsible for various roadways within the Port area. The State of Alaska DOT and the Municipality of Anchorage are responsible for maintaining their respective roadways. The Port of Anchorage provides routine maintenance, including plowing, sanding and sweeping, as a kind of landlord function on many of the common Port roads and properties.

Below are a few selected findings from the 1997 annual inspection report[1] produced by R&M Consultants.

Roadways

> "The roads and railroad crossings at the Port are in fair condition."

Port Transit Yards

> "Transit yards A, B, C, and 12B are in need of crack sealing, as are two small parking areas outside of Gates 5 & 7. The cracks should be cleaned and sealed." "The only major drainage problem observed in the yards was along the West side of Transit Yard A. Poor grading has created ponding of water, which in turn has caused serious alligator cracking in the pavement. The area must be re-graded to drain towards an adjacent catch basin, then re-paved."

In general several of the "older" paved areas show some alligator cracking. Many of these areas have 2" of asphalt over a questionable sub-base. The "newer" paved areas are now being built with 3" of asphalt and more attention is being paid to the sub base. These areas are performing well.

B.4.3 Drainage

The Port of Anchorage is currently operating under a National Pollutant Discharge Elimination System (NPDES) permit. This permit was issued March 3, 1995. It is due for renewal in March of 2000. The permit requires specific pollution prevention measures as well as a Storm Water Management Program (SWMP) and monitoring. The permit also requires that, in a master planning process, consideration be given to the impacts that new and significant re-development may have on water quality.

There are four major drainage systems on POA property. These include North TOTE, TOTE, Sea-Land / Cherry Hill, and Equilon (formerly Texaco) systems. The Municipality of Anchorage street maintenance department is responsible for maintaining these systems on public property. A recent 1997 drainage study[2] commissioned by the Municipality of Anchorage found deficiencies in all four systems. The problems ranged from "severe corrosion and heavy sedimentation" to "cracked manhole barrels and undersized pipes." Both CMP and aluminum drain piping have performed poorly in the Port area due to corrosion. Many of the drainage pipes are surcharged with silty saltwater at high tides. The generally poor soils in the area offer little in the way of lateral support for arch pipes and systems with these types of piping have also fared poorly.

As a result of the above referenced drainage study the Municipality of Anchorage under took some repair projects. During the summer of 1998, the Cherry Hill system was replaced from the outfall to the Sea-Land terminal, by the Municipality of Anchorage. A 54" diameter welded HDPE section was used from the last manhole to the end of the ocean outfall. A 60" diameter CEP pipe section was used for the upland portion of the project. It is hoped that these types of materials will fare better in the corrosive environment of the Port. Planing efforts are underway to deal with an off Port erosion problem in the Cherry Hill ditch. The erosion of a steep section of this ditch on Elmendorf Air Force Base has resulted in a maintenance problem by filling the drainpipes with gravel.

B.4.4 Corrosion

Cook Inlet has one of the highest cathodic protection current requirements of any marine environment. The National Association of Corrosion Engineers (NACE) recommends supplying 35-40 mA/ft^2 of current for structures submerged in Cook Inlet[3]. In comparison, this is several times the NACE recommendation of 5-6 mA/ft^2 for the Gulf of Mexico region. Cook Inlet's high tidal ranges and cold water combine to produce a highly oxygenated, moving body of seawater that has proven to be very corrosive.

The current Port cathodic protection (CP) system is about the third generation of CP systems installed at the Port. System number one was placed through the deck in a series of nonstructural

piles. The anodes in this system were sacrificial steel driven by an impressed current supplied by two rectifiers. This system experienced a series of structural failures that included jacking of the piles through the deck due to buoyant uplift of ice. Generation two consisted of a series of deep well platinum anodes again placed through the deck of the dock. This system was over driven and had problems with producing gas, etc. The current CP system consists of a large number of deep well anodes placed on the bank near the docks. This system appears to be functioning adequately and is considered a successful well designed CP system. There is some concern about interior pilings being shielded from protection by the perimeter piles. There are currently about six million square feet of uncoated steel piling requiring protection at the Port.

Because the amount of current required for CP is directly related to the amount of un-coated steel needing protection, it is recommended that consideration be given to coating all new steel piling and related steel structures at the Port. It is also recommended that consideration be given to coating some of the existing piles, perhaps as part of an ongoing maintenance program. It may also be worth considering new ways to supply CP current to the interior piles. Several ideas include directional drilling deep well anodes, using sleds, bracelet anodes, protective sleeves, etc.

B.4.5 POL Piping

The Port of Anchorage Valve Yard (POAVY) was completely rebuilt in 1996. The approximate cost of this project was five million dollars and it dramatically increased both the available capacity and efficiency of the system. The POAVY is semi automated 96 valve manifold system that allows for fuel transfer between POL 1 and POL 2 and local liquid bulk storage facilities. The facility is situated on a lined secondary containment pad. There are eight pipe headers, four to each POL dock. Each header is capable of supplying 6000 bbls. / hour. Hose derricks with hydraulic tidal compensation winches augment the ship to shore connection.

The piping to POL 1 has recently undergone extensive modification. New buried pipe was installed between the Valve Yard and the new Pipe Bridge Trestle. The system appears to be receiving adequate CP current. The above ground portion of the POL 2 piping is tape wrapped. This pipe wrap has been damaged or removed in several areas. Localized corrosion has been observed in these areas.

B.4.6 Environmental

Much of the surface material in the Port of Anchorage area consists of fill placed over the Cook Inlet silt tidal flats. In general, the fill ranges from about four to 25 feet in thickness. Water surface is estimated to be three to eight feet below ground level. The water is contained within the granular fill and perched on the underlying silts and clays. Within the fill are culverts, POL lines, and other utilities. The Port and surrounding industrial area contain many large above ground petroleum storage tanks.

Spills or releases of petroleum product of varying sizes have been recorded at each of the liquid bulk facilities contained in the inventory. These spills have impacted the soils and/or ground water at various places throughout the Port. The Alaska Department of Environmental

Conservation (ADEC) is aware of the petroleum contamination in the Port area. The ADEC is concerned that contaminated soils could have an adverse effect on either human or ecological receptors. Contaminated soils have impacted earthwork related construction projects in the area.

An example of a recent project impacted by contaminated soils is Ocean Dock Road. The environmental sampling program[4] undertaken by the State of Alaska DOT for the upcoming Ocean Dock Road project located an area of the Port that had elevated hydrocarbons in the soil. This area is on the West side of the existing road near the South Transit Yard. The level of petroleum hydrocarbons detected was characterized as "exceeding ADEC Category A cleanup criteria". It was estimated that this site contained about 65 cubic yards of contaminated material. Several other areas of elevated hydrocarbon soil samples were located on Alaska Railroad owned property. For this particular project the State has required periodic environmental testing during construction. A hazardous waste professional must be available at all times during construction for testing of suspected material. Material that is not within the acceptable limits is to be brought to a DEC thermal remediation facility. Although these requirements do pose an additional burden during construction, they have not been insurmountable and earthwork related projects are routinely completed in the Port area.

Much of the construction of the existing petroleum storage and transportation facilities was completed in the 1960s and 1970s, before the current, more stringent, environmental regulations were in place. This was in the era before tank liners and secondary containment was mandated. Much remedial tank lining work has been done to date and several projects are planed for 1999.

In an attempt to deal with some of the petroleum contamination issues, the Petroleum Users Group (PUG) was formed in 1991. This group is an organization of Port area land owners and users that are working in a cooperative manner in an effort to manage petroleum impacted soil and water concerns. The PUG is currently working with the ADEC and EPA in a risk assessment process. The PUG, ADEC, and EPA are working toward risk based clean up standards so that controlled growth and development can occur. Current PUG group members include POA, Equilon, Tesoro, Signature Flight Service, Defense Fuels, Chevron, and Williams.

B.4.7 Electrical

Municipal Light and Power (ML&P) supplies power to the Port area. This power currently comes in via the overhead power lines along Ocean Dock Road. The power poles are close to the edge of Ocean Dock Road. In some cases, they are close enough to affect the level of service offered by the road. Relocation of the poles would be difficult due to the proximity of railroad tracks and adjacent roadside ditches. The Port supports changing to an underground power system. The POA maintained facilities are supplied by about 19 meter drops throughout the area. This does not include the service to tenants such as TOTE and Sea-Land.

The Port recently upgraded the lighting in the area. The old wooden poles were replaced with modern steel poles and the associated electric cables were routed underground.

B.4.8 Fire Water System

The Port is currently completing work on a dock side fire water system upgrade. This is the third and final phase of this project. Also, the Port recently upgraded their building sprinkler system.

B.4.9 Annual Inspections

As outlined previously, the Port has a well-managed system of annual inspections and a prioritized ongoing maintenance program. Each year a formal and thorough civil, mechanical, and electrical inspection is carried out at the Port. As a result of these inspections, prioritized work orders are created. These are categorized as level one, two, three, etc. depending on the extent of the deficiency. The work orders are sometimes combined to create projects that are then let out to bid. The consulting team and Port staff have prepared a matrix of estimated facilities maintenance and repair costs through the year 2020, which is presented in Section E: Implementation.

B.5 References

1. R&M Consultants, Anchorage Alaska. December 1997. Port of Anchorage 1997 Annual Inspection Summary Report.
2. CH2MHILL, Anchorage Alaska. March 1997. Port of Anchorage Drainage Study, Final Report.
3. National Association of Corrosion Engineers, Houston Texas. May 1983. Recommended Practice, Corrosion Control of Fixed offshore Platforms Associated with Petroleum Production.
4. Shannon and Wilson, Inc. Anchorage Alaska. November 1997. Environmental Site Characterization, Ocean Dock Road, Whitney Road to Port of Anchorage.

Figure B-1 - Facility Inventory Summary: Port Tenants (or Users)

Name / User	Code	Land Owner	Approx Acreage	Cargo Use Type
Containerized Cargo				
Sea-Land	C1	POA	29.2	Container
TOTE	C2	POA	29.1	Container (Ro - Ro)
Tract 4A	C3	POA	5.3	Container
Tract A	C4	POA	9.9	Container
Tract EE	C5	POA	4.4	Container
South Transit	C6	POA	4.8	Container
Total Containerized Cargo			**82.7**	
Break-Bulk / Neo-Bulk Cargo				
Transit Area A	B1	POA	4.6	Break-Bulk / Neo-Bulk
South Transit & 9A	B2	POA	7.5	Break-Bulk / Neo-Bulk
Total Break Bulk / Neo Bulk Cargo			**12.1**	
Automobile Cargo				
Sea-Land Auto	A1	POA	4.0	Auto
Tote Auto	A2	POA	1.0	Auto
Total Automobile Cargo			**5.0**	
Liquid Bulk Cargo				
Equilon (Texaco)	L1	POA	8.7	Liquid Bulk (Petroleum)
Signature / AFSC	L2	POA	11.2	Liquid Bulk (Petroleum)
Total Liquid Bulk Cargo			**19.9**	
Passenger / Cruise				
Passenger Area	P1	POA	0.4	Passenger Area
Total Passenger / Cruise			**0.4**	
TOTAL POA AREA			**120.1**	
Liquid Bulk Cargo (POA Wharf Use)				
Williams (MAPCO)	L3	ARRC	27.2	Liquid Bulk (Petroleum)
Chevron	L4	ARRC	17.3	Liquid Bulk (Petroleum)
Total Liquid Bulk Cargo (POA Use)			**44.5**	
Dry Bulk Cargo (POA Wharf Use)				
Alaska Basic Industries	D1	ARRC	5.3	Dry Bulk (Cement)
Total Dry Bulk Cargo			**5.3**	
TOTAL POA (WHARF USE ONLY)			**49.8**	

Figure B-2 - Facility Inventory Summary: Non-Port Tenants

Name / User	Code	Land Owner	Approx Acreage	Cargo Use Type
Containerized Cargo				
NorthStar Container	NC1	ARRC	7.4	Container
Douglas Container	NC2	ARRC	1.9	Container
Containerized Cargo Total			**9.3**	
Break-Bulk / Neo-Bulk Cargo				
NorthStar Break Bulk	NB1	ARRC	14.8	Break-Bulk / Neo-Bulk
Douglas Break Bulk	NB2	ARRC	1.0	Break-Bulk / Neo-Bulk
Break-Bulk / Neo-Bulk Cargo Total			**15.8**	
Dry Bulk Cargo				
Douglas Dry Bulk	ND1	ARRC	1.5	Dry Bulk (Gravel)
Dry Bulk Cargo total			**1.5**	
Liquid Bulk Cargo				
Tesoro	NL1	ARRC	7.6	Liquid Bulk (Petroleum)
Liquid Bulk Cargo Total			**7.6**	
Intermodal Rail				
ARRC Intermodal Yard	NI1	ARRC	27.4	Intermodal Freight
Intermodal Rail Total			**27.4**	
TOTAL NON-PORT AREA			111.4	

Notes:

1. An N Code denotes a non-Port of Anchorage user on non-Port owned property.
2. Some Port of Anchorage users are on non-Port owned (ARRC) property.
3. POA = Port of Alaska
4. ARRC = Alaska Rail Road Corporation
5. C = Container, B = Break-Bulk, A = Auto, L = Liquid-Bulk, D = Dry-Bulk, P = Passenger, I = Intermodal

Figure B-3 - Summary of Inventory

Type	POA Land Acres	Non-POA Land Acres
Container	**82.7**	9.3
Break-Bulk	**12.1**	15.8
Autos/Vehicles	**5.0**	0.0
Liquid Bulk	**19.9**	52.1
Dry Bulk	**0.0**	6.8
Passenger	**0.4**	0.0
Intermodal Rail	**0.0**	27.4
Total	**120.1**	111.4

1. Not including circulation areas of approximately 15%.
2. Not including 49.8 acres of non-POA land/wharf use.

Sea-Land; Container C1

General Terminal Characteristics

Terminal Inventory Designation	C1	
Terminal Name / Berth	Sea-Land	
Land Owner	POA	
Area Total	33.2	acres
Area Container (33.2 - 4.0 Auto)	29.2	acres

Berth / Vessel Characteristics

Berth Name / Number	Terminal 2	
Berth Length	610	feet
Number of Berths	1	
Water Depth from MLLW	30	feet
Vessel Length	710	feet
Vessel Calls per Week	2	
Structural Type	Pile Supported Dock	
Fender Type	Energy Absorbing UHMW	

Upland Characteristics

Dedicated Open Storage Area	32	acres
Temporary Open Storage Area	1	acres
Warehouse Storage / Facilities	38,000	SF (auto)
Office Facilities	12,000	SF

Crane Data

Number	Type	Capacity	Outreach	Backreach	Rail Gauge	Moves / Hour
1	Paceco	30 LT	9-Wide	1-Wide	50 ft	28
2	Paceco	30 LT	9-Wide	1-Wide	50 ft	28
3	Mitsubishi	40 LT	9-Wide	1-Wide	50 ft	28

Apron to Storage Transfer

Type	Hostler
Number	5 per Crane

Comments

Sea-Land is the major Lo-Lo container operation for the Regional Port of Anchorage. They have ships scheduled every Sunday and Tuesday. Typical offload is 1,000 TEU per ship. They use Terminal 2 wharf area (approx. 1 acre). They also use a small portion of Terminal 1 wharf area. And they lease the associated 6.4 acres of Transit Area B. They lease lots 5D-1, 5F-1 and 6D-1 (combined 25.8 acres). Approximately 7 acres of leased area is used for automobile storage (4 acres) and administrative offices (see A-1). Sea-Land also rents 1-2 additional acres, as needed, for about 9 months of the year.

Totem Ocean Trailer Express (TOTE); Ro-Ro C2

General Terminal Characteristics

Terminal Inventory Designation	C2	
Terminal Name / Berth	TOTE	
Land Owner	POA	
Area Total	30.5	acres
Area Trailer (30.5 - 1.0 Auto - 0.4 Passenger)	29.1	acres

Berth / Vessel Characteristics

Berth Name / Number	Terminal 3	
Berth Length	993	feet
Number of Berths	1	
Water Depth from MLLW	28-30	feet
Vessel Length	790	feet
Vessel Calls per Week	3	
Structural Type	Pile Supported Dock	
Fender Type	Energy Absorbing UHMW	

Upland Characteristics

Dedicated Open Storage Area	27.9	acres
Temporary Open Storage Area	4.4	acres (Tract EE)
Warehouse Storage / Facilities	12,000	SF (1/3 Port Shed)
Office Facilities	4,800	SF

Ship to Storage Transfer

Type	Hostler
Number	21 per Vessel
Ramps	2

Comments

TOTE is the major Ro - Ro operation at the Regional Port of Anchorage. TOTE has ships scheduled every Sunday and Tuesday year round. Typical offload is 850 TEU per ship. They use Terminal 3 wharf area (approx. 1.6 acres) and associated 14.8 acre transit areas C and D. TOTE leases lots 1D1, 2B1, 1E, and 3A (combined 14.1 acre). They periodically lease Tract EE during the busy season which lasts for about 8 months. Approximately 1 acre of total leased area is used for automobile storage. (see A2). TOTE usually schedules a third ship to come in on Saturdays from about mid April to mid November. The 1.6 acre wharf area is used periodically for passenger traffic. Therefore, we attribute approximately 0.4 acres (25%) for that activity.

Tract 4A; Container C3

General Terminal Characteristics

Terminal Inventory Designation	C3	
Land Owner	POA	
Area Total	5.3	acres

Upland Characteristics

Dedicated Open Storage Area	5.3	acres
Warehouse Storage / Facilities	0	SF
Office Facilities	0	SF

Ship to Storage Transfer

Type	Varies	
Distance	800	feet to Terminal #2

Comments
Tract 4A is currently under development. It will be paved and available for lease in the fall of 1999. Sea-Land has indicated that they are interested in acquiring a long term lease.

General Terminal Characteristics

Terminal Inventory Designation	C4	
Land Owner	POA	
Area Total	9.9	acres

Upland Characteristics

Dedicated Open Storage Area	9.9	acres
Warehouse Storage / Facilities	0	SF
Office Facilities	0	SF

Ship to Storage Transfer

Type	Varies	
Distance	1200	feet to Terminal #2

Comments
Tract A is Federal property currently under the control of the Bureau of Land Management. Efforts are underway to transfer this property to the Municipality of Anchorage. However, the Port holds a long-term lease. The Port would like to dedicate the east portion of this property (along the bluff) as a road right of way. The Port would like to sub-divide the remaining portion for use as lease lots.

General Terminal Characteristics

Terminal Inventory Designation	C5	
Land Owner	POA	
Area Total	4.4	acres

Upland Characteristics

Dedicated Open Storage Area	4.4	acres
Warehouse Storage / Facilities	0	SF
Office Facilities	0	SF

Ship to Storage Transfer

Type	Varies	
Distance	1000	feet to Terminal #3

Comments

Tract EE is Federal property currently under the control of the Military. However, the Port holds a long-term lease. The Port would also like to transfer this property to the Municipality of Anchorage. The Port would like to dedicate the east portion of this property (along the bluff) as a road right of way. The Port would like to sub-divide the remaining portion for use as lease lots.

South Transit Area & Lot 9A; Container C6

General Terminal Characteristics

Terminal Inventory Designation	C6	
Terminal Name / Berth	South Transit Area / Terminal #1	
Land Owner	POA	
Area Total	12.3	acres
Area Container	4.8	acres

Berth / Vessel Characteristics

Berth Name / Number	Terminal #1	
Berth Length	600	feet
Number of Berths	1	
Water Depth from MLLW	28-30	feet
Vessel Length	Varies	
Vessel Calls per Month	Varies	
Structural Type	Pile Supported Dock	
Fender Type	Energy Absorbing UHMW	

Upland Characteristics

Dedicated Open Storage Area	8.9	acres
Warehouse Storage / Facilities	0	SF
Office Facilities	0	SF

Apron to Storage Transfer

Type	Varies	
Distance	800	feet to Terminal #1

Comments

The South Transit Area consists of Lot 12B (8.9 acres) and Lot 9A (3.4 acres). Lot 9A has a small amount of usable storage area. It is squeezed between Tidewater Road and Anchorage Port Road and contains some railroad track. Approximately 4.8 acres of Lot 12B can be used for container storage. The remaining 4.1 acres is considered used for Break Bulk / Neo Bulk cargo use. In general, South Transit Area is used for "cargo of opportunity". It also contains the 1/2 acre valve yard. Some oil spill response gear is currently stored on this lot. Access to POL 2 is through this area. In the future, the POA intends to use this area for general cargo, cruise ship passengers, petroleum tankers, and natural resources.

