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Economic Assessment for Port of Alaska Terminals

Prepared for Don Young Port of Alaska

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Executive Summary

Executive Summary Overview [1/2]

Economic Assessment of Don Young Port of Alaska (POA): The Port is an essential gateway to serving the diversified economic base throughout the state. Providing reliable service to cargo owners and the military is critical to the overall well-being of Alaska.

Therefore, in order for the Port of Alaska Modernization Program (PAMP) to fully meet the needs of Alaska, it should ensure that POA is flexible enough to accommodate change in the future¹ and provide redundancy of service in the case of emergency.

Moffatt & Nichol (M&N) has been retained by POA to conduct an Economic Assessment of the Port. The scope of work is focused on identifying what supports overall demand for freight movement throughout the state, how POA along with Alaska's other commercial maritime ports meet the needs of the cargo owners (including the military), the outlook for future activity at the Port and the implications on its infrastructure in the context of both the ever-changing dynamics in the global shipping industry and PAMP. The analysis establishes the economic value of the Port's infrastructure, in particular the general cargo / containerized docks, by estimating the cost of a loss of service at these facilities.

Moderating Economic Growth Still Drives Demand for Diversified Cargo:

- The current conditions and outlook for Alaska's economy is one of slow-to-moderate growth. The state's GDP growth has lagged that of the national average in recent years and continues to be heavily influenced by the mining sector which has struggled with lower production levels over the last decade.
- Long-term population projections through 2050 indicate that Alaska's total population will remain near 750,000 people, relatively unchanged from current levels.
- Economic activity is concentrated in the high population, metropolitan areas of Anchorage and Fairbanks, and in the markets of the Southeast region of the state, which drive demand for a wide variety of goods and services. The mineral extraction industries (oil & gas and ore) also serve as key sources for demand and activity but are generally limited to the freight and service needs directly associated with their operations.
- The outlook for total volume growth through POA too is generally one of flat-to-slow growth, mirroring that of underlying demand from the overall economy. Despite this outlook, the Port serves as an indispensable gateway for the diversified cargo base (containerized, liquid, dry, breakbulk and roll on-roll off [RoRo]) commodities which are destined to markets throughout the state, and in particular to the Anchorage and Fairbanks markets, and the military bases located therewithin.

POA Plays a Key Role In Alaska's Commercial Maritime Port Network:

- Alaska is geographically isolated, and the population depends on imports to sustain daily life, and as such the state is home to system of diversified commercial maritime ports. These facilities meet the needs of their respective local communities and / or serve as dedicated gateways for the extraction industries which rely them to reach global commodities markets.
- POA is unique amongst the state's ports in terms of the volume (tonnage or units) and the variety of cargo able to be serviced. The Port generally handles between 4-to-5 million tons annually, split between liquid bulk petroleum products, containerized goods, dry bulk commodities and breakbulk cargo including autos. The next largest multi-purpose port in the Southcentral Region is Whittier which handles between 0.4 - 0.7 million tons a year, followed by Seward handling between 0.3 – 0.5 million tons per year.
- POA benefits from three distinct advantages 1) Equipment and infrastructure including for container, liquid bulk and dry bulk cargoes 2) Proximity to the high population centers (sources of demand and workforce) and 3) connectivity by road and rail.
- M&N has concluded that while Alaska's other ports (with a focus on those in the Southcentral region) do play an integral role in meeting statewide and local needs, they each contend with limited size, infrastructure, equipment offerings, and most importantly, connectivity to the state's population centers and therefore do not match the service / capacity of POA.
 - M&N conducted a series of stakeholder engagements to support the analysis. A common theme expressed across the interviews is that there are no economically viable alternatives to POA.
- In summary the analysis indicates that POA is the best location in Southcentral Alaska to develop port infrastructure and to provide redundancy in the case of an emergency.

¹ – considered to be the 75-year plan horizon of the infrastructure

Executive Summary Overview [2/2]

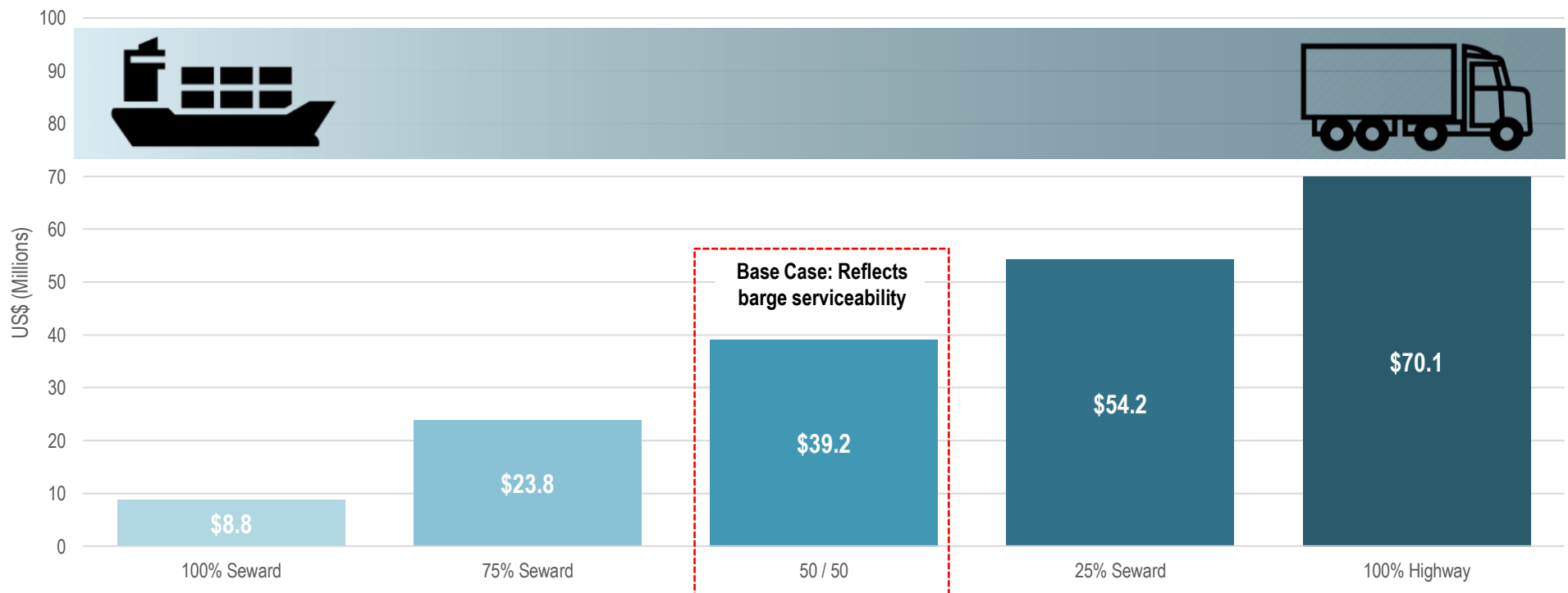
Economic Assessment of Don Young Port of Alaska (POA): The Port is an essential gateway to serving the diversified economic base throughout the State. Providing reliable service to cargo owners and the military is critical to the overall wellbeing of Alaska.

Therefore, in order for PAMP to fully meet the needs of Alaska, it should ensure that POA is flexible enough to accommodate change in the future, and provide redundancy of service in the case of an emergency or service disruption

Service Disruption at POA's General Cargo Terminals Exceeds \$39 million / week in Economic Costs:

- M&N has estimated the economic cost of a service disruption at the container terminals, which incorporate the cost of operations, safety, emissions, labor and to the broader economy.
- The analysis reflects the need to reroute cargo through another port (e.g. barge from Tacoma to Seward), or by truck via the Alaskan Highway (Tacoma to Anchorage) or a combination of the two. It is assumed that almost 8,000 twenty equivalent units (TEU – a standard container unit) are displaced within the 1-week period, which is equivalent to POA's existing volume.
- Based on Seward's ability to receive almost 6 full barges of 720 TEU, this implies that roughly 50% of the cargo would go by barge and 50% would travel by truck. This is considered the Base Case in the report. The combined transportation costs plus the impact of these costs to the overall economy of the Base Case equates to \$39.2 million in additional cost/impact per week.
- M&N ran the analysis to reflect varying splits between barge and truck and determined the impact to range from \$8.8 – to – \$70.1 million per week. The truck routing is comparatively more expensive, and therefore as reliance on truck increases so does the cost.

RANGE OF ECONOMIC COST



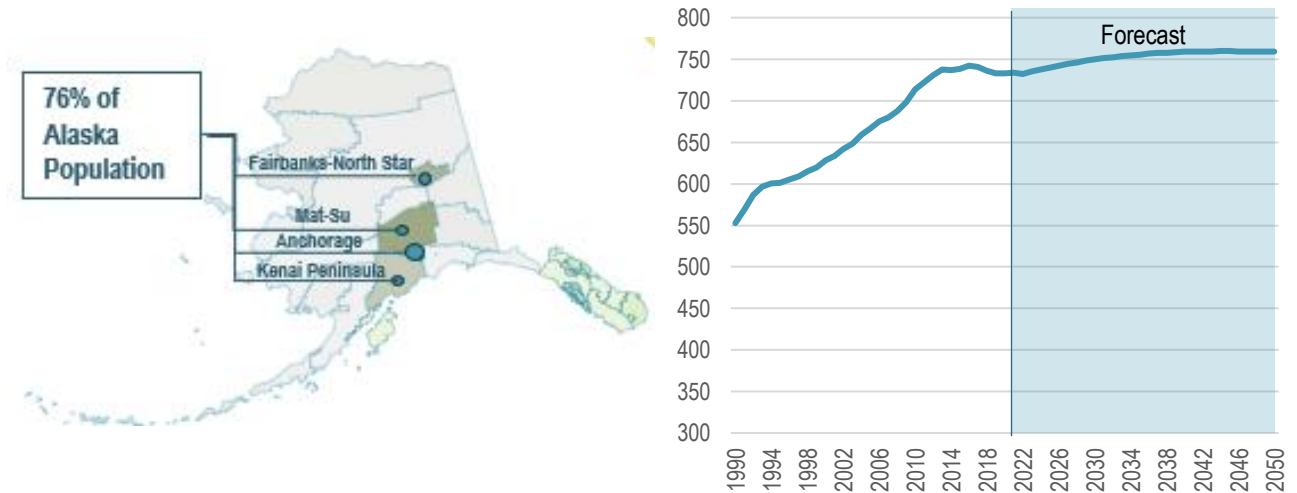
Alaska Economic Overview

Alaska has a stable population concentrated around several key metropolitan areas, forming a consumer base that predominately works in the services-providing sector and relies heavily on imported goods to sustain daily life.

1. Alaska's population is expected to remain stable and reliant on imports over the coming decades.

- The population is stable at ~735,000 residents in 2023
- Alaska's residents concentrate around metropolitan centers (high-population counties highlighted in green)
 - 76% of Alaska's population is concentrated in 4 counties near Anchorage and Fairbanks
- Alaskans increasingly work in services-providing industries and less often in goods-producing industries
- Alaska and its people rely on imports for everyday essential items, fuel and supplies for businesses

ALASKA POPULATION DISTRIBUTION AND HISTORICAL TREND (THOUSANDS OF PERSONS)



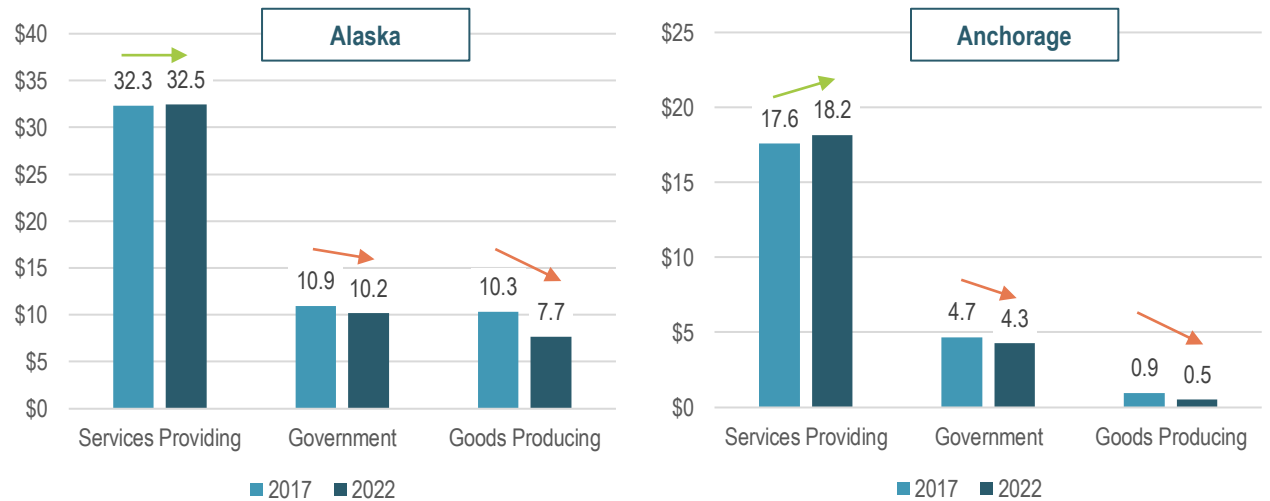
2. The services sector has driven economic activity and employment, particularly in Anchorage.

- Services include transportation (air and sea), leisure / hospitality, education / healthcare and retail trade
 - Anchorage is a service-based consumer economy
- The active federal government sector includes the large Army, Air Force and Space Force presence in Alaska
 - Anchorage is home to JBER the large joint Army-Air Force base

3. The military and Alaska's stable population will continue to form the foundation of economic activity in Alaska.

- Alaska will likely remain a key element in national defense and military training
- Alaska's population is forecast to remain stable at ~750,000 residents
- Tourism continues to emerge as an important and growing sector

ALASKA AND ANCHORAGE REAL GDP BY SECTOR (MILLIONS OF 2017 DOLLARS)



Industry Profiles

Anchorage is a global air cargo hub and facilitates fuel shipments for the increasingly import-dependent Alaska energy market. It also anchors the state's active military presence.



1. Major industries in Anchorage include transportation, government and military and, to a lesser extent, tourism.

2. Alaska has become a net importer of energy due to declining oil production and refining.

- Crude oil production declined from a height of 2.0 million barrels per day in the mid 1980's and has plateaued over the last decade at less than 0.5 million barrels per day.
- Alaska's largest refinery, Flint Hills, closed in 2014 and took 85,000 barrels per day of capacity from the market.

3. Ted Steven's International Airport is a major refueling stop for air cargo carriers on the US-Asia trade lane.

- Air cargo tonnage through the airport has increased since the pandemic.

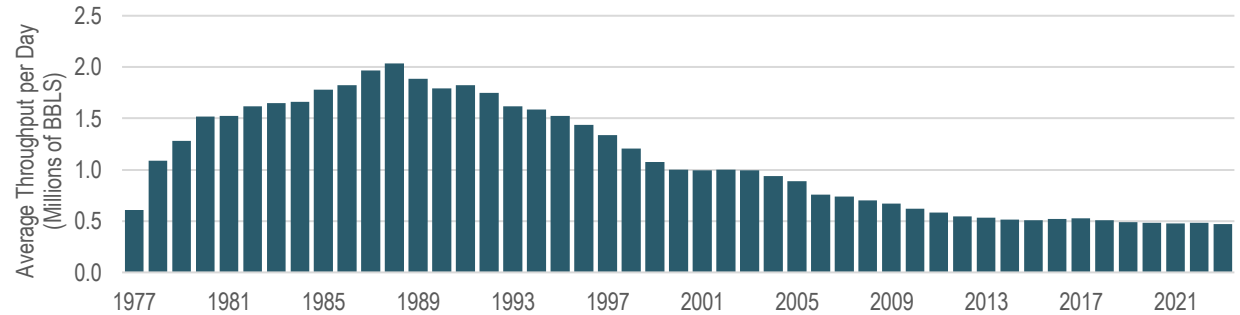
4. The military has a large presence in Alaska, with active bases in Anchorage and the Interior.

- Alaska provides a strategic base of operations for monitoring Asia-Pacific activity.

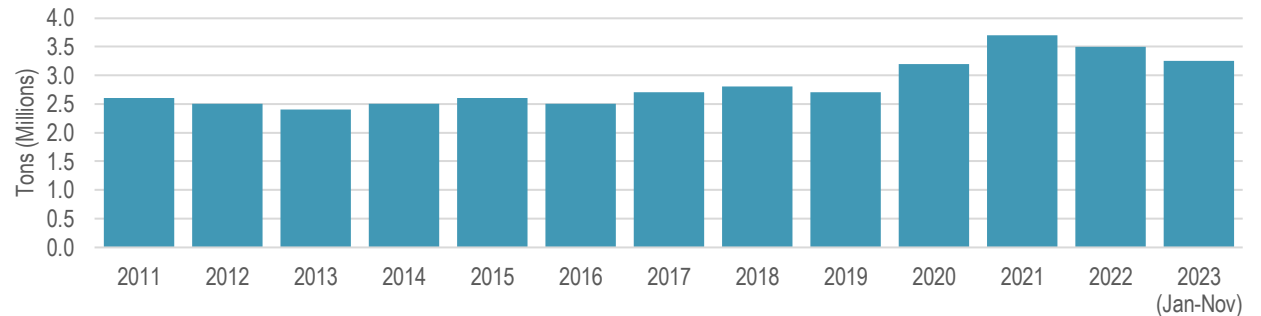
5. Tourism concentrates in Alaska's Southeast, but Anchorage still receives visitors.

- In 2023, Anchorage received 23% of the state's cruise tourists and a high share of non-cruise visitors that travel through the airport.

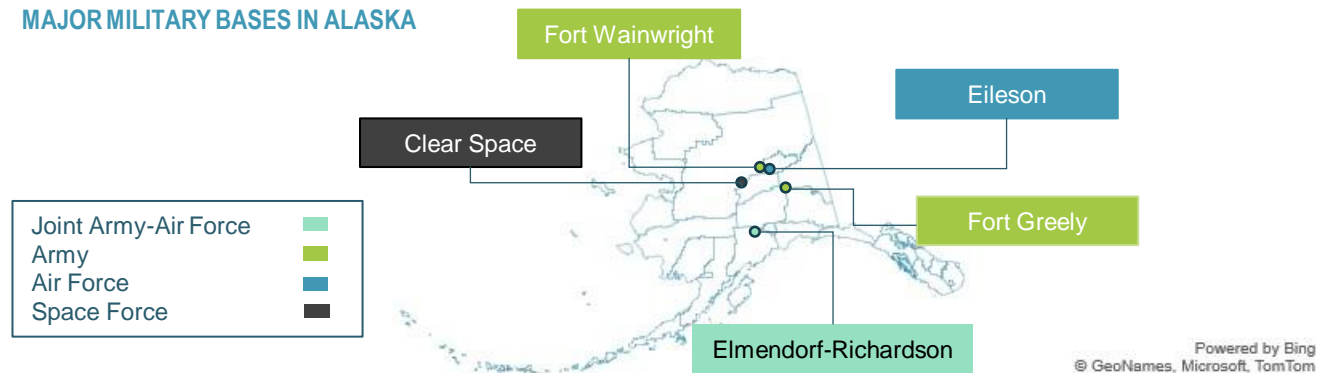
ALASKA AVERAGE CRUDE OIL THROUGHPUT PER DAY (MILLIONS OF BBLs)



ALASKA AIR CARGO TONNAGE (MILLIONS)



MAJOR MILITARY BASES IN ALASKA



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Port of Alaska Overview

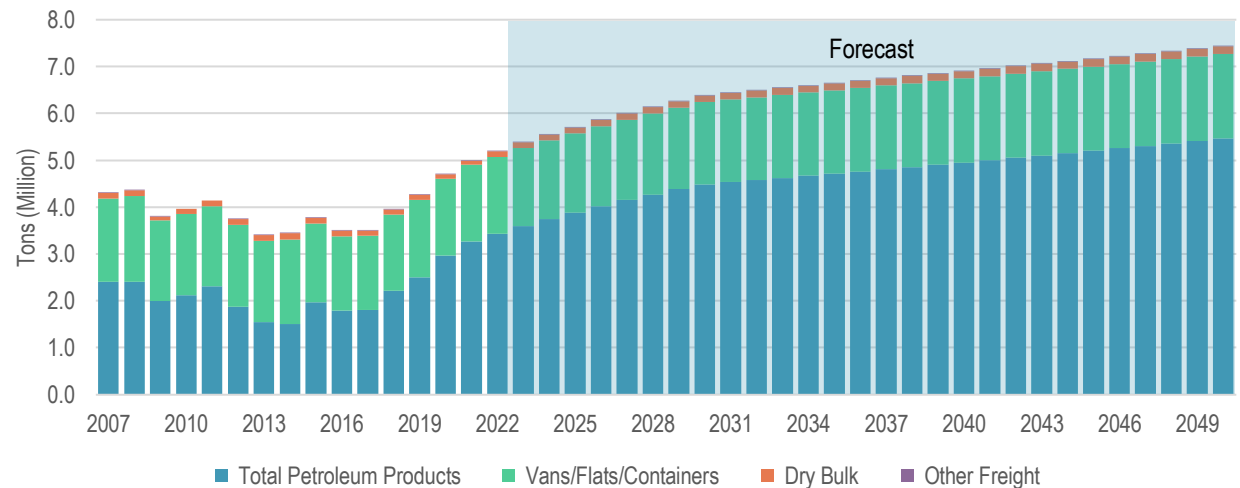
POA handles several cargo types key to the population and economy's sustainment, ranging from food and clothes to jet fuel. Volume is projected to experience moderate growth over the coming decades, with rising demand for jet fuel and stable demand for consumer goods.

1. POA, located in Anchorage, handles a wide variety of cargo types to support the needs of the Southcentral Alaska population and various industries.
 - In 2022, the Port handled 5.2 million tons of containerized goods, passenger vehicles and other RoRo cargo, fuel, cement, and breakbulk cargo. The port also received cruise ships.
2. Due to the stable and slow growing populations, essential goods carried in vans / flats / container has remained relatively steady. Growth in overall port volume for the past 15 years has been mainly fueled by vessel offloaded dockside petroleum
 - The recent growth in dockside petroleum can be attributed to greater jet fuel demand for cargo ships during the pandemic where consumer activity increased, as the Alaska International Airport plays a critical role in air cargo shipments between Asia and the US.
 - Container volumes, originating from the Port of Tacoma and serviced by Matson and TOTE, have held relatively steady over the past 15 years. As an isolated economy far from any major urban population centers, Alaska depends on Matson and TOTE's routine services to supply necessities to distribute them among the rest of the state.
3. M&N expects total volume at the Port to grow at an average annual rate of 1.3%.
 - Liquid bulk (petroleum) is expected to grow at an average yearly rate of 1.7% out to 2050.
 - Container / flat / vans volume is expected to remain stable as Alaska's population ages and parallels in stability.
 - Dry bulk (cement) is expected to grow at an average yearly rate of 1.4% forecasted out to 2050 as Alaska's population recovers and gains some net migration inflows.

POA AERIAL OVERVIEW



POA VOLUME: HISTORICAL AND PROJECTIONS



Port of Alaska Competitive Assessment

POA operates within a system of ports that work together to serve the state’s widespread population centers. These ports generally do not compete with one another given that they are focused on serving the needs of their immediate / local communities.

1. Goods flow between Seattle and Alaska population hubs

- Several facilities in Alaska connect to Tacoma by sea and receive cargo from the mainland by barge and other vessel types

2. Southcentral Alaska has the best inland connectivity

- Southcentral Alaska provides a gateway for cargo from Tacoma to reach isolated markets in Alaska’s interior
- Southcentral Alaska cargo facilities have road and rail connections to Fairbanks and the distant North Slope.

3. Population hubs in Anchorage and the interior primarily rely on Anchorage-based ports

- Marine cargo facilities in Anchorage, namely Port of Alaska, play key roles in supplying interior regions with goods from the mainland US.
- Port of Alaska is the only port on the Cook Inlet capable of efficiently handling large container and RoRo vessels

4. Seward and Whittier primarily serve local populations with barge services

- Transporting goods to inland markets faces several challenges, including road closures by falling ice and rock along the highway and a potentially congested road / rail tunnel

5. Southeast Alaska ports have no land connectivity and serve the population in the immediate area

SOUTHCENTRAL AND SOUTHEAST ALASKA KEY TRANSPORTATION INFRASTRUCTURE






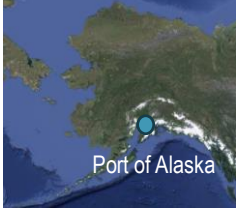
SOUTHCENTRAL AND SOUTHEAST ALASKA CARGO FACILITIES

Region	Facility	Vessel Type	Inland Connectivity	Primary Market
Anchorage	Port of Alaska	Container, RoRo	●	Anchorage, Interior
	Ship Creek	Barge	●	Anchorage, Interior
Kenai Peninsula	Seward	Barge	●	Local population
	Whittier	Barge	●	Local population
Southeast	Juneau, Ketchikan	Barge	●	Local population

● Stronger ● Weaker

Port of Alaska Benchmarking Analysis

Southcentral Alaska needs two container berths to meet demand and for redundancy. The Ports of San Juan, Guam, and Hawaii serve isolated markets relying on marine infrastructure. These ports have multiple berths creating redundancy and resiliency during natural disasters and other events which could disrupt operations..

	Location	Function	Container Infrastructure			Equipment	Notes
			Terminal	Depth	Berth Length		
Port of San Juan		The Port of San Juan is Puerto Rico's primary container port serving the island's concentrated population	Puerto Nuevo	39 ft.	4,721 ft.	11 STS Cranes	Hurricanes Irma and Maria left extensive damage to Puerto Rico and the Port in 2017. Puerto Rico used the Port of San Juan and Port of Ponce to transport goods
			Isla Grande	36 ft.	2,000 ft.	3 STS Cranes	
Port of Guam		The Port of Guam handles essentially all the of island's freight	F4, F5, F6	28-35 ft.	1,970 ft.	3 STS Cranes	An earthquake damaged the container terminal in 1993. Part of 5 and part of 6 were damaged so part of 3, 4 and 5 were able to be worked off of.
Port of Hawaii / Honolulu Harbor		The Port of Hawaii's epicenter is located at the Honolulu Harbor which distributes containerized cargo to the other islands via barge	Sand Island	40 ft.	4,010 ft.	9 STS Cranes	The Port of Hawaii expects to receive larger vessel calls in the future as is undergoing a modernization program to widen its piers
			Kapalama (Under Construction)	-	1,800 ft.	No. of STS Cranes TBD	
Port of Alaska		Port of Alaska is the primary gateway to the state, connecting the isolated population to supplies from the US mainland	T2 (Matson)	35 ft.	1,350 ft.	3 STS Cranes	Anchorage became the primary cargo port in 1961, after a large earthquake decimated the Seward Harbor
			T3 (TOTE)	35 ft.	800 ft.	RoRo Ramps	

Vessel Operations at Port of Alaska

POA supports several vessel types including container, specialized roll on roll off, cruise, oil tankers and bulk cement.

1. Matson operates a container service at T2

- Matson will assign vessels in its fleet to Alaska that are larger and faster than the vessels currently serving the market.

2. TOTE operates a roll on roll off service specially designed for Alaska

- TOTE utilizes two ORCA class vessel to service the trade, emphasizing fast unloading to quickly maintain its weekly service to Alaska
- If an opportunity to increase efficiency and lower costs arises, it may alter future vessel designs

3. Cruise vessels share the cargo terminals (T1 and T2) and are expected to remain active going forward.








4. Large liquid bulk oil tankers have seen higher demand but face depth restrictions at Port of Alaska

- Tankers have visited Port of Alaska more frequently to keep up with rising petroleum product demand
- Tankers can only call during high tide due to depth constraints, limiting the window of opportunity to use the Port

5. Cement-carrying dry bulk vessels will soon share a terminal with liquid tankers

- Cement vessels can spend up to two weeks at the Port
- Vessels may increasingly compete for berth space

PORT OF ALASKA PRIMARY VESSEL TYPES
















Terminal	Vessel Type	Vessel Calls (2023)	Operations	Notes	
T2	 Container		99	Containers lifted on and off vessel by STS cranes	Vessel size will increase
T3	 RoRo		87	Trailers, containers, vehicles and equipment driven on and off vessel using special ramps	RoRo specially designed for Port of Alaska
T2 / T3	Cruise		3	Passengers disembark at cargo terminals	Expected to visit Anchorage more
PCT / POIL2	Liquid Bulk Tanker		37	Unloading at POIL2	Facing depth restrictions at the Port
PCT	Dry Bulk / Cement		5	Unloading at new Petroleum Cement Terminal	Spending a long time at Port, will eventually share the terminal with liquid bulk tankers

Stakeholder Outreach

M&N interviewed key stakeholders and port users as part of its economic assessment to better understand their relationship with the Port and how they plan to use its facilities in the future.

Key takeaways and reoccurring themes among all interviews:

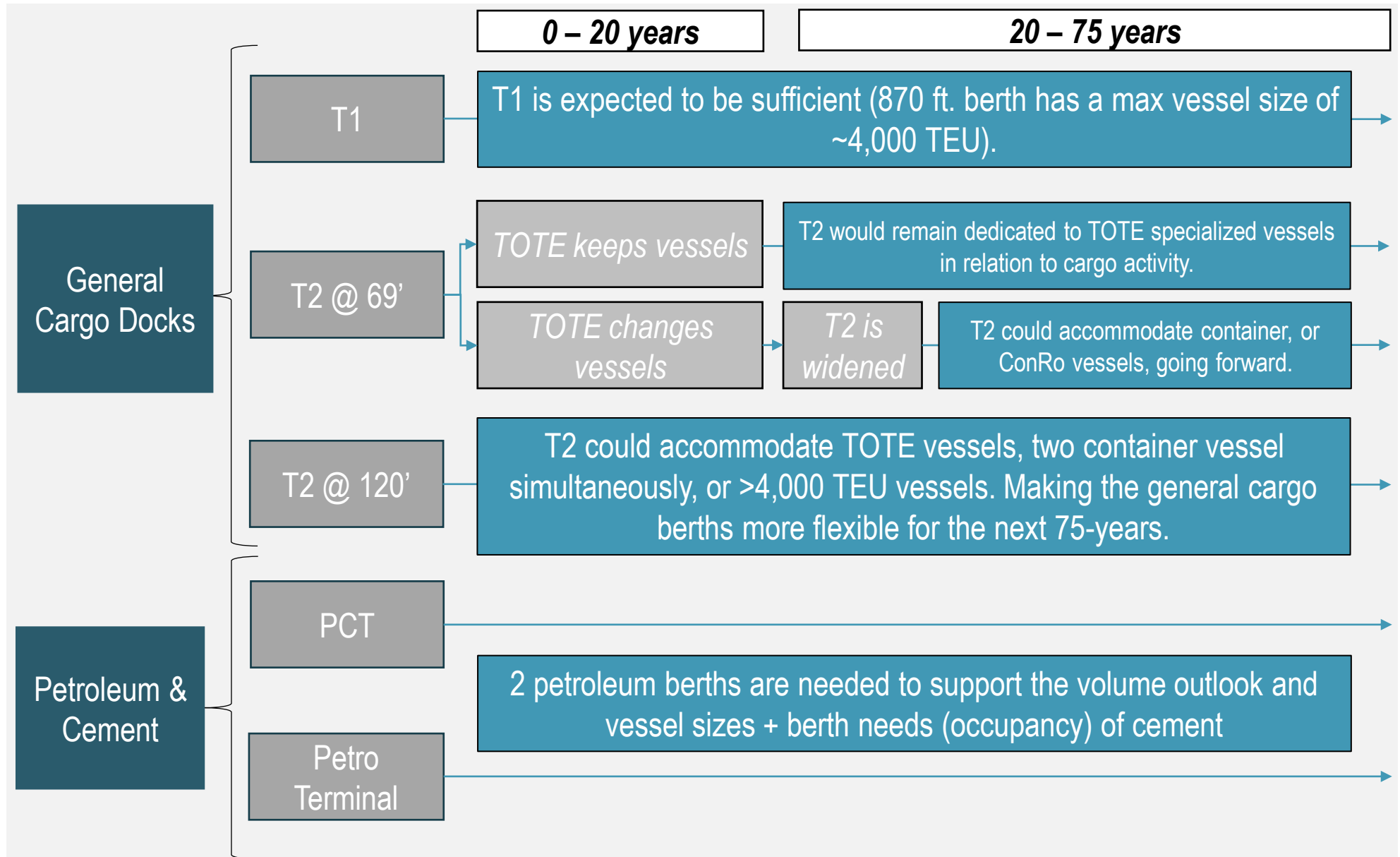
1. PoA's importance in the economy of the region cannot be overstated.
2. Need for reliability for both liquid bulk and cargo operations is a key area of interest for all users.
3. There are no economically viable alternatives to PoA from both a maritime infrastructure and inland connectivity standpoint.

Stakeholders Interviewed To-Date	Port Uses	Key Takeaways	Reliance on Port Infrastructure
	Cargo Docks	Will be introducing larger vessels to the Alaska trade route in the near-term. Remains firmly committed to serving the Alaskan market and supports PAMP's objectives of developing POA into a modern, self-reliant gateway.	
	Cargo Docks	Maintaining schedule integrity is crucial to TOTE's operations and the specialized infrastructure and labor available at POA is needed to support this. Vessel types could see a change following end of design life of current vessels (15-20 years).	
 	Cargo Docks Petroleum Berths	Port of Alaska is the premier port for Military operations in Alaska, and the military presence in Alaska is growing. The POA supports the movement of pieces of equipment used in exercises, regular consumable goods for the troops and fuel for the Air Force.	
	Petroleum Import / Export	Marathon relies on POA to receive inbound shipments of fuel to complement the production at the Kenai Refinery. With demand rising, the ability to efficiently handle product at multiple berths benefits the various liquid bulk customers at POA.	
	Jet Fuel Imports	POA is crucial in serving as a gateway for fuels destined to the Ted Stevens International Airport. Cargo and passenger planes alike rely on the fuel handled through the Port.	
	Petroleum Import	Petro Star uses POA distribute its refined product throughout the State including the North Slope. Their refined product is shipped by barge and utilizes POL1 and POL2. The company took over the Tesoro tanks at POA in 2017.	
	Inland Cargo Movement	ARRC and POA work together to rail cargo into Fairbanks. This is an important logistics service for the interior markets of the State. Capital development costs would be very high at other ports to replicate the service at POA.	

The following pages provide more detailed notes of the interviews

PAMP Assessment

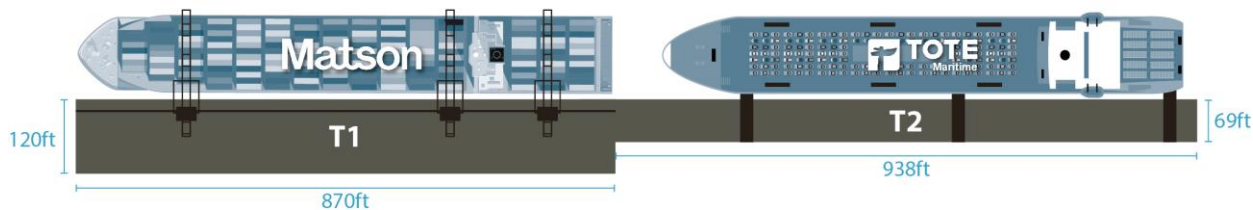
1) Developing T2 as an identical structure as T1 appears supported by the future market conditions, industry standards, observed practices, stakeholder comments and the potential impact on costs related to delay and/or unforeseen operational disruptions



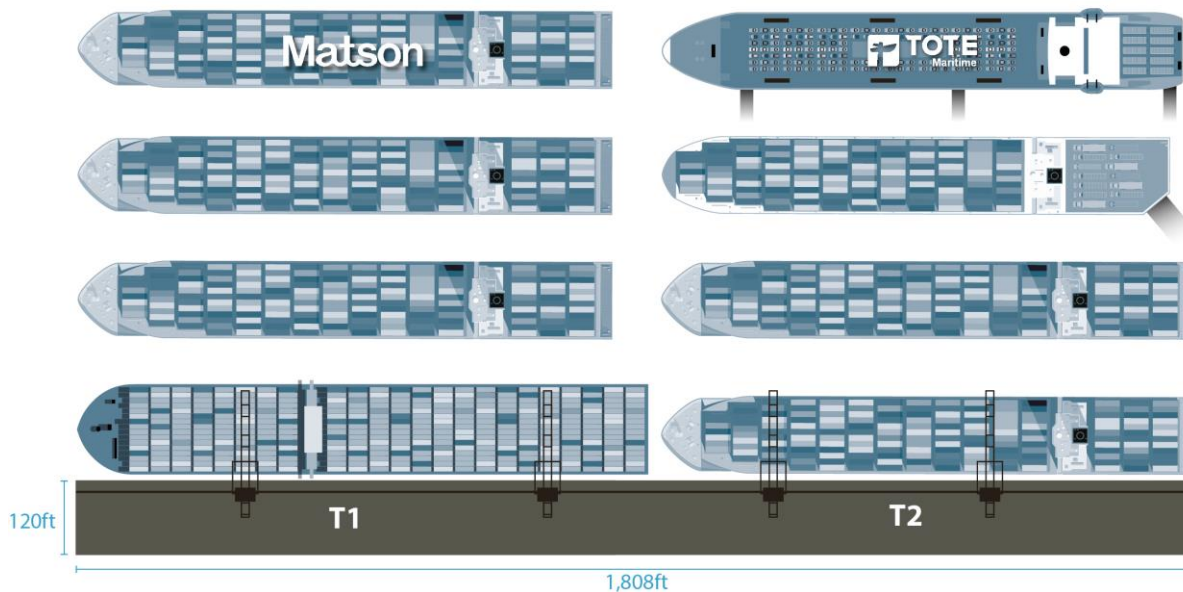
Flexibility of Berths

Two uniform width berths allow for the extension of the crane rail the full length of the berths. This creates a greater degree of flexibility to handle a range of vessels (sizes and types) across the full general cargo dock facility at the POA.

Option 1: Non-Uniform Berth



Option 2: Uniform Berth



Option 1

- Will provide adequate berthing capabilities for the current / near future Matson & TOTE vessels
- Containerized lift-on, lift operations will be limited to T1 as there is no crane rail extension to T2

Option 2

- Will also allow the existing / near future Matson & TOTE vessels to be serviced
- With the extension of crane rail, could allow for two cellular container vessels, or one cellular vessel and one ConRo vessel, to call using both berths simultaneously
- Additionally, this option would allow for a larger container vessel or other type of ship to call (cruise, LMSR), and still allow for either a Matson or TOTE vessel to call

Benefits of a Uniform Berth Offering

- If the objective of PAMP is to develop modern port infrastructure that will prove to be as necessary and adaptive in 75-years as it would be today, then the utility of the uniform berth offering is apparent.
- As designed Option 1 (Non-Uniform Berth), in M&N's assessment, is sufficient to meet the needs of Matson and TOTE over the coming 20-year period, given the guidance from the respective carriers of their intent to deploy and maintain vessels of similar size to POA.
- Option 1's utility, however, is greatly reduced should TOTE alter operations / vessels following the retirement of their existing vessels.
- Option 2 would allow first for Matson and TOTE to keep their same operations in the coming 20-year period, secondly, provide for a greater ability to handle a mixture of vessels during this first 20-year period, and allow for adaptation in the future for larger or different vessels to call POA should TOTE change operations.

Economic Cost Analysis

Calculating the economic cost of a service disruption at POA, helps to understand the value of the infrastructure that is being considered under PAMP

In an attempt to quantify the value of POA's infrastructure to the overall economy, M&N has estimated the economic costs in a scenario where the POA's general cargo docks (container terminals) are shutdown for a week.

- This analysis does not claim to fully encompass the economic costs associated with a shutdown¹. However, it should help establish the overall range and order-of magnitude.
- This analysis only considers the impacts on containerized cargo.

A service disruption would lead to cargo being rerouted either through another maritime port or by land (truck)

- In the event of a disruption at POA's container docks cargo would either (1) be redirected through alternate port gateways utilizing barge service, (2) be trucked up from Tacoma via the Alaskan Highway, or (3) a combination of the two routes

M&N has followed the US Department of Transportation's (USDOT) guidelines for measuring the cost of transportation.

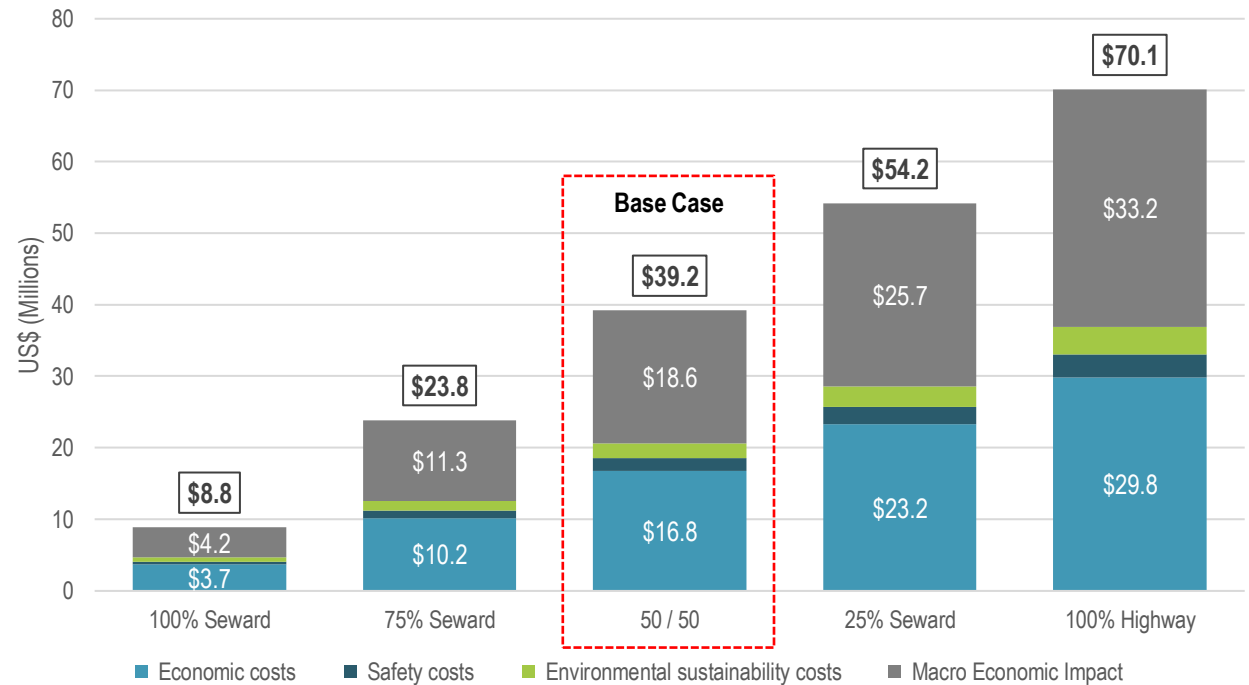
Regional Input-Output Multipliers (RIMS) are an established approach to understanding the relationship between how a change in one industry impacts others (or the economy) as a whole.

- For the purpose of the analysis, which is to estimate the total economic impact of POA, and in this case by the cost of a service disruption, M&N utilized the 1.9X output multiplier.²

Under the base case assumptions, every week the cargo docks at the POA are closed have an economic impact of about \$40 million.

Depending on the assumed split between cargo diversion through Seward vs Alaskan Highway, the economic cost of a one-week shutdown can vary significantly, as depicted in the chart on the right.

ECONOMIC COSTS ASSOCIATED WITH ONE WEEK POA SHUTDOWN



1 – The intent of the analysis is to establish a benchmark estimate of the estimated economic cost of a singularly defined event (scenario). M&N acknowledges that there is a wide range of conditions which could, and would, differ from the defined scenario. These include but are not limited to the possibility of disruption to the military, the cost of shifting / housing labor to new locations (e.g. Anchorage to Seward) to support heightened levels of activity, the types of goods which would be shipped in the event of an emergency and how this would impact the total volume of displaced cargo. The analysis presents an estimated range of costs, an order-of-magnitude, which are indicative of the overall costs of service disruption at POA's general cargo docks.

2 – Developed by the US Bureau of Economic Analysis; for the Water Transportation industry in the State of Alaska

2



Alaska Economic Overview

Alaska Economic Overview

Alaska's economy and population have stabilized in recent years. An active services sector supports the economy, with government offices, logistics, education, health care, retail trade and leisure employing a high share of the workforce.

Alaska's economic growth has moderated. Its existing population remains economically active

Real GDP has declined at an average annual rate of 1.2% since 2017, reaching \$50.3 billion in 2022.

The population peaked in 2016 at 742,575 and has trended down to 733,406 as of 2023.

Real income per capita increased over the last five years.

- Population growth has eased at a slower five-year CAGR (-0.2%) compared to real income (-1.2%). This reflects more economic resources available to the average Alaskan.
- As population size have stabilized, employment levels have held firm, reflecting less competition in the job market.

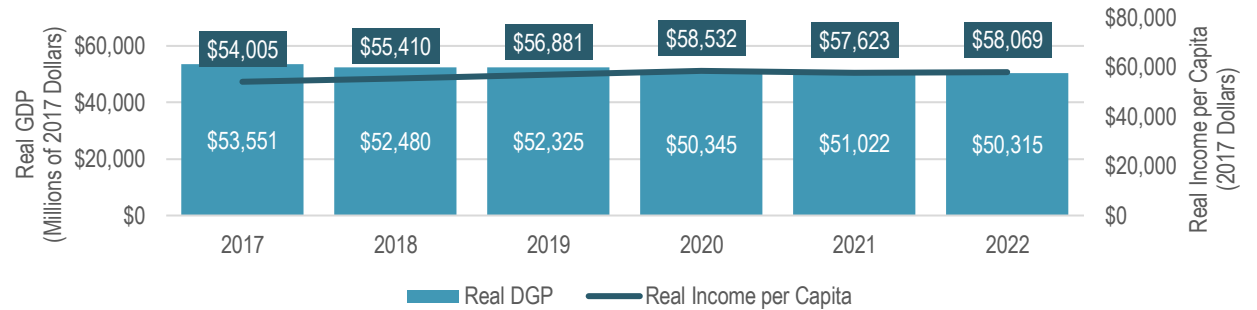
The population supports GDP through an active services sector while energy and mining also contribute strongly to GDP

The mining and energy industry, predominately made up of oil and mineral extraction, accounts for 12% of Alaska's GDP due to the high-value nature of oil exports. However, it employs only 3% of Alaska's workforce.

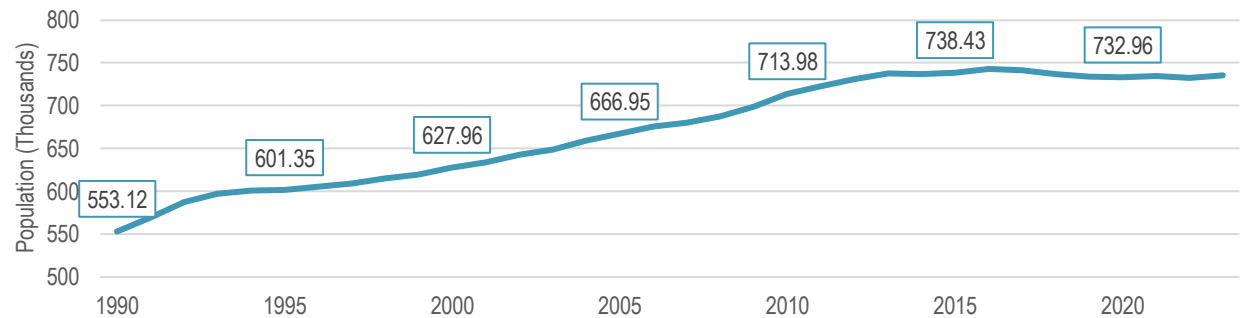
Government, logistics and other services account for high shares of GDP and employment, reflecting the population's contribution to the economy.

- Government accounts for ~20% of GDP and employment, driven by active federal, state and local offices.
- Pipeline transportation contributes to the transportation sector's large share of GDP as well as air and water-based transportation. Transportation, in aggregate is one of the largest employers in Alaska.
- Retail trade and leisure too are important contributors to overall economic growth and employment. These industries collectively employ nearly 20% of Alaska's workforce.
- Alaska has a strong professional services sector, including education and healthcare as well as financial services.

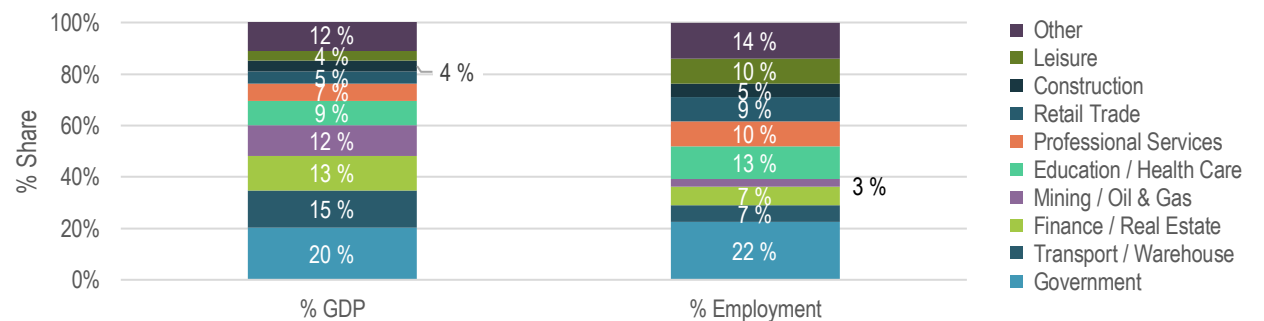
ALASKA REAL GDP AND INCOME PER CAPITA



ALASKA POPULATION



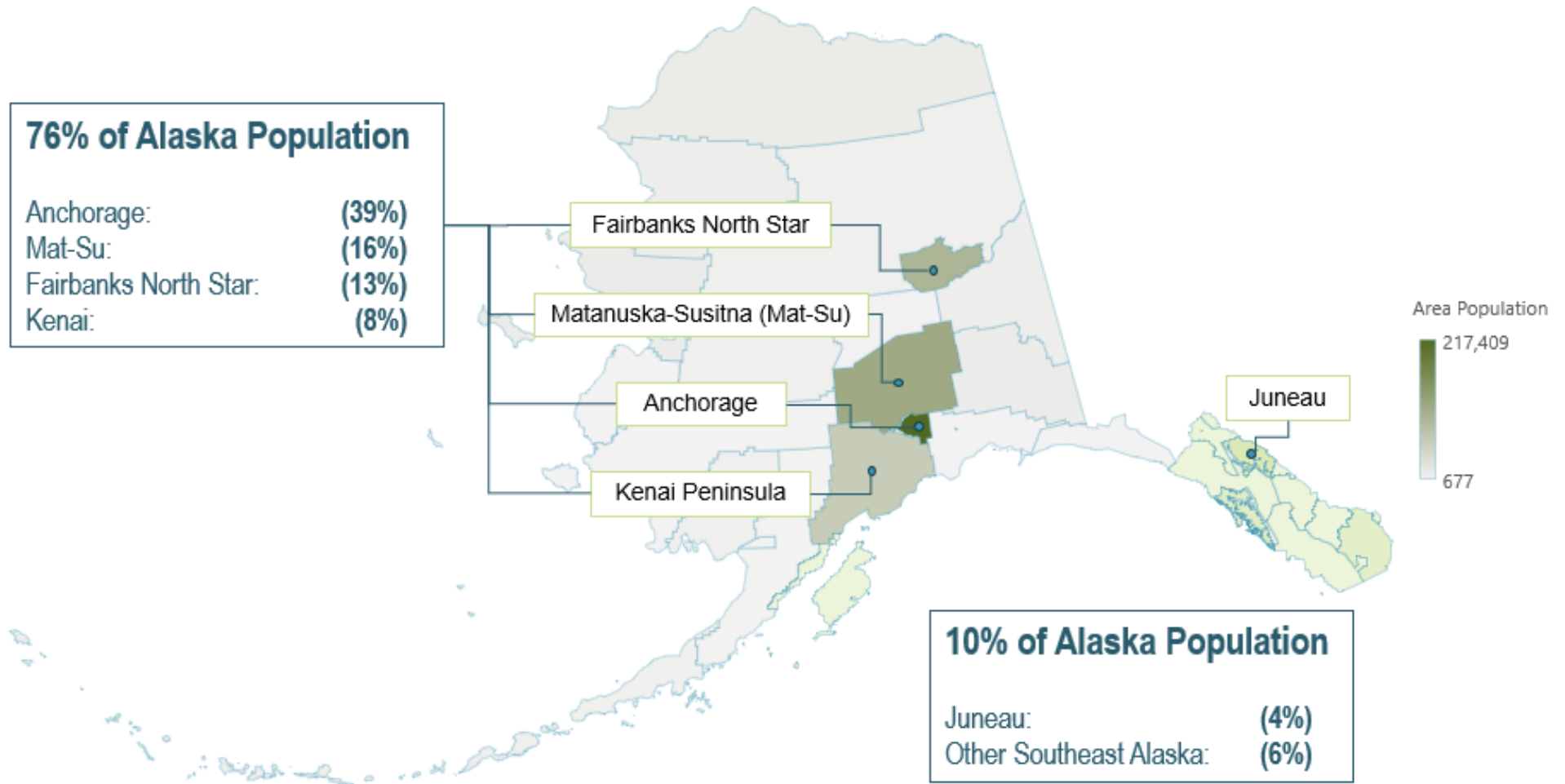
ALASKA INDUSTRIES BY SHARE OF GDP AND EMPLOYMENT



Sources: Bureau of Economic Analysis

Alaska Population Distribution

Alaska's population concentrates in the Southcentral region around Anchorage and Fairbanks. The remaining population is widely dispersed, namely among small mining communities in the North and West, and in the Southeast region which itself relies on local ports to meet its needs given the lack of road and rail connectivity.

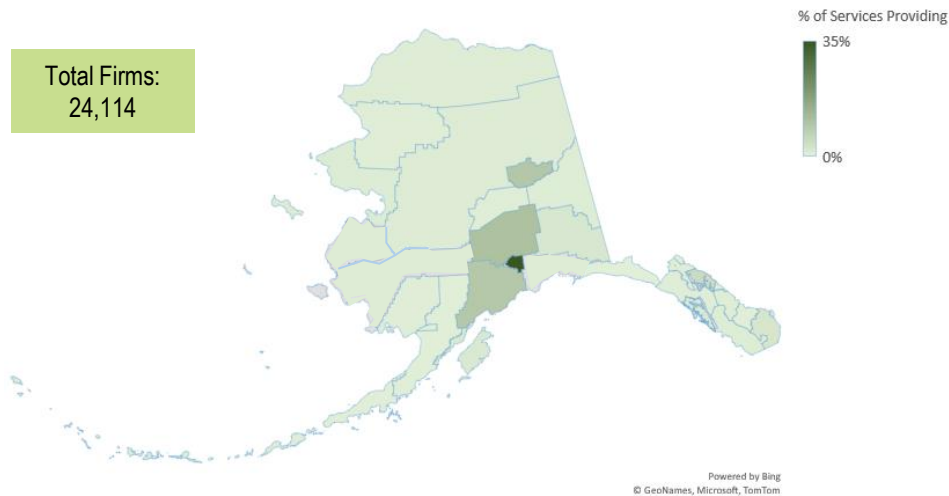


Sources: US Census

Alaska's Service and Goods Based Economies

Anchorage, Fairbanks and Juneau support a service / consumer-based economy while goods producing operations (oil, gas and minerals) drive economic activity outside of the large population centers.