Transit Area A; Break-Bulk / Neo-Bulk B1

General Terminal Characteristics

Terminal Inventory Designation	B1	
Terminal Name / Berth	Transit Area A / Terminal #1	
Land Owner	POA	
Area Total	4.6	acres
Area Break Bulk	4.6	acres

Berth / Vessel Characteristics

Berth Name / Number	Terminal #1	
Berth Length	600	feet
Number of Berths	1	
Water Depth from MLLW	28-30	feet
Vessel Length	Varies	
Vessel Calls per Month	Varies	
Structural Type	Pile Supported Dock	
Fender Type	Energy Absorbing UHMW	

Upland Characteristics

Dedicated Open Storage Area	4.6	acres
Warehouse Storage / Facilities	0	SF
Office Facilities	0	SF

Apron to Storage Transfer

Type	Varies	
Distance	400	feet to Terminal #1

Comments

Transit Area A is used for "cargo of opportunity". It is often used for construction staging. The Port maintenance facility is located on this lot. The Port rents space in Transit Area A through the use of a tariff system (by the container). Sea-Land sometimes rents space in Transit Area A. Transit area A normally serves Terminal 1.

South Transit Area & Lot 9A;
Break-Bulk / Neo-Bulk B2

General Terminal Characteristics

Terminal Inventory Designation	B2	
Terminal Name / Berth	South Transit Area / Terminal #1	
Land Owner	POA	
Area Total	12.3	acres
Area Break Bulk	7.5	acres

Berth / Vessel Characteristics

Berth Name / Number	Terminal #1	
Berth Length	600	feet
Number of Berths	1	
Water Depth from MLLW	28-30	feet
Vessel Length	Varies	
Vessel Calls per Month	Varies	
Structural Type	Pile Supported Dock	
Fender Type	Energy Absorbing UHMW	

Upland Characteristics

Dedicated Open Storage Area	8.9	acres
Warehouse Storage / Facilities	0	SF
Office Facilities	0	SF

Apron to Storage Transfer

Type	Varies	
Distance	800	feet to Terminal #1

Comments

The South Transit Area consists of Lot 12B (8.9 acres) and Lot 9A (3.4 acres). Lot 9A has a small amount of usable storage area. It is squeezed between Tidewater Road and Anchorage Port Road and contains some railroad track. Approximately 4.8 acres of Lot 12B can be used for container storage. The remaining 4.1 acres is considered used for Break Bulk / Neo Bulk cargo use. In general, South Transit Area is used for "cargo of opportunity". It also contains the 1/2 acre valve yard. Some oil spill response gear is currently stored on this lot. Access to POL 2 is through this area. In the future, the POA intends to use this area for general cargo, cruise ship passengers, petroleum tankers, and natural resources.

Sea-Land; Auto A1

General Terminal Characteristics

Terminal Inventory Designation	A1	
Terminal Name / Berth	Sea-Land	
Land Owner	POA	
Area Total	33.2	acres
Area Auto	4.0	acres

Berth / Vessel Characteristics

Berth Name / Number	Terminal 2	
Berth Length	610	feet
Number of Berths	1	
Water Depth from MLLW	28-30	feet
Vessel Length	710	feet
Vessel Calls per Week	2	
Structural Type	Pile Supported Dock	
Fender Type	Energy Absorbing UHMW	

Upland Characteristics

Dedicated Open Storage Area (Auto)	4	acres
Temporary Open Storage Area	1	acres
Warehouse Storage / Facilities	38,000	SF (auto)
Office Facilities	12,000	SF

Crane Data

Number	Type	Capacity	Outreach	Backreach	Rail Gauge	Moves / Hour
1	Paceco	30 LT	9-Wide	1-Wide	50 ft	28
2	Paceco	30 LT	9-Wide	1-Wide	50 ft	28
3	Mitsubishi	40 LT	9-Wide	1-Wide	50 ft	28

Apron to Storage Transfer

Type	Hostler
Number	5 per Crane

Comments

Sea-Land handles about 17,000 autos per year. Sea-Land has specialized car carrier containers for the Alaska portion of their operation. There are specialized car loading ramps inside the warehouse. Land associated with the automobile portion of the operation varies but averages about 4 acres. Approximately 26.3 acres of land is used for containerized cargo (see C1). The mix of autos is about 66% north-bound and 33% south-bound.

Totem Ocean Trailer Express (TOTE); Auto A2

General Terminal Characteristics

Terminal Inventory Designation	A2	
Terminal Name / Berth	TOTE	
Land Owner	POA	
Area Total	30.5	acres
Area Auto	1.0	acres

Berth / Vessel Characteristics

Berth Name / Number	Terminal 3	
Berth Length	993	feet
Number of Berths	1	
Water Depth from MLLW	28-30	feet
Vessel Length	790	feet
Vessel Calls per Week	3	
Structural Type	Pile Supported Dock	
Fender Type	Energy Absorbing UHMW	

Upland Characteristics

Dedicated Open Storage Area	1	acres
Temporary Open Storage Area	4.4	acres (Tract EE)
Warehouse Storage / Facilities	12,000	SF (1/3 Port Shed)
Office Facilities	4,800	SF

Ship to Storage Transfer

Type	Hostler
Number	21 per Vessel
Ramps	2

Comments

TOTE handles about 15,500 cars per year northbound and about 7,500 per year southbound. They are stored on about 1/2 of lot 1E. Overflow auto storage is on part of transit area D and Tract EE. Approximately 27.9 acres of total leased area is used for storing containerized general cargo utilizing a Ro - Ro operation (see C2).

EQUILON (Formerly Texaco) L1

General Terminal Characteristics

Terminal Inventory Designation	L1	
Terminal Name	EQUILON	
Land Owner	POA	
Area	8.7	acres

Berth / Vessel Characteristics

Berth Name / Number	POL 1 & POL 2	
Berth Length	612	feet
Number of Berths	2	
Water Depth from MLLW	28-30	feet
Vessel Length	Varies	
Vessel Calls per Year	4	
Structural Type	Pile Supported Dock	
Fender Type	Energy Absorbing UHMW	

Upland Characteristics

Dedicated Storage Area	19 Tanks	
Dedicated Storage Capacity	645,000	BBLS
Office Facilities	4,000	SF

Ship to Storage Transfer

Type	Pump / Piping
Capacity	5,000 BBLS / hour

Comments

EQUILON (formerly Texaco and Shell) sells about 270,000 bbls per month. About 70% of this comes in from Nikiski by pipeline (gas and jet fuel). Equilon also receives jet fuel and aviation gas by ship and barge as well as one barge a year of ethanol. The majority of their product is sold to local markets and transported by truck. Equilon currently leases the 8.7 acre lot 7B from the Port. Equilon has subleased their rail car valve rack to Williams Alaska Petroleum for jet fuel delivery to Signature Flight Service.

AFSC / Signature Flight Support L2

General Terminal Characteristics

Terminal Inventory Designation	L2	
Terminal Name	AFSC	
Land Owner	POA	
Area	11.2	acres

Berth / Vessel Characteristics

Berth Name / Number	POL 1 & POL 2	
Berth Length	612	feet
Number of Berths	2	
Water Depth from MLLW	28-30	feet
Vessel Length	Varies	
Vessel Calls per Year	4	
Structural Type	Pile Supported Docks	
Fender Type	Energy Absorbing UHMW	

Upland Characteristics

Dedicated Storage Area	9 Tanks	
Dedicated Storage Capacity	573,205	BBLS
Office Facilities	500	SF

Ship to Storage Transfer

Type	Pump / Piping
Capacity	5,000 BBLS / hour

Comments

AFSC / Signature Flight Support primarily provides service to deliver jet fuel to the airport via a new 12" pipeline. They receive liquid bulk from a number of sources including: Nikiski pipeline (about 1/3 of total), Mapco (about 1/3 of total), Equilon, Chevron, Tesoro, and a few barges. The barge and tanker operations account for about 1/3 of the total import and are generally not solely dedicated to AFSC. AFSC often shares these imports with one or more of the other Port area operators. They lease lots 8B and 8C (11.2 acres) from the Port.

Williams Alaska Petroleum (formerly MAPCO) L3

General Terminal Characteristics

Terminal Inventory Designation	L3	
Terminal Name	MAPCO	
Land Owner	ARRC	
Area	27.2	acres

Berth / Vessel Characteristics

Berth Name / Number	POL 1 & POL 2	
Berth Length	612	feet
Number of Berths	2	
Water Depth from MLLW	28-30	feet
Vessel Length	Varies	
Vessel Calls per Year	60	
Structural Type	Pile Supported Dock	
Fender Type	Energy Absorbing UHMW	

Upland Characteristics

Dedicated Storage Area	33 Tanks	
Dedicated Storage Capacity	731,000	BBLS
Office Facilities	21,400	SF

Ship to Storage Transfer

Type	Pump / Piping
Capacity	5,000 BBLS / hour

Comments

Williams receives fuel from the North Pole refinery via rail cars. They export this fuel to Western Alaska by way of barges loaded at the Port. Williams also supplies jet fuel to the international airport by pipeline. Williams currently processes about 70 rail cars per day, seven days per week. This amounts to a large portion of the Port area rail traffic. Williams plans to use the rack facility at Equilon to transfer jet fuel to AFSC tanks. This could add an additional 40 rail cars per day.

Chevron L4

General Terminal Characteristics

Terminal Inventory Designation	L4	
Terminal Name	Chevron	
Land Owner	ARRC	
Area	17.3	acres

Berth / Vessel Characteristics

Berth Name / Number	POL 1 & POL 2	
Berth Length	612	feet
Number of Berths	2	
Water Depth from MLLW	28-30	feet
Vessel Length	Varies	
Vessel Calls per Year	Varies	
Structural Type	Pile Supported Dock	
Fender Type	Energy Absorbing UHMW	

Upland Characteristics

Dedicated Storage Area	13 Tanks	
Dedicated Storage Capacity	700,000	BBLS
Office Facilities	32,000	SF

Ship to Storage Transfer

Type	Pump / Piping
Capacity	5,000 BBLS / hour

Comments

Chevron's primary customer is the military. Chevron supplies JP8 to them via pipeline.

Alaska Basic Industries (ABI) D1

General Terminal Characteristics

Terminal Inventory Designation	D1	
Terminal Name	ABI	
Land Owner	ARRC	
Area	5.3	acres

Berth / Vessel Characteristics

Berth Name / Number	POL 1	
Berth Length	612	feet
Number of Berths	1	
Water Depth from MLLW	28-30	feet
Vessel Length		
Ship	540	feet
Barge	270	feet
Vessel Calls per Year	8	4 ship/4 barge
Structural Type	Pile Supported Dock	
Fender Type	Energy Absorbing UHMW	

Upland Characteristics

Dedicated Storage Area	9 Silos	
Dedicated Storage Capacity	18,000	metric tons
Office Facilities	500	SF

Ship to Storage Transfer

Type	Dock Sider / Piping
Number	1

Comments

Alaska Basic Industries (ABI) imports bulk cement. ABI is located on ARRC property which adjoins Port of Anchorage property. They unload about four barges and four ships per year. This is done using specialized vacuum / pneumatic pump equipment. It currently takes about 10 days to unload a cement ship and about 4 days for a barge. However, inclement weather conditions can impact the unloading operations, creating substantial delays. ABI would like to use South Terminal (POL 2). This is closer to their silos and would speed transfer time considerably. Currently this option is not possible due to the size and load capacity of South Terminal (POL 2).

Passenger Area P1

General Terminal Characteristics

Terminal Inventory Designation	P1	
Terminal Name	Terminal 3	
Land Owner	POA	
Area	0.4	acres

Berth / Vessel Characteristics

Berth Name / Number	Terminal 3	
Berth Length	993	feet
Number of Berths	1	
Water Depth from MLLW	28-30	feet
Vessel Length	Varies	feet
Vessel Calls per Year	N/A	
Structural Type	Pile Supported Dock	
Fender Type	Energy Absorbing UHMW	

Upland Characteristics

Dedicated Upland Area	0	acres
Office Facilities	0	SF

Comments

Currently, the Port occasionally uses Terminal 3 for passenger operations. We have estimated the use of this wharf area (1.6 acres) at approximately 25% usage, or 0.4 acres. Buses, cabs, etc., drive out to the Terminal via the North Trestle. All passenger activities occur on the dock (except for bus and taxi cab waiting). These operations are limited to Wednesdays and Thursdays due to the TOTE cargo schedule. The Port would like to transfer passenger operations to the South Terminal as soon as that option becomes available.

NorthStar; Container NC1

General Terminal Characteristics

Terminal Inventory Designation	NC1	
Terminal Name / Berth	NorthStar	
Land Owner	ARRC	
Area Total	22.3	acres
Area Container	7.4	acres

Berth / Vessel Characteristics

Berth Name / Number	NorthStar Dock	
Berth Length	300+	feet
Number of Berths	1	
Water Depth from MLLW	+12	feet
Vessel Length	250-300	feet
Vessel Calls per Month	Varies	
Structural Type	Sheet Pile	
Fender Type	Tires	

Upland Characteristics

Dedicated Open Storage Area	7.4	acres
Temporary Open Storage Area	7.4	acres
Office Facilities	14,500	SF

Crane Data

Number	Type	Capacity
3	Manitowoc	150 T

Apron to Storage Transfer

Type	30 ton Fork Lift
Number	4

Comments

NorthStar has a multi purpose dock facility on 22.3 acres of ARRC property. They handle a wide variety of cargo including containers, break bulk, heavy lift, etc. Currently, several North Slope oilfield modules are being built on their facilities. These large pieces of oilfield equipment are constructed on the dock then transferred to barges for transport.

Douglas Management; Container NC2

General Terminal Characteristics

Terminal Inventory Designation	NC2	
Terminal Name / Berth	Northland Marine	
Land Owner	ARRC	
Area Total	16.1	acres
Area Container	1.9	acres

Berth / Vessel Characteristics

Berth Name / Number	NorthStar Dock	
Berth Length	300+	feet
Number of Berths	1	
Water Depth from MLLW	+12	feet
Vessel Length	250-300	feet
Vessel Calls per Month	2	
Structural Type	Sheet Pile	
Fender Type	Tires	

Upland Characteristics

Dedicated Open Storage Area	1.9	acres
Temporary Open Storage Area	1.5	acres
Office Facilities	1,000	SF

Crane Data

Number	Type	Capacity
1	Manitowoc	150 T

Apron to Storage Transfer

Type	30 ton Fork lift
Number	2

Comments

Northland Marine leases 2.9 acres from Douglas Management on which they operate a container / break bulk facility. They have about two barges a month arriving March through October and one barge a month the rest of the year. Typical off-load is 270 TEU. Most of the cargo is containers or palletized building products which are handled with forklifts. Some cargo is heavy, or odd sized and is unloaded via track mounted crane.

NorthStar; Break Bulk NB1

General Terminal Characteristics

Terminal Inventory Designation	NB1	
Terminal Name / Berth	NorthStar	
Land Owner	ARRC	
Area Total	22.3	acres
Area Break Bulk	14.8	acres

Berth / Vessel Characteristics

Berth Name / Number	NorthStar Dock	
Berth Length	300+	feet
Number of Berths	1	
Water Depth from MLLW	+12	feet
Vessel Length	250-300	feet
Vessel Calls per Month	2	
Structural Type	Sheet Pile	
Fender Type	Tires	

Upland Characteristics

Dedicated Open Storage Area	14.8	acres
Temporary Open Storage Area	7.4	acres
Office Facilities	14,500	SF

Crane Data

Number	Type	Capacity
3	Manitowoc	150 T

Apron to Storage Transfer

Type	30 ton Fork
Number	4

Comments

NorthStar has a multi purpose dock facility on 22.3 acres of ARRC property. They handle a wide variety of cargo, including containers, break bulk, heavy lift, etc. Currently several North Slope oilfield modules are being built on their facilities. These large pieces of oilfield equipment are constructed on the dock then transferred to barges for transport.

Douglas Management; Break Bulk NB2

General Terminal Characteristics

Terminal Inventory Designation	NB2	
Terminal Name / Berth	Northland Marine	
Land Owner	ARRC	
Area Total	16.1	acres
Area Break Bulk	1.0	acres

Berth / Vessel Characteristics

Berth Name / Number	NorthStar Dock	
Berth Length	300+	feet
Number of Berths	1	
Water Depth from MLLW	+12	feet
Vessel Length	250-300	feet
Vessel Calls per Month	2	
Structural Type	Sheet Pile	
Fender Type	Tires	

Upland Characteristics

Dedicated Open Storage Area	1	acres
Temporary Open Storage Area	1.5	acres
Office Facilities	1,000	SF

Crane Data

Number	Type	Capacity
1	Manitowoc	150 T

Apron to Storage Transfer

Type	30 ton Fork
Number	2

Comments

Northland Marine leases 2.9 acres from Douglas Management on which they operate a container / break bulk facility. They have about two barges a month arriving in March through October and one barge a month the rest of the year. Typical off load is 270 TEU. Most of the cargo is containers or palletized building products which are handled with forklifts. Some cargo is break bulk, heavy, or odd sized and is unloaded via track mounted crane.

Douglas Management; Dry Bulk ND1

General Terminal Characteristics

Terminal Inventory Designation	ND1	
Terminal Name / Berth	Summit Paving	
Land Owner	ARRC	
Area Total	16.1	acres
Area Dry Bulk	1.5	acres

Berth / Vessel Characteristics

Berth Name / Number	Minch Dock	
Berth Length	300+	feet
Number of Berths	1	
Water Depth from MLLW	+12	feet
Vessel Length	250-300	feet
Vessel Calls per Month	40	
Structural Type	Sheet Pile	
Fender Type	Tires	

Upland Characteristics

Dedicated Open Storage Area	1.5	acres
Temporary Open Storage Area	1.5	acres
Office Facilities	0	SF

Apron to Storage Transfer

Type	Conveyor / Front End Loader
Number	1

Comments

Summit Paving leases 1.5 acres from Douglas Management on which they operate a gravel / aggregate operation. They import 300,000 to 500,000 tons of gravel per year from a site off of the Knik Arm. Douglas Management can store about 30,000 tons on site. The gravel is off-loaded by conveyor then loaded into 20 ton dumps by front end loader. Summit also unloads one barge per year of salt which is used by the DOT for road de-icing.

Tesoro NL1

General Terminal Characteristics

Terminal Inventory Designation	NL1	
Terminal Name	Tesoro	
Land Owner	ARRC	
Area	7.6	acres

Upland Characteristics

Dedicated Storage Area	8 Tanks	
Dedicated Storage Capacity	220,000	BBLS
Office Facilities	1,200	SF

Comments

Tesoro currently receives all of their product from Nikiski via their own pipeline. They sell this product (gas and diesel) locally. Distributors pick it up and transport it by truck. They currently do not use the Port marine facilities. However, they remain connected to the Port's valve yard. They lease lots 11A and 10 (total 7.6 acres) from the ARRC.

ARRC Intermodal Yard NI1

General Terminal Characteristics

Terminal Inventory Designation	NI1	
Terminal Name	Alaska Railroad	
Land Owner	ARRC	
Area	27.4	acres

Upland Characteristics

Dedicated Storage Area	5	acres
Office Facilities	1,000	SF

Loading Track Characteristics

Average Length of Loading Track	2,000	feet
Total Loading Track Length	4,000	feet
Number of Loading Tracks	2	

Loading Equipment

Number	Type
2	Piggy Packer
4	Fork Lift

Comments

Alaska Rail Road Corporation (ARRC) owns and operates an intermodal rail facility near the Port of Anchorage. This intermodal yard is located on Whitney Road about 1.5 miles from the Port. The ARRC loads trailer on a flat car (TOFC) and container on a flat car (COFC) at this facility. Throughput is about 20,000 TEU per year. Of this, about 95% is outbound from Anchorage. The mix is about 60% TOFC and 40% COFC. The ARRC has about 600 acres of yard space in the area and could expand this operation if required.