SHARE OF SERVICES PROVIDING FIRMS IN ALASKA, BY COUNTY



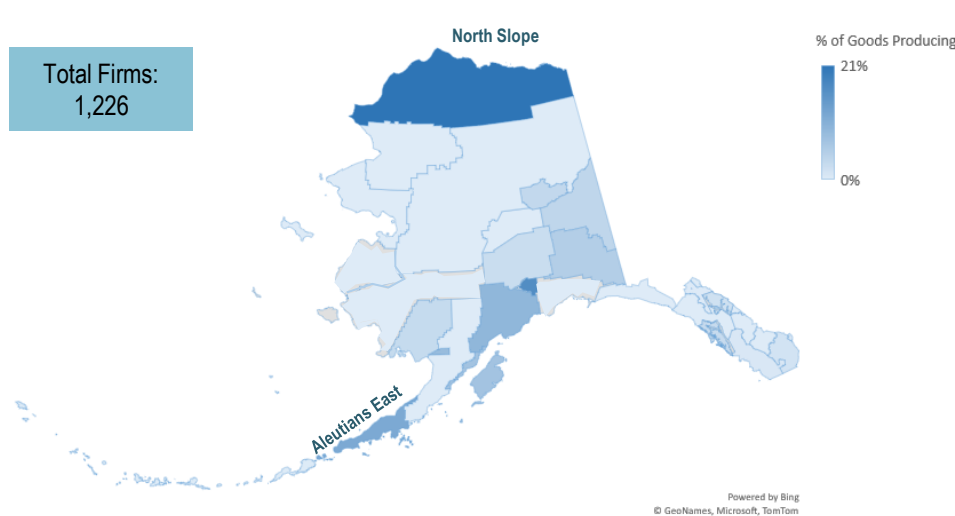
The high population in and around Anchorage has fostered a services-based economy

54% of Alaska's services providing firms operate in Anchorage, Mat-Su and Kenia counties.

The concentrated population in and around Anchorage creates demand for important services, such as logistics, financial services, education, health care, retail and leisure or accommodation (restaurants, hotels, recreational services).

- Demand for services supports consumer spending in the surrounding Anchorage area.
- Importantly, because of service industries' labor intense nature, consumer spending on services tends to create jobs, as reflected in Alaska's employment by industry figures. Service-based consumer economies also rely on imports for consumer goods, as there is limited production of such goods locally

SHARE OF GOODS PRODUCING FIRMS IN ALASKA, BY COUNTY



Several areas have low populations but high concentrations of goods-producing industries

Alaska's goods-producing industries depend on natural resources not always found near the population centers.

- North Slope and Aleutians East constitute some of Alaska's most remote areas, accounting for just 2% of Alaska's population. However, 33% of Alaska's goods-producing firms operate here.
- Both areas depend on nearby resources, not services. North Slope produces crude petroleum from its oil fields while Aleutians East serves as a commercial fishing hub.
- These industries create considerable economic value, particularly crude petroleum, but rely heavily on machines and highly skilled labor. Therefore, they do not employ as many Alaskans as the services sector.
- Goods-producing firms, particularly those advantaged by unique resources, often focus on exports as opposed to demand from the nearby population.
 - Despite this focus on production of raw commodities, there is import-driven demand for equipment, parts, and basic consumer related products for the labor forces sought by any population

Sources: Bureau of Labor Statistics

Alaska's Service and Goods Based Economies

The goods producing industries in Alaska focus on exporting seafood, crude petroleum, ores and forest products. Alaska's service-based urban economies largely rely on imports for essential and discretionary goods.

Alaska's urban population is predominately service-providing and goods-consuming

Alaskans purchase discretionary and essential goods. Importantly, some consumer goods such as clothing appear discretionary in other markets but become essential in Alaska due to the state's remoteness and relatively extreme weather conditions.

- The large population surrounding Anchorage and Southeast Alaska (Juneau) forms Alaska's core consumer base. The state as a whole purchased \$13.0 billion worth of goods in 2022.
- Food accounts for the highest share of consumer spending.
- Consumer goods such as furniture, household goods and clothing have also maintained their share of consumer spending around 8% and 7%, respectively.
- Other essential goods include energy (gasoline, heating oil) and pharmaceuticals.

Alaska's goods-producing industries do not produce many of the goods demanded, creating a need for imports

The seafood industry, active in remote areas such as Aleutians East, dominates Alaska's food production and accounts for 24% of goods-producing firms.

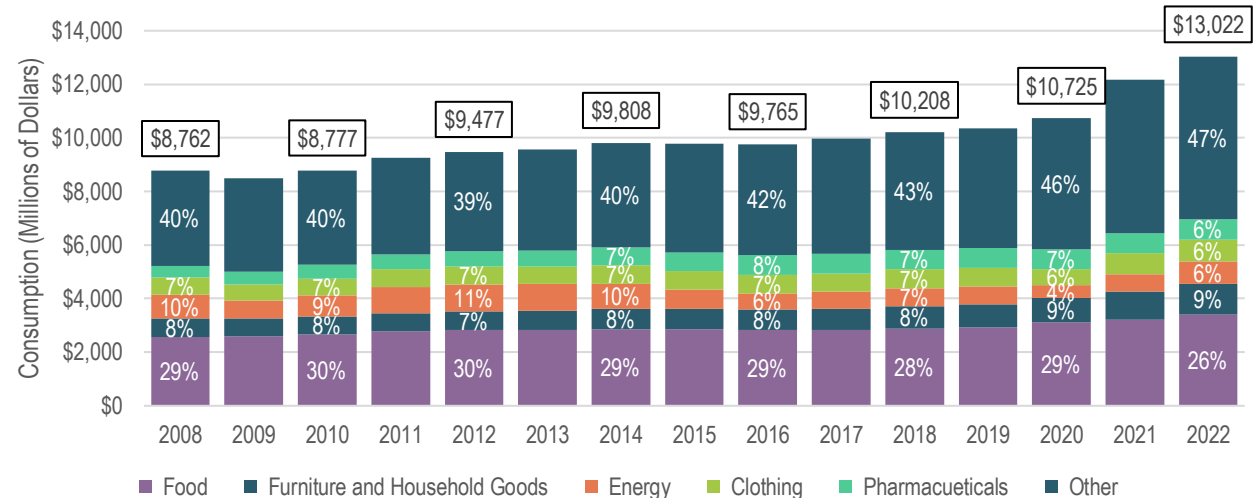
- Seafood exemplifies a major goods-producing industry that can, to an extent, accommodate some of Alaskan's essential consumption.
- This industry also brings considerable value to the economy by exporting to other states and internationally.

Mining, logging and energy industries also account for a large share of Alaska's goods-producing firms. While these industries add economic value, they do not accommodate much of Alaska's personal consumption.

Therefore, the services-based economies in Alaska's urban hubs rely significantly on imports for essential and discretionary goods.

This is exemplified in POA's container trade which is highly import-centric, with the majority of exported containers returning to Tacoma empty to be refilled with northbound import goods.

ALASKA PERSONAL CONSUMPTION EXPENDITURES BY MAJOR PRODUCT



ALASKA MAJOR GOODS PRODUCING INDUSTRIES

Industry	Firms	% of Goods Producing Firms
Seafood	291	24%
Mining	232	19%
Forestry / Logging	161	13%
Oil / Gas	154	13%
Subtotal	838	68%
Other	388	32%
Total	1,226	100%

Sources: Bureau of Economic Analysis, Bureau of Labor Statistics

Alaska Economic Outlook

Despite a softening economic outlook for Alaska, a considerable number of services-providing consumers in urban populations and military bases will likely remain in the state. This underpins continued consumption and import of essential and discretionary goods.

Alaska’s service-providing consumers, both private and public, will likely remain an integral part of the economy despite slowing population growth

According to the Alaska Department of Labor and Workforce Development, Alaska’s population is not forecast to resume strong growth over the coming decades.

Importantly, it is also not forecast to decline significantly despite recent economic headwinds.

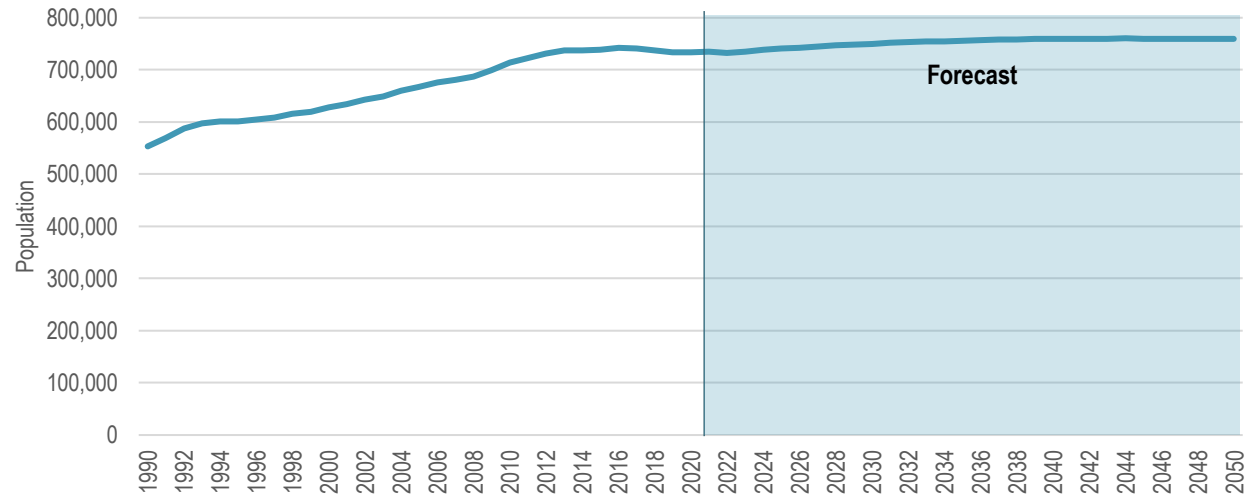
M&N expects the civilian and military populations, both key components of Alaska’s economy, to remain import-reliant consumers.

- Consumer spending on food, clothes, medicine, furniture, and other goods may not increase significantly but will likely persist.

Alaskan military bases provide defensive and potentially offensive capabilities in the event of threats.

- This should underpin future military activity in the state, as confirmed through discussions with the Military for the purpose of this study
- The continued transport of personnel, goods and equipment to Alaska will remain an important function at POA.

ALASKA POPULATION PROJECTION



ALASKA ECONOMIC SECTOR OUTLOOK

Sector	Outlook	Rationale
Resident Population	<ul style="list-style-type: none"> • Population size stabilizing • Sizeable residential population expected to remain • Continued need for imported goods 	<ul style="list-style-type: none"> • The future population in urban centers will remain services-focused
Visitors / Tourism	<ul style="list-style-type: none"> • Tourists expected to continue arriving • Visitors expected to continue arriving 	<ul style="list-style-type: none"> • Alaska provides unique outdoor experiences for tourists • Recent population flows out of Alaska may increase the number of people returning to see family and friends
Military Activity	<ul style="list-style-type: none"> • Military-associated residents expected to remain a large share of Alaskan population 	<ul style="list-style-type: none"> • US security interests in the Pacific remain a key focus for the military

Sources: Alaska Department of Labor and Workforce Development

3



Industry Profiles

Anchorage: Key Industries

Major employers and drivers of economic activity in Anchorage include Ted Steven’s Anchorage International Airport, Joint Base Elmendorf-Richardson and the various services industries (restaurants, finance, hotels) supporting the community.

Public and private industries provide employment in Anchorage, including military

The local economy in Anchorage is more service oriented compared to Alaska as a whole.

The transport / warehouse sector accounts for 20.2% of Anchorage’s GDP, encompassing the large air transportation sector, trucking and warehousing, and local transportation. This is far higher than the sector’s share of US GDP at 3.2%.

- The Ted Stevens Anchorage International Airport (ANC) is the 4th busiest cargo airport in the world with 93,269 commercial aircraft landings in 2021, 59% of which are cargo only.
 - ANC plays a critical role in Alaska’s air transportation and supply chain network as well as an important economic hub for Anchorage, directly employing 10,820 people. Major employers include Alaska Airline, FedEx, and UPS.
 - More than 3.7 million tons of cargo moved through ANC in 2021 with 46% being transited through the airport. ANC transited 51% of all cargo flown from Asia to North America in 2021.
- POA also provides critical transport infrastructure for fuel and goods (food, clothing, medicine) to Anchorage and the broader Alaskan market.

Government contributed the largest share to Anchorage GDP and employment in 2022. The federal government plays an outsized role at the state level, with federal (military and civilian) industries accounting for 50% of government GDP in Alaska.

- Federal jobs in Anchorage include Joint Base Elmendorf-Richardson (Army and Air Force).

Other services also provide significant GDP and employment in Anchorage.

- Major hospitals and universities support the whole Alaska population.
- Finance, professional services, restaurants and retail trade accommodate the Anchorage population and visitors.

ANCHORAGE METRO INDUSTRIES

Anchorage Industry	2022 Real GDP (Millions of 2017 \$)	5yr CAGR	Anchorage % of GDP	US % of GDP	Anchorage % of Employment
Agriculture / Forestry / Fishing	39.3	-8.2%	0.2%	0.8%	1.0%
Mining / Oil & Gas	309.0	-15.2%	1.3%	1.1%	1.1%
Utilities	305.4	1.0%	1.3%	1.5%	0.5%
Construction	839.0	-2.2%	3.7%	3.8%	5.8%
Manufacturing	160.7	-2.5%	0.7%	10.4%	1.4%
Wholesale Trade	942.0	-0.7%	4.1%	5.3%	2.2%
Retail Trade	1,107.0	-1.9%	4.8%	5.4%	9.8%
Transport / Warehouse	4,639.0	2.9%	20.2%	3.2%	7.7%
Information	1,173.4	4.0%	5.1%	6.9%	1.8%
Finance / Real Estate	3,230.1	-0.6%	14.1%	20.9%	9.0%
Professional Services	2,233.2	1.0%	9.7%	14.8%	11.8%
Education / Health Care	2,574.2	1.2%	11.2%	8.8%	14.8%
Leisure	846.6	0.3%	3.7%	4.1%	10.0%
Other Services	419.1	-1.7%	1.8%	2.0%	4.9%
Government	4,261.5	-1.8%	18.6%	11.6%	18.2%

MAP OF MAJOR EMPLOYERS



AEDC, Government of Alaska, FRED, BEA, McKinley Research

Alaska Energy Market

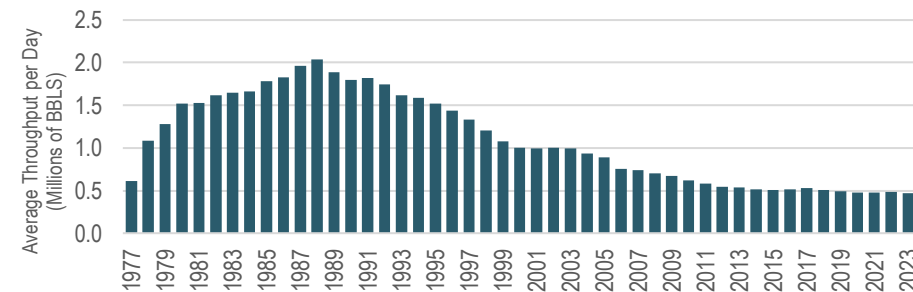
Following crude oil production's decline, Alaska has become a net importer of energy products. It ships crude petroleum to US refineries and imports the majority of its finished fuel products, namely jet fuel, from Asia, the Pacific Northwest and Canada.

Alaska has become a net importer of fuel products, particularly jet fuel of which it is one of the country's largest consumers (the largest cargo airport in the US)

Alaska's total crude output peaked in 1988 at 2 million barrels per day. However, due to maturing oil fields, the state's output has been significantly reduced to 469,196 barrels per day (bpd) in 2023.

- After several delays, the Pikka and Willow oil drilling projects will expectedly begin producing crude petroleum in 2026 and 2029, respectively. This will add ~260,000 barrels per day by over the next decade, supporting output as the existing Prudhoe Bay oil field reduces production.

Ninety-five percent of Alaskan crude oil production begins in the North Slope and travels via the Trans-Alaska Pipeline 800 miles south to the Port of Valdez. At the Valdez Marine Terminal (VMT), operated by Alyeska Pipeline which is owned by a consortium of the large energy companies, tanker vessels are loaded with crude cargo to be shipped to refineries in Washington and California.



Alaska has 5 operating refineries with a combined capacity of 164,000 bpd. Flint Hills, the state's largest refinery, closed in 2014 and took 85,000 bpd of capacity from the market.

- The Marathon refinery in Kenai, Southwest of Anchorage, produces most of the state's gasoline and distillate fuel oil, including jet fuel for the nearby airport. Other refineries in Valdez and near Fairbanks also produce diesel and heating fuels.

Imported petroleum products support Alaska's transportation industry, particularly the air transportation at the Anchorage airport and cargo flown between Alaska's isolated communities.

- Alaska imports jet fuel and other petroleum products from South Korea, Washington state, and Canada.
- Jet fuel consumption reached 21.0 million barrels in 2022, more than the state of New Jersey.



Alyeska Pipeline, U.S. Energy Information Administration, Alaska Tanker Company, Crowley, Conoco Phillips

Ted Stevens Anchorage International Airport

The Ted Stevens Anchorage International Airport is an integral air cargo hub on the US-Asia tradeline, and as such plays a significant role in Alaska’s transportation sector as a growing “exported” service.

The Ted Stevens Anchorage International Airport is the fourth largest cargo airport in the world, providing a fuel stop along the US-Asia trade lane.

Air cargo volume through Alaska has grown from 2.7 million tons in 2019 to 3.3 million tons in 2023 (through November).

- Air cargo has grown through the airport as demand for fast delivery times increases, particularly along US-Asian trade lanes.

The Ted Stevens International Airport is equidistant between Tokyo and New York. It connects to 44 cargo destinations, providing exposure to a wide array of US international trade.

The advantage of the airport is that it allows cargo planes to devote more of their carrying capacity to cargo as opposed to fuel. Relying on a refueling in Anchorage to complete the journey to the lower 48-states.

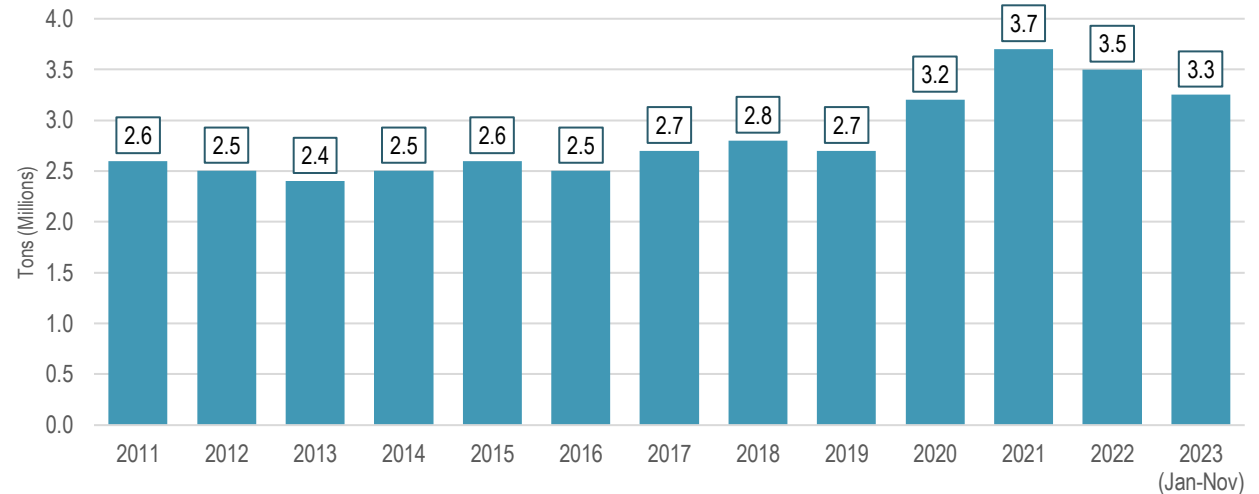
Fuel fees were the largest source of revenue for Alaska airports in 2023, according to the Alaska International Airport System.

Atlas Air, UPS and FedEx are major air cargo transporters with global distribution networks. These high-volume customers accounted for 40% of air cargo volume through Alaska airports in 2023.

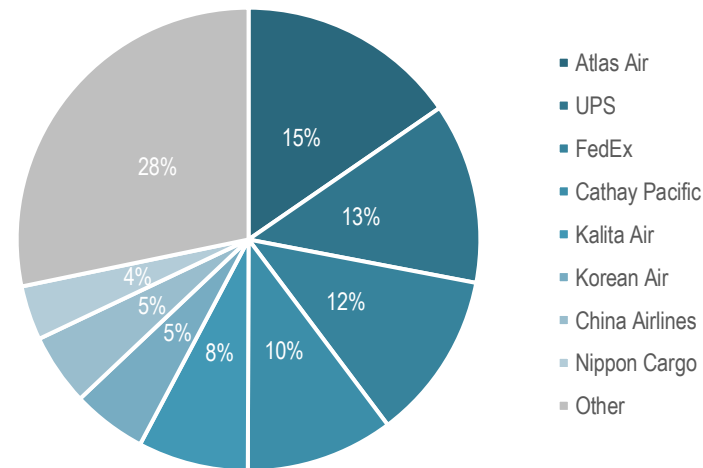
- Smaller customers also reflect the high share of US-Asia air cargo moving through Alaska. Korean Air, China Airlines, and Nippon Cargo accounted for 14% of tonnage in 2023.

A new \$200 million cargo terminal at Ted Steven International Airport will expand warehousing, parking and de-icing capabilities. The investment underscores the important, future role that the airport will continue to play in air freight transportation.

ALASKA AIR CARGO VOLUME



AIRLINES SHARE OF ALASKA AIR CARGO TONNAGE (2023)



Sources: Alaska News Source, Alaska International Airport System, Ted Stevens Anchorage International Airport

Alaska Military Activity

Alaska's military bases provide essential US combat readiness in the Pacific / Arctic as well as employment and economic activity through the sheer number of soldiers, support staff and families active on the bases.

Alaska has nine Army, Air Force and Space Force military bases

Joint Base Elmendorf-Richardson (JBER), a joint Army and Air Force base, protects U.S. interests in the Asia and Pacific regions. It is one of the largest bases on U.S. territory.

- The base includes Joint Alaska Command overseeing all military personnel in Alaska.
 - Operational support from the Air Force includes surveillance, maintenance and search and rescue.
 - The Air Force also conducts fighter pilot training.
 - Additionally, the base is home to the Army's 11th Airborne division.
- It employs about 10,687 Army and Air Force personnel, almost 50% of Alaska's total active-duty population.
- The base's two airfields receive jet fuel directly from a POA pipeline.
- JBER has announced a \$309 million runway and taxiway extension and taxiways, improving air capabilities at the base.
- Equipped with a rail yard, the base serves as the Alaska Rail line's first stopping point before heading north to supply other large bases.

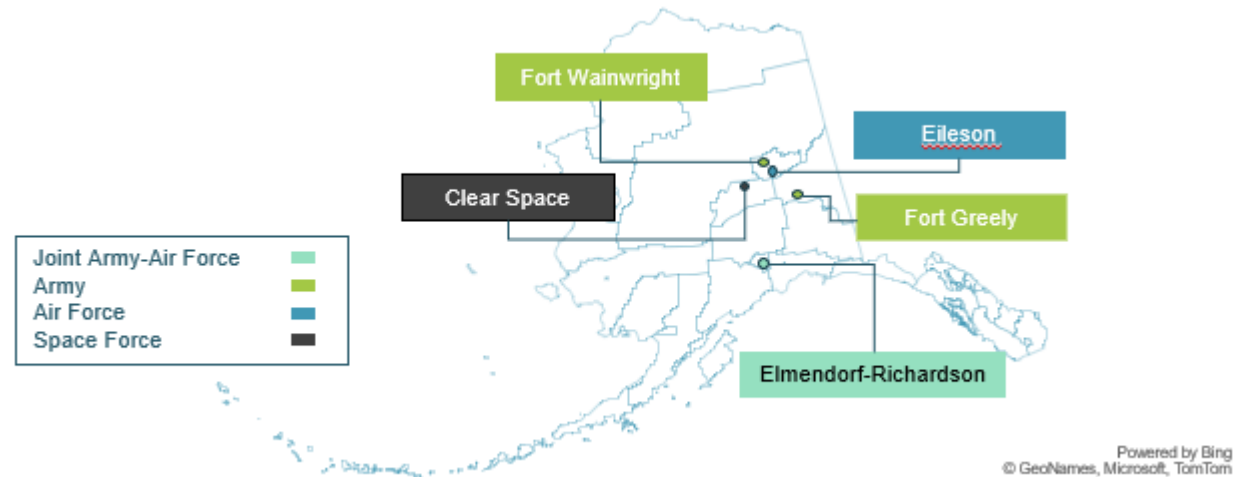
Fort Wainwright is a large Army base located in the city of Fairbanks. The base employs nearly 4,000 civilians and contractors and is home to over 10,000 military family members.

- Fort Wainwright houses the 11th Airborne Division's infantry and aviation personnel. It also provides Arctic training at the Northern Warfare Training Center.
- The base maintains a railhead and extensive rail infrastructure to enhance supply capabilities.

Eielson Air Force Base lies just 20 miles from Fairbanks. It includes a combat-ready fighter wing operating in the Indo-Pacific.

- Over 2,600 military family members and 1,682 non-military employees are connected to the base, reflecting its economic importance to Fairbanks.

ALASKA MAJOR MILITARY BASES



ALASKA MAJOR MILITARY BASES OVERVIEW

Base	Branch	Personel	Core Functions	Transport Connections
Joint Base Elmendorf-Richardson	Joint Army-Air Force	10,687	Alaskan military command providing surveillance, maintenance, search and rescue; training for Army soldiers and Air Force fighter pilots	Jet fuel pipeline connected to Port of Alaska, Rail yard, two airfields
Fort Wainwright	Army (Airborne)	6,750	Airborne division, Army Aviation attachment, North Warfare Training Center	Railyard, airfield, road connection to Fairbanks Airport
Eielson Air Force Base	Air Force	2,981	Fighter wing providing combat ready support in the Indo-Pacific	Rail connection, gas tanker storage, airfield
Clear Space Force Station	Space Force	300	Radar surveillance and missile detection	Rail connection, airfield
Fort Greely	Army	200	Missile defense attachment	Rail connection, airfield

Sources: Joint Elmsford-Richardson Base, Military OneSource, US Army Fort Alaska Garrison, Google Maps

Alaska's Visitors and Tourists

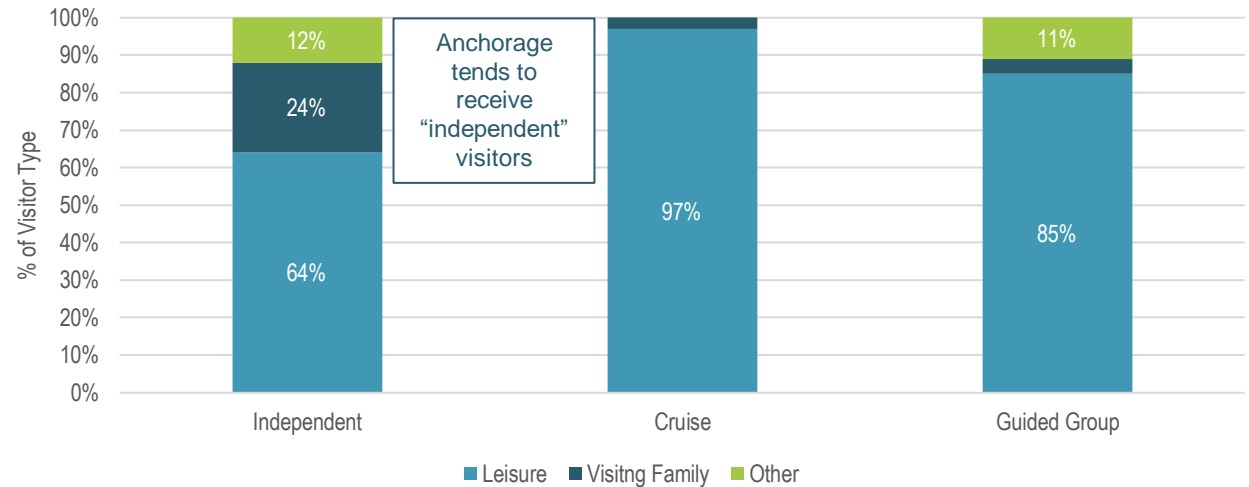
Anchorage's airport, nearby cruise ports, restaurants, hotels and shops accommodate a diverse array of visitors including tourists and people visiting family and friends. Cruise activity is highly concentrated in the Southeast, but is also present in Anchorage.

While Juneau and Ketchikan are Alaska's primary tourist hubs, Anchorage also receives tourists and visitors.

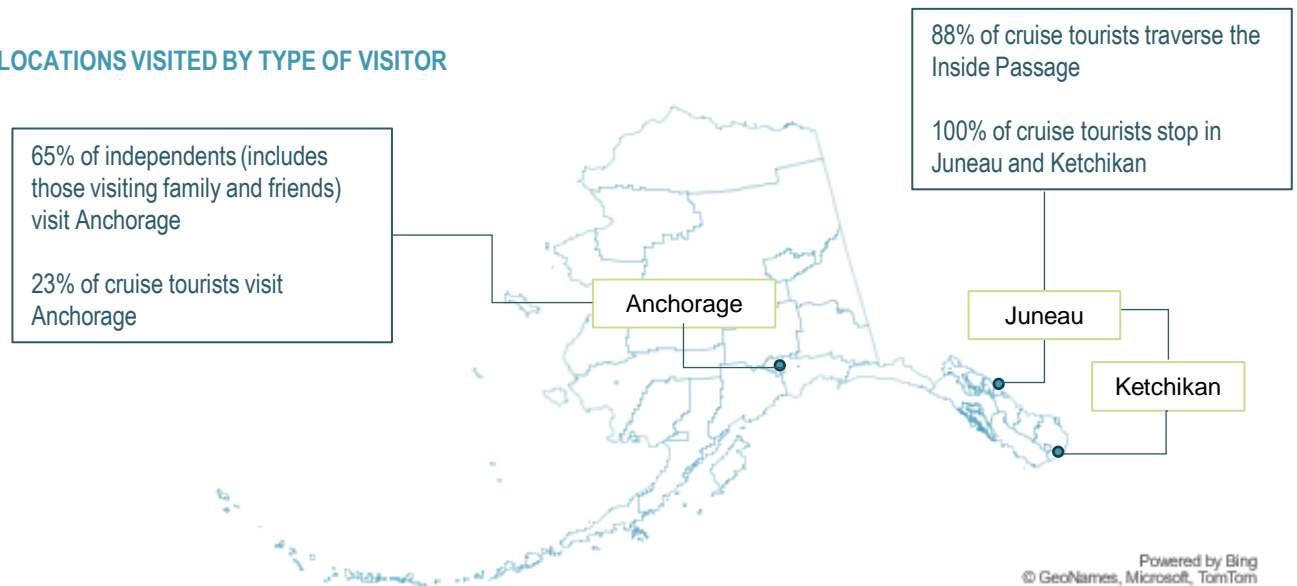
In 2023, "independents" (visitors excluding cruises and guided groups) accounted for 50% of Alaska's visitors, with cruise accounting for 43%. About a quarter of independent visitors come to see family and friends.

- Non-cruise tourists appear to spend more per trip than cruise tourists, particularly on job-creating services such as food, lodging, recreational activities and shopping.
- Additionally, these visitors tend to rely on air travel through the Anchorage International Airport.
 - 65% of independent visitors stopped in Anchorage.
 - The airport received 2.5 million passengers in 2022, reflecting a rebound from declining passenger volume in 2020.
- 100% of cruise tourists stop in Juneau and Ketchikan, compared with 23% of cruise tourists stopping in Anchorage.
- The Ports of Juneau and Ketchikan received about 1.6 million cruise ship passengers, respectively, in 2023. Juneau received the Ovation of the Seas vessel with 4,905 guests, one of the largest of the season.
- The Ports of Whittier and Seward accommodate cruise arrivals near Anchorage.

ALASKA VISITORS AND REASON FOR VISITING(2023)



LOCATIONS VISITED BY TYPE OF VISITOR



Sources: Alaska Travel Industry Association, Ted Steven Anchorage International Airport, Cruise Hive, Juneau Chamber of Commerce

4

Port of Alaska Overview and Volume Projections



Port of Alaska Overview

POA handles a wide variety of cargo types to support the needs of the local Southcentral Alaska population and industries, as well as the other major population centers throughout the state.

The Port of Alaska has three basic functions:

1. Support statewide commerce
2. Support the DoD mission (as one of 18 commercial strategic seaports)
3. Support federal and state disaster response and recovery plans

While the port users tend to focus on their commercial responsibilities, the Port focuses on all three and factors that into its infrastructure decisions.

In 2022, the Port handled 5.2 million tons of containerized goods, passenger vehicles and other RoRo cargo, fuel, cement, and breakbulk cargo. The port also received cruise ships.

The Port is key in serving Southcentral and Central regions, which account for over 76% of the state's population. It connects to Anchorage and other population centers, such as Fairbanks, via the Alaska Railroad.

The most frequent users of the Port's cargo docks—now and into the foreseeable future—are two private sector ocean carriers which each call two days a week.

Other users historically include various military combat and logistics vessels, cruise ships, fuel vessels, and cargo ships. Fuel vessels play a key role in supporting both the fuel needs of the Alaska population as well as the airport (passenger and cargo activity).

THE PORT OF ALASKA OVERVIEW (PRE-PAMP)



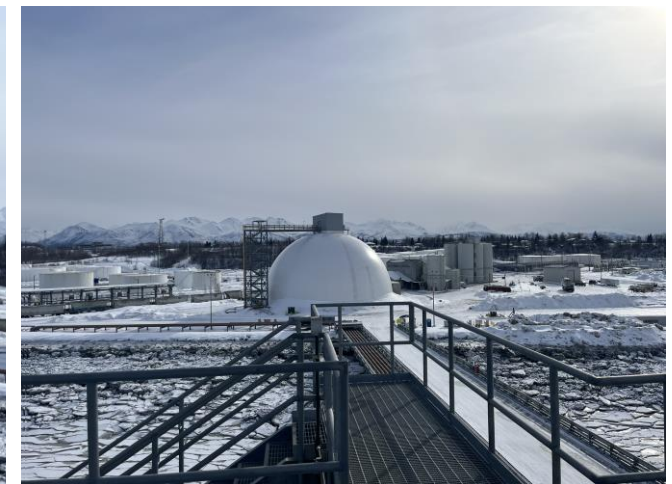
GENERAL CARGO BERTHS



LIQUID BULK (FUEL) STORAGE TANKS



DRY BULK (CEMENT) STORAGE TANK

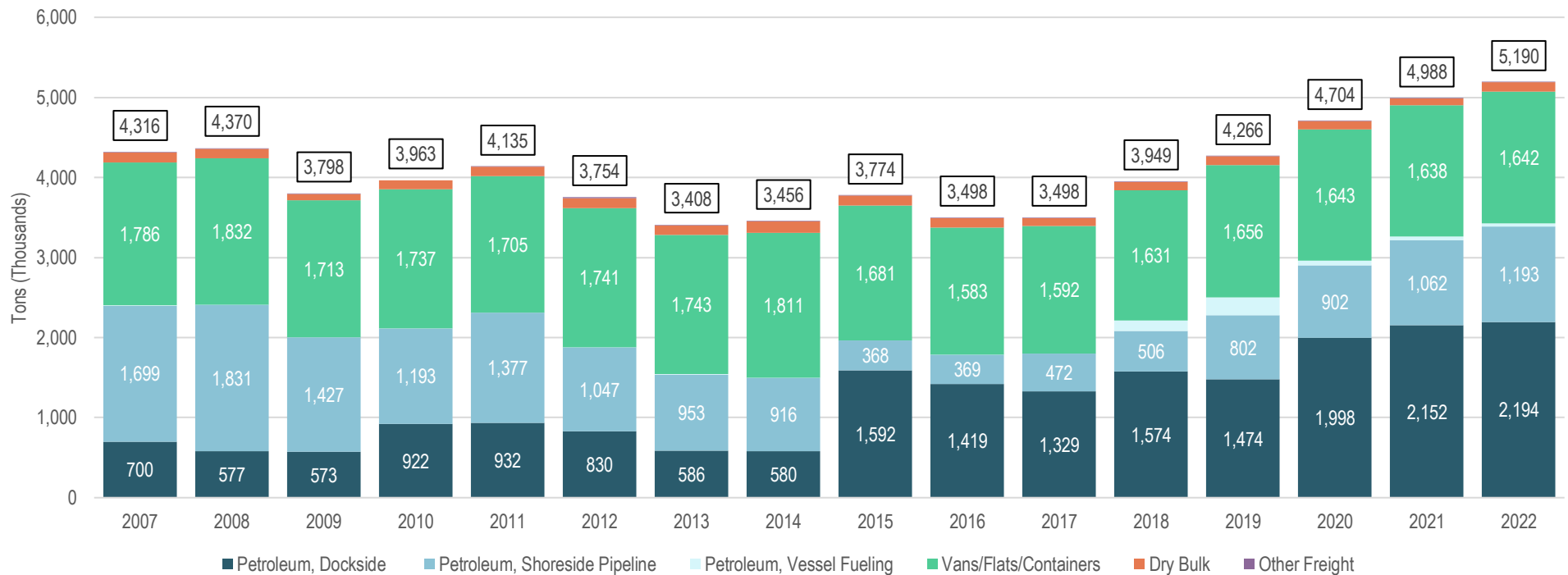


Source: Port of Alaska Website

Port Volumes

Volume through the Port of Alaska has generally held stable across most cargo types, with the exception of petroleum products which have experienced steady gains since 2017.

PORT OF ALASKA VOLUME SUMMARY



POA's total volume has generally held stable across most cargo types. Total volumes troughed in 2014, coinciding with the slowdown in the state's oil & gas industry

POA experienced declining volumes until 5 years ago when a rebound grew volume to unprecedented levels, pushing through the pandemic to reach 5.2 million tons in 2022.

Vans, flats, and containers have remained one of the largest components of total volume and consist of essential goods, such as food and clothes, that serve the population. This sector has been shrinking since 2015, possibly due to moderating population growth and a "cap" on how much a population base might be able to consume.

Docksider petroleum is the largest component of total volume and has overtaken shoreside pipeline petroleum as the largest petroleum product type since 2015. Docksider petroleum is off-loaded from the vessels while shoreside petroleum is pipelined from the Kenai refinery in Nikiski.

- Docksider petroleum volumes increased dramatically in 2014 following the closure of the Flint Hills refinery in North Pole. That refinery had previously shipped significant quantities of jet fuel to Anchorage on the Alaska Railroad. Foreign fuel imports seem to have replaced much of the closed refinery's volume.
- The recent increase in petroleum product volume reflects strong demand for jet fuel following increased air cargo shipments associated with increased consumer activity during the pandemic.

Sources: Port of Alaska Anchorage, Alaska Department of Natural Resources Division of Oil & Gas

Container Volumes

Container volume at the Port of Alaska, serviced by Matson and TOTE from the Port of Tacoma, has held steady over the last decade.

Container volume has held stable over the last decade

Container volume peaked in 2008 at 1,832 thousand tons and have remained steady in recent years. Volume reached 1.64 million tons in 2022.

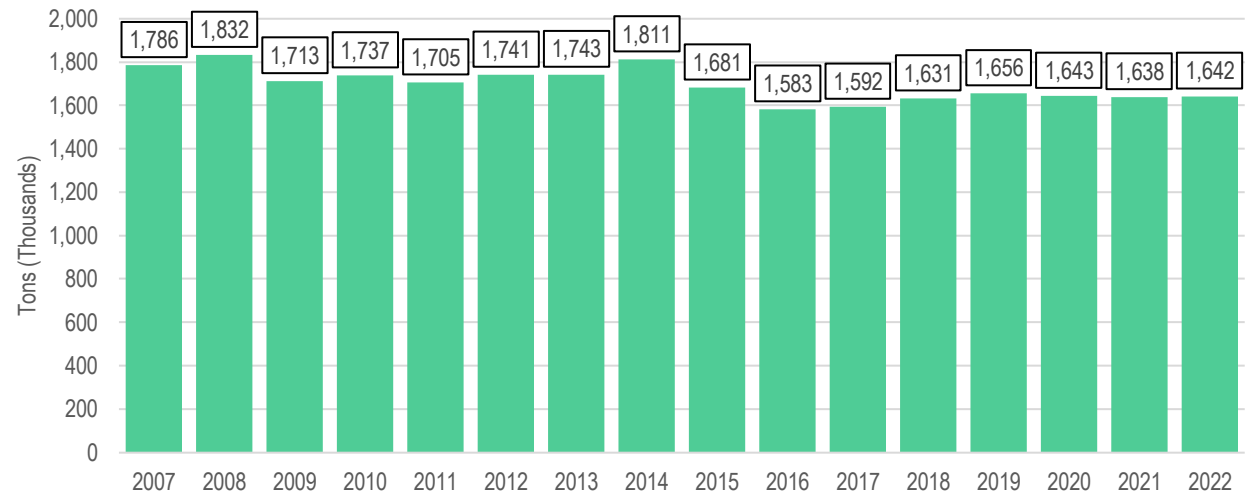
Alaska is an isolated economy that depends on routine cargo vessels to supply the population with goods used in daily life.

- With a slow-growing population base hovering under 800,000, demand for goods has historically been at a predictable constant which will most likely apply to future import trends.

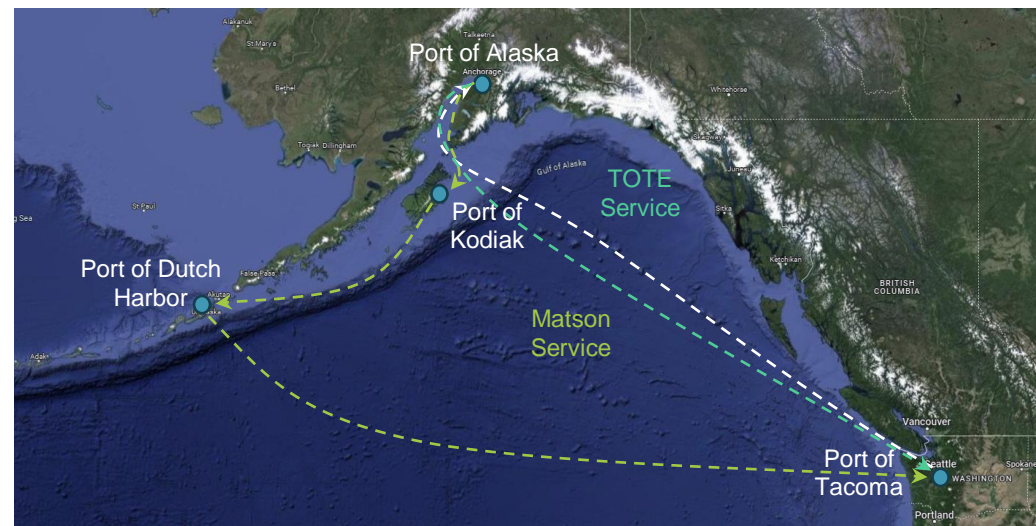
The two container services both load cargo and depart from the Port of Tacoma with the first, and sometimes only stop being POA.

- Matson and TOTE each operate a service through POA's General Cargo Terminal that call at the port bi-weekly.
- Matson's services, with an average vessel TEU of 1,668, follow a circular route that starts at the Port of Tacoma, and then stops at POA. Before returning to Tacoma, Matson will call at Kodiak and/or Dutch Harbor as needed.
- TOTE's services, with an average vessel capacity of roughly 1,200 TEU, follows a simpler route by starting at the Port of Tacoma, calling at POA, and then returning to Port of Tacoma.
- TOTE vessels are unique and require specialized infrastructure (ramps) at both POA and the Port of Tacoma in order to sustain operations.
- Such infrastructure is not available at other ports in Alaska or on the US West Coast's other container gateways.

PORT OF ALASKA CONTAINER VOLUMES



PORT OF ALASKA SERVICES MAP



Bluewater, U.S. Army Corps of Engineers

Petroleum Product Volumes

POA has liquid fuel storage capacity and proximity to fuel demand centers. It is a key source of jet fuel for nearby JBER and the Ted Stevens Anchorage International Airport, as well as fuel for the resident population.

Petroleum product volume through POA declined after the Great Recession (2009 / 2010) but has since recovered.

Total petroleum product volume increased at an annual rate of 13.7% from 2017 to 2022, reaching 3.4 million tons.

Dockside shipments account for the majority of petroleum product volume through the Port of Alaska.

In 2014, Flint Hills permanently closed its North Pole Refinery, the largest in the state. The increased demand for out-of-state refined petroleum products contributed to a shift in the dockside-shoreside ratio of petroleum product volume through POA.

- Dockside volume's share of petroleum product volume increased from 39% in 2014 to 81% in 2015. Pipeline volume has since increased but its share of petroleum product volume remains lower than before 2014.
- Jet fuel shipments from Asia have increased in the last decade, contributing to dockside volume's strong share.

The Nikiski Alaska Pipeline connects POA to the Kenai Refinery which supplies jet fuel, gasoline and other refined products.

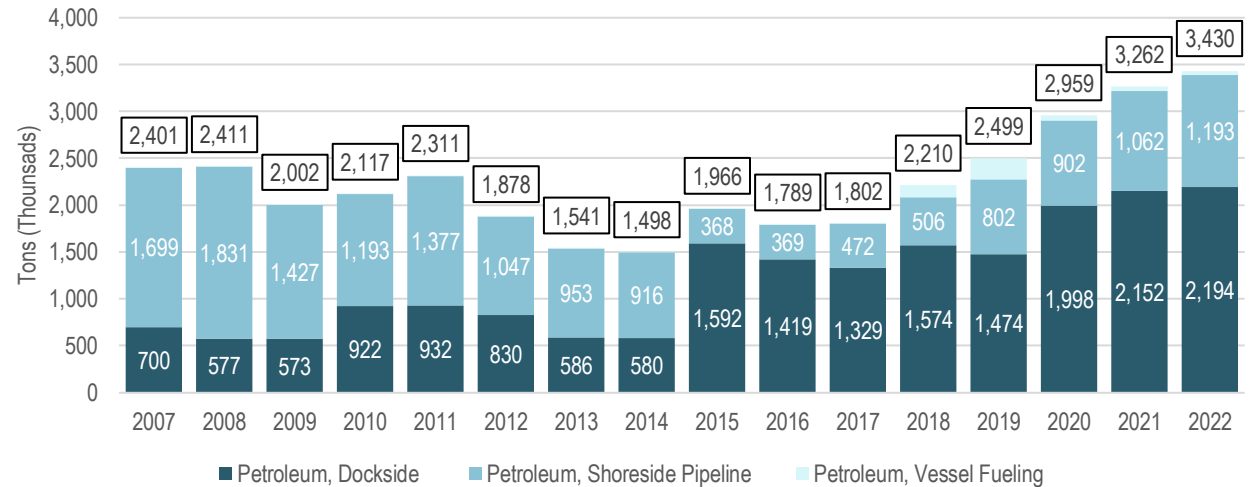
POA has 3.4 million barrels of liquid fuel storage and proximity to fuel demand centers including the Airport and JBER.

POA supports air cargo and passenger transport at the nearby Ted Stevens Anchorage International Airport. 50% of jet fuel used at the Airport moves through the POA, according to the McDowell Group.

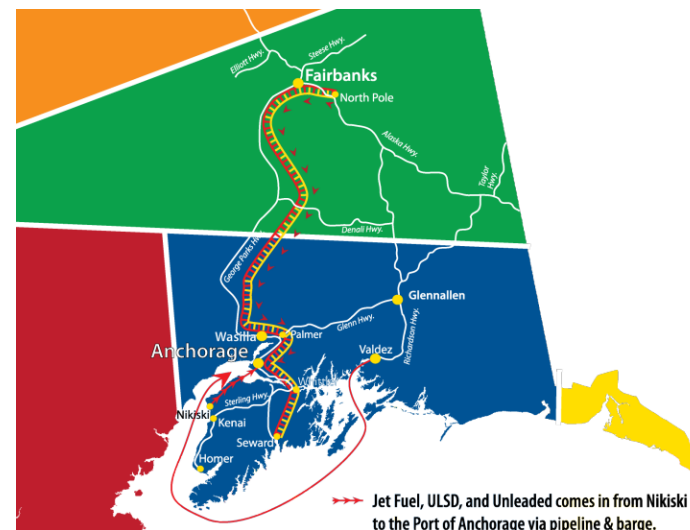
The Port also supports military operations by supplying jet fuel to JBER via a direct pipeline connection.

It also handles a significant share of the state's gasoline and diesel supply, providing the population with heat and transport fuel.

PETROLEUM PRODUCTS



PORT OF ALASKA FUEL DISTRIBUTION MAP



Sources: Port of Alaska, Airport Improvement, McDowell Group

POA Volume Projections

The projected volume increase through the POA reflects continued growth in jet fuel demand and stable consumer demand for containers.

As the population stabilizes and ages, M&N expects container / flat / vans volume remains stable as well.

Volume is expected to remain in line with levels seen during the 2010's and grow from 2022 to 2050 at an average annual rate of 0.3%.

Alaska's population is expected to remain largely stable over the next decades.

The oil and gas industry has historically attracted seasonal workers, resulting in population inflows.

However, as the industry's role in the state economy lessens, the state has experienced population outflows, particularly from young working-age people. This includes oil and gas workers who previously commanded high salaries and contributed to the state's consumption.

Jet fuel related to air cargo freight is the primary driver of total volume and petroleum product volume growth

M&N expects growth above the long-term trend at the beginning of the forecast period as Alaska takes advantage of growing demand for faster, overnight delivery driven by e-commerce and businesses' growing need for agile supply chains. This growth will diminish over time.

Air freight demand remains strong, Alaska will continue importing jet fuel.

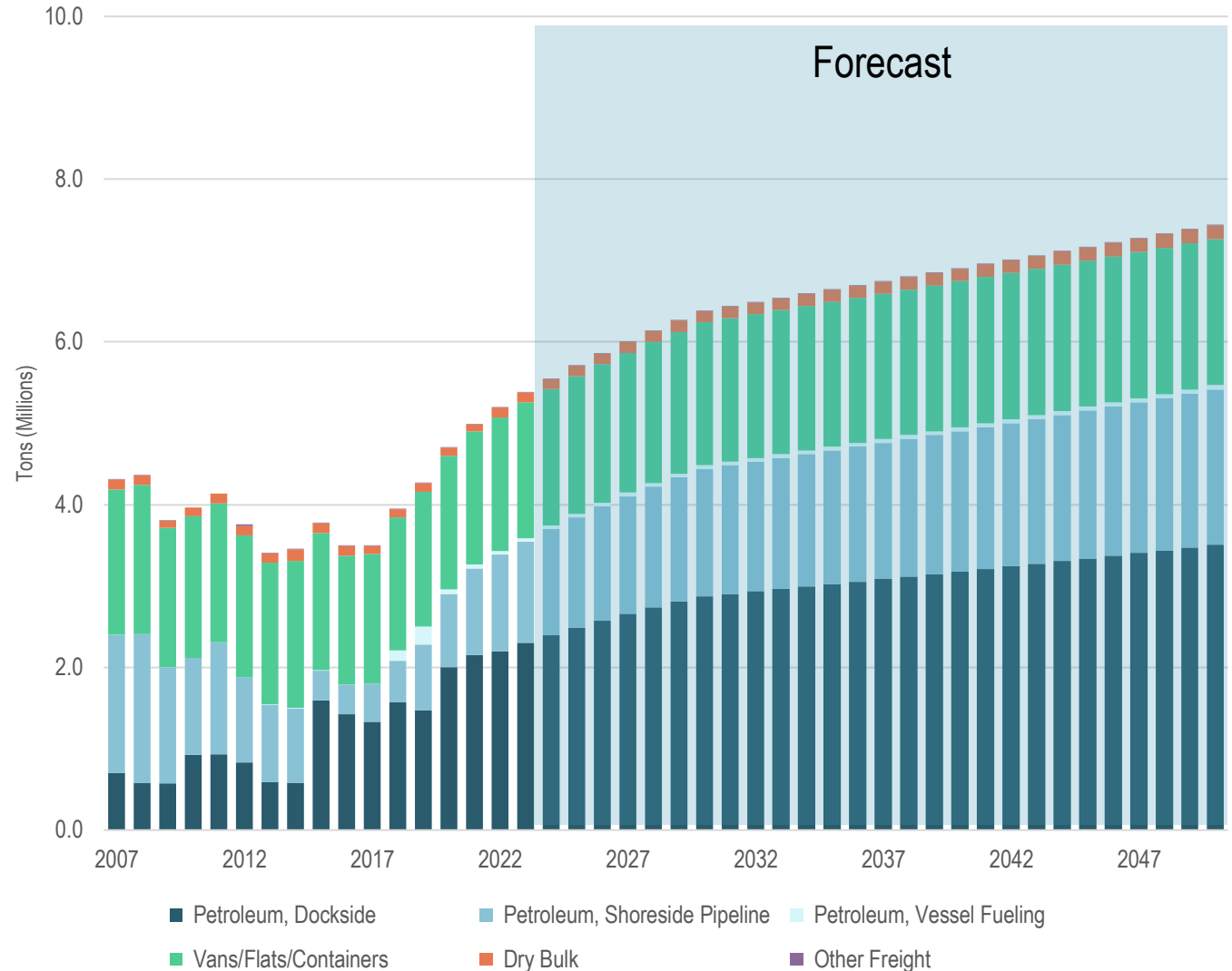
M&N forecasts petroleum liquid bulk to grow at an average annual rate of 1.7% from 2022 to 2050.

M&N expects cement volume to grow over the next decade as the recovery in Alaska's population results in some population inflows.

Cement is projected to increase at an average annual rate of 1.4% from 2022 to 2050.

Other freight volume associated with a variety of industries, including mining and construction, is expected to be stable with low growth in the coming decades.

POA CARGO PROJECTIONS (2007 – 2047)



Sources: M&N

POA Volume Projections: Containers

Alaska’s resident population, the primary market for containerized goods, is not projected to drastically grow, contributing to stable container volume in the outlook period.

As the population stabilizes and ages, M&N expects container / flat / vans volume remain stable.

Alaska’s consumer population is the primary market for POA’s container volume. Food, clothing, furniture, medicine and other everyday items used by Alaska residents enter the state in containers.