INVENTORY OF EXISTING MARITIME FACILITIES - SITE PLAN

GRAPHIC SCALE
300 0 150 300 600
(IN FEET)
SCALE: 1" = 300'
(11x17 SCALE: 1" = 600')

LEGEND

C = CONTAINER
B = BREAK-BULK / NEO BULK
A = AUTO / VEHICLE
L = LIQUID BULK
D = DRY BULK
P = PASSENGER
I = INTERMODAL RAIL
N = NON-PORT LAND OR NON-PORT USE

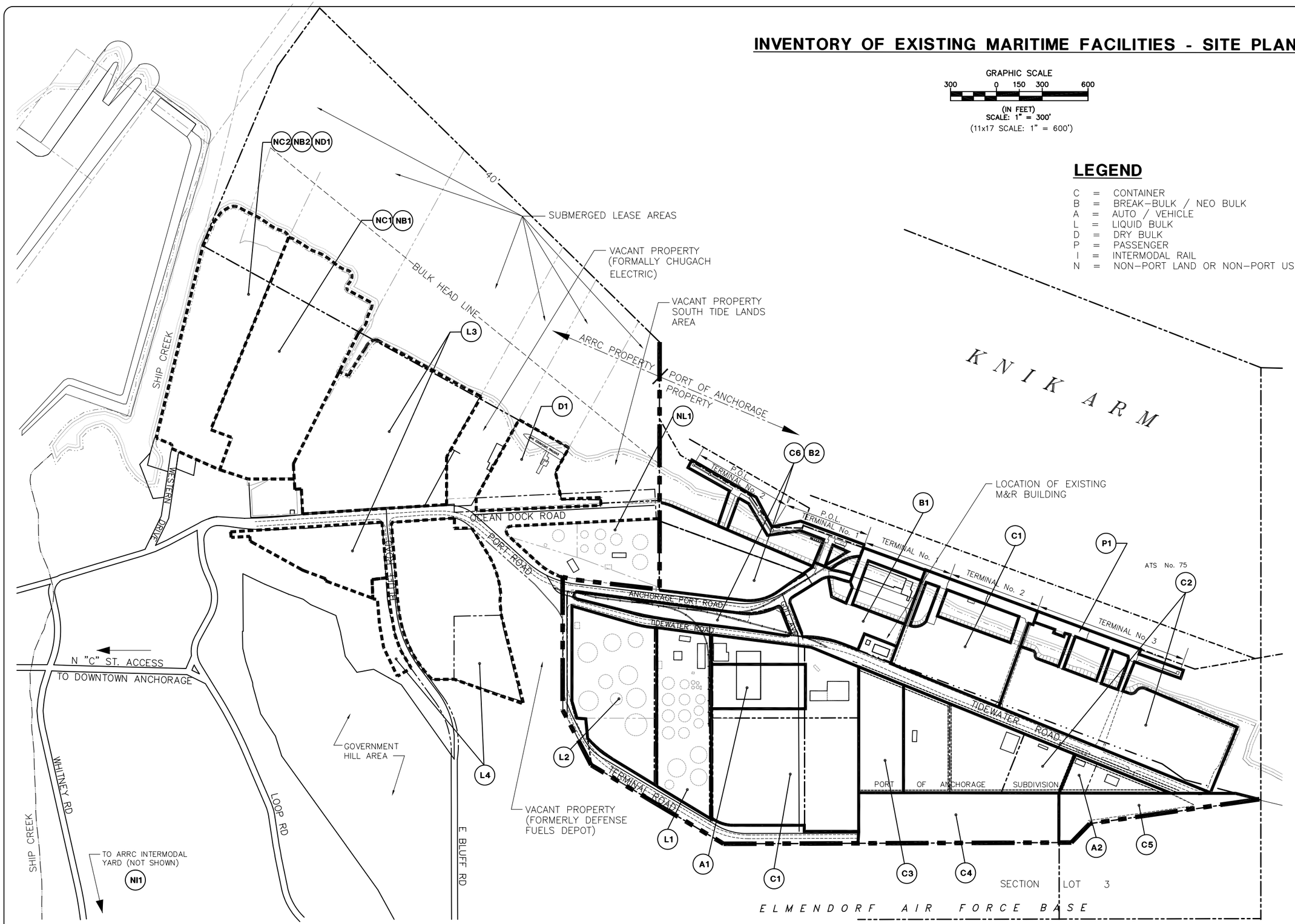


FIGURE B-4

Wehrmeyer · Zachary · Miller
a division of
RANSYSTEMS CORPORATION
Planning Architecture Engineering
180 Grand Avenue, Suite 400
Oakland California 94612-3741
phone 510 895 5700 fax 510 895 5959

THE REGIONAL PORT OF ANCHORAGE

MASTER PLAN

REVISIONS / ISSUES			
NO.	DATE	BY	APP'D
NO.	DATE	BY	APP'D
NO.	DATE	BY	APP'D
NO.	DATE	BY	APP'D

ENGINEERS/PLANNERS/SURVEYORS & LANDSCAPE ARCHITECTS
TRYCK NYMAN HAYES, INC.
911 W. 8TH AVENUE, SUITE 300
ANCHORAGE, AK 99501
TEL: 907-279-0543 · FAX: 907-276-7679

FILE:J:\980730\FINAL-AUG99\FIG-B-4	
SCALE:	1" = 300'
DESIGNED BY:	JD
DRAWN BY:	HAD/EAC
CHECKED BY:	JF
APPROVED BY:	DV
DATE:	9/30/99
PROJECT NO.:	V980730

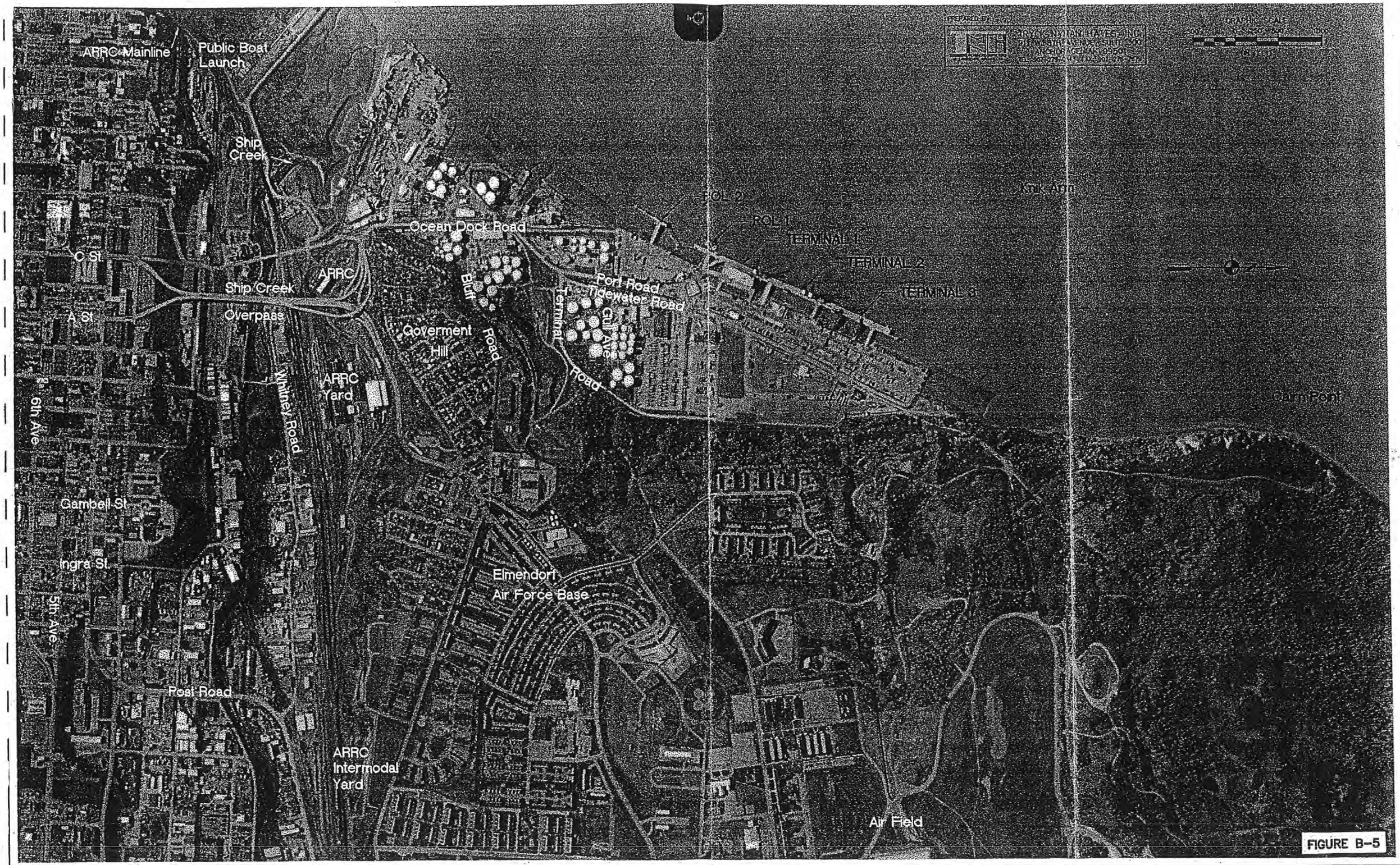


FIGURE B-5

TNH JOB NO.: 8155.0 PLOT VIEW: P1
PLOT DATE: 12/30/98 DWG FILE: B155PH03.DWG PLOT SCALE: 1

C. ANALYSIS OF CAPACITY AND DEMAND

C.1 Maritime Facility Capacity Analysis

C.1.1 Capacity Model Overview

To assess existing cargo-handling capability, detailed computerized cargo-handling models were developed for the regional Port of Anchorage by VZM/TranSystems. These models analyzed containerized cargo, break-bulk/neo bulk, automobiles, liquid bulk, dry bulk and passenger/cruise capabilities. The models compared six key facility components related to maritime terminal cargo throughput capacity:

- Vessel arrival and berth availability.
- Cargo transfer at the wharf apron.
- Apron-to-storage transfer.
- Storage yard and dwell times.
- Storage-to-inland transfer.
- Gate processing.

To understand the Passenger/Cruise terminal facilities, the model compared six similar specific facility components related to Passenger/Cruise terminal throughput capacity.

Each cargo model has the capability to utilize monthly throughput data to identify peaking requirements for storage and retrieval systems typical of modern container, break-bulk/neo bulk, liquid bulk and dry bulk facilities.

Seasonality and operational peaks and valleys are typical of all maritime-related businesses and are directly incorporated into the model. This phenomenon is particularly true at the Port of Anchorage, given its unique environmental conditions, such as ice, extreme low and high tides, etc. Therefore, these local peaking characteristics are used to account for operational practices, as well as for seasonality.

The computerized models were then applied to each terminal user's operations to identify the average "maximum practical capacity" for each terminal. Maximum Practical Capacity (MPC) is defined as the high end of a realistic operating scenario. For containerized cargoes, this throughput is measured in either lifts or twenty-foot equivalency units (TEU). For break-bulk/neo bulk, liquid bulk and dry bulk, the units of measurement are in short tons. Automobiles are measured in number of vehicles per year, and passenger/cruise in number of passengers.

Although the MPC of a terminal is defined as the high end of a realistic operating scenario, this represents the peak operation of a terminal and sustained operation at this level for a significant period of time is generally:

- Uneconomical
- Impractical
- Unsafe

An analogy for this is the speedometer on a car. Although the speedometer may read up to 120 mph, this is not the safest, practical, or most economical speed at which to drive the car.

For this reason, a maintainable capacity for each terminal has been estimated and used as the terminal's capacity in this Master Plan report. This capacity is known as the **Sustainable Practical Capacity (SPC).** VZM/TranSystems' past experience in applying these capacity models is that the sustainable practical capacity of a terminal is generally 75 percent of the terminal's Maximum Practical Capacity (MPC). For throughput to exceed the SPC, the terminal must potentially operate at uneconomical or unsafe levels, build additional terminals, or expand the existing ones. This threshold generally may vary between terminals, but past experience has shown that the breaking point generally is near 75 percent.

However, for planning purposes, we have consistently used Sustainable Practical Capacity (SPC) as the basis for our Future Facility Demand Analysis, as well as subsequent estimating exercises throughout this Master Plan. This equates to a throughput that is planned at approximately 75% to 85% of the terminal's MPC.

In reality, during peak times, many terminal throughputs can operate at, or close to, 100% MPC. This appears to be the case for the two containerized cargo tenants currently operating at the Port of Anchorage. TOTE and Sea-Land are operating at MPC's (very high TEU's/acre/year) and are stretching the envelope with respect to their respective MPC's. But, for practical planning purposes, we believe that operations at 100% MPC are not sustainable over prolonged periods. It should also be noted that prolonged operations at 100% MPC tend to drive up operating and maintenance costs and are considered unrealistic for long durations.

Note that the estimated SPC per each planning module for containerized cargo has been adjusted (between 75% and 80% MPC) over each approximately ten to fifteen-year interval. This is done to reflect the likelihood that there will be projected throughput increases due to improvements to cargo handling equipment and higher productivity levels, as well as the addition of other types of technological advancements in automated improvements. It can be safely assumed that these technological improvements and productivity increases are likely to occur at the Regional Port of Anchorage over the next few decades.

VZM/TranSystems' method for estimating maximum practical capacity has been used for the following purposes:

- To identify the need for additional terminals or expansion of existing ones.
- To identify current physical and operational constraints on maximum terminal throughput capability.

- To create a balanced terminal design in which each component provides approximately the same throughput capability.
- To evaluate various productivity measures that utilize improved technologies for handling, transferring and storing cargo.

C.1.2 Summary of Capacity Model Findings

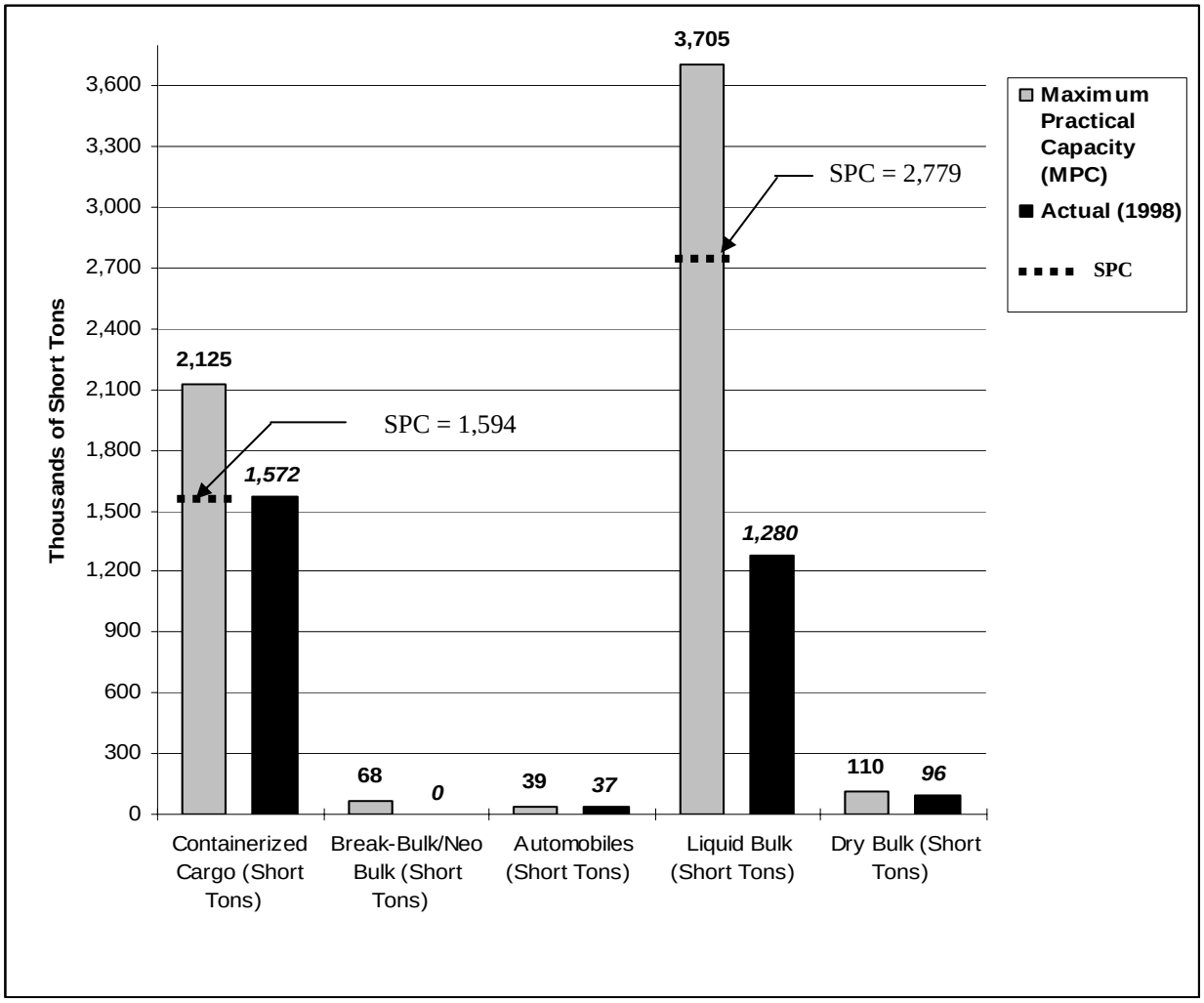
A detailed description of the computer model architecture and features, as well as a print out of the summary sheets of each model run for containerized cargo, break-bulk/neo bulk, automobiles, liquid bulk, dry bulk and passenger/cruise is presented in the Appendix. Summaries of the capability estimates for each cargo type (containerized cargo, break-bulk/neo bulk, automobiles, liquid bulk, and dry bulk), as well as passenger cruise, are presented in Figure C-1. (Based on December, 1998 - Inventory of Existing Facilities.)

Figure C-1: Summary of Throughput Capacity Analysis – By Cargo Type

Commodity Type	Maximum Practical Throughput (MPC)	Units
Containerized Cargo	2,125,043 (485,170)	Short Tons / (TEU's)
Break-Bulk / Neo Bulk Cargo	68,079	Short Tons
Automobile Cargo	39,281	Autos/Year
Liquid Bulk Cargo	3,704,835	Short Tons
Dry Bulk Cargo	107,817	Short Tons
Passenger / Cruise	17,354	Passengers

A summary of the Regional Port of Anchorage's actual 1998 cargo throughput versus the estimated Maximum Practical Capacity Throughput (MPC) is presented in short tons, and is illustrated in Figure C-2.