Alaska has experienced population outflows in recent years. The downward population trend is expected to ease in the outlook period as Alaska continues its post-pandemic recovery, led by the transportation sector, healthcare and expansions at existing mining operations.

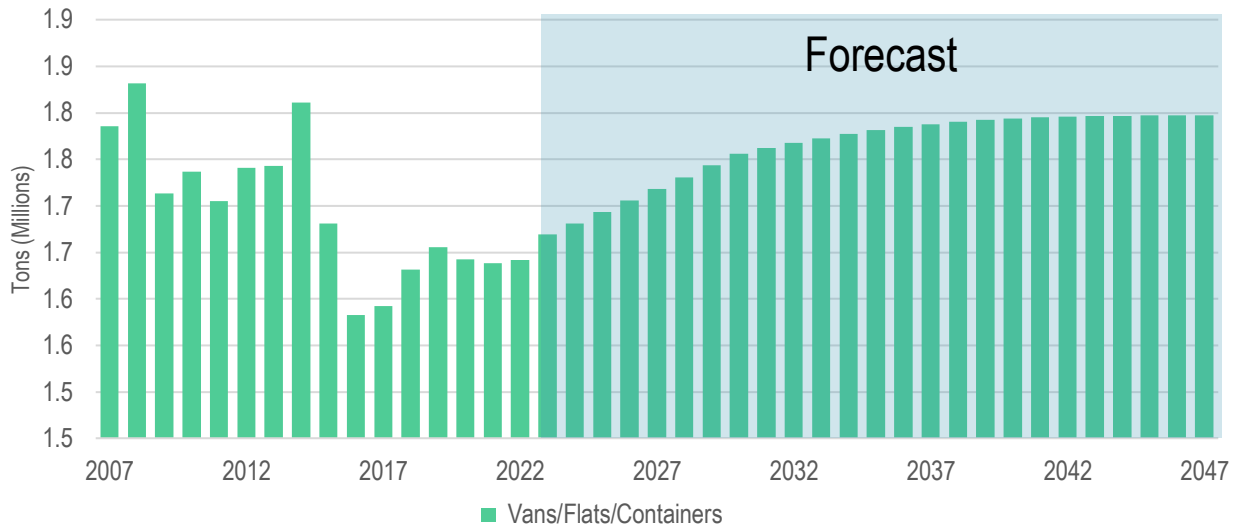
The Alaska Department of Labor and Workforce Development projects the population to stabilize around 760,000 residents over the coming decades, slightly above levels seen in the 2010’s.

- Older residents account for a rising share of Alaska’s population as the oil and gas industry, a long-time driver employment, draws in fewer young job seekers.
- This is expected to weigh on employment’s share of the population as more residents enter retirement age. It also may lead to outsized growth in the healthcare services industry, a low-wage industry compared with oil and gas.
- M&N expects these trends to impact the relationship between population and container volume. With employed and high-earning persons accounting for a smaller share of the population in the outlook period, Alaska is projected to yield less container volume per resident than in previous decades.

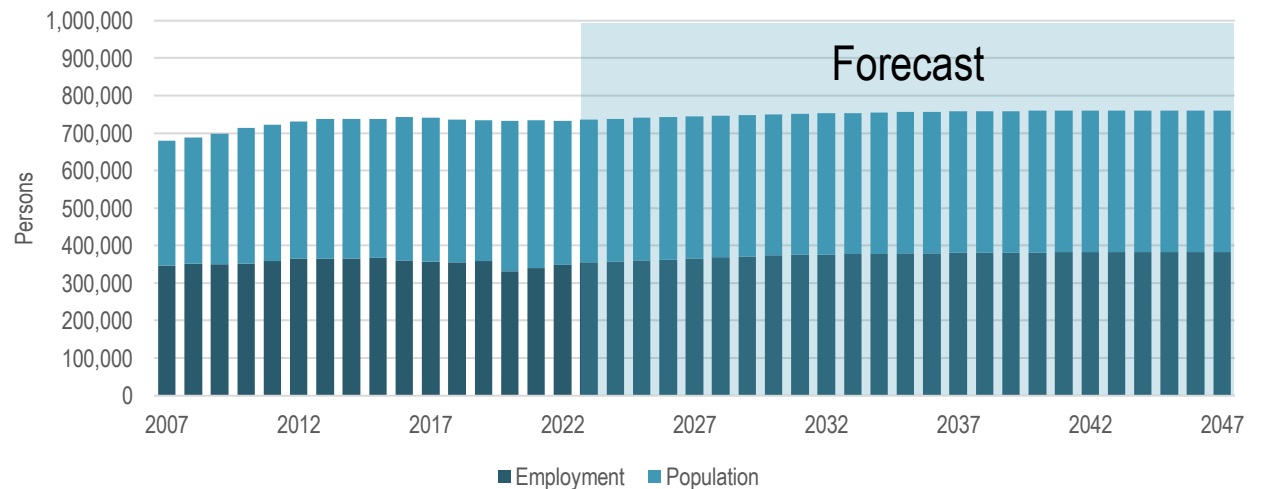
Volume is projected to reach 1.8 million tons over the coming decades, marking a return to levels seen in 2014.

- Overall, market size is not expected to drastically change over the coming decades.

CONTAINER VOLUME PROJECTIONS



POPULATION AND EMPLOYMENT FORECASTS



Sources: M&N, Alaska Department of Labor and Workforce Development

POA Volume Projections: Petroleum Products

Jet fuel is projected to primarily drive volume growth through Port of Alaska as air cargo volume remains strong at the nearby Ted Stevens Anchorage International Airport.

The market for petroleum products shipped through POA is expanding. These goods will be the primary drivers of the Port's total volume growth going forward.

Petroleum products are projected to drive volume growth through the POA, accounting for over 70% of total tonnage by 2030, up from 66% in 2022.

Volume increased at an average annual rate of 13.7% from 2017 to 2022. M&N projects volume to maintain strong growth for the first half of the forecast before easing toward the long-term trend.

The underlying driver of demand is jet fuel related to air cargo freight.

US air cargo demand has resumed its long-term growth, accelerated by the pandemic. Air cargo ton-miles increased an annualized 5.6% from 2015 to 2022.

Ted Stevens Anchorage International Airport helps facilitate US air cargo, particularly on the US-Asia trade lane.

- E-commerce and the expectations for faster delivery times have become more prevalent since the pandemic. This trend will likely continue, contributing to more utilization of the Anchorage airport by UPS, FedEx and other logistics companies.
- E-commerce represents roughly 15% of total retail sales, having doubled over the past 7-years when it represented 7.5% in 2016. Future, continued shifts into e-commerce underpin the outlook for higher demand for airfreight in over the forecast period.

Dockside volume is expected to maintain its elevated share of petroleum product volume. Limited refining in Alaska coupled with strong jet fuel production in South Korea and the United States will likely support shipments arriving by vessel.

SAF is increasingly likely to flow through Anchorage as customers look to blend fuel and SAF production ramps up in regions economically connected to Alaska.

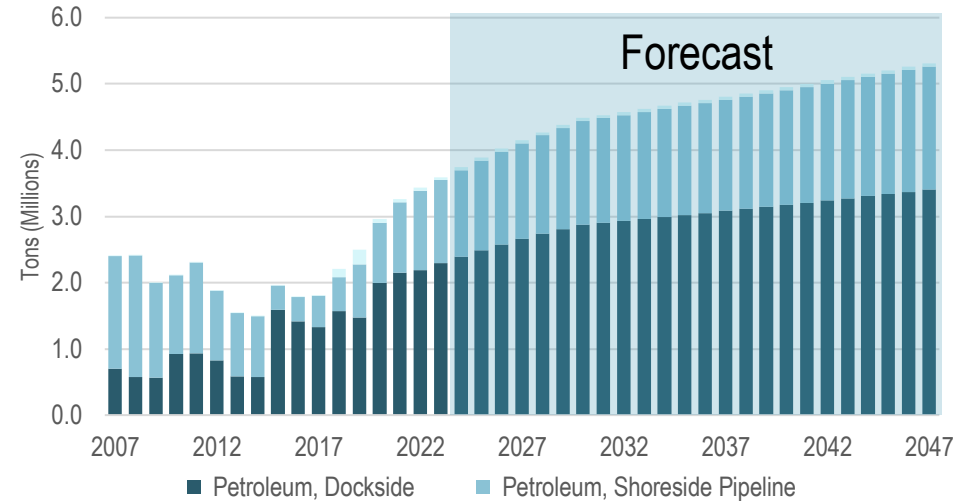
Alaska Airlines has announced plans to purchase SAF from Shell and Gevo for use at hubs outside of Alaska. It may eventually expand SAF use to include Alaskan airports.

Several Asian countries have announced future SAF blending requirements, including Japan, Singapore and Malaysia.

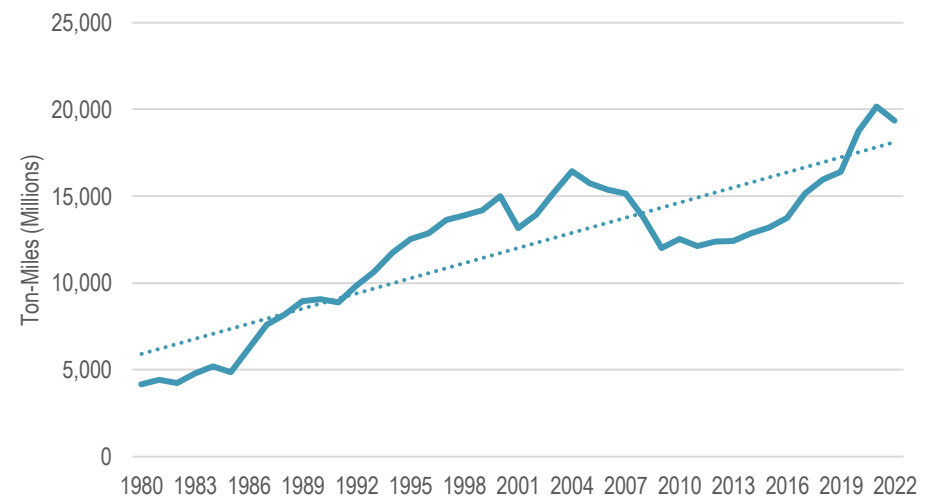
The Pacific Northwest and Asia, sources of Alaska's jet fuel, are expanding SAF production capacity.

Importantly, SAF is "drop-in", meaning it can be blended with existing jet fuel and used in existing combustion engines

PETROLEUM PRODUCTS VOLUME PROJECTIONS



US AIR CARGO TON-MILES



Sources: Port of Alaska, US BST

POA Volume Projections : Dry Bulk / Cement

Infrastructure investments, including those supporting the expanding transportation sector, are projected to drive cement volume growth.

Cement volume is projected to return to low, trend growth.

Cement dry bulk volume rebounded in 2022 to levels seen in the mid-2010's, reaching nearly 118,000 tons. M&N expects volume to remain elevated and grow at an average annual rate of 1.3% over the coming decades.

Infrastructure investment will likely play a greater role than residential construction in driving demand.

Civil engineering projects have driven growth in Alaska's construction sector over the last two decades.

- Civil construction employment has grown at an average annual rate of 1.4% from 2001 to 2022, faster than other construction sectors.
- Building construction has lagged, though residential construction employment has experienced some growth in recent years.

Civil construction's strong growth is expected to continue with funding for infrastructure investments and continued demand from Alaska's growing air transportation industry.

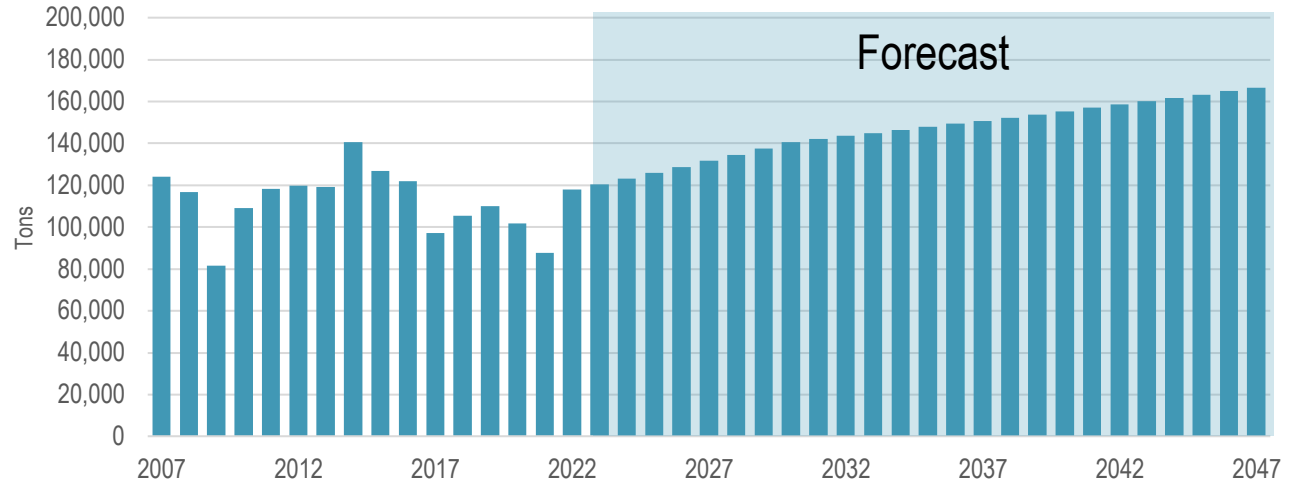
- Transportation is a leading driver of economic growth in Alaska, particularly the Anchorage International Airport. This industry is infrastructure-dependent and will likely increase demand for cement as it expands.

Alaska is expected to receive \$3.9 billion in funding from the Bipartisan Infrastructure Bill. It has a population one-tenth the size of Indiana yet will receive \$300 million more in funding.

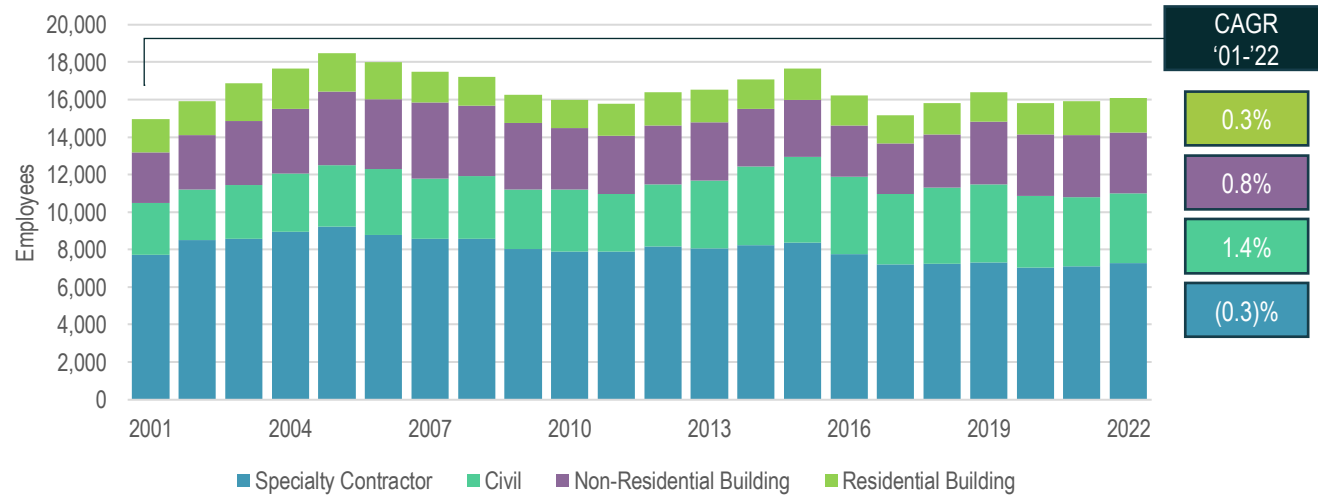
- This reflects the need for and commitment to infrastructure development in Alaska, primarily directed toward roads, highways and bridges.
- The majority of Alaska's funding is expected to support highway and bridge repair and development.

Residential building permits have declined over the last decade as the population stabilized. M&N expects residential construction to play a smaller role in cement demand going forward.

DRY BULK VOLUME PROJECTIONS



ALASKA CONSTRUCTION EMPLOYMENT BY INDUSTRY



Sources: Port of Alaska, M&N, Bureau of Labor Statistics, US BTS

5



Port of Alaska Competitive Assessment

Southcentral and Southeast Alaska Key Transportation Infrastructure

Rail, road, and marine connectivity is present in the Southcentral port region. However, ports in the Southeast lack good connectivity by land to more populous Southcentral and Interior regions.



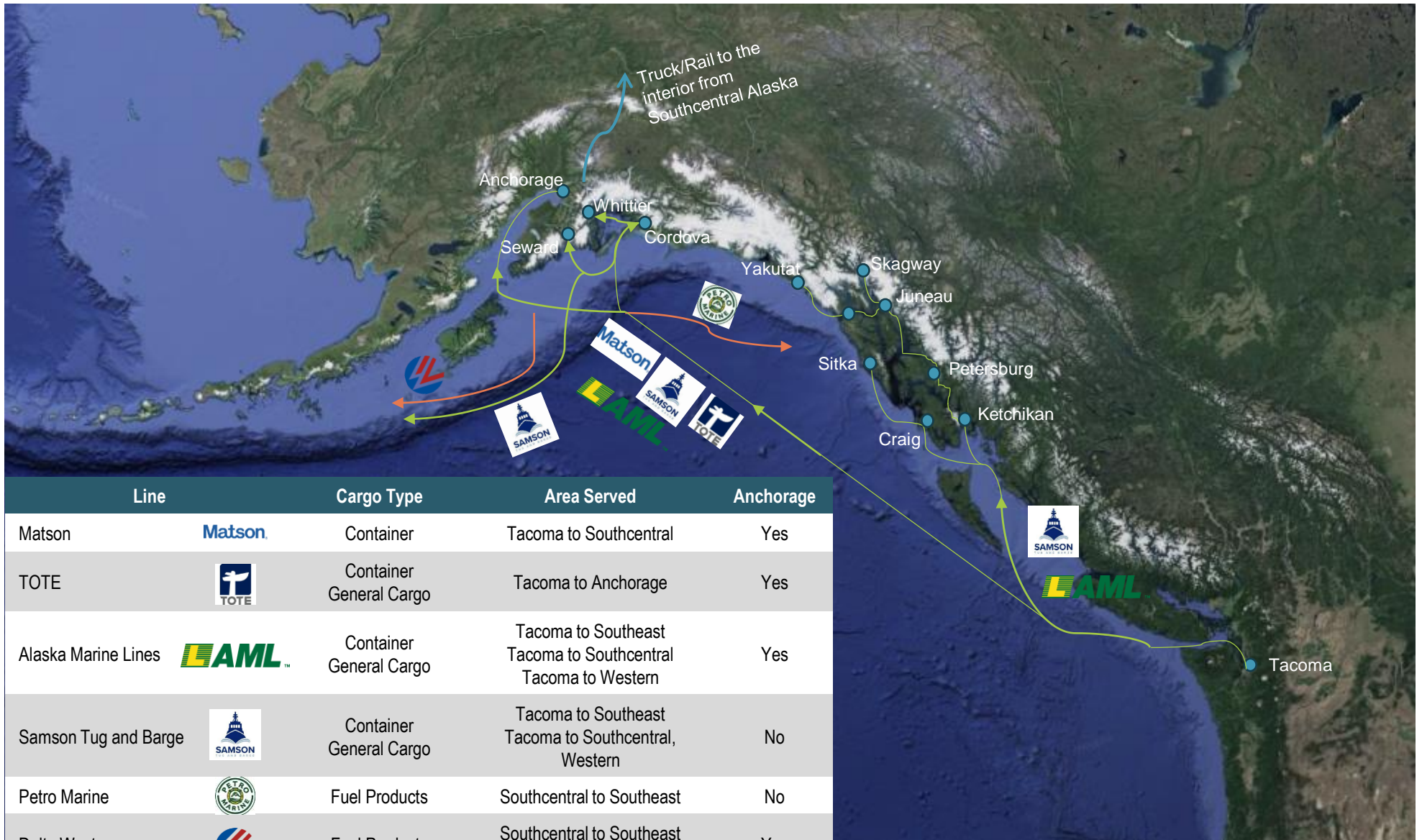
KEY

- Highway System
- - - Alaska Railroad
- /// No Rail or Road Connectivity

Alaska Railroad

Marine Cargo Service to Alaska Population Hubs

Alaska's cargo predominately flows to population hubs around Anchorage and the interior via vessel services between Southcentral Alaska and Tacoma. With no land connectivity, Southeast Alaska settlements must individually receive goods and fuel through weekly barge services originating in Southcentral Alaska or Tacoma.



Line	Cargo Type	Area Served	Anchorage
Matson	Container	Tacoma to Southcentral	Yes
TOTE	Container General Cargo	Tacoma to Anchorage	Yes
Alaska Marine Lines	Container General Cargo	Tacoma to Southeast Tacoma to Southcentral Tacoma to Western	Yes
Samson Tug and Barge	Container General Cargo	Tacoma to Southeast Tacoma to Southcentral, Western	No
Petro Marine	Fuel Products	Southcentral to Southeast	No
Delta Western	Fuel Products	Southcentral to Southeast Southcentral to Western	Yes

Sources: Shoreside Petroleum, Petro Marine, Delta Western, Samson Tug and Barge, Alaska Marine Lines

General Cargo Handling Infrastructure Overview

Alaska's commercial maritime ports offer cargo shippers a variety gateway options, though POA stands out as the largest and best-connected facility to serve the key Anchorage and Fairbanks markets

Facility	Services	Cargo Handled	Berth Length (ft)	Storage Size (acres)	Equipment	Land Connectivity	Distance from Anchorage	Notes
POA	Matson TOTE	Container General Cargo	2,100	60	STS Crane, Special RoRo Ramps	Truck Rail	-	Robust storage space and handling equipment
Ship Creek	Alaska Marine Lines	Container General Cargo	125	23	Crawler Crane	Truck Rail	-	Limited berth length but notable storage space and land connectivity
Seward	Samson	Container General Cargo	500	30	Crawler Crane	Truck Rail	100 miles (rail)	Long and at times difficult journey to Anchorage
Whittier	Alaska Marine Lines	Container General Cargo	330	7		Truck Rail	60 miles (rail)	Limited storage space
Juneau	Alaska Marine Lines Samson	Container General Cargo	Small Barge Ramp	25	Top Pick	None	900 miles (nautical)	Not well connected to Central Alaska's population
Ketchikan	Alaska Marine Lines Samson	Container General Cargo	Small Barge Ramp	8	Top Pick	None	1,060 miles (nautical)	Not well connected to Central Alaska's population

POA has more waterside and landside infrastructure compared to other regional and leading cargo ports in the State. It is also the closest commercial maritime port to the large population centers of Anchorage and Fairbanks

- POA's berth length is over 3X that of Seward's, allowing the Port to handle multiple cargo vessels simultaneously
- Additionally, the available storage area at POA allows it to receive and stage larger volumes containers and general cargo (including liquid bulk), then its smaller counterparts. This allows for cargo owners to store their respective goods on site, prepare for shipping, without the concern of finding an off-dock storage area and / or addition logistics service to move cargo to / from a holding yard
- It is the only port under review that maintains dedicated STS cranes which are the most efficient equipment (cranes) to move containers between the vessel and the quay

Source: M&N

Southcentral Alaska Goods Transport

POA primarily serves Southcentral Alaska and the Interior with regular calls from Matson and TOTE Maritime. Barge services call smaller docks in Whittier and Seward.

SOUTHCENTRAL ALASKA CARGO HANDLING PORTS



POA handles the vast majority of inbound goods to Southcentral Alaska. Other smaller ports in the Cook Inlet also handle containers and general cargo.

Matson and TOTE Maritime provide regularly scheduled services from Port of Tacoma to Port of Alaska.

- Matson transports containerized cargo “on deck” enabling the use of lift on / lift off overhead cranes at the Port. The service then continues to smaller ports on Kodiak Island and Dutch Harbor (Western Alaska).
- TOTE Maritime carries containerized cargo between Port of Alaska and Port of Tacoma. Cargo is rolled on and off TOTE vessels using specialized ramps, as opposed to lifted by crane.

Alaska Marine Lines’ (AML) barge service from Seattle stops in Southeast Alaska and Southcentral Alaskan terminals in Whittier and Port of Alaska.

- AML provides the largest container shipping service outside of Matson and TOTE (affiliated with POA).
- The container barge service has rail and road connections at Ship Creek (Anchorage) and Whittier to reach Southcentral Alaska markets.

Samson Tug and Barge calls the small general cargo terminal at Seward, which has rail and road connections to Anchorage.

Sources: Bluewater Reporting, Samson Tug and Barge, Alaska Marine Lines; ¹Road runs parallel to rail aside from a brief diversion between Seward and Whittier

Ship Creek: Alaska Marine Lines

Alaska Marine Lines operates a container on barge and general cargo service to Anchorage through the Minch Dock facility at Ship Creek, located just south of Port of Alaska.

Ship Creek Terminal

The barge-served terminal area near Ship Creek sits just south of Port of Alaska.

The terminal area has two docks: Minch Dock and Anderson Dock. Combined, these facilities have a total area of 45 acres with seven additional acres of container storage near the Ship Creek Boat Launch.

Minch Dock

Alaska Marine Lines operates a container on barge and general cargo terminal at Minch Dock.

The company has a fleet of large barges bringing goods from Tacoma to Anchorage and Alaska's interior through Ship Creek.

The workable dock appears to be roughly 125 feet long. A crawler crane and several forklifts unload the barges.

The terminal area has about 16 acres of storage yard space. Alaska Marine Lines may also have access to the additional seven acres of container storage at Ship Creek Boat Launch.

A rail spur runs through the container yard, providing Alaska Marine Lines with access to the Alaska Railroad.

Anderson Dock

North Star Equipment Services provides stevedoring at Anderson Dock. This facility handles scrap metal, general cargo, modular housing, equipment and some containers.

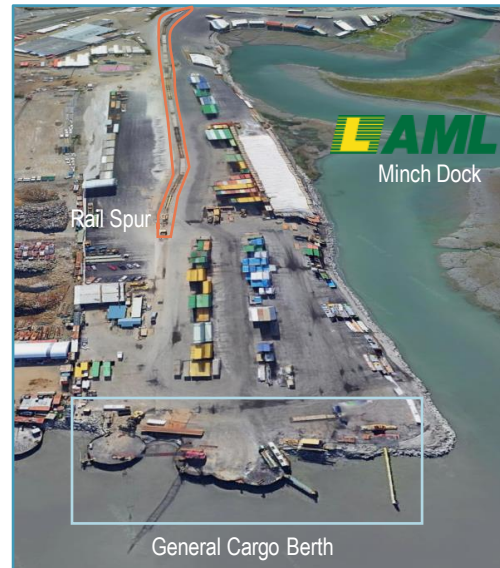
The terminal area consists of more than 22 acres and a 376-foot-long dock.