Figure C-2: Port of Anchorage Annual Cargo Throughput – Maximum Practical Capacity versus Actual 1998 Throughputs



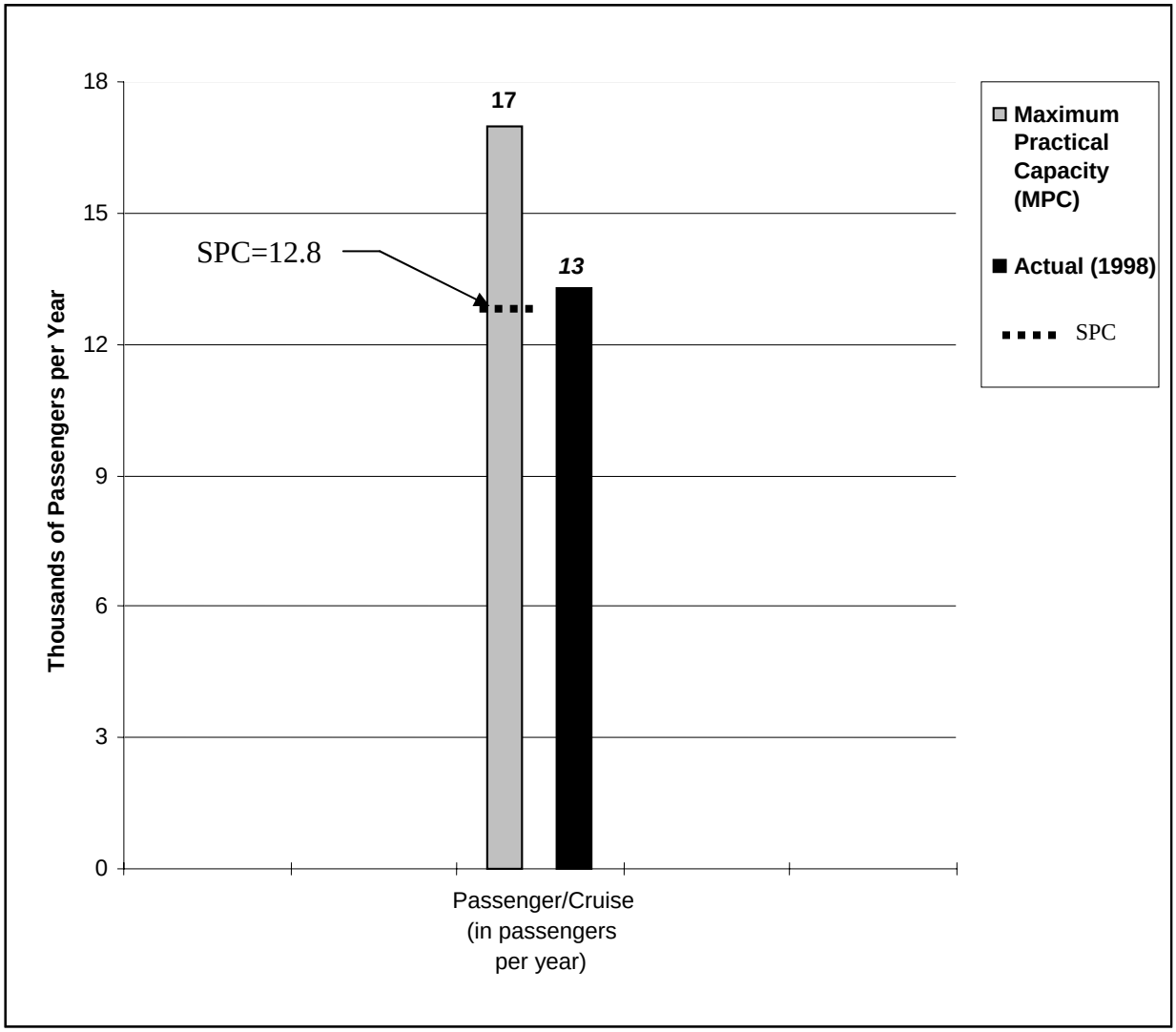
Based on the Strategic Marketing Plan, note that the Maximum Practical Capacity of 2,125,043 short tons of containerized cargo is equivalent to approximately 485,170 TEU's, at about 4.38 short tons per TEU. The equivalent conversion for automobiles is estimated to be approximately 1 short ton per 1 unit of automobile. The equivalent unit of conversion for liquid bulk is approximately 6.58 barrels per short ton. Dry Bulk has no conversion factor.

As an additional reality check, we compared the 485,170 TEU per year MPC to world industry standards and to actual performance at the Port of Anchorage. By world standards, the TEU per acre per year typically is between 2,000 and 4,500. Only in a few cases in Asia (high transshipment ports) does this number exceed 6,000. The 485,170 MPC divided by 82.7 acres (as used in the capacity model) equals 5,866 TEU per acre. 75% to 80% of 5,866 TEU equals 4,340 to 4,690 TEU per acre. These are the SPC values that we have used to define future development

needs. The actual 1998 throughput of 358,480 divided by 68.3 acres (the approximate actual acreage used in 1998) equals 5,249 TEU per acre. This actual performance is slightly higher than the estimated SPC, however, somewhat lower than the estimated MPC. This indicates that the Port is operating at a fairly high level and new developments will be needed soon. Therefore, our calculated MPC and SPC estimations compare favorably to both world practice and actual Port of Anchorage standards.

A summary of the Port's actual 1998 annual cruise vessel calls, versus the estimated Maximum Practical Capacity Throughput (MPC), in number of passengers per year, is presented in Figure C-3.

Figure C-3: Port of Anchorage Annual Passenger / Cruise Throughput – Actual versus Maximum Practical Capacity



Based on Port of Anchorage data, it has been reported that the actual passenger volumes for 1998 were approximately 13,259 passengers. The data also indicated that there were 10 cruise vessel calls in calendar year 1998, or an average of approximately 1,325 passengers per vessel call.

C.2 Future Facility Demand Analysis

Working from the Inventory and throughput modeling, the future facility demands analysis for the Regional Port of Anchorage was developed. The MPC's of existing facilities, for each cargo type were subtracted from the cargo forecasts developed by Northern Economics, Inc. and Leeper, Cambridge and Campbell, Inc. (LCC) for the Strategic Marketing Plan. This was done in order to identify possible future shortfalls (or over-capacities). If a shortfall was identified, the quantity of the shortfall was divided by the appropriate capacity of the associated terminal planning module (planning modules are described in greater detail later in this section). Thus, the required number of future acres to accommodate the shortfall was identified. This exercise was performed for the medium and high forecasts for the years 1998, 2005, 2010, 2015 and 2020 to assess the needs for any new facilities space over an approximately 20-year planning horizon.

Figure C-4 indicates the findings of the Demand Analysis utilizing the results of the capacity models and using the medium forecast as developed in the Strategic Marketing Plan Final Draft, dated February 1999. The results are in the quantity of new acres required.

Figure C-4: Amount of New Terminal Acres Based on Medium Forecast and SPC

Cargo / Use Type	1998	2005	2010	2015	2020
Containerized Cargo	0.0	19.4	35.6	43.1	63.9
Break-Bulk / Neo Bulk Cargo	0.0	0.0	0.0	0.0	0.0
Automobile Cargo	2.0	3.9	5.2	6.0	7.6
Liquid Bulk Cargo	0.0	0.0	0.0	0.0	0.0
Dry Bulk Cargo	0.1	0.2	0.2	0.2	0.3
Passenger / Cruise	0.0	0.0	0.0	0.3	0.7
Totals	**2.1**	**23.5**	**41.0**	**49.6**	**72.5**

Figure C-5 indicate the findings of the Future facility Demand Analysis utilizing results of the capacity models and the high forecast as developed in the Strategic Marketing Plan – Final Draft, dated February 1999. The results are in the quantity of new acres required.

Figure C-5: Amount of New Terminal Acres Based on High Forecast and SPC

Cargo / Use Type	1998	2005	2010	2015	2020
Containerized Cargo	0.0	30.3	53.2	69.0	98.8
Break-Bulk / Neo Bulk Cargo	0.0	1.0	1.0	1.8	2.9
Automobile Cargo	0.8	3.2	5.1	6.8	9.3
Liquid Bulk Cargo	0.0	0.0	0.0	0.0	0.0
Dry Bulk Cargo	0.0	0.1	0.2	0.3	0.4
Dry Bulk Cargo - with Added Coal	0.0	3.1	6.1	8.6	11.5
Passenger / Cruise	0.0	0.0	0.4	0.7	1.1
Totals	**0.8**	**37.7**	**66.0**	**87.2**	**124.0**

Several nuances were applied to the Demand Capacity Analysis to enhance defensibility and accuracy:

- The medium forecast was used as a baseline for comparison. It would be quite reasonable to use the high forecast, yielding to the simple truth that "aiming too low" can produce a self-fulfilling prophecy. However, in order to maintain a pragmatic and defensible quality in the findings of this study, we have used the medium forecast for planning the Alternatives. Because of the sensitive nature of many of the existing cargoes to small changes in the local economy, a conservative planning approach is considered more realistic. This issue should be fully understood by Port decision-makers and revisited in more detail in their own subsequent marketing and planning efforts. In our view, to base long-range planning on low forecasts risks the artificial constraining of terminal throughputs, which is clearly contrary to the Regional Port of Anchorage's planning strategy. Utilization of the Port's future needs, based on low forecasts, effectively locks the planning process into a constrained growth scenario.
- In addition, although some commodities may only grow at the low forecast, others may grow at the high forecast. The modules that have been developed for this Master Plan were designed to allow flexibility. By reserving expansion options for the medium forecasts for all commodities, it is more likely that particularly successful future marketing efforts of any given commodity can be accommodated.

C.2.1 Methodology

Based on the results of the Capacity Analysis of existing facilities, and a review of the planned improvements, VZM/TranSystems has prepared the Future Facility Demand Analysis for each type of terminal. VZM/TranSystems has developed idealized facility modules, to be used as tools, or guidelines in comparing the current MPC's of the existing terminals to the forecasts.

However, for the purposes of this Master Plan, the primary focus has been on the quantity of new acres that will be needed to fulfill future requirements. Therefore, where shortfalls occur, the approximate quantities of new terminal acreages have been derived.

VZM/TranSystems has developed 'idealized terminal modules' that will be used as guides for means of comparison, and as footprints to help identify the approximate areas for proposed new terminal development. Data from VZM/TranSystems 'idealized terminal modules' have been used in the Future Facility Demand Analysis spreadsheets, which are used later in this Section. It is the opinion of the consulting team that VZM/TranSystems typical modules will not be used for the purposes of defining new terminals in the Port of Anchorage's Master Plan. This is due to the existing conditions that are unique to the way terminals are designed in the Anchorage area. That is to say that the general areas of VZM/TranSystems 'idealized terminal modules' will be used as footprints for new terminal concepts, but the details of those modules will not be used. These module footprints will be carefully refined and incorporated into the Facility Development Alternatives Section of this Facility Plan.

C.2.2 Containerized Cargo Future Facility Demand Analysis

The Northern Economics, Inc. and LCC high and base (medium) forecasts for containerized cargo volumes were used by VZM/TranSystems to develop the Future Facility Demand Analysis and low forecast assumptions. Forecasted Annual Growth Rates for cargo volumes are described in detail in the Strategic Marketing Plan section of this Master Plan. The forecasted growth rates have been compiled and are illustrated on Figure C-6, along with the Maximum Practical Capacity of the existing container cargo facilities of 485,170 TEU's.

For the purposes of future facility planning and future facility demand analysis, VZM/TranSystems has used the medium (baseline) compared to the Sustainable Practical Capacity (SPC) for both the medium and high forecast's as derived in the Strategic Marketing Plan.

Note that the estimated capacity per module for containerized cargo has been adjusted (between 75% and 80% SPC for the medium, and 85% and 90% for the high) over each approximately ten to fifteen year interval. This is done to reflect the likelihood that there will be projected throughput increases due to improvements to cargo handling equipment and productivity levels, as well as the addition of other types of technologically advanced automated improvements. It can be safely assumed that these technological improvements and productivity increases will likely occur over the next few decades.

As explained previously, for practical planning purposes, sustained throughput is often planned at approximately 75%-80% of the terminals MPC. The graph on Figure C-7 illustrates the need for two new container terminals of approximately 40 acres each between now and approximately 2020, when using the **medium forecast** and this approximately 75%-80% utilization factor. And our demand capacity analysis indicates that, for the medium forecast approximately 64 acres will be needed, or about 1.5 modules. However, as mentioned before, it would be impractical to build ½ of a terminal, therefore we have rounded to 2 new 40-acre terminals.

The stepped lines illustrate when and how these increases in capacity would occur in order to meet the medium forecast. In other words, each stepped increase represents one 40-acre container terminal.

It is important to note that the hatched pattern areas represent periods when excess shortfalls can be expected should the high forecast be realized.

For the purposes of the **high forecast**, we believe that approximately 99 acres (or approximately 3 new container terminal modules) of new container terminal will be required by the year 2020. The graph in Figure C-8 illustrates when new container terminals will be required when using 85%-90% of the Sustainable Practical Capacity (SPC). And like the graph used for the medium forecast, the stepped lines illustrate when and how increases in capacity (using a 85%-90% capacity module) occur in order to meet the high forecast.

Figure C-6: Containerized Cargo New Facility Module Demand Analysis

Trade Forecast in TEU's	1998	2005	2010	2015	2020
Low	359,000	395,000	417,000	435,000	458,000
Medium	359,000	449,000	520,000	590,000	687,000
High	359,000	563,000	677,000	800,187	957,000

Estimated Capacity	TEU/YR	1998	2005	2010	2015	2020
Estimated .Maximum Practical Capacity (MPC)	485,170					
SPC % Factor (Medium Forecast)		75%	75%	75%	80%	80%
Base SPC		363,878	363,878	363,878	388,136	388,136
SPC % Factor (High Forecast)		85%	85%	85%	90%	90%
High Forecast SPC		412,395	412,395	412,395	436,653	436,653
Base Acres	83					
TEU/Acre/Year	5,845					
Estimated Module MPC (100%)	234,000					
Acres per Module	40					
SPC Factor per Module Medium (75%-85%)		75%	75%	75%	80%	80%
Module SPC		175,500	175,500	175,500	187,200	187,200
SPC Factor per Module High (85%-90%)		85%	85%	85%	90%	90%
Module SPC		198,900	198,900	198,900	210,600	210,600
Module TEU/Acre/Year	5,850					

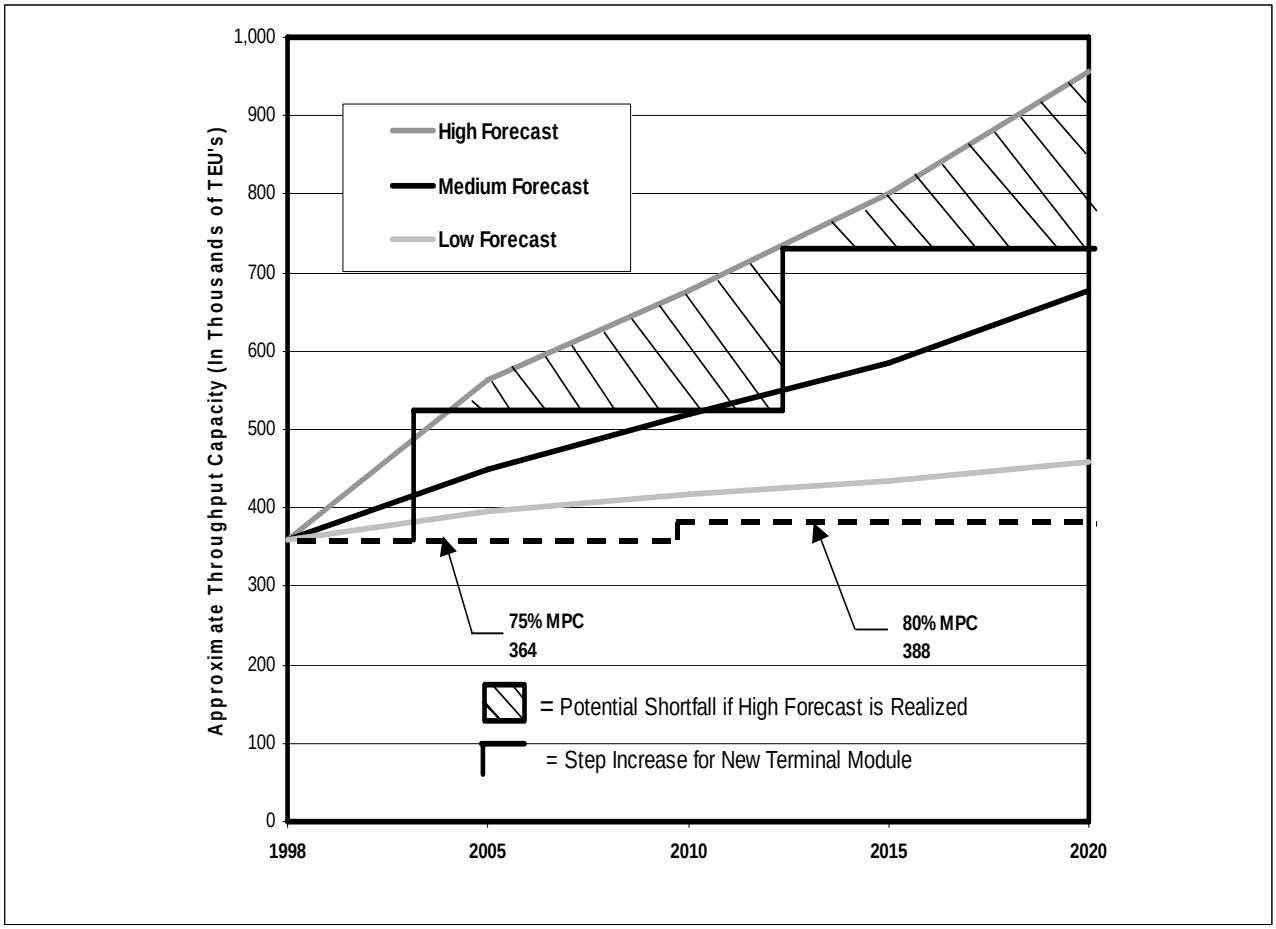
Estimated Modules Needed - Medium Forecast					
Shortfall (or Overcapacity)	(4,878)	85,123	156,123	201,864	298,864
New Terminal Modules Needed	0.0	0.5	0.9	1.1	1.6
New Acres Needed	0.0	19.4	35.6	43.1	63.9
New Modules Needed - Medium Forecast (75%-85% MPC)	**0**	**1**	**1**	**1**	**2**

Estimated Modules Needed - High Forecast					
Shortfall (or Overcapacity)	(53,395)	150,606	264,606	363,534	520,347
New Terminal Modules Needed	0.0	0.8	1.3	1.7	2.5
New Acres Needed	0.0	30.3	53.2	69.0	98.8
New Modules Needed - High Forecast (85%-90% MPC)	**0**	**1**	**2**	**2**	**3**

Recommended New Terminal Modules for Long Range Planning Purposes					
New Terminal Modules	**0**	**1**	**1-2**	**1-2**	**2-3**

In all cases, the number of new terminal modules have been rounded up to the next terminal module increment. If additional acreage or some percentage of new terminals is needed, then a whole new terminal module is required. One would not build portions of a new terminal module (an approach that is not considered to be economical or practical).

Figure C-7: Containerized Cargo – Medium Forecast versus Capacity – Using 75% -80% SPC



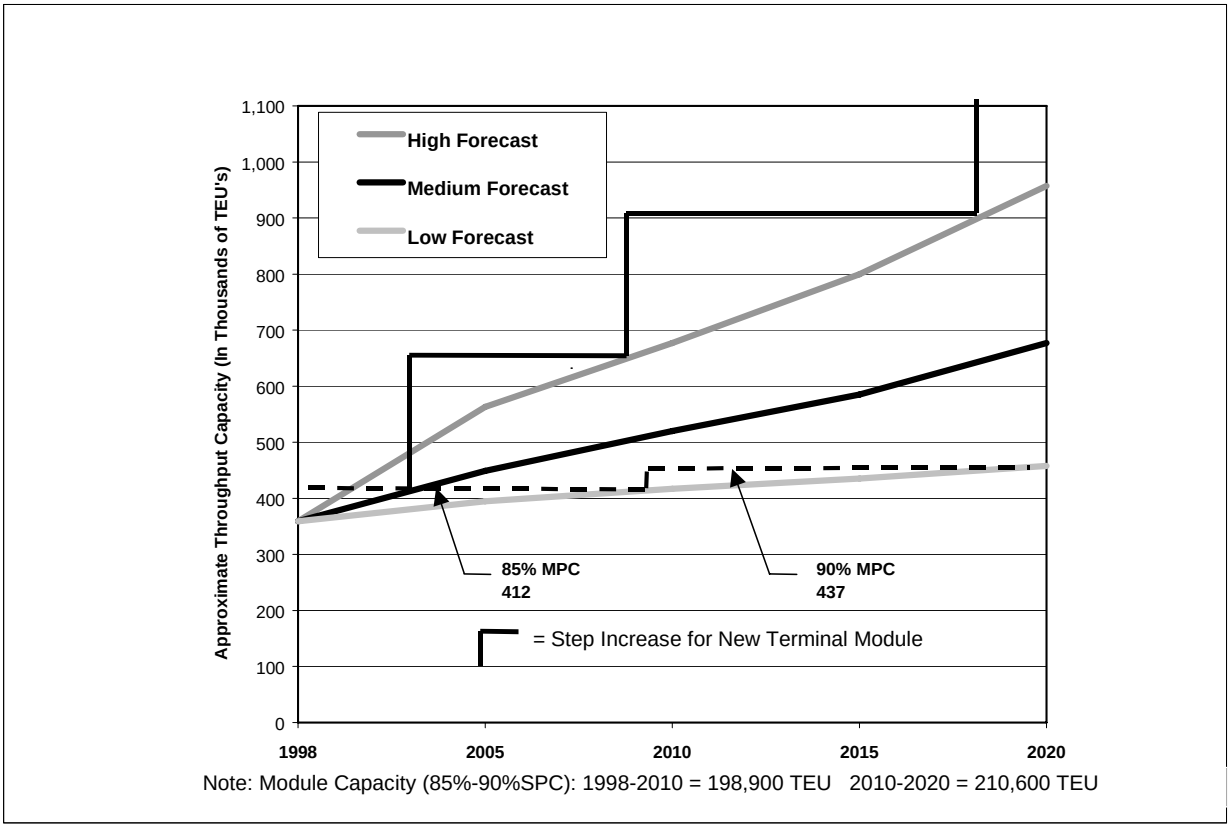
Note: Module Capacity (SPC=85-90% of MPC): 1998-2010 = 198,900 TEU 2010-2020 = 210,000 TEU

C.2.3 Containerized Cargo Future Facility Demand Capacity Summary

To summarize, we estimate that between **54 and 89 acres** (or 2 - 3 new container cargo terminal modules) for new containerized cargo facilities will be needed at the Regional Port of Anchorage between now and 2020. **This accounts for the re-use of existing Port facilities that may be converted to container terminal use.** We have used the medium and high cargo forecast, and assumed that most of the container operators are operating at between 75% and 90% SPC.