Container Barges

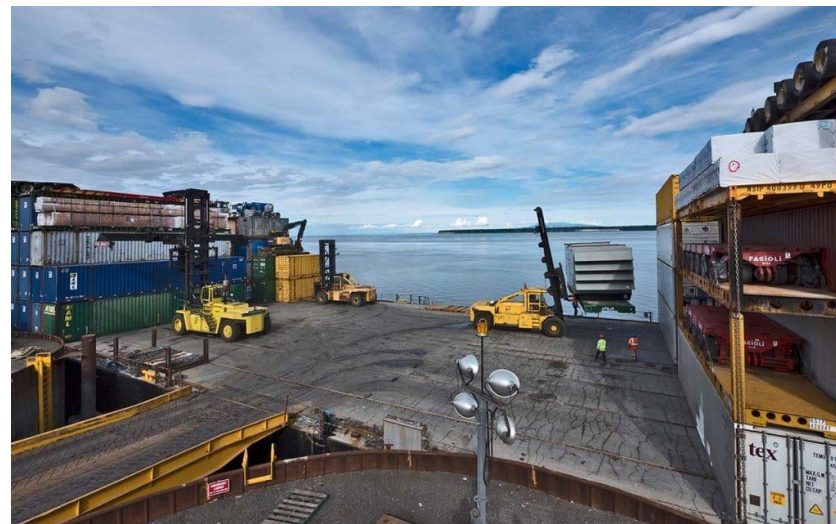
AML utilizes barges which can carry up to 720 TEU on the Alaska trade route

These Barges can also accommodate other general cargo as well as specialized containers for vehicles and liquid bulk

MINCH DOCK AND SHIP CREEK TERMINAL AREA



ALASKA MARINE LINES BARGE UNLOADING



Sources: Nearmap, Google Earth, Lyden

Whittier Harbor Area

Whittier is located 60 miles from Anchorage by rail. The harbor area can receive three cargo vessels at a time and has a dedicated barge slip for Alaska Marine Line's container service.

Alaska Marine Lines barges containers and general cargo to Whittier

Whittier has a cruise terminal, a general cargo dock and two general cargo barge ramps with connections to a rail yard.

The harbor area is on the Passage Canal which does not freeze during winter.

Alaska Marine Lines appears to unload and load containers at a dedicated barge slip.

- The barge slip has two ramps for bringing container handling equipment onto the vessel. The slip length is roughly 330 feet.
- Alaska Marine Lines stores containers in the 7-acre yard adjacent to the barge slip. Three rail spurs connect the storage yard to the Whittier Rail Yard.

Whittier also has a small barge ramp and a larger general cargo berth, known as Delong Dock. This infrastructure appears dedicated to general cargo, bulk and equipment.

Truck and rail traffic between Whittier and Anchorage must pass through the Anderson Tunnel which can experience congestion issues.

WHITTIER HARBOR AREA



WHITTIER GENERAL CARGO FACILITY



Seward Harbor Area

Seward, once a major Alaskan port, sits on a deepwater bay and has a general cargo facility with container barge service from Samson Tug and Barge.

Seward's once robust port infrastructure was devastated in the 1964 earthquake

Benefitting from a lack of ice year-round, Seward's economy has historically depended on port facilities. It once had tank farms owned by Texaco and Standard Oil of California, fishing operations, and barge cargo flowing to Alaska's interior via the Alaska Railroad's nearby yard.

In 1964, a 9.2 magnitude earthquake struck Alaska, effectively wiping out Seward's port infrastructure. Shoreline land sliding and seismic waves sent docks, exploding oil tanks, and the railyard's gantry cranes into the bay. Cargo has since flowed through POA.

Seward receives containers and general cargo via barges

Seward's transport infrastructure consists of a cruise terminal, a general cargo facility and a rail yard connecting to Alaska Rail lines.

The existing general cargo facility handles containers, bulk and general cargo. It is served by Samson Tug and Barge, calling between Seward and the Pacific Northwest.

- The facility has a 500 m long berth and a sizeable 30 acres of storage yard.
- Seward lies on a deep-water Resurrection Bay, with depths surpassing 500 feet
- Importantly, the Bay does not freeze in winter, enabling the harbor to remain open all year.

Transporting goods from Seward to Alaska's interior via the Seward Highway can be challenging due to ice and rock blocking the road and the threat of avalanches.

SEWARD GENERAL CARGO FACILITY



SEWARD HARBOR AREA



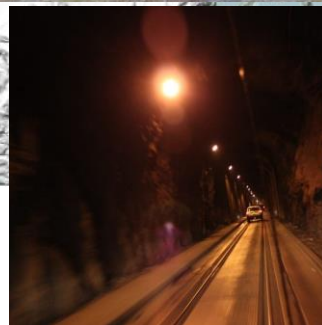
Sources: Google Earth, "The Alaska Earthquake, March 27, 1964: Effects on Communities by Richard W. Lemke"

Seward and Whittier: Connectivity to Anchorage

The rail and truck routes from Seward / Whittier to Anchorage carry certain challenges and risks, including congestion at the Anderson Tunnel near Whittier and avalanche risks along the Seward Highway.



Alaska Rail line ———
Seward Highway ———



The Turnagain Pass portion of the Kenai Peninsula to Anchorage route can pose risks to truck and rail transport

Trucks on the Seward Highway must drive between mountains along the Turnagain Pass to reach Anchorage. The road reaches an elevation of over 900 feet above sea level.

On the Northside of the Turnagain Arm waterway, the highway descends toward sea-level and continues along the mountain range, creating risks of road closures due to falling ice or avalanches.

The area between Anchorage and Whittier passes through approximately 55 known avalanche paths. Snow falls on top of mountains bordering the route while rain falls at sea level near the route, creating avalanche risks.

- The Seward Highway Avalanche Program initiates controlled avalanches to mitigate these risks.
- Still, natural and human-caused avalanches can occur. In 2023, an Alaska Railroad freight train was derailed after striking an unexpected snow pile from an avalanche.
- The Alaska Department of Transportation has reported that rocks and ice tend to fall onto the Seward highway every year. These chunks of ice can go months before thawing, creating road hazards.

Seward inland connectivity

Of the nearly 13,000 people living on the Kenai Peninsula, roughly 5,000 live within a 50-mile radius of Seward.

Seward sits about 100 miles from Anchorage by rail and nearly 130 miles by road. The land routes face several challenges, including snow and waterways.

- Satellite imagery suggests that trains moving goods from Seward to Anchorage would have to pass over nearly 30 bridges due to the intricate network of waterways flowing through the Eastern Kenai Peninsula.

Whittier inland connectivity

Whittier is 60 miles from Anchorage by rail.

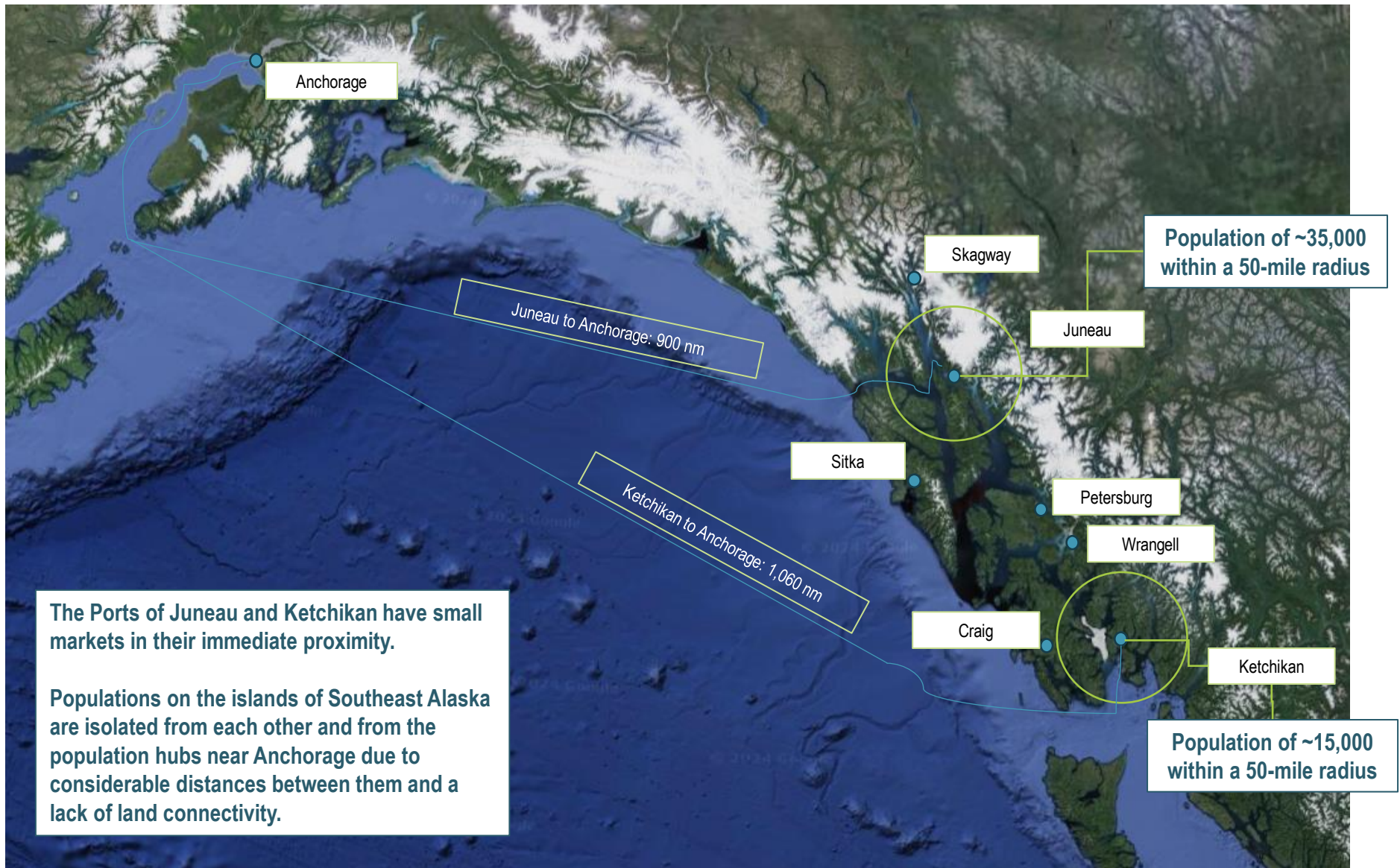
The Anton Anderson Memorial Tunnel, which is the only connection between the Town of Whittier and the rest of Alaska's highway system, is a 2.5-mile rail/car hybrid tunnel that could cause severe logistical problems and delays because of the tunnel's alternating one-way traffic and narrow design.

- Two-way truck and rail traffic must share the one-way pass through the tunnel.

Sources: Alaska Department of Transportation

Southeast Alaska Goods Transport

The largest settlements in Southeast Alaska do not serve as maritime or land-based transport hubs due to the lack of land connectivity and distance from other settlements. Cargo shippers instead serve each settlement individually, with services originating in Southcentral Alaska (Anchorage) and the Pacific Northwest (Seattle).

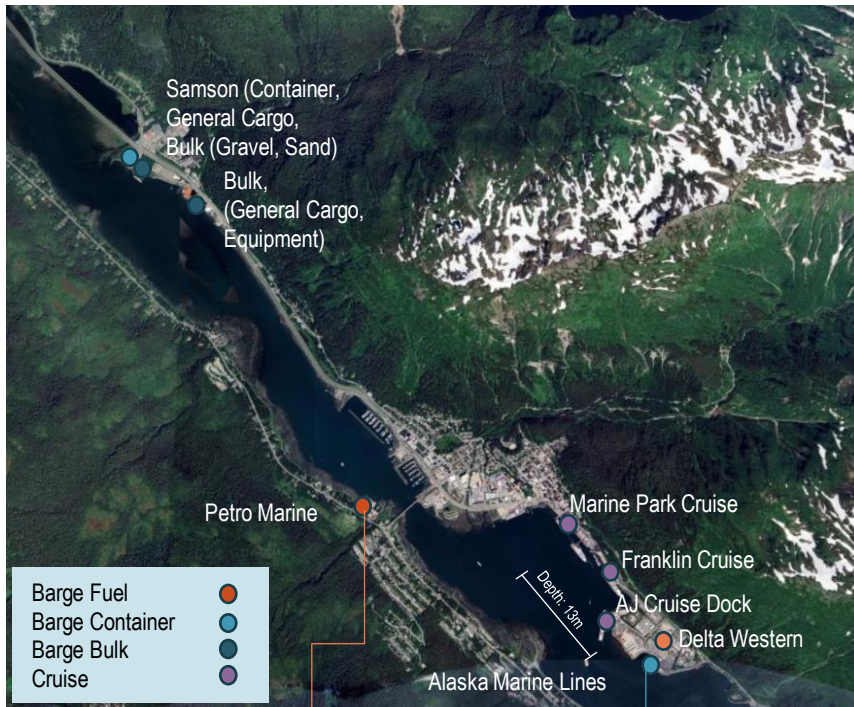


Sources: Google Earth, US Census

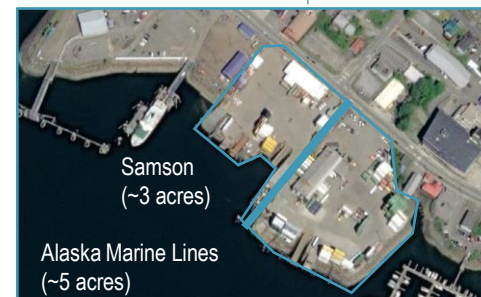
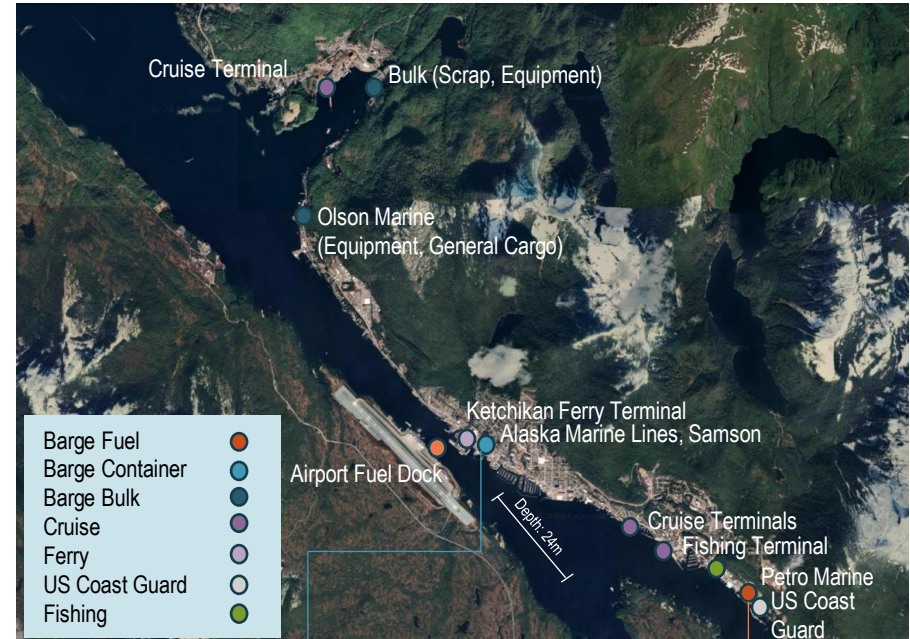
Ports of Juneau and Ketchikan

Marine infrastructure at the Juneau Harbor Area and Ketchikan is largely dedicated to serving cruise vessels. The Ports primarily handle fuel, equipment and containerized goods for their respective local communities.

Port of Juneau Infrastructure Overview



Port of Ketchikan Infrastructure Overview



Alaska Marine Lines (~5 acres)



Sources: National Oceanic and Atmospheric Administration, Google Maps, Google Earth, Juneau Empire

6



Vessel Operations at Port of Alaska

POA Vessel Size Profile

POA receives container vessels (Matson) and RoRo vessels (TOTE) at T1 and T2. While vessel size may not drastically change, a possible shift in TOTE operations could increase the frequency of container vessel unloading.

Container and RoRo vessels call T1 and T2 . Vessel sizes have not significantly changed in recent years.

Matson has recently deployed 710 ft. container vessels to POA. Matson scrapped its 48-year-old Lihue containership in 2019 (1,970 TEU), resulting in lower maximum container ship size calling the Port in recent years. These Matson vessels have traditionally the most frequent to call (POA) with TOTE listed as vehicle carrier in the chart to the right.

TOTE vessels, specifically designed for POA, are over 800 ft. in length. The maximum vehicle carrier size increased from 820 ft. to 948 ft. in 2020 due to a US Navy RoRo vessel calling the Port.

Other vessel types calling T1 and T2 include cruise, bulk carriers and smaller vessels.

The sizes and types of vessels calling T1 and T2 could change in the coming decades.

Since the 1960's, when the original docks were built, vessel sizes calling POA have doubled in length.

TOTE calls Anchorage with a proprietary RoRo vessel. If TOTE services were to change in the future, the vessel call frequency may shift to more vessel calls that require STS cranes.

Matson's aging container vessel fleet will be replaced with newer, slightly larger LoLo container vessels in the coming years.

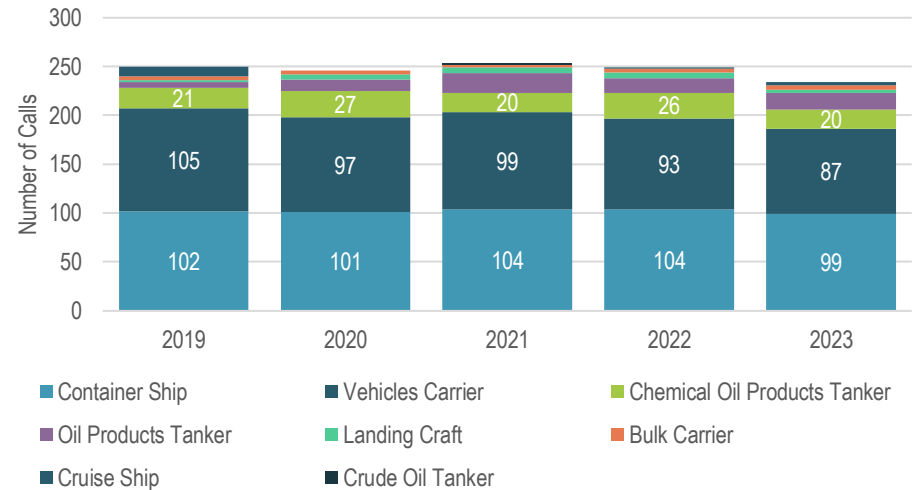
Cruise vessels could begin to call Anchorage more frequently as tourism demand to Alaska grows.

POA VESSEL PROFILE – AVERAGE OVER LAST 5 YEARS

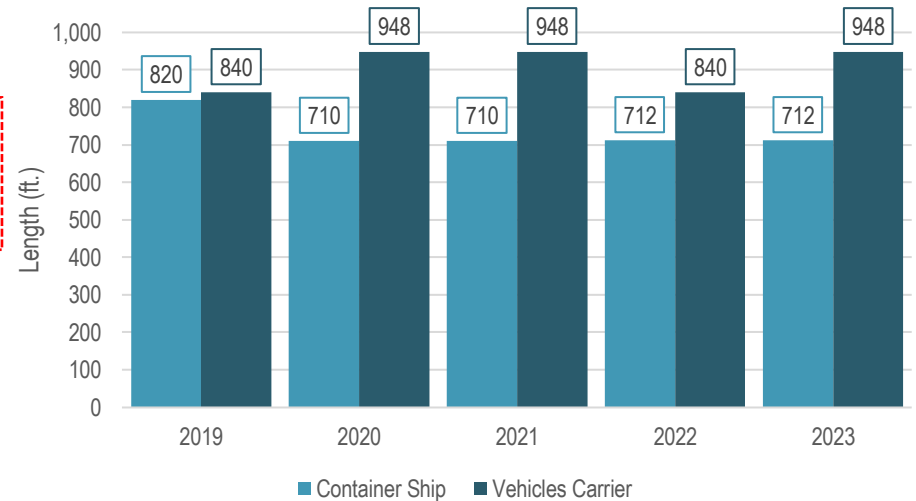
	Vessel Calls (2023)	Length (ft.)	Beam (ft.)	Gross Tons	DWT	TEU
Container Ship (Matson)	99	709	80	21,640	21,787	1,768
Vehicles Carrier (TOTE)	87	834	118	64,617	24,978	
Chemical Oil Prod. Tanker	20	591	102	27,592	45,657	
Oil Products Tanker	17	598	105	30,131	49,620	
Landing Craft	3	142	44	450	286	
Bulk Carrier	5	593	98	22,297	38,313	
Cruise Ship	3	802	104	65,266	7,410	

Call at Cargo Terminals T1 & T2

POA VESSEL CALLS BY TYPE



MAX VESSEL SIZE BY TYPE



Source: Vessel Tracker

Matson Vessels

Matson currently deploys smaller and older container vessels on its Tacoma-Alaska service but will replace these with newer and slightly larger container vessels which are currently deployed on the China-Long Beach service.

Matson has a fleet of barges, general cargo and container vessels servicing trade routes between the US West Coast, Alaska, Hawaii, Guam, Japan and China.

CLX, MAX and AAX services connect the US West Coast to China and markets in between using the fleet's largest vessels.

- CLX (China-Long Beach Express) serves a string of ports between the US and China with the fleet's largest LoLo and ConRo (Container and RoRo).
 - Matson vessels call ports in Long Beach, Hawaii, Guam, Okinawa and China.
- MAX (Matson Asia Express) offers expedited service from Long Beach to China.
- AAX (Alaska Asia Express) connects Long Beach to China with a call to Dutch Harbor, Alaska.

Anchorage currently receives a trio of 710 ft. long, 1,668 TEU vessels that also call Tacoma, Kodiak and Dutch Harbor.

The three primary vessels on this service are aptly named the Anchorage, Kodiak and Tacoma. These relatively smaller container vessels were built in 1983.

New container vessel orders in 2027 will reshuffle the fleet, possibly leading to younger and larger vessels calling Anchorage.

Matson will add three new container vessels to its global fleet in 2027.

These vessels will replace three older vessels on the China-Long Beach strings, allowing for the replacement of the older vessels on the Tacoma-Alaska string.

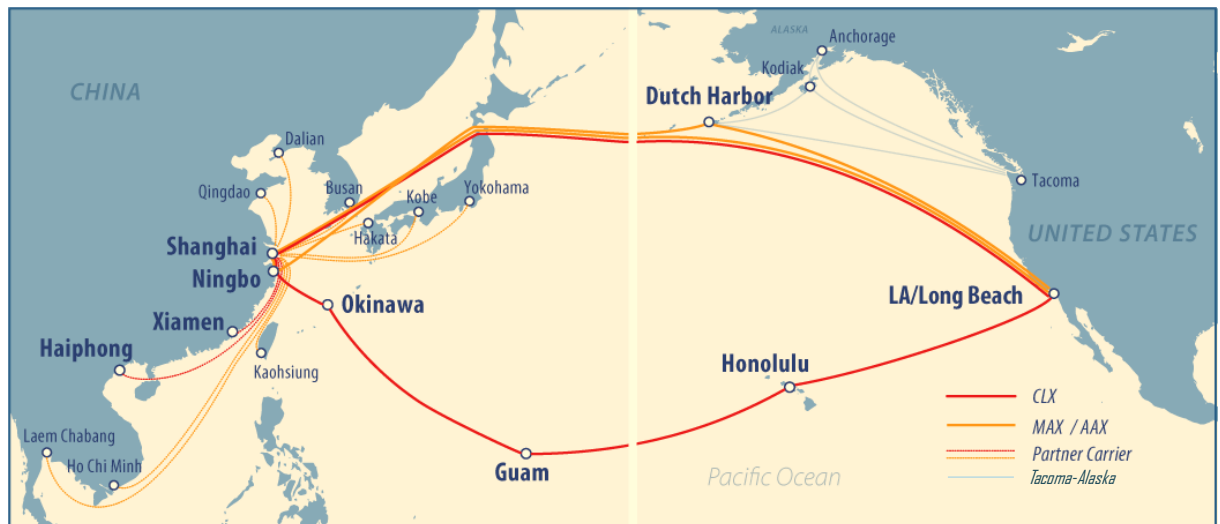
While specific vessels have not been named, it is possible that the core trio of Tacoma-Anchorage vessels, built in 1983, will be replaced by the younger (early 2000's) and larger container vessels currently operating on the China-Long Beach service.

- Based on guidance from Matson, they will replace the vessels currently used on the Alaska service with 2,200-2,800 TEU vessels

MATSON FLEET OVERVIEW

Trade Lanes	Current Fleet			Future Ships
	Tacoma-Alaska	China-Long Beach Long Beach-Alaska-China		China-Long Beach
Operation	LoLo	LoLo	ConRo	Container
Max Length (ft.)	713	860	869	854
Vessel Count	5	9	3	3
Avg. Capacity	1,848 TEU	2,606 TEU	2,998 TEU 833 Autos	3,600 TEU
Year Built Range		1980		
		1987	2003	1983
		2006	2006	2019
			2018	2020
			2019	2027

MATSON SERVICES OVERVIEW



Sources: Matson, Vessel Tracker, Vessel Finder

Matson Operations Overview

Matson operates two weekly services between the Port of Tacoma and Anchorage. The service uses LoLo container vessels unloaded and loaded by ship-to-shore gantry cranes (STS).

Matson operates out of West Sicum Terminal in Port of Tacoma.

Matson operates the two Alaska services and one Hawaii service out of Tacoma.

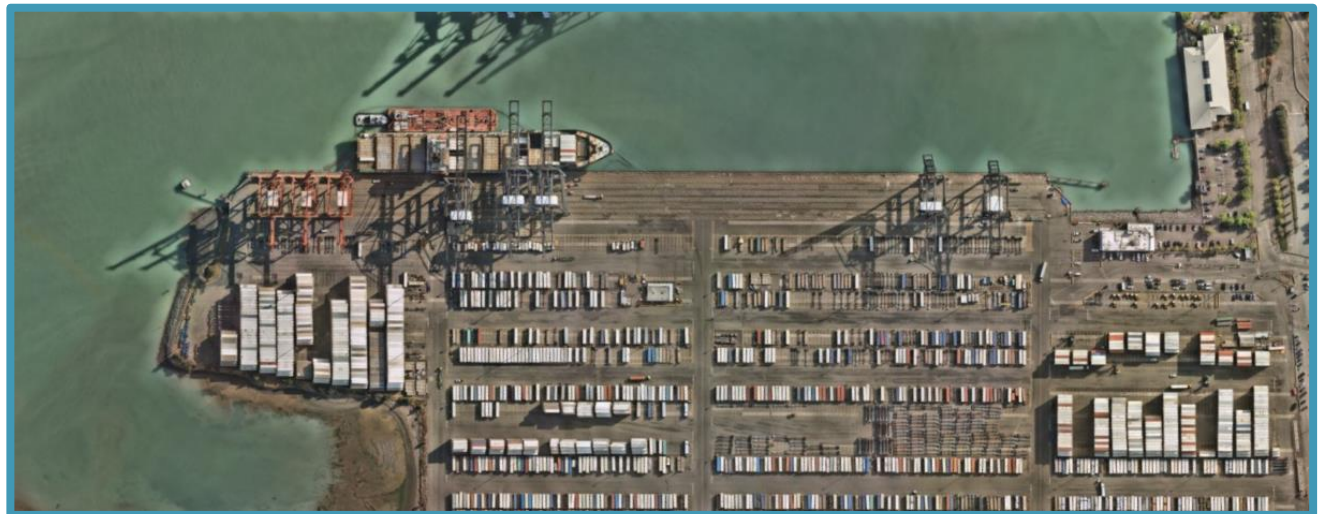
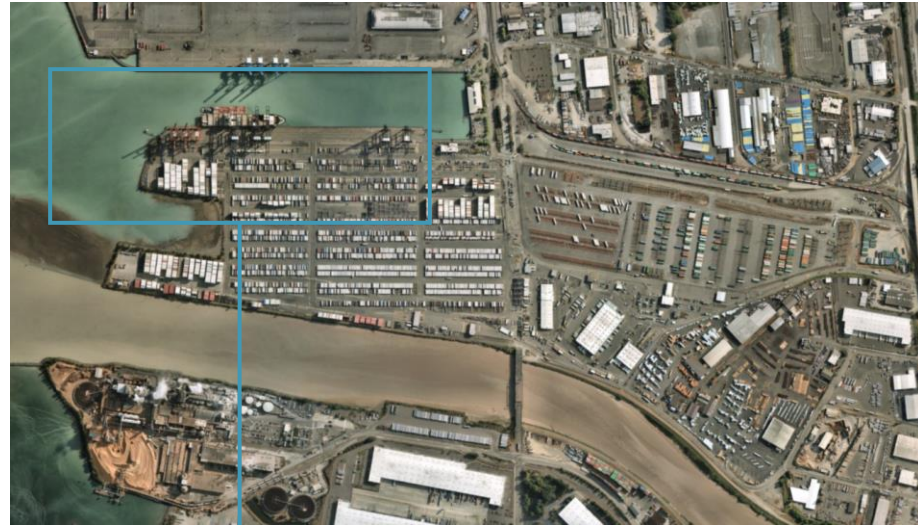
Matson partnered with SSA Terminals in 2018 for stevedoring and terminal services at the Port of Tacoma, following the expiration of its existing lease agreement with APM Terminals.