We have determined that some of this acreage requirement (approximately 10-15 acres) can be achieved with the use of existing Port land and adjacent properties that can be converted for containerized cargo use. The uses and locations of these areas are described in much greater detail in the Facility Development Alternatives Section of this Facility Plan. The descriptions of these potential sites for uses other than containerized cargo can also be found on the Phase I and Phase II drawings presented in Section F: Implementation.

Figure C-8: Containerized Cargo – High Forecast versus Capacity – Using 85% - 90% SPC



Break-Bulk/Neo Bulk, Automobiles, Liquid Bulk, Dry Bulk and Passenger/Cruise Future Facility Demand Analysis

Similar to the containerized cargo Future Facility Demand Analysis, new facility module demand analysis charts have been prepared for Break-Bulk / Neo Bulk, Automobiles, Liquid Bulk, Dry Bulk and Passenger / Cruise facilities, and are presented on Figures C-11 through C-14. However, graphs have not been developed for these commodities. Instead refer to the graphs that have been developed and presented in the Appendix of the Strategic Marketing Plan.

Also, note that stepped increases for the terminal module capacities for Break-Bulk / Neo Bulk, Automobiles, Liquid Bulk, Dry Bulk and Passenger / Cruise are not indicated on any of the graphs in the Strategic Marketing Plan. But, in the case of Liquid Bulk and Dry Bulk cargoes, cargo-handling improvements should also be anticipated. The assumption is that cargo handling technologies for these types of cargoes will likely improve over the next 20 years, similar to containerized cargo, from approximately 75% SPC to 80% SPC.

And, the assumption is that handling improvements will not occur for Break-Bulk /Neo Bulk, Automobiles and Passenger facilities. An important factor to consider is that more and more break-bulk/neo bulk cargo and automobiles are being transported in containers. This trend is

likely to continue and will probably see significant increases in the next 20 years. In addition, based on our Future Facility Demand Analysis, we do not anticipate the need for any new facilities for Break-bulk operations, based on the medium forecast. In the case of break-bulk / neo bulk future facility demands, the high forecast appears to indicate that there may be a need for additional space. However, we believe that this can be accommodated with existing Port facilities, such as with better utilization of existing land in the South Transit Area.

In the case of Passenger / Cruise facilities, as pointed out in the Strategic Marketing Plan, cruises of 10-days or more, are on the decline. And travel between Vancouver B.C. (or Seattle) and Anchorage typically takes about 10 days. Less than 5 percent of cross-Alaska Gulf cruise passengers are interested in taking more than a 7 days cruise in length. So, the ability of Anchorage to capture a large share of the cross- Gulf cruise market is limited.

Currently, the cruise passenger vessels are accommodated at Terminal 3, working around TOTE's container vessel schedule. While this operation may currently present minimal disruption to the current operations, should there be a dramatic change in the cruise market conditions, existing facilities at the Port of Anchorage will be inadequate to handle large increases in cruise vessel passenger volumes. And more disruption from increased cruise related traffic is likely. And based on the medium forecast, approximately 0.7 acres will likely be needed by the year 2020. The high forecast predicts that approximately 1.1 acres will be needed by the year 2020.

It may be in the Port's best interest to consider the South Tidelands for the development of a new cruise terminal. This area is considerably closer to downtown Anchorage for buses and taxi activity, and its location would have less impact on the cargo vehicular activities in and around the Port.

Break-Bulk/Neo Bulk, Automobiles, Liquid Bulk, Dry Bulk and Passenger/Cruise Future Facility Demand Analysis Capacity Summary

Based on the Strategic Marketing Plan, it is anticipated that break-bulk/neo bulk, automobiles, liquid bulk and dry bulk cargoes are not likely to grow at the same rate as containerized cargo. However, there will still be the need for more areas of new development for these cargoes, although not nearly as much area.

The following Figure C-9 represents the summary of new acreage for other cargo types that are anticipated to be required for the medium forecast.

Figure C-9: Summary of New Terminal Acreage's for Break-Bulk/Neo bulk, Automobiles, Liquid Bulk and Dry Bulk – Medium Forecast

Cargo / Use Type	1998	2005	2010	2015	2020
Break-Bulk / Neo Bulk Cargo	0.0	0.0	0.0	0.0	0.0
Automobile Cargo	2.0	3.9	5.2	6.0	7.6
Liquid Bulk Cargo	0.0	0.0	0.0	0.0	0.0
Dry Bulk Cargo	0.1	0.2	0.2	0.2	0.3
Passenger / Cruise	0.0	0.0	0.0	0.3	0.7
Totals	**2.1**	**4.1**	**5.4**	**6.5**	**8.6**

Figure C-10 represents the summary of new acreage for other cargo types that are anticipated to be required for the high forecast.

Figure C-10: Summary of New Terminal Acreage's for Break-Bulk/Neo bulk, Automobiles, Liquid Bulk and Dry Bulk – High Forecast

Cargo / Use Type	1998	2005	2010	2015	2020
Break-Bulk / Neo Bulk Cargo	0.0	1.0	1.0	1.8	2.9
Automobile Cargo	0.8	3.2	5.1	6.8	9.3
Liquid Bulk Cargo	0.0	0.0	0.0	0.0	0.0
Dry Bulk Cargo	0.0	0.1	0.2	0.3	0.4
Dry Bulk Cargo - with Added Coal	0.0	3.1	6.1	8.6	11.5
Passenger / Cruise	0.0	0.0	0.4	0.7	1.1
Totals	**0.8**	**7.4**	**12.8**	**18.2**	**25.2**

It is extremely important to note that the majority of new acreage required for the high forecast is attributable to the assumption that coal will be a major player at the Port of Anchorage. Should coal not become a realized commodity, the needs change dramatically for these cargoes.

The results of the Future Facility Demand Analysis for Break-Bulk / Neo Bulk, Automobiles, Liquid Bulk, Dry Bulk and Passenger / Cruise facilities is presented in the following Figures C-11 through C- 14.

Figure C-11: Break-Bulk / Neo Bulk New Facility Module Demand Analysis

Trade Forecast in Short Tons	1998	2005	2010	2015	2020
Low	0	0	0	0	0
Medium	0	15,000	30,000	37,500	45,000
High	0	70,000	70,000	85,000	100,000

Estimated Capacity	ST's/YR	1998	2005	2010	2015	2020
Estimated Maximum Practical Capacity (MPC)	68,100					
SPC % Factor (Medium Forecast)		75%	75%	75%	80%	80%
Base SPC		51,075	51,075	51,075	54,480	54,480
SPC % Factor (High Forecast)		85%	85%	85%	90%	90%
High Forecast SPC		57,885	57,885	57,885	61,290	61,290
Base Acres	12.1					
Short Tons/Acre/Year	5,628					
Estimated Module MPC (100%)	150,000					
Acres per Module	10					
SPC Factor per Module Medium (75%-80%)		75%	75%	75%	80%	80%
Module SPC		112,500	112,500	112,500	120,000	120,000
SPC Factor per Module High (85%-90%)		85%	85%	85%	90%	90%
Module SPC		127,500	127,500	127,500	135,000	135,000
Module Short Tons/Acre/Year	15,000					

Estimated Modules Needed - Medium Forecast					
Shortfall (or Overcapacity)	(51,075)	(36,075)	(21,075)	(16,980)	(9,480)
New Terminal Modules Needed	0.0	0.0	0.0	0.0	0.0
New Acres Needed	0.0	0.0	0.0	0.0	0.0
New Modules Needed - Medium Forecast (75%-80% MPC)	0	0	0	0	0

Estimated Modules Needed - High Forecast					
Shortfall (or Overcapacity)	(57,885)	12,115	12,115	23,710	38,710
New Terminal Modules Needed	0.0	0.1	0.1	0.2	0.3
New Acres Needed	0.0	1.0	1.0	1.8	2.9
New Modules Needed - High Forecast (85%-90% MPC)	0	1	1	1	1

Recommended New Terminal Modules for Long Range Planning Purposes					
New Terminal Modules	**0**	**0-1**	**0-1**	**0-1**	**0-1**

Figure C-12: Automobile New Facility Module Demand Analysis

Trade Forecast in Unit	1998	2005	2010	2015	2020
Low	37,000	39,000	39,000	40,500	42,000
Medium	37,000	44,000	49,000	55,500	62,000
High	37,000	47,000	55,000	66,000	77,000

Estimated Capacity	Units/ Year	1998	2005	2010	2015	2020
Estimated .Maximum Practical Capacity (MPC)	39,281					
SPC % Factor (Medium Forecast)		75%	75%	75%	80%	80%
Base SPC		29,461	29,461	29,461	31,425	31,425
SPC % Factor (High Forecast)		85%	85%	85%	90%	90%
High Forecast SPC		33,389	33,389	33,389	35,353	35,353
Base Acres	5.1					
Units/Acre/Year	7,702					
Estimated Module MPC (100%)	50,000					
Acres per Module	10					
SPC Factor per Module Medium (75%-80%)		75%	75%	75%	80%	80%
Module SPC		37,500	37,500	37,500	40,000	40,000
SPC Factor per Module High (85%-90%)		85%	85%	85%	90%	90%
Module SPC		42,500	42,500	42,500	45,000	45,000
Module Units/Acre/Year	5,000					

Estimated Modules Needed - Medium Forecast					
Shortfall (or Overcapacity)	7,539	14,539	19,539	24,075	30,575
New Terminal Modules Needed	0.2	0.4	0.5	0.6	0.8
New Acres Needed	2.0	3.9	5.2	6.0	7.6
New Modules Needed – Medium Forecast (75%-80% MPC)	1	1	1	1	1

Estimated Modules Needed - High Forecast					
Shortfall (or Overcapacity)	3,611	13,611	21,611	30,647	41,647
New Terminal Modules Needed	0.1	0.3	0.5	0.7	0.9
New Acres Needed	0.8	3.2	5.1	6.8	9.3
New Modules Needed – High Forecast (85%-90% MPC)	1	1	1	1	1

Recommended New Terminal Modules for Long Range Planning Purposes					
New Terminal Modules	**1**	**1**	**1**	**1**	**1**

Figure C-13: Liquid Bulk New Facility Module Demand Analysis

Trade Forecast in Unit	1998	2005	2010	2015	2020
Low	1,280,000	977,000	977,000	977,000	977,000
Medium	1,280,000	1,120,000	1,489,000	1,615,500	1,742,000
High	1,280,000	1,334,000	2,157,000	2,382,500	2,608,000

Estimated Capacity	ST's/YR	1998	2005	2010	2015	2020
Estimated Maximum Practical Capacity (MPC)	3,704,203					
SPC % Factor (Medium Forecast)		75%	75%	75%	80%	80%
Base SPC		2,778,626	2,778,626	2,778,626	2,963,868	2,963,868
SPC % Factor (High Forecast)		85%	85%	85%	90%	90%
High Forecast SPC		3,149,110	3,149,110	3,149,110	3,334,352	3,334,352
Base Acres	19.9					
Short Tons/Acre/Year	186,173					
Estimated Module MPC (100%)	2,400,000					
Acres per Module	10					
SPC Factor per Module Medium (75%-80%)		75%	75%	75%	80%	80%
Module SPC		1,800,000	1,800,000	1,800,000	1,920,000	1,920,000
SPC Factor per Module High (85%-90%)		85%	85%	85%	90%	90%
Module SPC		2,040,000	2,040,000	2,040,000	2,160,000	2,160,000
Module Short Tons/Acre/Year	240,000					

Estimated Modules Needed - Medium Forecast					
Shortfall (or Overcapacity)	(1,498,626)	(1,658,626)	(1,289,626)	(1,348,368)	(1,221,868)
New Terminal Modules Needed	0.0	0.0	0.0	0.0	0.0
New Acres Needed	0.0	0.0	0.0	0.0	0.2
New Modules Needed – Medium Forecast (75%-80% MPC)	0	0	0	0	0

Estimated Modules Needed - High Forecast					
Shortfall (or Overcapacity)	(1,869,110)	(1,815,110)	(992,110)	(951,852)	(726,352)
New Terminal Modules Needed	0.0	0.0	0.0	0.0	0.0
New Acres Needed	0.0	0.0	0.0	0.0	0.0
New Modules Needed – High Forecast (85%-90% MPC)	0	0	0	0	0

Recommended New Terminal Modules for Long Range Planning Purposes					
New Terminal Modules	**0**	**0**	**0**	**0**	**0**

Figure C-14: Dry Bulk New Facility Module Demand Analysis

Trade Forecast in Unit	1998	2005	2010	2015	2020
Low	96,000	99,000	102,000	104,500	107,000
Medium	96,000	106,000	113,000	121,500	130,000
High	96,000	113,000	128,000	145,000	162,000
High with Added Coal	97,855	614,855	1,129,855	1,645,965	2,163,965

Estimated Capacity	ST's/YR	1998	2005	2010	2015	2020
Estimated Maximum Practical Capacity (MPC)	110,000					
SPC % Factor (Medium Forecast)		75%	75%	75%	80%	80%
Base SPC		82,500	82,500	82,500	88,000	88,000
SPC % Factor (High Forecast)		85%	85%	85%	90%	90%
High Forecast SPC		93,500	93,500	93,500	99,000	99,000
Base Acres	5.3					
Short Tons/Acre/Year	20,755					
Estimated Module MPC (100%)	4,000,000					
Acres per Module	20					
SPC Factor per Module Medium (75%-80%)		75%	75%	75%	80%	80%
Module SPC		3,000,000	3,000,000	3,000,000	3,200,000	3,200,000
SPC Factor per Module High (85%-90%)		85%	85%	85%	90%	90%
Module SPC		3,400,000	3,400,000	3,400,000	3,600,000	3,600,000
Module Short Tons/Acre/Year	200,000					

Estimated Modules Needed - Medium Forecast					
Shortfall (or Overcapacity)	13,500	23,500	30,500	33,500	42,000
New Terminal Modules Needed	0.0	0.0	0.0	0.0	0.0
New Acres Needed	0.1	0.2	0.2	0.2	0.3
New Modules Needed - Medium Forecast (75%-80% MPC)	0	0	0	0	0

Estimated Modules Needed - High Forecast					
Shortfall (or Overcapacity)	2,500	19,500	34,500	46,000	63,000
New Terminal Modules Needed	0.0	0.0	0.0	0.0	0.0
New Acres Needed	0.0	0.1	0.2	0.3	0.4
New Modules Needed - High Forecast (85%-90% MPC)	0	0	0	0	0

Estimated Modules Needed - High Forecast with Added Coal					
Shortfall (or Overcapacity)	4,355	521,355	1,036,355	1,546,965	2,064,965
New Terminal Modules Needed	0.0	0.2	0.3	0.4	0.6
New Acres Needed	0.0	3.1	6.1	8.6	11.5
New Modules Needed - High Forecast (85%-90% MPC)	0	1	1	1	1

Recommended New Terminal Modules for Long Range Planning Purposes					
New Terminal Modules	**0**	**1**	**1**	**1**	**1**

Figure C-15: Passenger / Cruise New Facility Module Demand Analysis

Trade Forecast in Number of Passengers	**1998**	**2005**	**2010**	**2015**	**2020**
Low	13,259	1,500	2,300	2,500	2,700
Medium	13,259	4,000	13,800	20,000	27,000
High	13,259	12,000	23,000	31,250	40,500

Estimated Capacity	**Rev.Pass. /Yr.**	**1998**	**2005**	**2010**	**2015**	**2020**
Estimated Maximum Practical Capacity (MPC)	17,354					
SPC % Factor (Medium Forecast)		75%	75%	75%	80%	80%
Base SPC		13,016	13,016	13,016	13,883	13,883
SPC % Factor (High Forecast)		85%	85%	85%	90%	90%
High Forecast SPC		14,751	14,751	14,751	15,619	15,619
Base Acres	0.4					
Revenue Passengers /Acre/Year	43,385					
Estimated Module MPC (100%)	50,000					
Acres per Module	2					
SPC Factor per Module Medium (75%-80%)		75%	75%	75%	80%	80%
Module SPC		37,500	37,500	37,500	40,000	40,000
SPC Factor per Module High (85%-90%)		85%	85%	85%	90%	90%
Module SPC		42,500	42,500	42,500	45,000	45,000
Module Passengers/Acre/Year	25,000					

Estimated Modules Needed - Medium Forecast					
Shortfall (or Overcapacity)	244	(9,016)	785	6,117	13,117
New Terminal Modules Needed	0.0	0.0	0.0	0.2	0.3
New Acres Needed	0.0	0.0	0.0	0.3	0.7
New Modules Needed - Medium Forecast (75%-80% MPC)	0	0	0	1	1

Estimated Modules Needed - High Forecast					
Shortfall (or Overcapacity)	(1,492)	(2,751)	8,249	15,631	24,881
New Terminal Modules Needed	0.0	0.0	0.2	0.3	0.6
New Acres Needed	0.0	0.0	0.4	0.7	1.1
New Modules Needed - High Forecast (85%-90% MPC)	0	0	1	1	1

Recommended New Terminal Modules for Long Range Planning Purposes					
New Terminal Modules	**0**	**0**	**0-1**	**1**	**1**

C.3 Berth Occupancy Analysis

A separate Berth Occupancy Analysis was initiated in order to confirm or disprove the future need for additional berths, and to better understand the current berth utilization situation. A Berth Occupancy Analysis is an important tool that can be used to investigate berth operation and vessel characteristics with little or no prejudice to the vessel (un)loading processes. This analysis concentrated on the characteristic differences in cargo vessels such as length-over-all (LOA) and beam width and how specific vessel's berth, without the customary influence from landside operations.

C.3.1 Model Architecture

This Berth Occupancy Analysis was developed to investigate the ongoing berthing at the Regional Port of Anchorage for the duration of calendar year 1998. Data collected from the Port of Anchorage pertaining to the berth and vessel characteristics, as well as arrival and departure information, was used to calculate Maximum Practical Berth Occupancy (MPBO) and Berth Utilization. MPBO and Berth Utilization are defined as:

MPBO — Maximum Practical Berth Occupancy is the maximum percentage of berth occupancy that a given berth or series of berths can operate under while sustaining no more than a maximum 5% average vessel waiting time.

Berth Utilization — Berth Utilization is calculated for each day of the analysis period and is the ratio of berth availability to berth occupancy.

To calculate the MPBO for a terminal, certain types of data are needed. The model employs look-up tables, similar to our throughput capacity models, which contain MPBO values for various types of vessels (i.e. container, dry bulk, etc.). The model chooses MPBO values that pertain to the following types of data:

1. Number of Berths
2. Vessel Scheduling
3. Vessel Types by Cargo

Each of the cargo type look-up tables takes into consideration these factors to choose the most appropriate MPBO values to use. Then, the chosen MPBO values are calibrated according to the associated percentage of each type of vessel calling at the berth being analyzed. Later, this MPBO value is used in comparison to the historical Berth Utilization Percentage.