- Of all the Matson terminals on the West Coast, Tacoma was the only remaining terminal not already managed by SSA Terminals.
- The Matson Tacoma terminal has 3 berths measuring 2,200 feet and 8 cranes for handling container shipments.
- NWSA signed a 10-year lease to manage Matson's Tacoma terminal in 2017.

Matson vessels use conventional lift on lift off cranes to unload containerized cargo.

- These are traditional containerized operations, with cellular vessels and STS cranes
- These operations are the most consistent for moving containers not just in the \us but worldwide

MATSON TERMINAL AT PORT OF TACOMA



TOTE Vessels

Orca class RoRo vessels were custom built in 2003 specifically for the Tacoma-Alaska trade lane and have another 15-20 years of design life remaining.

TOTE Maritime’s current fleet consists of Orca class vessels specifically used for Tacoma-Alaska trade and Marlin class vessels for Florida-Puerto Rico trade.

The Orca class has two RoRo vessels that transport containers, trailers, vehicles and equipment to Anchorage from the Port of Tacoma.

The Marlin class has two built in 2015 and 2016 for the Puerto Rico and Jacksonville, FL route.

Both classes have been converted to use LNG fuel. Orca class vessels most recently made the switch in 2023.

Midnight Sun and North Star form the Orca fleet, each custom built for Alaska trade in 2003.

These unique vessels measure over 800 feet in length and have three RoRo ramps to unload vehicles, trailers, container and equipment.

- Vessels have de-icing equipment to remain operating in the Alaska trade route's difficult weather conditions.
- Orca class vessels can carry up to 200 vehicles and 600 FEU (roughly 1,200 TEU) of containers.

TOTE vessels could be replaced upon approaching design life in 15-20 years by more conventional container vessels or ConRo¹ vessels.

ORCA CLASS VESSEL UNLOADING BY RAMP AT ANCHORAGE



TOTE MARITIME FLEET OVERVIEW

	Current Fleet		Future Ships
Vessel Class	Orca	Marlin	N/A
Vessel Count	2	2	5
Length (ft.)	833-840	764	525
Built / Expected Delivery	2003	2015-2016	2023/2025
Operations	RoRo	LoLo Container	National Security Multi-Mission Vessels
Trade Route	Tacoma-Alaska	Jacksonville-Puerto Rico	Berthed at US Maritime Academies

NORTH STAR (ORCA CLASS VESSEL)



Sources: Vessel Tracker, TOTE Maritime, General Dynamics NASSCO

1 – Combination container & RoRo vessel

TOTE Operations Overview

TOTE vessels require unique infrastructure that is only available in Tacoma and Anchorage but provides efficient operations at both ports. TOTE could replace its existing Orca class with a different type of vessel in the future.

TOTE operations are unique to the Tacoma-Alaska trade lane. No other vessels in the world operate like TOTE's proprietary RoRo service to Anchorage.

TOTE's Orca class vessels require dedicated infrastructure but provide time efficient operations specific to Alaska.

- The terminal must have ramps located in line with the three doors on the vessels. Unlike conventional RoRo, ramps are not part of the TOTE vessel and must be brought from the shore to the ship.
- These ramps are specially designed to mitigate impacts of large tidal swings in Anchorage which can make unloading difficult.
- Container cargo and trailers are unloaded with chassis (i.e., put on a platform and driven off the ship) while vehicles can also roll on and off the vessel.
- The RoRo operation allows TOTE to carry a wide variety of cargo (i.e. containers on chassis, vehicles, heavy equipment, etc.) on the same vessel.
- RoRo operations are typically more time efficient and speedy than LoLo – TOTE vessels average ~14 hours at berth compared to ~20 for Matson vessels.
- While more time efficient, these operations require more labor to ensure quick turn around times.

TOTE could replace the existing Orca class with different vessels to increase flexibility of the fleet.

- Despite the efficiency of the existing vessels, by design they are not serviceable on other routes. Therefore, the utility of new, more-generalized vessels (LoLo / ConRo) could be greater.
- The per unit cost of operations could be reduced by transitioning to fully cellular or a ConRo vessel.
- Other carriers (Matson, Crowley) on similar routes have made recent new-builds of ConRo vessels.
- It should be noted however, a change in vessel type would require new infrastructure and equipment in Tacoma.

TOTE TERMINAL AT PORT OF TACOMA



SPECIALIZED RAMP AT POA



Container RoRo Vessels (ConRo)

M&N believes combination container and RoRo vessels, also known as ConRo, could be a likely option for replacing the current Orca class vessels.

ConRo vessels transport containers unloaded by crane, and vehicles and equipment unloaded by ramp towards the stern of the ship.

ConRo enables vessel operators to leverage the efficiency of LoLo containers while still serving demand for automobiles and other RoRo equipment.

These vessels have become increasingly common on services between the continental US and island markets such as Hawaii and Puerto Rico.

With ConRo, TOTE would benefit from the use of cranes while continuing to serve Alaska's demand for vehicles and equipment.

Cranes could unload cargo types currently handled by TOTE with greater efficiency.

- TOTE currently transports trailers and chassis. These goods are also transported in containers.
- TOTE requires double the number of longshoreman as Matson. Cranes could unload much of TOTE's cargo, particularly trailers, with fewer workers, reducing operating costs.

With ConRo, TOTE could benefit from crane handling while still serving the vehicles and equipment market in Alaska.

M&N is aware of six active ConRo vessels operating on Jones Act trade routes. A vessel may go on the market in the coming decades, creating an opportunity for TOTE.

Matson and Crowley, a Florida-Puerto Rico service provider, each commissioned two ConRo vessels between 2017 and 2019. Pasha, a West Coast to Hawaii shipping line, commissioned a ConRo vessel in 2015.

Matson also has a 41-year old ConRo vessel currently in operation.

Importantly, a TOTE ConRo vessel would have to be built in the US to comply with Jones Act regulations.

M&N notes that the US military has purchased ConRo vessels in recent years, taking them out of the commercial market.

MATSON LURLINE "CONRO" VESSEL

Lift on Lift Off container unloading by crane



Ramp for unloading vehicles from below deck storage

CROWLEY TAINO "CONRO" VESSEL

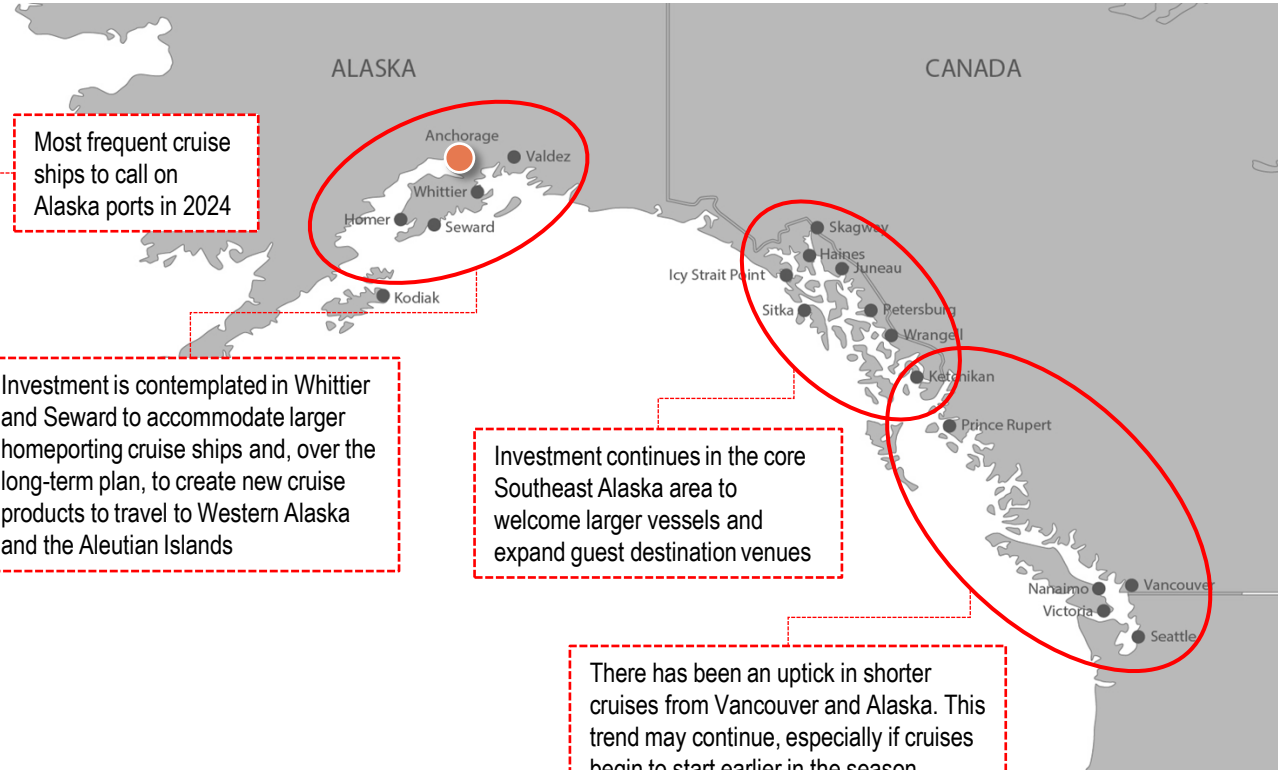
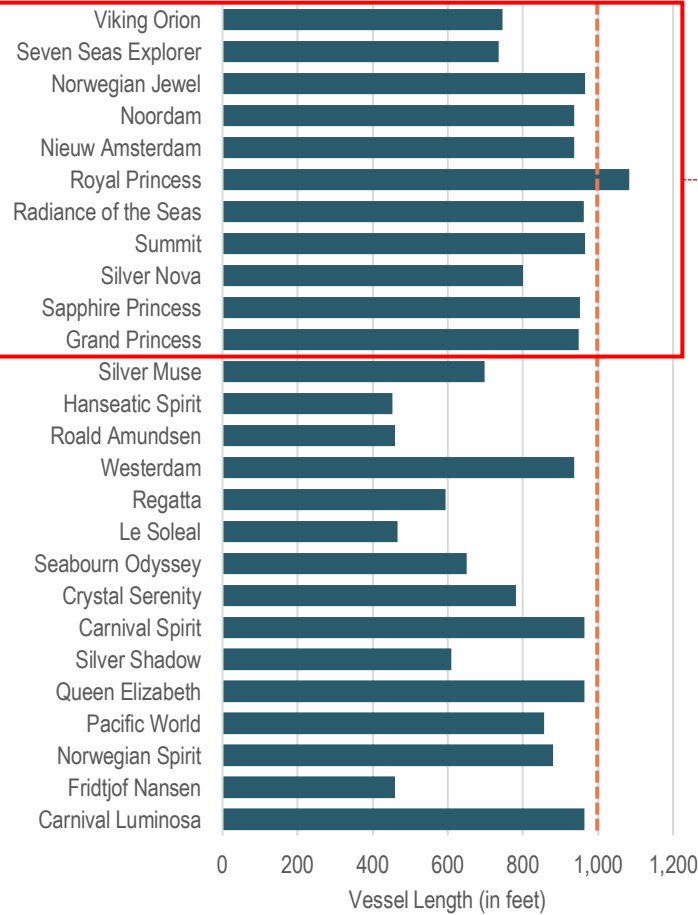


Sources: Matson, Pasha, TradeWinds, Crowley

Cruise

Alaska is the 5th largest region in the world for cruise deployment. Alaskan cruises generally follow two main deployment patterns: round-trip cruises from Seattle or Vancouver and one-way cruises to/from Vancouver and Whittier or Seward.

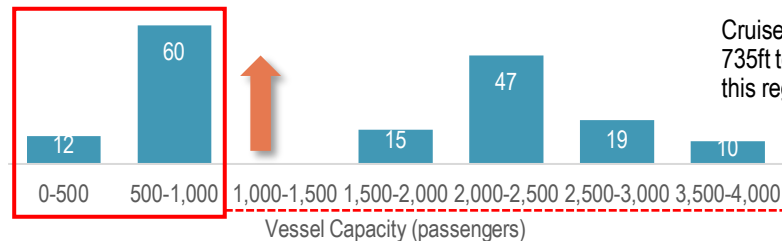
CRUISE VESSELS CALLING ON ALASKA PORTS



Similar to trends in the container industry, cruise vessels are getting larger.

Based on the 2024 cruise schedule, cruise ships calling on Anchorage are Holland America Line vessels, all of which measure to 936ft in length and carry over 1,900 passengers. PAMP would establish a new berth face of 1,808' which could accommodate a vessel this size. However, as vessel get larger the ability to handle a cruise ship and a general cargo vessel simultaneously could become challenging.

Cruise ships within this region also call on Whittier, Seward, and Homer. Cruise vessels that most frequent Alaska ports range from 735ft to 1,083ft in length with ship capacity of as high as 3,600 cruise passengers. The average cruise vessel length traveling through this region is 798.5ft long, with approximately 1,511 passengers.



Over 55% of cruise vessels traveling throughout the Alaska region in 2024 will carry 1,500 passengers or more. However, smaller cruise vessels are still expected to call on ports in this region

Source: Anchorage 2024 Cruise Schedule; Various Cruise Sites

Cruise

The Alaska region will continue to see an uptick in both small and larger cruise vessels.

Alaska cruise is composed of a variety of small and large cruise vessels, moving from ports along the coast.





The region can expect cruise calls to increase as the cruise market continues to recover and grow from the pandemic-period.

The cruise vessels identified to the right are cruises that either currently deploy in the Alaska region or are planning to. Various large cruise ships – including some of the major cruise operators (Royal Caribbean Group, Norwegian Cruise Line) – already call on ports within the Alaska region.

However, some of these cruise vessels are unable to reach Anchorage due to their size. One of these cruise vessels would take up more than one berthing slot at POA.

- Additionally, it would take too much time to go around the Alaska peninsula in order to reach Anchorage due to their size.
- This is not to say that large cruise vessels do not call POA. In 2023, the Holland America's Nieuw Amsterdam (935') was the first to call POA.
- A vessel this size would take up the larger of the two PAMP berths (T2 offering 938')

LARGE VESSEL CLASS SIZES WITHIN ALASKA REGION

Cruise Vessel	Description	Deployment
	<p>Vessel Class: Quantum of the Seas Cruise Operator: Royal Caribbean Group Length Overall: 1,139 ft. Capacity: 4,100 lower berths</p>	<p>Deployment Status: Currently deployed within the Alaska region Ports-of-Call: Whittier, Seward</p>
	<p>Vessel Class: Breakaway Plus Cruise Operator: Norwegian Cruise Line Length Overall: 1,083 ft. Capacity: 4,200 lower berths</p>	<p>Deployment Status: Currently deployed within the Alaska region Ports-of-Call: Turn away at Skagway</p>
	<p>Vessel Class: Celebrity Edge Cruise Operator: Celebrity Cruises Length Overall: 1,073 ft. Capacity: 3,260 lower berths</p>	<p>Deployment Status: First time expected to deploy in 2024 Ports-of-Call: Seattle to Skagway</p>
	<p>Vessel Class: Sphere II Cruise Operator: Princess Cruises Length Overall: 1,132 ft. Capacity: 4,300 lower berths</p>	<p>Deployment Status: Not in market yet but will be Ports-of-Call: N/A</p>

The new second Sphere Class ship – Star Princess – is expected to deploy in Alaska in the long-term

Liquid Bulk Vessels

Petroleum tankers have called POA more frequently in recent years to meet growing demand for petroleum products. These petroleum tankers are large enough to approach depth limitations at the Port and therefore typically call during high tide.

Increasing demand for petroleum products has led to more frequent vessel calls and slightly larger vessel sizes. Operators often increase vessel size over time to reduce per ton shipping costs.

Dockside petroleum volume rose by more than 500,000 tons from 2019 to 2022.

The average petroleum tanker capacity grew slightly from 44,958 DWT to 47,558 DWT. This does not reflect a significant shift in the class of vessels calling the Port.

The frequency of petroleum tanker calls increased from 27 in 2019 to 41 in 2022. More vessel arrivals facilitated the volume growth as opposed to an increase in vessel size.

Since vessel size increases to reduce per ton costs, projected dockside petroleum product volume growth will likely be served by larger vessels in the coming decades.

Vessel operators take channel depth and tidal waves into consideration when planning Port calls.

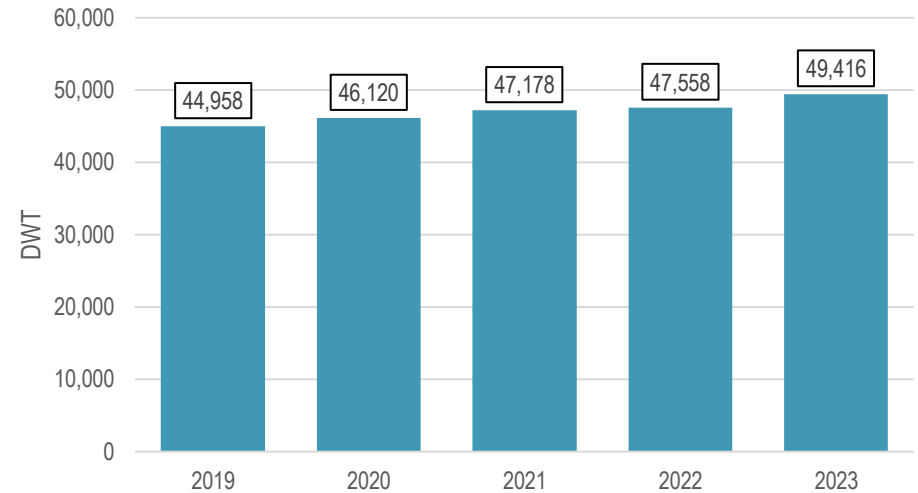
The Port has a depth of 35 ft., though tidal waves provide a window of 50 ft. depth, allowing larger vessels.

Vessels with large drafts, measured from the surface to the bottom of the ship, have increasingly called the Port and accounted for 65% of vessel calls in 2023.

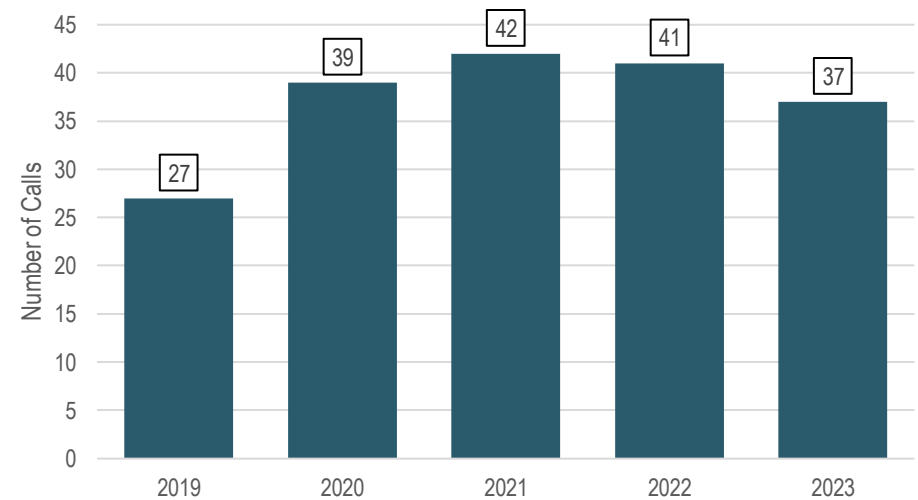
PETROLEUM TANKER OVERVIEW BY DRAFT (2023)

	Vessel Draft Size	
	< 35 ft.	> 35 ft.
Vessel Count	9	12
Calls	13	24
Draft Range (ft.)	23 - 27	36 - 42
Avg. DWT	48,696	49,954
Avg. Length (ft.)	600	600

AVERAGE PETROLEUM TANKER CAPACITY



PETROLEUM TANKER CALLS



Sources: Port of Alaska, Port of Alaska

Cement Bulk Vessels

Rebounding volume has led to slightly larger dry bulk vessels in recent years. Dry bulk vessels spend upwards of two weeks unloading at the Port.

Vessel calls have adjusted with volume demand in recent years, declining in 2021 and rebounding in 2022.

Dry bulk volume, consisting almost entirely of cement, declined from nearly 110,000 tons in 2019 to nearly 88,000 tons in 2021 before rebounding to nearly 118,000 tons in 2022.

The increase in dry bulk vessel calls from three in 2021 to five in 2023 reflects rebounding demand, and the start of operations at the new PCT terminal.

The average capacity of dry bulk vessels has increased from 35,274 DWT in 2019 to 41,688 DWT in 2023. This reflects the larger 46,618 DWT Astoria Bay calling the Port in 2022 and 2023.

Call frequency is relatively low compared with other vessel types at the Port. However, dry bulk vessels spend more time unloading than other vessels.

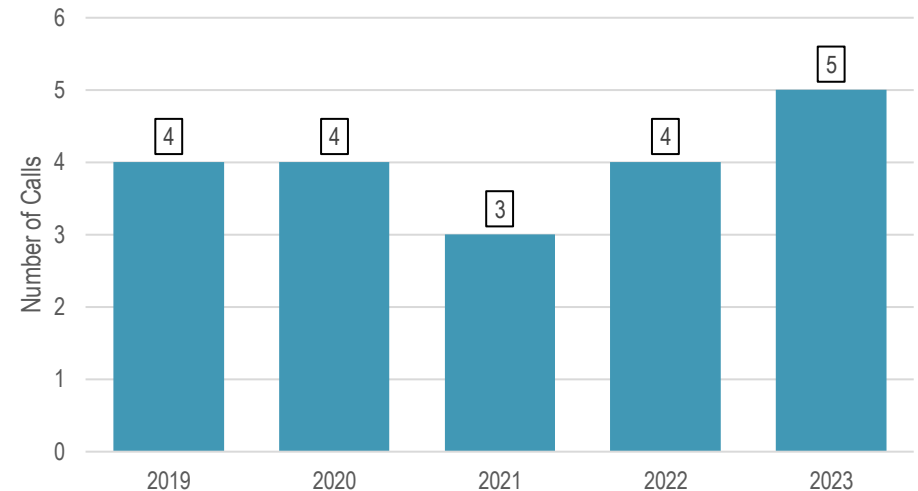
Dry bulk vessels spent an average of 16 days at POA terminal in 2023. More than two weeks in Port per dry bulk vessel accounts for significant utilization of the shared petroleum and cement terminal.

Most dry bulk vessels do not face depth constraints, though two vessels with drafts greater than 35 ft. called the Port in 2022 and 2023.

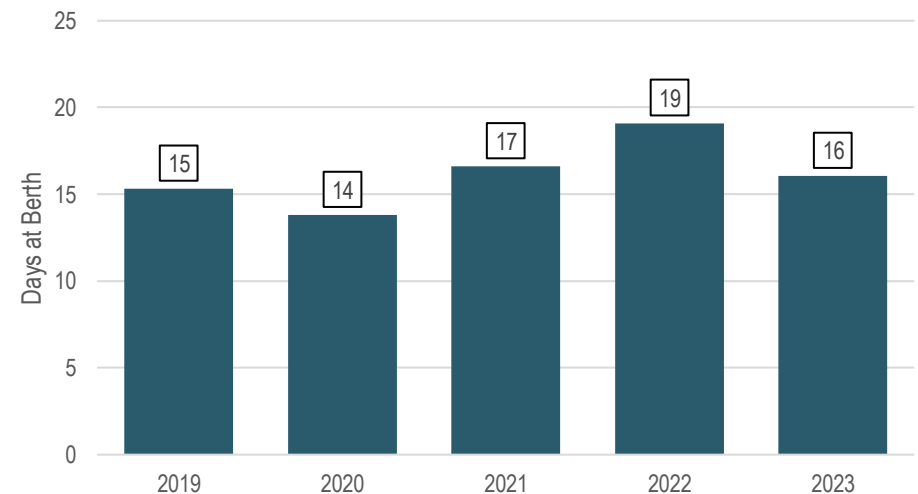
BULK CARRIER OVERVIEW BY DRAFT (2023)

	Vessel Draft Size	
	< 35 ft.	> 35 ft.
Vessel Count	3	1
Calls	3	2
Draft Range (ft.)	20 - 34	39
Avg. DWT	38,400	46,619
Avg. Length (m)	594	610

BULK CARRIER VESSEL CALLS



BULK CARRIER AVERAGE DURATION AT PORT



Sources: Port of Alaska, Vessel Tracker

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Port of Alaska Benchmarking Analysis

Port of San Juan, Puerto Rico

As the island's most significant piece of infrastructure, the Port is responsible for providing necessary goods to the population through weekly vessel calls, mostly serviced by TOTE and Crowley. With hurricanes being a threat to the island, past damage has shown that it is necessary to build resiliency into its ports to be able to provide effective relief.

The Port of San Juan is the largest port on the island and the most critical piece of infrastructure as Puerto Rico imports 85% of its food and 100% of its liquid fuel.

Among smaller operations, there are 3 main container services that operate out of the port and lease from the Puerto Rico Port Authority (PRPA):

- TOTE brings in necessary life sustaining goods from the Port of Jacksonville, Florida to the Puerto Nuevo terminal.
- Crowley operates a liner service from the Port of Jacksonville and Penn Terminal in Philadelphia to the Isla Grande terminal.
- Trailer Bridge also operates a liner service out of Port of Jacksonville that ships vehicles and cargo.

TOTE and Crowley operate the largest vessels at the port.

- Crowley has 3 weekly services with an average vessel size of 2,400 TEU and TOTE has 2 weekly services with an average vessel size of 3,100 TEU.

There are 3 cargo ports and several smaller ports located all around the island. On the Southern side of the island, there is a smaller container port called the Port of Ponce (Port of the Americas) equipped with 3 STS cranes.

- Given that Ponce is so far from the island's concentrated population in San Juan, it is costly to move containers by truck through Ponce to server the islands major population areas.

Hurricanes Irma and Maria left extensive damage to Puerto Rico and the port in 2017. The damage disrupted the efficient and quick allocation of emergency supplies to people in need.

- In addition to the ports, the airports were also severely damaged which closed off another access point to provide relief.
- Since fleeing by land to gain relief is not an option for the island, transportation infrastructure is more critical for Puerto Rico than most other parts in the United States.
- The aftermath of the hurricane damage demonstrated the need for resiliency and redundancy measures to strengthen both the Port of San Juan and Port of Ponce.

Additionally, the port has 2 cruise terminals that accommodate around 500 cruise ships and just under 2 million passengers annually that travel around the Caribbean from Carnival, Royal Caribbean, Celebrity, Princess, and more.