Historical vessel record information, collected during the year from January 1, 1998 to December 31, 1998, was used for the berthing analysis. During that time a total of approximately 502 vessels called at the Port. Of these total vessel calls, approximately 346 were determined to be ships, and approximately 156 were determined to be barges (barges were considered as 200

feet or less in length). The collected data from these 502 vessel calls, which was subsequently used for this analysis, consisted of the following types of data:

1. Vessel LOA (ship or barge)
2. Time and Day of Arrival
3. Time and Day of Departure

The vessel call data accumulated was used to calculate the daily Berth Utilization. Berth Utilization can be summarized as the product of multiplying the percent of time that a vessel occupies a berth during a given day by the percent of berth length that is occupied. Daily Berth Utilization can be calculated using the following equation:

$$BERTH\ UTILIZATION = \left(\frac{Time\ At\ Berth}{Time\ Berth\ is\ Available}\right) x \left(\frac{LOA + Tie\ Down}{Berth\ Length\ Available}\right)$$

Once the MPBO and Berth Utilization values are analyzed, they are compared to one another graphically. The MPBO is graphed as a straight-line value to show the threshold occupancy of a terminal's practical berth occupancy. Practical berth occupancy is considered to be the level beyond which diversion to competing facilities will occur. In the case of the Port of Anchorage, this diversion may not be readily apparent. However, it would be impractical for terminals to operate at 100% berth occupancy, as excessive and unacceptable delays to waiting vessels would result. And, diversion to competing port facilities, where feasible, would likely occur. In essence, the Maximum Practical Berth Occupancy should never approach 100% utilization.

MPBO values approaching threshold can be indicators that a Port's berths are at their maximum occupancy possible, and delays and congestion in and around the Port can become problematic. **They also can indicate that a respective Port should be considering building new berths or looking for ways to significantly improve the productivity levels at respective existing berths, if that is possible.**

It is also important to note that the resultant MPBO model value can typically produce a range of ±5% from the actual MPBO value. This allowance for error can indicate that a berth may be nearer to its actual MPBO than our model may convey. Actual daily berthing experiences at a respective Port (i.e., occurrences of delays and conflicts for berthing resources) also should be considered to determine if the results of the models tell the whole story.

Once the daily berth utilization is calculated for each day of the sample year, it is graphed against the MPBO. This graph shows where the daily utilization has the potential to encroach upon the MPBO range. In addition to the daily Berth Utilization percentages, which show peaking days throughout the year, a seven-day and a 31-day running average are used to show seasonal peaking throughout the year.

C.3.2 Analysis Structure

Because the berth occupancy model is structured to compare the estimated MPBO of a given terminal's berth(s) to the terminal's historical Berth Utilization, this analysis for the Regional Port of Anchorage has been structured in an accommodating manner. This special approach to the berth occupancy analysis is needed to accommodate several characteristics that are unique to the Regional Port of Anchorage's berth configurations and operating practices. The following characteristics demand the need for this analysis structure:

1. Sea-Land and TOTE hold preferential use agreements for the Berths for Terminal 2 and 3, respectively.
2. Berths for Terminal 1, POL 1 and POL 2 are for multiple uses and utilized by multiple users.
3. The following are the approximate berth lengths for each Terminal:

   POL 1 = 612 feet

   POL 2 = 612 feet

   Terminal 1 = 600 feet

   Terminal 2 = 610 feet

   Terminal 3 = 993 feet

4. Average vessel call LOA is approximately 428' long.

The Regional Port of Anchorage maintains five berths, POL 1, POL 2, Terminal 1, Terminal 2 and Terminal 3. The average aggregate LOA of the vessels calling at the Regional Port of Anchorage measure 428', not including tie down. The vessel LOA's range from approximately 65' to 791'. Actual maximum vessel lengths overall for each berth have been input into our model based on monthly ship logs provided by the Regional Port of Anchorage. In general, the berth lengths are adequate to accommodate most of the vessel LOA's. However, at times some of the existing berths are not long enough to accommodate some of the larger vessels used by Sea-Land and portions of adjacent berth must be encroached. But, for the purposes of this berthing analysis, each of the berths was analyzed separately in an effort to minimize any inaccuracy. Figure C-19 summarizes the input used for this berthing analysis.

Both Sea-Land and TOTE have first rights agreements to Terminals 2 and 3, respectively. In cases where the arrival and departure of vessels can be scheduled, the delays associated with a given berth occupancy rate will be lower than if arrivals and departures are random. However, Terminal 1, POL 1 and POL 2 are shared by multiple operators who perform different types of loading/unloading operations. For example, POL 2 is used by both liquid bulk and dry bulk operations, but each time slot is scheduled. A special constraint occurs at POL 2. The dry bulk vessels (cement) using POL 2 can often be docked for several weeks while their cargo is transferred. The shared used of POL 2 creates some missed opportunity for the docking of cruise ships, which are sometimes required to use Terminal 3, sharing this berth with TOTE.

The selective scheduling of all berths allowed VZM/TranSystems to analyze each berth by the computer model. And, the vessels can be either ships or barges. The acceptable delay, due to waiting for a berth is generally longer for barges than it is for ships. This is due primarily to lower demurrage charges and time value of the cargo. Furthermore, the Port of Anchorage has been very successful at diverting vessels to Terminal 2 or Terminal 3 if these terminal berths are not being utilized. However, it needs to be understood that, as the scheduled vessel calls increase, this 'fail safe' option may not be available in the future.

C.3.3 Results

The Regional Port of Anchorage provided monthly ship logs for the year 1998. During that year, the Regional Port of Anchorage experienced an above average utilization of their berths. Terminal 2 and Terminal 3 were at 70% MPBO, while POL 1, POL 2 and Terminal 1 were closer to 50% MPBO. **In addition, during the summer months there was a significant increase in the amount of use (such as for cruise vessel activities) and, therefore, the potential for congestion at several berths increased as well.**

Furthermore, extreme tides and shoals pose significant navigational constraints upon the use of the berths at the Port. For example, due to the extremes that expose deep draft vessels to hazards at low tide, conventional bulk carrier with a laden draft of over 40 feet are often required to schedule it's arrival and departures so precisely as to avoid being delayed by low tide. This practice plays a more significant role in recent years, due to higher fuel costs, as well as the trend towards deeper draft vessels becoming the standard.

During the course of the year analyzed (1998), there appear to be several occasions where berthing congestion met or exceeded the MPBO region for each of the five berths. The Berth Occupancy Graphs (see Figures C-20 through C-24) indicate these occurrences with spikes above the MPBO line. **These occurrences only highlight situations where conflicts for berthing resources were excessive.** Figure C-16 summarizes the approximate number of events where the berthing congestion's occurred for each berth.

Figure C-16: Estimate of Congestion Occurrences for the Year 1998

Berth Name / Number	POL 1	POL 2	Terminal 1	Terminal 2	Terminal 3	Total Occurrence
Estimated Number of Occurrences Berth Exceeded Recommended Maximum Practical Occupancy Berth Occupancy **(MPPO)**	12	12	7	38	15	84

We have concluded that the disparity in berth allocation (for Terminals 2 and 3) is due to the infrastructure requirements (i.e. cranes, ro-ro ramps, etc.) of the containerized cargo operations at Terminal 2 and Terminal 3. This disparity is illustrated in the MPBO threshold occurrences. Of the 84 total occurrences, 53 were observed at Terminal 2 and Terminal 3. Also, occurrences appear to be higher than normal for POL 1 and POL 2 due to the fact that typically multiple

barges are tied up at one time. **Another important factor that is likely affecting the occupancy rates at the Port is the fact that the small window of opportunity for arrivals and departures ultimately results in longer occupancy rates.** Also, while comparing the graphs (Figures C-23 and C-24) for Terminal 2 and Terminal 3, note that the seasonal peaking during the summer months seems to be fairly consistent in both diagrams.

The congestion at the Regional Port of Anchorage's existing berths seems to be a result of both dynamic and rather robust operations at Sea-Land and TOTE and because of the structural limiting characteristics of POL 1 and POL2.

It has been mentioned that POL 1 is not capable of supporting the heavy equipment necessary for handling the dry bulk pneumatic off loader. Furthermore, POL 1 or POL 2 do not have crane rails or the ability to accommodate the heavy lift equipment required for containerized cargo. While POL 1's insufficient strength may act as a buffer between the two berth groups, thus relieving some of the wharf-side traffic congestion, the Port may wish to consider strengthening the berth to accommodate additional types of vessel (un)loading.

Figure C-17 (Summary of Berth Occupancy Analysis Model Results) also indicates that there were more daily peak occurrences for **all five** berths, while peak weekly berth utilization percentages were higher for POL 1, POL 2 and Terminal 1. The peak monthly rates for all five berths hovered between 31% and 50% utilization.

Figure C-17: Summary of Berth Occupancy Analysis Model Results

Time Period/Operations Scenario:	Existing	Existing	Existing	Existing	Existing
Terminal Name/Berth Number:	POL 1	POL 2	Terminal 1	Terminal 2	Terminal 3
MAXIMUM PRACTICAL BERTH OCCUPANCY % (MPBO)	47.5%	50.0%	55.0%	70.0%	70.0%
Berth Utilization Percentages:					
Peak Daily Berth Utilization Percentage	88%	91%	97%	97%	90%
Peak Weekly Berth Utilization Percentage	88%	76%	91%	36%	48%
Peak Monthly Berth Utilization Percentage	50%	36%	47%	31%	38%

The results identified in Figure C-17 indicate that the MPBO rates for the berths at Terminal 2 and Terminal 3 are at approximately 70%. The weekly and monthly utilization ranges from 31% to 48%. Using the medium forecast, and a starting point of 359,000 TEU (1998 actual), or approximately 180,000 TEU per berth, per year, this suggests that utilization will approach the recommended maximum by the year 2010. Another new berth, under the medium forecast scenario, would not be needed until after 2020. However, if the high forecast is realized, the need for the first new berth could occur even before 2005. Also, since new terminal acreage appears needed, it may be desirable to provide a new adjacent wharf before 2005, even under the medium forecast. Furthermore, the high forecast also suggests that a second new berth may be needed in 2015. Both the medium and high forecast scenarios suggest that an additional (or third berth) could be needed just beyond the 2020 horizon. Figure C-18 summarizes the estimated number of

new berths that will be required for both the medium and high forecasts for the years 2005-2020 and beyond.

Figure C-18: Summary of New Berth Requirements

Forecast (Estimated Number of New Berths Required)						Total Number of New Berths
Year	2005	2010	2015	2020	Beyond 2020	
Medium Forecast	0	1	0	0	1	2
High Forecast	1*	0	1	0	1	3

* The need for new berth could occur before 2005

Figure C-19 is a summary of the input characteristics that were used for the purposes of this Berth Occupancy Analysis. Much of this data was derived from the Inventory of Maritime Facilities, and from available Port documentation.

Figure C-19: Summary of Berth Analysis Input

Berth Name / Number	POL 1	POL 2	Terminal 1	Terminal 2	Terminal 3
Average Berth Length	612	612	600	610	993
Number of Berths	1	1	1	1	1
Typical Vessel spacing	35	35	50	50	50
Hours per Day that the Berth is Available	24	24	24	24	24
Are Vessels Scheduled (1=yes, 0=no)	1	1	1	1	1
Percent of Berth(s) used for Container Vessels	0%	0%	25%	100%	0%
Percent of Berth(s) used for General Cargo Vessels	0%	0%	75%	0%	0%
Percent of Berth(s) used for Ro-Ro Vessels	0%	0%	0%	0%	100%
Percent of Berth(s) used for Dry Bulk Vessels	25%	0%	0%	0%	0%
Percent of Berth(s) used for Liquid Bulk Vessels	75%	100%	0%	0%	0%

C.3.4 Conclusions

Terminal 2 and Terminal 3 have accommodated the majority, about 242 (approximately 70%), of the 346 ship calls at the Regional Port of Anchorage. Meanwhile, POL 1, POL 2 and Terminal 1 have accommodated the majority, or about 121 (approximately 78%), of the 156 barges as well as the remaining 30% of the ships that called at the Port last year. It is reasonable to say that any attempt to add a substantial number of ship calls at Terminal 2 and Terminal 3 could become problematic, and it would likely create significant delays. However, it is important to note that typically TOTE adds one vessel call per week during the summer months. Therefore, it is also reasonable to estimate that Sea-Land, at Terminal 2, could possibly add one more vessel call per week to their summer schedule, as well. Additional vessel calls beyond three per week, at Terminal 1 and Terminal 2 is not recommended.

C.3.5 Key Berthing Recommendations

- **Renovate and expand POL2 in the near future. This needs to be performed in order for the Port to successfully market itself as a cruise vessel destination, as well as a multi-use facility for petroleum products and general cargo.**
- **Construct one new berth in the Northern Tidelands area in order to accommodate all of the future cargo capacity requirements sometime between the years 2005-2010 under the medium forecast.**
- **Using the medium forecast, a second berth is not needed until around 2020.**
- **Using the high forecast, a new berth will be needed between 2000 and 2005.**
- **Using the high forecast, a second new berth may be required around 2015.Then, like the medium forecast, an additional (or third) berth could be required around 2020.**
- **In addition, the provision for a possible third berth should always be considered during any subsequent planning or design phases for new terminal development. This could have implications as to the subsequent configuration and arrangement of the proposed commodities/coal terminal berth.**
- **Adequate dredge depth (as described below) should be considered for all new and renovated berth projects.**

C.3.6 Consideration for Possible Future Vessels

However, from an operational prospective, the current berths appear to be adequate for the volumes anticipated for the short term, namely the years 1999 to about 2001. But, as the projected containerized cargo volumes increase, berth access is very likely to become problematic, and delays are inevitable. Many of the world's container shipping lines and cruise ship lines are beginning to deploy the newest generation of vessels. These vessels are larger and faster, and they are being added to the major carrier fleet on a regular basis. It is possible that someday the major shipping lines and others may wish to deploy these larger vessels on the Anchorage trade routes. Furthermore, as vessel sizes increase, particularly with respect to containerized cargo vessels, several factors will become crucial to the Regional Port of Anchorage's ability to accommodate the needs of containerized cargo operators:

- Larger vessels will require deeper draft capability adjacent to the berths, as well as the entrance channel.
- Larger vessels will require an extension of the crane booms and legs in order to provide adequate outreach and height. Other significant infrastructure requirements also will need to be considered. A larger crane gage (100' or more) should be considered, however, this will require the accommodation of a new heavy crane rail and support infrastructure well beyond the existing one. In addition, the existing transit shed and Port office building may need to be relocated away from the wharf area in order to accomplish this expansion. Larger crane gages are discussed in greater detail (i.e., approximate costs and time frame) in the Facilities Expansion Matrix section of this Master Plan.
- Larger vessels will require additional spacing between the berths. Typically 100' or greater is desired. The working berthing space between Terminal 2 and Terminal 3 may need to be re-configured.

Wharf improvements, such as increasing crane gage or crane outreach, may alleviate some the berth utilization problems. However, as vessel calls increase, a third container cargo carrier is added, or vessel sizes increase, the need for a new berth, one that has state-of-the-art features, will become more apparent. It is likely that a third container cargo carrier would require a dedicated berth and associated backlands, therefore a new berth would be anticipated or expected.

Expansions or revisions to POL 2 should include consideration of this facility for multiple uses. It is the common practice of many Ports to convert warehouses, etc., into multi-use structures that can function as cruise ship terminals one day and as covered storage for general cargo the next. This has been accomplished with great success at several Florida ports-of-call.

Any proposed new berth(s) should have provisions, or be designed, to accommodate the latest generation of Ultra Large Container Vessels (ULCV's), which can be as long as 1,100', 18 to 20 containers across the top deck, and typically require 50 feet or more of draft. The wharf infrastructure requirements necessary to accommodate these types of vessels should be evaluated carefully before any proposed new berths are developed.

The following Figures C-20 through C-24 are the berth occupancy graphs for POL1, POL 2, Terminal 1, Terminal 2 and Terminal 3, respectively.

Figure C-20: POL 1 Berth Occupancy Analysis Graph

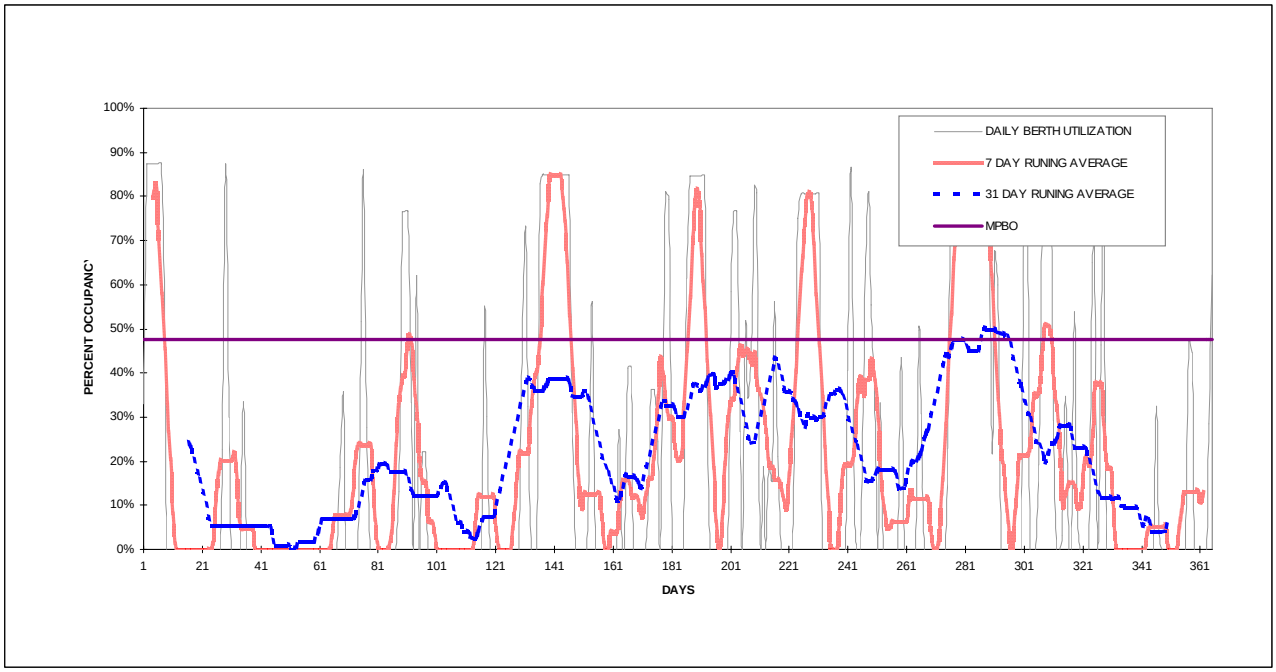


Figure C-21: POL 1 Berth Occupancy Analysis Graph

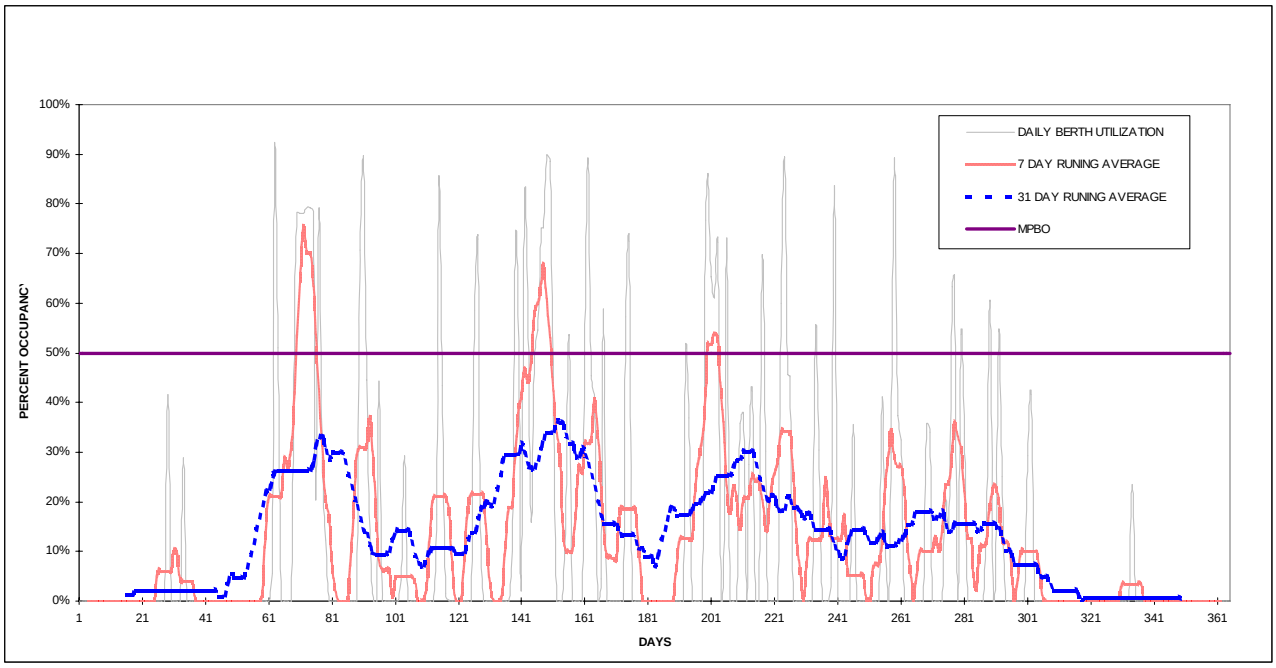


Figure C-22: Terminal 1 Berth Occupancy Analysis Graph

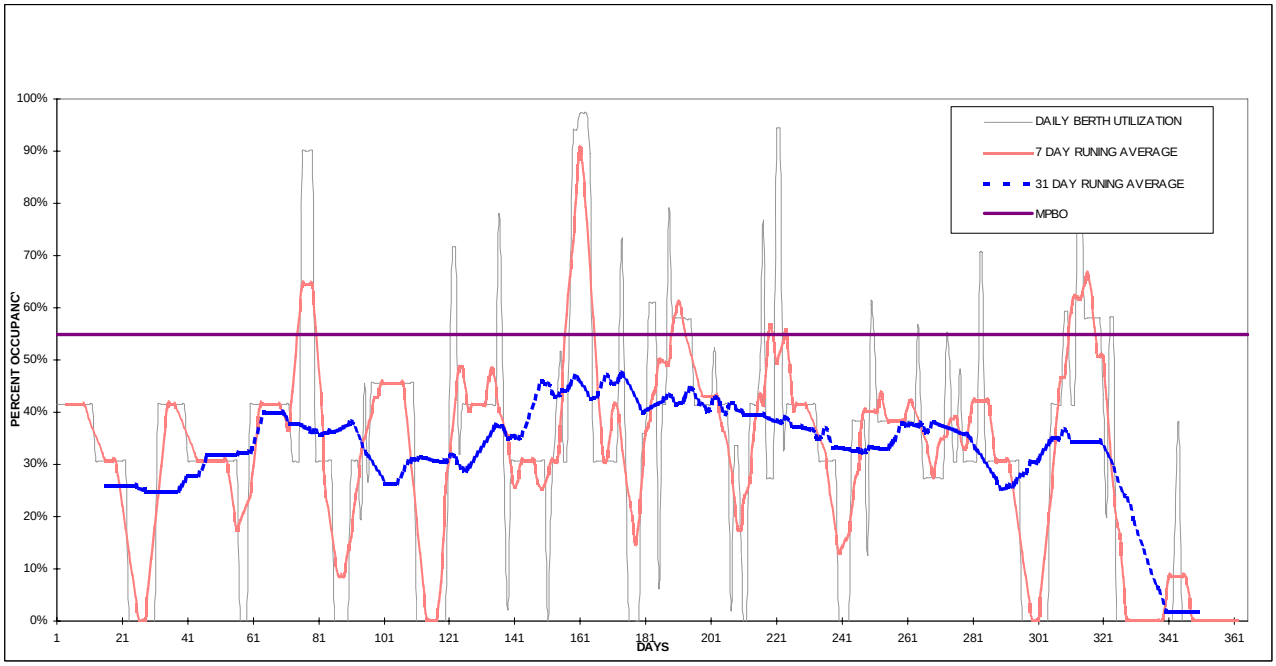


Figure C-23: Terminal 2 Berth Occupancy Analysis Graph

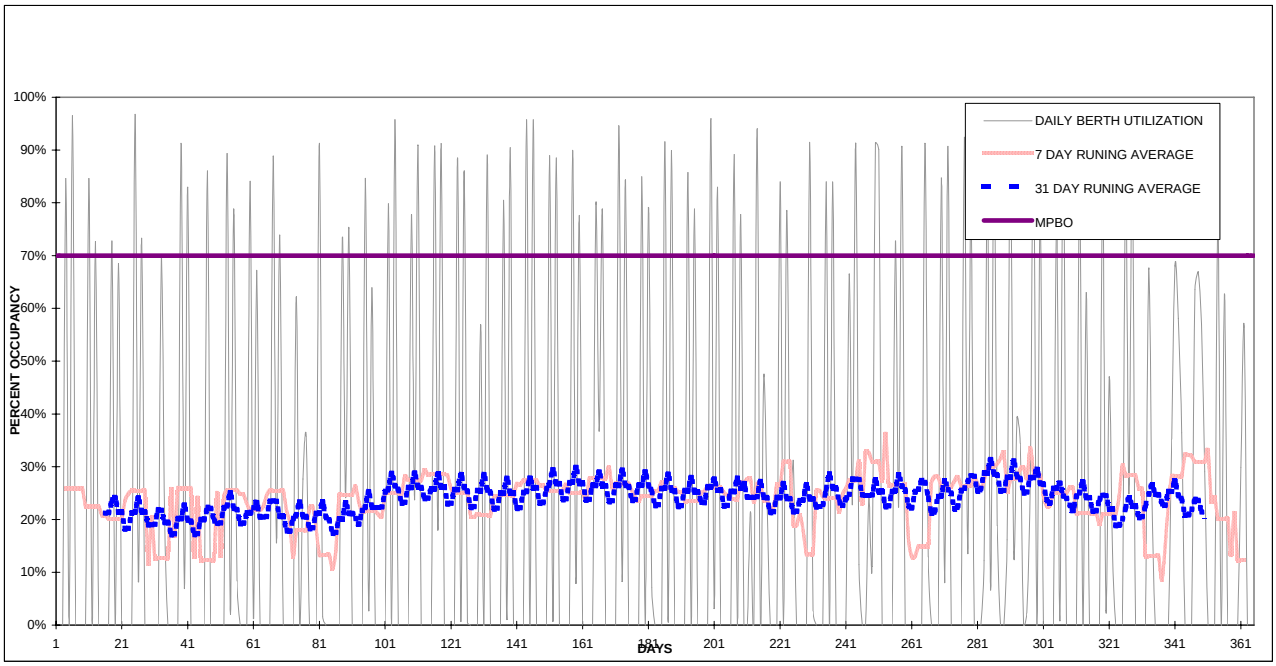
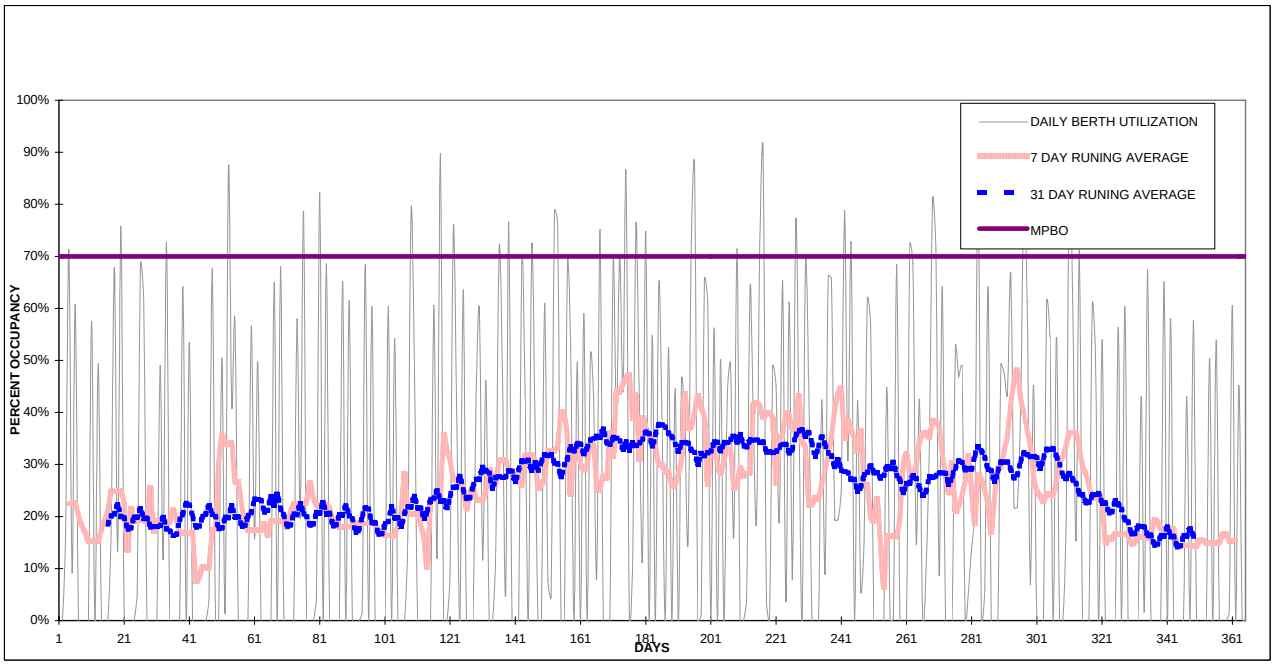


Figure C-24: Terminal 3 Berth Occupanc Analysis Graph



D. FACILITY DEVELOPMENT ALTERNATIVES

D.1 Overview

This section presents the Facility Development Alternatives and recommended overall Phasing Areas for the Regional Port of Anchorage Master Plan, which will accommodate the forecasted growth rates to the year 2020. A CADD and Aerial Photograph composite overview of the existing Port and surrounding areas is presented on Figure D-1. An overview CADD drawing of the same area showing the five macro development phases is presented on Figure D-2. Based on our Analysis of Capacity and Demand, we have concluded the following:

- Approximately **73 acres** of land will be required to meet the medium forecast.
- Approximately **124 acres** of land will be required to meet the high forecast.
- Of this quantity, approximately **64 acres** is needed for containerized cargo to meet the medium forecast.
- Approximately **99 acres** is needed for containerized cargo to meet the high forecast.
- Approximately **15 to 25 acres** of the abandoned Defense Fuels Depot should be considered as a means of reducing the need for land that would result in additional fill. See Phase I-A and Phase I-B drawings, (Figures F-1 and F-2 in Section F. Implementation).
- Approximately **10 acres** of the existing Port area can be reconfigured to provide additional cargo uses and further reduce the need for land that would result in additional fill. See Phase I-A and Phase I-B drawings, (Figures D-3 to D-4 and F-1 to F-2 in the Implementation section of this Facilities Plan).
- The net result is that:
  - Approximately **54 acres (medium forecast) to 89 acres (high forecast)** will be needed for new containerized cargo facilities. Alternatives 1 through 12 present the options to accommodate new container facilities.
  - Approximately **0 to 12 acres** will be needed for the remainder of other uses and cargo types. The 0 acres assumes that future non-container cargo needs (mostly auto storage) can be accommodated in the Defense Fuels area. The 12-acre need is for a natural resource facility (bulk commodities terminal), which would be needed in the North Tidelands area to accommodate the high forecast.

This overview provides a description of the various Alternatives and Phasing scenarios that were considered for the areas of proposed development, as a precursor to the development of the Facility Alternatives. **Wherever possible, the Alternatives and Phasing Plans have utilized the maximum amount of existing Port land before considering the use of other properties.**

However, as a means of accommodating the land requirement for new facility development that will enable the Port to meet its need for the 21st century, adjacent properties that may not be Port-owned, will also be required and have been identified on several of the Alternatives.

It is important to acknowledge the fact that the existing Regional Port of Anchorage property for maritime use is a wedge shaped piece of land, see Figure D-1, that is bordered by the following:

- On the north and east by Elmendorf Air Force Base (AFB).
- On the south by land owned by the Alaska Rail Road Corporation (ARRC).
- On the west by the Knik Arm waterway.

In essence, the Port has no large tracts of leasable land with waterfront access that is available for new terminal development. However, as part of its future development plans for expansion of docking and storage facilities, the Municipality of Anchorage (MOA) applied for and received title to approximately 1,300 acres of tidelands extending from the north end of the Port to the vicinity of Sixmile creek.

The State of Alaska, Department of Natural Resources conveyed the North Tidelands to the MOA, in 1992. The tidelands boundary follows the mean high water line, which also forms the western boundary of Elmendorf AFB.

The Northern Tidelands represents the only truly feasible, large land tract that is adequately sized to accommodate the amount of land required for new cargo facilities (see Figure D-2). Our site selection process has concluded that some portion of the Northern Tidelands will need to be used for new containerized cargo, and possibly future bulk commodities (natural resources, such as coal, timber, sea food products, etc.) terminal development.

As previously mentioned, a few of the Alternatives also discuss the possibility of using an amount of land not currently owned by the Port. This was necessary in order for each Alternative to fulfill all of the requirements to satisfy the forecasted demands of the Port between now and the year 2020. These concepts all assume that some percentage of the Port owned North Tidelands will be required for new wharves and some backlands. These new land areas are envisioned as filled areas in Knik Arm (North Tidelands area), with new wharf structures supported by concrete piles that would provide approximately 45 to 50 feet of draft.

Each Alternative also evaluated the issues of filling Knik Arm, as a means of accommodating the 54 to 89 acres required for new container terminal development. This scenario proved to be the most costly and environmentally challenging. But, it would fulfill all of the requirements for the development of a deep water container terminal with sufficient berthing depths, approximately 50 feet of draft, and adequate backlands to meet the requirements for a modern container terminal well into the 21st century.

Other scenarios suggest that the backlands areas be built on non-Port owned property that is adjacent, or as near as possible, to the new filled wharf areas. These scenarios have been seriously considered as a means of keeping development costs, such as for additional fill areas in Knik Arm, and wharf structure costs, to a minimum. The backlands area for these scenarios would then be located up on the bluff, immediately to the east of the shoreline of Knik Arm, and will require a switchback or steeply graded road that can provide access to the land area above the existing shoreline. However, acquisition of this land by the Port for terminal development may prove to be a challenge, as this property is currently under the ownership of Elmendorf Air Force Base.

An overall Phasing Plan (Master Plan –Study Areas) has been developed which coincides with the Regional Port of Anchorage's own Phasing Plans that have been developed in earlier planning studies. A summary of the corresponding Phases is presented as follows:

Near-Term Capital Improvements and Repairs (Existing Infrastructure):

- Phase I-A
- Phase I-B
- Phase II (See Access Plan Section of this Study)

New Facilities Expansion (North Tidelands Development):

- Phase III-A
- Optional Phase III-A
- Phase III-B
- Phase III-C
- Optional Phase III-D
- Phase IV Potential Bulk Commodity (Natural Resources Terminal (Also See North Tidelands Coal Terminal Study, December, 1997)
- Phase V Potential North Access Improvement Area (See Northern Access Corridor Reconnaissance Study, May 1998)

Refer to Figure D-2 for the complete overall Phasing Program.

D.1.1 Summary of Phasing Plans I-A and I-B

Two Phasing Plans were developed by the consulting team as a basis for defining re-use or reconfiguration of Port owned and non-Port owned properties in this Master Planning effort. These phasing plans coincide with the Port's own Phasing Plans that have been developed in earlier planning studies. The following is a description of each of the Phasing Plans.

Phase I-A

Phase I-A considers the construction of a new concrete trestle structure for TOTE at Terminal 3. The exact location and configuration will require further study and review beyond the scope of this Master Plan. Another element of Phase I-A involves the realignment of the current configuration of the Port land use for both the existing Sea-Land and TOTE container operations. This realignment would create more of a contiguous property configuration and also require some modifications to current lease boundaries. Note that the final location of the proposed lease line may vary. It should also be noted that this realignment will affect the abandonment of Tidewater Road and could also affect existing utility power lines, fence lines and other structures that may require relocation or be put underground.

Under Phase I-A it is assumed that existing office buildings and other essential structures would remain within the current boundaries of each container operator, however, this will require a further evaluation and analysis that is not within the scope of this Master Plan.

Another consideration of Phase I-A is for a new access corridor that utilizes either Anchorage Port Road or Tidewater Road as the primary entrance and exit for both the Sea-Land and TOTE gate facilities. An optional gate configuration has also been identified for the southernmost container terminal.

Phase I-A also considers that the existing break-bulk terminal, an area of approximately 4.6 acres (see area B-1 of the Inventory of Maritime Facilities), would remain for break-bulk and miscellaneous uses. The existing transit shed and Port offices would also remain in their current configuration and use(s).

Phase I-A also envisions the renovation and/or expansion of P.O.L. 2 for liquid bulk, dry bulk and passenger/cruise, as well as general cargo uses. Essentially, this area would become available as a multi-use terminal. P.O.L. 1 would remain in its present configuration. The South Transit Area (see area B-2 of the Inventory of Maritime Facilities) would be enlarged, possibly by incorporating Anchorage Port Road (which would require closure) and could be made available as combination container/passenger/miscellaneous use area. Access to the new terminal would be along the new access corridor, whose exact configuration will require further review beyond the scope of this Master Plan.

As an option, Phase I-A also envisions a passenger and intermodal cargo access corridor parallel to Ocean Dock Road on ARRC property. This facility would provide much needed passenger access to the proposed Port cruise terminal in the South Transit Area. This option does not include an associated estimated cost item in the Construction Budget Estimate.

Refer to Figure D-3 for a descriptive drawing of Phase I-A.

Phase I-B

Similar to Phase I-A, Phase I-B also considers the realignment of the current configuration of the Port land use for both the existing Sea-land and TOTE container operations. Like Phase I-A, this would create more much more contiguous property configuration and also require some modifications to current lease boundaries. Note that the final location of the proposed lease line may vary. It is also assumed that existing office buildings and other essential structures would remain within the current boundaries of each container operator. Like Phase I-A, a new access corridor would be needed that utilizes either Anchorage Port Road or Tidewater Road as the primary entrance and exit for both the Sea-Land and TOTE gate facilities. Optional gate configurations for the container terminals have also been identified on Phase I-B.

The major difference between Phase I-B and Phase I-A is the expansion of the existing wharves at Terminal 1 through Terminal 3 to accommodate 100-foot gage container cranes. This would also envision the purchase of new, or possibly used cranes. Phase I-B also requires the reconfiguration of the existing break-bulk terminal, an area of approximately 4.6 acres (see area B-1 of the Inventory of Maritime Facilities), for the expansion and use by the southernmost container terminal. However, the existing transit shed and Port offices would remain in their current configuration and use(s).

Phase I-B would also require the relocation of the existing maintenance building (currently located adjacent to Tidewater Road across from the Port of Anchorage's offices), or the construction of a new building, to an area near the new multi-use terminal. Maintenance operations would be enclosed within it's own boundary.

Also, as part of Phase I-B, the South Transit Area, (see area B-2 of the Inventory of Maritime Facilities) would be enlarged to incorporate what is now Anchorage Port Road (which would require closure) and will be made available as combination container/passenger/miscellaneous use area. Access to the new terminal will be along the reconfigured access corridor.

As an option, Phase I-B also envisions a passenger and intermodal cargo access corridor parallel to Ocean Dock Road, however, this concept would require the use of ARRC property. This facility would provide much needed passenger access to the proposed Port cruise terminal in the South Transit Area.

Refer to Figure D-4 for a descriptive drawing of Phase I-B.

D.1.2 Summary of Alternatives

Altogether, 12 Alternatives have been seriously considered and analyzed. From these 12 Alternatives, seven of the Alternatives are essentially various scenarios that consider how to provide filled land within Knik Arm to accommodate the demands to the year 2020. Drawings are provided for each of these seven Alternatives in Figures D-5 through D-11.

Five other Alternatives (8 through 12) are also considered, however drawings of these Alternatives are not provided. These Alternatives take into consideration the possibility of acquiring rights to adjacent properties as a means to accommodate the demands to the year 2020, while reducing the possibility of additional fill in Knik Arm.

The seven Alternatives that have been drawn, and the five that are presented by narrative only, will be analyzed for conformance to project goals and objectives. During this process, the most promising Alternative was selected, and where possible incorporated the best features from all the Alternatives in order to be considered as the Recommended Development Plan. Note that for all of the alternatives we have targeted a need for approximately 75 acres (a compromise between the medium and high forecasts). The following is a brief narrative of all 12 Alternatives:

Alternative 1 - Low Fill (Figure D-5)

Alternative 1 envisions a modest fill into Knik Arm of approximately 40 acres. However, it would also require an amount of remote land that would serve as additional backlands for storage uses for the new terminal development. Alternative 1 would require a new 1,200-foot long, pile supported concrete wharf structure. The face of the wharf would be located at approximately –30 feet M.L.L.W. This wharf configuration would necessitate additional dredging in order to provide approximately 45-50 feet of draft, which is considered necessary for a modern container terminal. Note that for all of the alternatives, a commodity/coal facility of approximately 10 acres has been included at the north end of the development.

Alternative 2 - Medium/Low Fill (Figure D-6)

Alternative 2 envisions a slightly larger fill of approximately 50 acres. It would also require an amount of remote land that would serve as additional backlands. As the rock dike line moves westward beyond the –10 contour, COE regulation issues must be addressed. Alternative 2 would require a new 1,200-foot long, pile supported concrete wharf structure. The face of the wharf would be located at approximately –35 feet M.L.L.W. This wharf configuration would necessitate additional dredging in order to provide approximately 45-50 feet of draft.

Alternative 3 - Medium Fill (Figure D-7)

Alternative 3 envisions a medium fill into Knik Arm of approximately 75 acres. It would still require a small amount of remote land that would serve as additional backlands. COE regulation issues would be involved as with all alternatives with fill line beyond the –10 contour. Alternative 2 would require a new 1,200-foot long, pile supported concrete wharf structure. The face of the wharf would be located at approximately –45 feet M.L.L.W. This wharf configuration would necessitate minimal additional dredging in order to provide approximately 45-50 feet of draft.

Alternative 4 - Low Fill w/ Pile Supported Backlands (Figure D-8)

Alternative 4 envisions a footprint fill exactly marching Alternative 3, however the portion of backlands beyond the –10 contour would consist of a pile supported deck. This expensive proposition is considered because this alternative would not require changes to the current COE policy of locating the fill edge at the –10 contour. All other aspects are similar to Alternative 3.

Alternative 5 - Large Fill/New Wharf Line (Figure D-9)

Alternative 5 envisions an aggressive fill into Knik Arm of approximately 100 acres. Additional remote backlands would not be required. Alternative 5 would require a new 1,200-foot long, pile supported concrete wharf structure. The face of the wharf would be located at approximately –50 feet M.L.L.W. This wharf configuration would necessitate no additional dredging in order to provide approximately 45-50 feet of draft. The alignment of the wharf would allow the south corner to connect to a future reconstruction of the existing wharf at the –50 foot line for long-term development beyond the year 2020.

Alternative 6 - Medium Fill/ New Wharf Line (Figure D-10)

Like Alternative 5, but less aggressive, Alternative 6 envisions the wharf line at the –45 to –40 contour, with a connection at the south end that would coincide with an expansion of the existing wharf to accommodate future 100 foot gage cranes. Other features are similar to Alternative 3.

Alternative 7 - Medium/Large Fill/ New Wharf Line (Figure D-11)

This alternative is a compromise between Alternatives 5 and 6. The new wharf line would be non-continuous with the existing wharf, which has the disadvantage of not allowing shared cranes (until such time as the existing wharf might be reconstructed). However, it has the

advantages of providing most of the area needed for the high forecast. Also, the wharf alignment is more parallel to the existing shoreline allowing for a much preferred rectangular aspect ratio in lieu of the relatively inefficient "bow-tie" effect which is generated by many of the other alternatives.

Alternative 8 - Very Low Fill/ Use Remote Backlands (No Drawing)

Similar to Alternative 1, but with even less fill (assume 30 acres), this would be the lowest cost approach to the need for new land. This approach envisions a very low fill combined with a large amount of remote land that would serve as additional backlands. The low cost is a benefit, however, the use of remote land area at Elmendorf would be required. A graded access road would also be required.

Alternative 9 - Cut into Bluff for Backlands (No Drawing)

Alternative 9 envisions a medium/low fill into Knik Arm of approximately 40 to 50 acres as shown in Alternative 2. The additional 30 to 40 acres needed to achieve 80 would come from an excavation of the bluff separating the new port area from Elmendorf Air Force Base. This would require a large engineering project and negotiations for Elmendorf property. However, the benefits would include a contiguous, well proportioned yard and the ability to use much of the cut material for fill thus mitigating the cost impact of the excavation.

Alternative 10 - Fill in Front of Existing Wharf (No Drawing)

Alternative 10 is included in the interest of documenting all possible concepts. This alternative envisions the development of the area west of the existing wharf, building a new wharf at the –50 foot line or beyond and undertaking a large fill project. The cost would be very high and the impact on operations very disruptive. Therefore, we consider this concept to be not feasible. However, long-term future conditions may warrant a review of this concept.

Alternative 11 - Work with ARRC to Expand Port to the South (No Drawing)

Also in the interest of documenting all possible concepts, the acquisition and development of ARRC land to the south is envisioned in Alternative 11. The level of current development, relative closeness to downtown Anchorage and plans currently being considered by the ARRC make this approach to achieving an additional 80 acres appear to be not feasible. However, to the extent that some available areas might be used (as described in Phases IA and IB), we strongly recommend that these areas be used if possible prior to undertaking expensive fill work to gain land. We also recommend that the available areas be considered for uses appropriate to the adjacent land, for example, the development of additional liquid bulk facilities (3 acres are needed for the high forecast) or dry bulk facilities (1 acre is needed). An excellent use of remote storage yards could be made for automobile and vehicle storage (8 to 9 acres are needed). In addition, current auto storage could be relocated off Port area to allow some additional container storage.

Alternative 12 – Develop New Terminals North of Cairn Point or Some Other Location (No Drawing)

Also in the interest of documenting all possible concepts, the acquisition and development of Northern Tidelands north of Cairn Point, or some other location is envisioned in Alternative 12. This alternative envisions the development of the area north of Cairn Point, building new wharves at the –50 foot line or beyond and undertaking a large fill project, in addition access could be more problematic. The cost to do this Alternative would be very high. An alternate location well beyond Port owned properties was also considered, but proved to be highly undesirable. Therefore, we consider these concepts to be not feasible. However, long-term future conditions may ultimately warrant a review of this concept. Note that no order of magnitude cost was attributed to Alternative 12.

D.1.3 Order of Magnitude Cost Estimates for Each Alternative

Figure D-12 presents the order of magnitude cost estimates for Alternatives 1-11, in 1999 dollars. No cost estimate was established for Alternative 12. These estimates are to be used in conjunction with a full array of other considerations, such as wharf access, efficiency of terminal configuration etc. For all of the Alternatives, the commodities/coal facility was not included in the any of the cost estimating. The coal facility shown is based on a recent study, which estimated that such a facility could cost approximately $60 million, based on 1997 dollars.

Figure D-12: Order of Magnitude Cost Estimates – Alternatives 1-11

Alternative	Dredging	Fill	Rock Dike (L, M or H)	Wharf (L, M or H)	Infrastructure	Remote Area	Access Road to Remote	Special Conditions	Subtotal	Contingency 20%	Rounded Totals
1	$3.9	$18.4	$20.0 L	$14.4 L	$14.0 40 Acres	$14.0 40 Acres	$2.0		$86.2	$17.3	$104.0
2	$2.8	$25.2	$20.0 L	$14.4 L	$17.5 50 Acres	$10.5 30 Acres	$2.0		$92.3	$18.5	$111.0
3	$2.4	$40.7	$22.0 M	$16.2 M	$26.3 75 Acres	$1.8 5 Acres	$2.0		$111.3	$22.3	$134.0
4	$2.4	$18.7	$25.0 H	$18.0 H	$14.7 42 Acres	$1.8 5 Acres	$2.0	$172.5 See Note 1	$255.1	$51.0	$306.0
5	$1.1	$52.0	$25.0 H	$18.0 H	$35.0 100 Acres	$0.0 0 Acres	$0.0 N/A		$131.1	$26.2	$157.0
6	$2.4	$38.7	$22.0 M	$16.2 M	$24.5 70 Acres	$3.5 10 Acres	$2.0		$109.4	$21.8	$131.0
7	$1.8	$47.1	$22.0 M	$16.2 M	$28.0 80 Acres	$0.0 0 Acres	$0.0 N/A		$115.1	$23.0	$138.0
8	$3.0	$14.0	$12.0 L	$14.4 L	$12.2 35 Acres	$15.8 45 Acres	$2.0 N/A	$1.0 See Note 2	$74.4	$14.9	$89.0
9	$3.6	$4.0	$12.0 L	$14.4 L	$28.0 80 Acres	$0.0 0 Acres	$0.0 N/A	$16.0 See Note 3	$78.0	$15.6	$94.0
10	$12.0	$16.0	$48.0 H	$18.0 H	$28.0 80 Acres	$0.0 0 Acres	$0.0 N/A	$62.5 See Note 4	$161.5	$32.3	$194.0
11	$12.0	$20.0	$25.0 H	$18.0 H	$28.0 80 Acres	$0.0 0 Acres	$0.0 N/A	$80.0 See Note 5	$183.0	$36.6	$220.0
Assumptions:											
	Approx. $6 per Cubic	Approx. $8 per Cubic	L= $20.0M M=$22.0M H= $25.0M	L= $14.4M M=$16.2M H= $18.0M	$350K per Acre	$350K per Acre	Approx. $2M for Access				

Notes:

1. The Special Conditions costs for Alt. 4 are for a completely pile-supported backlands area of approximately 24 acres.
2. The Special Conditions costs for Alt. 8 include an increase in security fences and devices, etc.
3. The Special Conditions costs for Alt.9 assume a rough cost to excavate into the bluff down to an elevation of approximately +15 feet.
4. The Special Conditions costs for Alt.10 would account for a rough estimate for replacing all of the existing wharves with new concrete pile-supported structures out to the approximately –50 foot depth.
5. The Special Conditions costs for Alt. 11 involve a rough estimate for locating many of the required port facilities on land owned by the ARRC.

D.2 Internal Circulation Improvements

Based on numerous traffic studies previously prepared for the Regional Port of Anchorage, road access will need to dramatically improve in and around the Port, as well as to and from the National Highway System. Several of these studies have suggested that some type of Northern Access be considered by the Port and the Municipality as a means of providing alternative routes

to Alaska's Highway System, as well as providing a 'relief valve' means of road and rail access to the Port.

In preparation for increases in truck volumes generated by the forecasted cargo growth, the Port of Anchorage must embark upon a program to improve internal circulation and look for ways to provide improved access to the Port.

Currently, Port terminal traffic moves in and out of the Port area on roads that were not designed to handle the current volumes of traffic. Ocean Dock Road remains the only means of access and egress to and from the Port. Based on documented projections (from Port of Anchorage Traffic Flow Study, February 1996, by VZM and HDR), the current weekly truck traffic at the Port will nearly double in the next twenty years.

In order to meet the challenges of today and the projected increases in vehicular traffic to and from the Port in the future, the consulting team has prepared the following recommendation:

- Straighten the curvature of Ocean Dock Road to access Terminal Road.
- Open Terminal Road as a two-way access road for all Sea-Land and TOTE trucks.
- Pursue the development of a north access road (extension of Terminal Road) for any future container terminal expansion.
- Abandon Anchorage Port Road, between Terminal Road and Gull Avenue.
- Abandon Gull Avenue.
- Reconfigure Sea-Land and TOTE container yards.
- Reconfigure Tidewater Road north of the Texaco Gate to provide access to a future combination container/passenger terminal; abandon Tidewater Road north of Gull Avenue.
- Realign terminals to utilize Tract 4A, Tract A and Tract EE.

D.2.1 Existing Conditions

Existing Road Access

All Port-related road traffic enters and exits the Port via Ocean Dock Road. Traffic reaches Ocean Dock Road via the Port Access Bridge and via Whitney Road. Whitney Road intersects the Port Access Bridge off-ramp at Ocean Dock Road. The majority of the truck traffic associated with the Port is concentrated with these two entrance roads, Anchorage Port Road, Tidewater Road, Terminal Road and Gull Avenue.

Existing Rail Access

Currently a single rail line enters the Port from the ARRC main access track from the south. The existing rail line primarily serves the liquid bulk operators such as MAPCO. This line has recently been realigned along the western side of Ocean Dock Road, relieving a major point of blockage and road traffic congestion.

Existing Users and Traffic Flow

Traffic flow generators can generally be classified into two major components:

1. General and miscellaneous non-Port related traffic.
2. Port cargo transfer traffic.

General and miscellaneous non-Port related traffic includes cement, forestry, tourist and transit trips. Other Port-related traffic and Port of Anchorage personnel transit are also included in this category. The major generating component for traffic is specifically Port and cargo transport related. Several fueling companies and two container terminal operators comprise this component. This traffic is almost exclusively truck traffic. The container handling operations also generate an intra-terminal traffic flow of hostlers transferring containers on chassis' between shipside and remote storage locations, particularly on days when a ship is in port.

D.3 Port Operations and Maintenance Building

The current Port Operations and Maintenance (O&M) Building is located along Tidewater Road just North of Gull Avenue. This building is about 50' x 100' (5,000 square feet) in size and houses the shop type equipment required to operate and maintain the Port. It consists of a steel-framed building that includes a 5-ton overhead crane. There is about 2/3 of an acre of land associated with this facility. Items stored in the surrounding yard include an aboveground fuel tank, storage sheds, a steel rack, a storage annex, and a gear locker. Several of the Port upgrade alternatives call for a reworking of Anchorage Port Road, Tidewater Road, and Gull Avenue. These roads along with the Port Operations and Maintenance Building occupy what has now become prime container facility operations use areas.

It is the opinion of the consulting team that it may be in the Port's best interest to relocate the Operations and Maintenance Building as part of the Phase I-B rework and upgrade program (see the section on Facility Development Alternatives). Should the demand for more containerized cargo space become a reality, this relocation would provide a more efficient use of that space.

The primary functions that occur in this building, routine maintenance and storage are such that the present building location is of relatively minor consequence. It is important to note that there is also a need for general cargo yard storage in addition to the actual building.

Several options are available for the relocation of these facilities as follows:

- **Option 1:** Move the operation South to the area just North of the Tesoro yard. This option is predicated on the demolition of Anchorage Port Road. The land area that is currently between the Anchorage Port Road and Tidewater road would be available as dedicated yard space. A new building approximately 100' x 100' (10,000 square feet) would be required along with about 2 acres of storage yard space for this option.
- **Option 2:** Use a portion of the Transit Shed for the O&M equipment. This would entail reworking a portion of this 100' x 270' (27,000 square foot) building to provide the proper mechanical and electrical systems for new offices and for the shop type of equipment now

located in the Operations and Maintenance Building. The current building is divided into two sections. The Port currently uses the northern section for sand and equipment storage.

TOTE leases the southern portion of the Transit Shed for certain types of cargo. Generally, worldwide cargo trends point to moving away from break-bulk toward various types of containerized cargo. This being the case, the Transit Shed is likely to become an under utilized area in the future. Therefore, under Option 2, approximately two acres of outside yard storage area would still be required for Port-owned equipment.

D.4 Environmental Issues

The surface material throughout the majority of the developed portion of the Port of Anchorage is a fill material overlying tidal flat silts and clays from the Bootlegger Cove formation. The fill material ranges from 4 to 24 feet in thickness. The ground water in the vicinity is estimated at about 3 to 8.5 feet below the ground surface and is largely perched within the granular fills overlying the silts and clays. Below grade railroad ballast and porous underground pipeline backfill provide for a number of low resistance groundwater “conduits” throughout the area. In the area of the Defense Fuel terminal, the surface soils consist of native sands and gravels and extend to a depth of about 50 feet. The depth to water at the Defense Fuel terminal is estimated at about 20 feet below the surface. As an industrial area, the entire Port site contains numerous buried Petroleum, Oil and Lubricant (POL) lines and utilities and is surrounded by large fuel storage tanks at the south and east ends. The POL lines extend from the Port's main fuel terminal to the main fuel tanks of the various bulk fuel storage facilities located in the area. To reach these tanks, these lines parallel and cross the existing roads and railroads at a number of points within the project. Much of the construction of the existing petroleum storage and transfer facilities was completed in the 1960’s and early 1970’s before the current more stringent environmental regulations were in place.

Spills and releases of petroleum hydrocarbons have been documented over time at each of the bulk fuel facilities located within the project area. Spills resulting from broken valves, overfilling of trucks, tanks and rail cars, leaking pipelines and other sources may have resulted in the release of about 490,000 gallons of petroleum. Documented petroleum hydrocarbon impacted soils and/or water are located within the parcels leased by each of the six bulk fuel facilities and within the Port of Anchorage south transit yard. Contaminated soils have impacted earthwork related construction projects in the area.

An Example of a project impacted by contaminated soils is the up coming Ocean Dock Road project. The State of Alaska DOT performed an environmental sampling program for this project. This sampling indicated that an area on the West side of Ocean Dock Road near the South Transit Yard had elevated levels of hydrocarbons in the soil. The level of hydrocarbons was characterized as “exceeding ADEC category A cleanup criteria”. It was estimated that this site contained 65 cubic yards of contaminated material. The State undertook several measures to deal with this during construction. They will require that the contractor have an “environmental professional” available at all times during construction. This individual will be responsible for testing any suspected contaminated material to DEC standards. Contaminated material, if found,

will be removed from the site and delivered to a DEC thermal remediation facility. Special requirements are also required for handling and stockpiling contaminated material. These measures are typical of the added burden contaminated soils can have on an earthwork related projects. Ultimately, the special requirements add to the cost of the project. It is important to note that, in spite of the added burden, these types of projects are still going forward. They are somewhat routine and are being successfully completed.

The Petroleum Users Group, PUG, (now known as the Port Users Group) was founded in 1991. This group was organized in an attempt to organize and encourage all POA vicinity landowners and land users to work in a cooperative effort to manage the environmental concerns related to petroleum hydrocarbon impacted soil and water within a defined POA-PUG area. The PUG retained a consultant in 1992 to gather and summarize in one report the existing site assessment data that is available for areas within the POA-PUG area. Their Summary Site Assessment report, dated July 1992 identifies where the data gaps exist within the study area. Current PUG members include POA, Equilon, Tesoro, Signature Flight Service, Defense Fuels, Chevron, and Williams.

Since 1992, the PUG members, including the Port and the Alaska Railroad have performed preliminary site assessments and field investigations each parcel with no or little environmental information. Since 1993, the information gathered during these combined assessment activities have been used to prepare a risk assessment on the subject area, such that alternative cleanup levels may be negotiated with the ADEC. It is the general consensus of the PUG that the risk assessment will show that the existence of the petroleum hydrocarbon constituents in the soil and water will not have an adverse impact on any human or ecological receptors and, therefore, can be left in-place.

Also of interest from an environmental standpoint is the North Tideland area adjacent to the Port. This area has been studied for possible future expansion. The tidelands are bordered by coastal bluffs, which range in height from about 80 feet to about 240 feet. The tidelands themselves have not been developed and are generally considered to be free from contamination. There is an abandoned 100-acre landfill on top of the bluff. This site is on military property. The landfill contains old cars, construction rubble, regulated hazardous waste, and general refuse. Occasionally debris is eroded out of the bluff site and falls to the toe of the slope. There also may be ground water seeps that run down the slope and into the Knik Arm. It is estimated that the site contains 6,000,000 cubic yards of material and 500,000 cubic yards of landfill debris.