PORT OF SAN JUAN OVERVIEW



CONTAINER TERMINALS OVERVIEW

Container Terminals	Puerto Nuevo	Isla Grande
Main Operator	TOTE	Crowley
Container Acreage	120	85
Container Berths	4	3
Container Berthing Length	4,721 ft.	1,000 ft.
Depth	39 ft.	36 ft.
RO/RO or LO/LO	Both	Both
Container Vessel Length	761 ft.	719 ft.

Sources: Puerto Rico Terminals, RAND, Discover Puerto Rico, TOTE, Crowley

Port of Guam

The Port of Guam handles the majority of the island's freight. It benefits from having three main multipurpose and flexible cargo berths, any of which can accommodate the various cargo vessels calling the Port (containers, general cargo, RoRo, barge, cruise).

The Port of Guam has three multipurpose berths named F4, F5 and F6, each served by STS gantry cranes. These berths handle essentially all the island population's freight.

The main cargo berths are F4, F5, and F6, totaling 1,970 feet in length.

- These berths' 3 mobile STS gantry cranes handle 80,000 to 90,000 boxes per year.
- Port of Guam is the only non-military cargo handling port that serves the island's 170,534 residents.
- Therefore, the main cargo berths must be able to handle all types of cargo ships calling the port, including lift on-lift off container vessels, general cargo vessels and vehicle deliveries from roll on-roll off vessels.

In 1993, a magnitude 8.1 earthquake struck Guam, severely damaging the main cargo berths (F4, F5 and F6). With portions of the terminal inoperable, vessels were still able to call at the remaining functioning sections as well as at the older general cargo terminal, F3.

- The population experienced goods shortages within a week. However, life returned to normal quicker because of F3's availability, and the redundancy of service offerings throughout F4, F5 and F6. This reflects the benefits of multipurpose and redundant berths, particularly for island ports.

Having three multipurpose berths provides flexibility. Different vessel types can load and unload at any of the three berths.

Guam benefits from having STS gantry cranes which can traverse the full length of the berth face.

- Container vessels can call any of the three berths.
- The Port can accommodate two large vessels or three smaller vessels at the same time.
- The berths can be shared by container vessels and general cargo / RoRo vessels. Cranes can be moved to allow for RoRo ramps or general cargo unloading.

Cruise vessels can also call the cargo berths.

PORT OF GUAM CARGO BERTHS OVERVIEW



VESSEL TYPES CALLING F4, F5, AND F6

Vessel Type	Berths Used			Port Utilization	Vessel Size		Major Lines
	F4	F5	F6		Length	Capacity	
Container	●	●	●	16.6%	460 – 870 ft.	777 – 3,620 TEU	Matson, APL, MARIANA EXPRESS LINE
Container RoRo	●			0.5%	460 ft.	650 TEU	KYOWA KOREA MARITIME AGENCY
Vehicle RoRo	●	●		2.8%	600 – 660 ft.	14,000 – 17,000 DWT	INCHCAPE, AMBYTH LOGISTICS
General Cargo	●			9.2%	400 ft.	13,000 DWT	KYOWA KOREA MARITIME AGENCY
Container Barge			●	-	300 ft.	3,747 tons	
Cruise		●	●	1.4%	985 ft.	1,000 – 7,000 passengers	MSC CRUISES, Holland America Line

Sources: Nearmap, Google Earth, Port of Guam, VesselTracker, National Center for Earthquake Engineering Research

Port of Hawaii

Hawaii's cargo transportation system is centered around Honolulu Harbor, which distributes containerized cargo from its main terminals to smaller communities by barge. Honolulu has invested in lift on-lift off container handling infrastructure.

Hawaii's cargo transportation relies on a "hub and spoke" system with Honolulu at the center.

Shipments come from the US PNW and other regions, such as Asia and Oceania. Cargo is typically transshipped through Honolulu Harbor and distributed to other islands by smaller barge services.

- Hawaii's cargo transportation system functions similarly to Alaska's. Cargo accumulates at the largest population center and is distributed to smaller, more isolated communities.

Matson and Pasha operate the main container services calling Hawaii. They connect the US West Coast to terminals in Honolulu, Nawiliwili, Kahului, Kwaihae and Hilo.

Honolulu Harbor is the center of Hawaii's container transportation system, utilizing 9 mobile gantry cranes to accommodate larger vessels.

Honolulu Harbor has 9 mobile gantry cranes for servicing container vessels. Matson added three of the nine cranes in 2019 to accommodate the larger vessel sizes in its fleet.

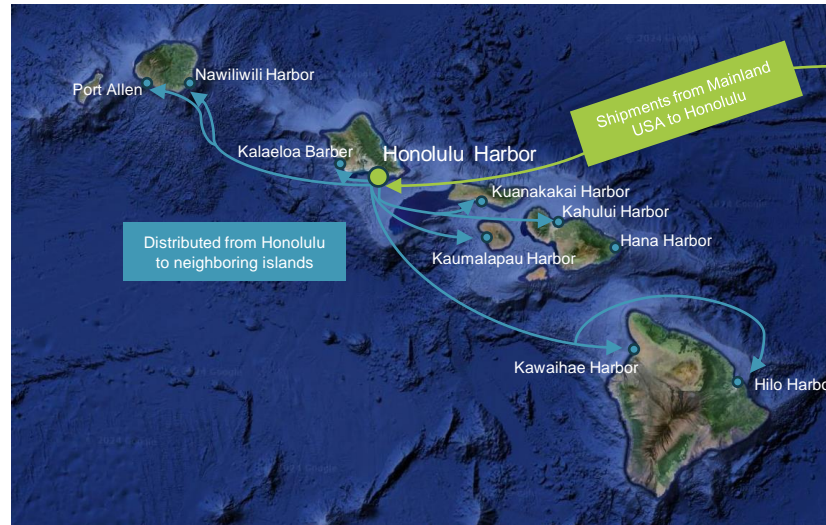
- The port has initiated a modernization program to accommodate larger vessels. The new 65-acre Kapalama Container Terminal will be equipped with gantry cranes and complement the existing Sand Island terminal, which is operated by Matson and Pasha.
- Currently there are 5 berths capable handling containers, which will increase to 7 following completion of the expansion.

Notably, Honolulu Harbor serves lift on-lift off container vessels. It does not serve TOTE roll on-roll off container vessels. The Harbor's roll on-roll off services move vehicles, not containers.

- Additionally, the modernization program focuses on expanding lift on-lift off infrastructure.

Honolulu uses Piers 39 and 40 for barge transshipment to other islands. These piers will be widened to accommodate larger expected barge vessels.

HAWAII HUB AND SPOKE CARGO TRANSPORTATION SYSTEM



HONOLULU HARBOR CONTAINER BERTHS OVERVIEW



9 mobile gantry cranes form the core of Hawaii's container handling infrastructure

Sources: Vessel Tracker, Nearmap, Matson, American Journal of Transportation

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Stakeholder Outreach

Stakeholder Outreach

M&N interviewed key stakeholders and port users as part of its economic assessment to better understand their relationship with the Port and how they plan to use its facilities in the future.

Key takeaways and reoccurring themes among all interviews:

1. PoA's importance in the economy of the region cannot be overstated.
2. Need for reliability for both liquid bulk and cargo operations is a key area of interest for all users.
3. There are no economically viable alternatives to PoA from both a maritime infrastructure and inland connectivity standpoint.

Stakeholders Interviewed To-Date	Port Uses	Key Takeaways	Reliance on Port Infrastructure
	Cargo Docks	Will be introducing larger vessels to the Alaska trade route in the near-term. Remains firmly committed to serving the Alaskan market and supports PAMP's objectives of developing POA into a modern, self-reliant gateway.	
	Cargo Docks	Maintaining schedule integrity is crucial to TOTE's operations and the specialized infrastructure and labor available at POA is needed to support this. Vessel types could see a change following end of design life of current vessels (15-20 years).	
 	Cargo Docks Petroleum Berths	Port of Alaska is the premier port for Military operations in Alaska, and the military presence in Alaska is growing. The POA supports the movement of pieces of equipment used in exercises, regular consumable goods for the troops and fuel for the Air Force.	
	Petroleum Import / Export	Marathon relies on POA to receive inbound shipments of fuel to complement the production at the Kenai Refinery. With demand rising, the ability to efficiently handle product at multiple berths benefits the various liquid bulk customers at POA.	
	Jet Fuel Imports	POA is crucial in serving as a gateway for fuels destined to the Ted Stevens International Airport. Cargo and passenger planes alike rely on the fuel handled through the Port.	
	Petroleum Import	Petro Star uses POA distribute its refined product throughout the State including the North Slope. Their refined product is shipped by barge and utilizes POL1 and POL2. The company took over the Tesoro tanks at POA in 2017.	
	Inland Cargo Movement	ARRC and POA work together to rail cargo into Fairbanks. This is an important logistics service for the interior markets of the State. Capital development costs would be very high at other ports to replicate the service at POA.	

The following pages provide more detailed notes of the interviews

Matson

Matson handles roughly 50% of all Port of Alaska container volumes. They are committed to providing quality service at competitive costs to the Alaska population.

“Alaskan’s dependence on the Port of Alaska cannot be understated”



LOCATION



Topic	Matson Response
What does Matson do?	<ul style="list-style-type: none"> • Matson transports containers filled with everyday essential items used by Alaskans • Scheduled to arrive in Anchorage every Sunday and Tuesday (same schedule as TOTE Maritime), with service continuing to Kodiak Island and Dutch Harbor • 75 longshoremen work to unload Matson vessels
Why do you use the Port of Alaska?	<ul style="list-style-type: none"> • It is the only port able to serve Anchorage and interior markets <ul style="list-style-type: none"> • Seward and Whittier lack the necessary workforce, would require hundreds of millions in investment to upgrade cargo handling infrastructure and would have higher transport costs to reach the state’s economic center • Whittier has a tunnel constraint • It has the necessary infrastructure to efficiently handle Matson vessels <ul style="list-style-type: none"> • Matson uses the world standard lift-on lift-off operating method using three ship-to-shore gantry cranes at T2 • The world’s fleet of vessels are wider and the Port needs infrastructure to support modern container handling operations • Current vessels will be replaced with larger ships
Do you expect operational changes in the future?	<ul style="list-style-type: none"> • 2,200-2,800 TEU vessels will replace the vessels currently used on the Alaska service • Rough weather can impact Matson’s schedule, larger ships fare better in rough weather. Additionally, the larger vessels have higher cruising speeds which allow for more efficient and timely service.
What are your operational concerns or needs for the future?	<ul style="list-style-type: none"> • Matson supports protecting Alaska consumers from the Port’s vulnerabilities to natural disasters by providing redundant and resilient facilities at Terminals 1 and 2 • If the Municipality decides a redundant, resilient facility is not what Alaskans need now, what will eventually trigger a build out of Terminal 2? If it is a user-requested change in the future, how is that paid for? • Now is a good time to undergo infrastructure improvements. Federal funding for public infrastructure is widely available • A lot of time, effort and resources has been invested in PAMP. If delayed to future time, the project would have to start from the beginning and would likely cost more

TOTE

TOTE uses a specialized berth only found at POA and Tacoma to unload faster and stay on schedule. Future TOTE vessels may see a different configuration.

“At this time, there are no practical alternatives to the POA to maintain schedule and service levels”

“Given changing regulatory environment and market needs, TOTE cannot say for certain what the design of our next ships will be”



LOCATION



Topic	TOTE Response
What does TOTE do?	<ul style="list-style-type: none"> TOTE has transported containers (about 50% of total), passenger vehicles, and equipment for construction, military and mining for the past 49 years <ul style="list-style-type: none"> Operates proprietary roll on roll off operation with dedicated terminals in Anchorage and Tacoma – berths have three trestles that line up perfectly with vessel doors. Scheduled to arrive in Anchorage every Sunday and Tuesday (same schedule as Matson) 140 longshoreman support the loading / unloading operation
Why do you use the Port of Alaska?	<ul style="list-style-type: none"> Schedule integrity is critical to the TOTE operation. POA is currently the most efficiency way to reach our customers in Alaska Seward's berth is currently not designed for specialized TOTE vessels. The dock would need expanding to support shoreside ramps and cargo operations The distance from Valdez to Anchorage would create inland transportation constraints when trying to serve the population centers of Anchorage and Fairbanks Port McKenzie is not built to accommodate RoRo operations and lacks rail infrastructure. It is outside of the federal dredging profile, resulting in shallower waters that make Port McKenzie exceptionally difficult to navigate, according to TOTE pilots A TOTE vessel can safely berth at Homer. Load and discharge would be constrained by only using one ramp. Inland transportation and yard options constrain efficient operations Rail service from POA is crucial to meet the needs of Fairbanks
Do you expect operational changes in the future?	<ul style="list-style-type: none"> Vessel types could see a change following end of design life of current vessels (15-20 years) If TOTE were to alter vessel design, considerations would need to be made at the Tacoma terminal to support operations
What are your operational concerns or needs for the future?	<ul style="list-style-type: none"> RoRo operations that use vessel ramps would be constrained by large tidal fluctuations at POA Increased construction costs, re-mobilization of construction equipment, and operational disruptions are likely to occur if T2 is widened in the future rather than as part of the cargo dock construction phase of the PAMP. The risk of a single berth terminal could threaten schedule integrity / ability to support the market: redundancy is key.

Military

Port of Alaska is strategic for the military, which uses all berths to transport equipment, troops, fuel and everyday items for the military bases such as food and clothing.

“Alaska is a strategic port – with the required capability to support real world scenarios”

“The military presence in Alaska is growing”



LOCATION



Topic	Military Response
<p>What does the Military do?</p>	<ul style="list-style-type: none"> • Moves equipment, fuel and cargo for the day-to-day needs of the military bases to support soldiers (some of this cargo moves via Matson and TOTE) • Operation Pathways (OP) is a subset of exercises that drive a high volume of large cargo. Each movement consists of about 20 to 150 pieces of equipment (typically RoRo) • There are military forces stationed in Alaska that could be called for worldwide deployment at any time. • Move goods consumed by the military population such as food, clothing, household items and fuel
<p>Why do you use the Port of Alaska?</p>	<ul style="list-style-type: none"> • It is a strategic port with the required capability to support real-world scenarios. • Proximity to JBER and Fairbanks bases. • Port of Alaska is the premier port for Military operations in Alaska: <ul style="list-style-type: none"> • Continued rail access through harsh weather conditions • Port of Alaska is always running • Military Sealift Command, requires adequate storage space, ramp access and utilization of the cranes at certain times
<p>Do you expect operational changes in the future?</p>	<ul style="list-style-type: none"> • In the summer of 2022, the Army activated the 11th Airborne Division, which will increase the size of Army forces in Alaska. • Artic Training is a priority which will increase import/export of military cargo. • The Air Force is expanding and increasingly using vessel transport to mobilize equipment
<p>What are your operational concerns or needs for the future?</p>	<ul style="list-style-type: none"> • Continued seaport access to efficiently sustain a larger military footprint in Alaska with an increase to rotational forces for Artic Training

Marathon

Marathon primarily imports petroleum products to support Alaska populations and airport activities. Marathon has supported increasing jet fuel demand.

“Commitment is to do it safely, do it right”

“Port of Alaska needs two berths to appropriately handle petroleum and cement products”



LOCATION



Topic	Marathon Response
What does Marathon do?	<ul style="list-style-type: none"> Operates the Kenai Refinery, located 60 miles Southwest of Anchorage Transports petroleum products such as jet fuel, gasoline, and diesel fuel to the Port via tanker vessels ranging in size from 100,000 to 315,000 bbls.
Why do you use the Port of Alaska?	<ul style="list-style-type: none"> Marathon has a pipeline to sell jet fuel directly to Ted Stevens International Airport, but it cannot handle all volume Uses POA to transport additional volume to the airport
Do you expect operational changes in the future?	<ul style="list-style-type: none"> Demand for jet fuel has surged since COVID, creating more volume. Korean vessels have called the Port more frequently to keep up
What are your operational concerns or needs for the future?	<ul style="list-style-type: none"> There is no “Plan B” for tankers if the current petroleum berth goes down <ul style="list-style-type: none"> Marathon, Idemitsu, and Navco all ship jet fuel to POA, creating congestion issues Medium range vessels (315,000 bbls) cannot call POL2 due to size restrictions and PCT does not currently handle petroleum A second berth with larger size restrictions could help limit fallout from a potential closure of berthing constraints. Liquid storage tank space is always a constraint. There are no plans to expand storage capacity. There is no gangway at existing petroleum berths which is a safety issue. Continuing to use a man basket is unsustainable

Menzies

Menzies relies heavily on Port of Alaska for importing fuel products but has concerns around the temporary configurations at PCT and sharing the terminal with cement and cruise vessels in the future.

“Capacity would fall by 70% without the Port of Alaska in an emergency situation”



LOCATION



Topic	Menzies Response
What does Menzies do?	<ul style="list-style-type: none"> Primarily provides fuel services to the Ted Stevens Anchorage International Airport, a major cargo hub transporting goods back and forth along the Asia trade lane <ul style="list-style-type: none"> Supply 90% of its fuel to cargo planes and 10% to passenger planes
Why do you use the Port of Alaska?	<ul style="list-style-type: none"> Tankers calling the Port of Alaska supply nearly 60% of Menzie’s fuel <ul style="list-style-type: none"> The average tanker vessel size is about 315,000 bbls and arrives at the Port five times per month The Flint Hill refinery previously supplied more than half of Menzie’s fuel, but now rely more heavily on tankers <ul style="list-style-type: none"> Marathon and Petro Star are key sources of Menzie’s jet fuel
Do you expect operational changes in the future?	<ul style="list-style-type: none"> The recently completed Petroleum and Cement Terminal (PCT) does not yet handle petroleum We are concerned about maintaining current operations while using temporary configurations at the terminal
What are your operational concerns or needs for the future?	<ul style="list-style-type: none"> Cement vessels also call PCT, taking up utilization at the significant berth time given 2-3 week unloading times. Face vessel size and storage issues at the Port of Alaska Currently, Menzies facility has enough fuel storage reserves for only 8 days of which a single tanker can fill 70% of the reserves It is very expensive to build new tanks Many tankers currently arrive at the Port only half full due to storage and draft restrictions

Petro Star

Petro Star is a PAO tenant which imports petroleum products and connect its Valdez refinery to customers throughout the State.

“POA infrastructure allows for most efficient operations in the region today”

“Operational disruptions as a result of PAMP construction is a major concern that needs to be managed for all cargo movements”



LOCATION



Topic	Petro Star Response
What does Petro Star do?	<ul style="list-style-type: none"> • Petro star operates two refineries in Valdez and North Pole and moves petroleum through the Port of Alaska. • Petro Star recently expanded its footprint at the port and has actively investing in the port including building rail racks • Have to take tide cycles into consideration but not same level of complications tankers have with draft • Focus on moving self refined product
Why do you use the Port of Alaska?	<ul style="list-style-type: none"> • Petro Star utilizes barge for its transport of fuel – calling more often than the other petroleum users at the Port (approx. once per week for 24-36 hours per call). • Can use POL1 or 2 depending on availability. • Petro Star could theoretically flex to use other ports, or unload creatively, but would lose significant efficiency that POA offers. • Building tank costs are higher than they should be. Much of that is related to local requirements and soil contamination. No plans to add capacity via building. Have done it previously by purchasing
Do you expect operational changes in the future?	<ul style="list-style-type: none"> • Petro Star does not expect vessel calls to increase significantly moving forward
What are your operational concerns or needs for the future?	<ul style="list-style-type: none"> • Significant PAMP concerns : the impacts to regular operations during construction regular operations are going to be a bigger challenge than being discussed. • A second liquid bulk facility is needed during PAMP construction – where do you put it? What are the use costs associated with the options and berth availability? • What does the interim, during construction, solution look like • Challenges to get PCT up and running. Additionally, in the end PCT will still be tied up with cement • Broader review of port infrastructure (i.e., tanks, roads) could prove prudent in relation to survivability from s seismic event • A seismic event by definition would reduce operational efficiency and change the cargo composition. Why build two docks that have the same level of resiliency?

Alaska Railroad

The Alaska Railroad believes POA to be the ideal gateway for bringing cargo to and from Anchorage, Fairbanks and Alaska as a whole.

“Getting trucks off the road is not a conversation in Alaska”

“\$250 million would be needed to support upgrades at Seward”



LOCATION



Topic	Alaska Railroad Response
What does the Alaska Railroad do?	<ul style="list-style-type: none"> • Our mandate is to meet the commercial needs of Alaska and be self-sustaining • ARRC move trailers, containers, heavy equipment, fuel, cement and water to and from the Port • Matson and TOTE account for roughly 100+ containers/trailers per week on the rail line • Alaska Marine Line barge has a contract to rail roughly 5,500 to 6,500 containers per year as well as heavy equipment and water • 10% of Port of Alaska volume goes to Fairbanks, largely by rail
Why do you use the Port of Alaska?	<ul style="list-style-type: none"> • Port of Alaska is well connected to ARRC rail network and perfectly positioned to serve Fairbanks and other smaller population clusters. • Seward is a theoretical alternative but has complications <ul style="list-style-type: none"> • Seward can only handle one ship at a time; Port of Alaska can handle multiple, including two general cargo vessels • Seward would need \$250 million to support upgrades
Do you expect operational changes in the future?	<ul style="list-style-type: none"> • Matson will employ larger ships in the future, likely increasing rail volume • We have discussed at-grade crossings between Crowley tank farm and Whitney Rd with Port of Alaska
What are your operational concerns or needs for the future?	Safety is a priority – Matson, TOTE, AML will slow down in order to stay safe

9



Operating in Alaska

Harsh Operating Conditions: Large Tidal Ranges

POA experiences particularly large swings in water levels throughout the day which can impact berth availability.

The water level at POA experiences particularly large swings

POA has a depth of 35 ft (MLLW). However, depth at the Port varies considerably throughout the day depending on high and low tide.

Around Anchorage, the average difference between daily maximum and minimum water levels above MLLW was 28 ft in 2023, reflecting considerable changes in the water level throughout the day.

Anchorage has a wider range of observed water levels than Tacoma, which receives many of the vessels also calling Port of Alaska. Additionally, it is common to observe high and low water levels, reflecting the frequency of wide swings. Water levels at Tacoma tend to concentrate at the higher end of its range.

Larger vessels typically must call POA during high tide and can face depth constraints at berth during low tide

Liquid bulk vessels have particularly low drafts which limits the window of opportunity to call POA and impacts the liquid bulk berths' availability.

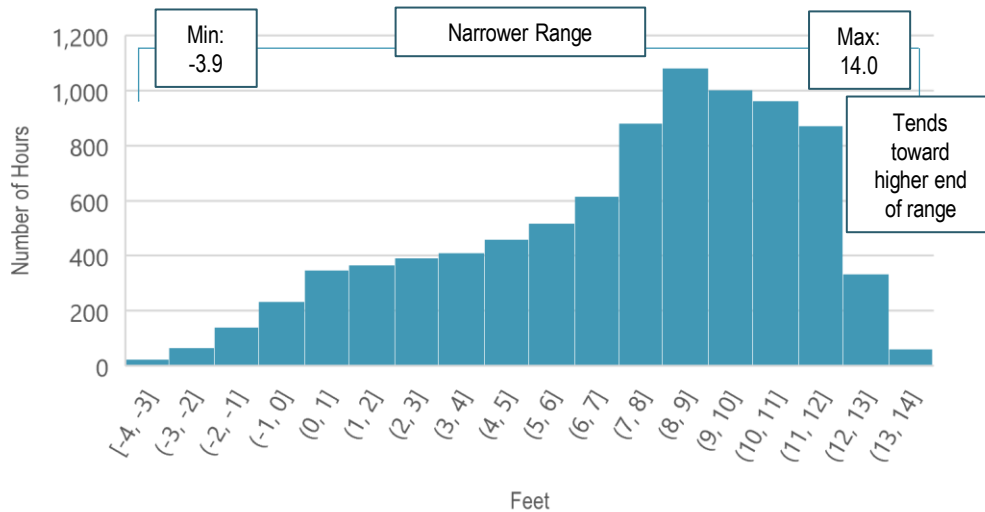
Strong currents associated with the inflow and outflow of tidal swings can make operating difficult

Currents can cause vessels to shift during unloading, creating the risk of damages and injuries.

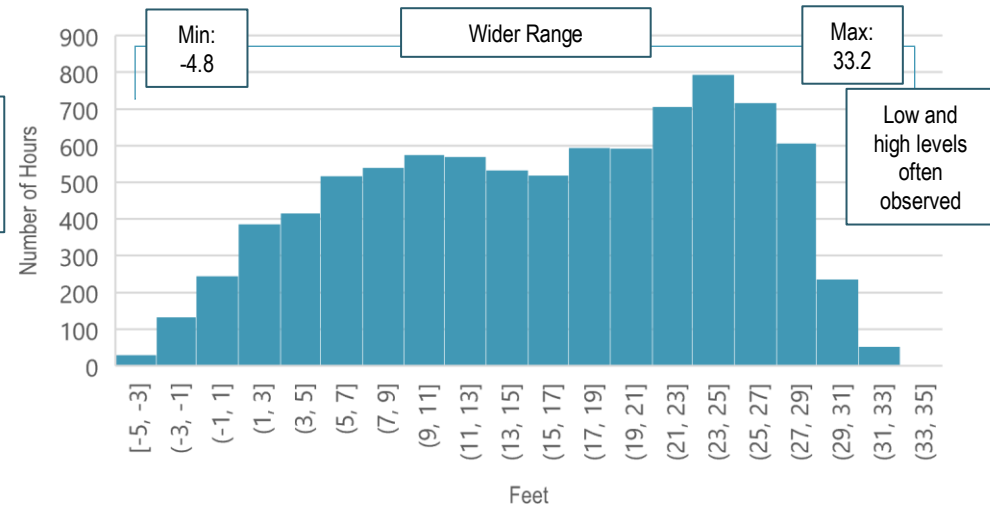
WATER LEVEL RANGES: ANCHORAGE VS. TACOMA

Water Level Measure (Ft. above MLLW)	Port Area	
	Anchorage	Tacoma
Maximum	33.2	14.0
Minimum	-4.8	-3.9
Avg. Intraday Swing	28.2	11.9

TACOMA DISTRIBUTION OF WATER LEVELS ABOVE MLLW IN 2023



ANCHORAGE DISTRIBUTION OF WATER LEVELS ABOVE MLLW IN 2023



Sources: National Oceanic and Atmospheric Administration

Harsh Operating Conditions: Ice and Sedimentation

POA experiences difficult operating conditions that require active maintenance, such as de-icing vessels, removing ice buildup at the berths and dredging waterways due to sediment buildup.

Ice and snow can impact operating conditions at sea, berths and landside

Daily high temperatures in Anchorage can remain below freezing for four months of the year, reflecting the harsh winter weather experienced at POA.

Before unloading can begin, vessels may have to receive de-icing treatment after experiencing harsh weather at sea.

Ice builds up at the berth wall and must be removed before vessels arrive.

Snowy weather and ice can also impact landside operations. Operators must maintain storage yards and roads during winter. Icy-roads and snow can damage cargo during transportation and pose dangers to workers.

Sediment buildup requires annual maintenance dredging

POA experiences sediment erosion which then builds up along the waterway near the Port and at the berths.

Sediment buildup makes the water depth uneven, increasing the risk of vessels running aground and sustaining damage. Therefore, it must be monitored and dredged annually.

MATSON VESSEL COVERED WITH A LAYER OF ICE



ICE BUILDUP AT T1



ICE AND SNOW AT CONTAINER AND LIQUID STORAGE AREAS



Sources: Alaska Tours, M&N

10



POA Modernization Program (PAMP)

POA Modernization Program (PAMP) Overview

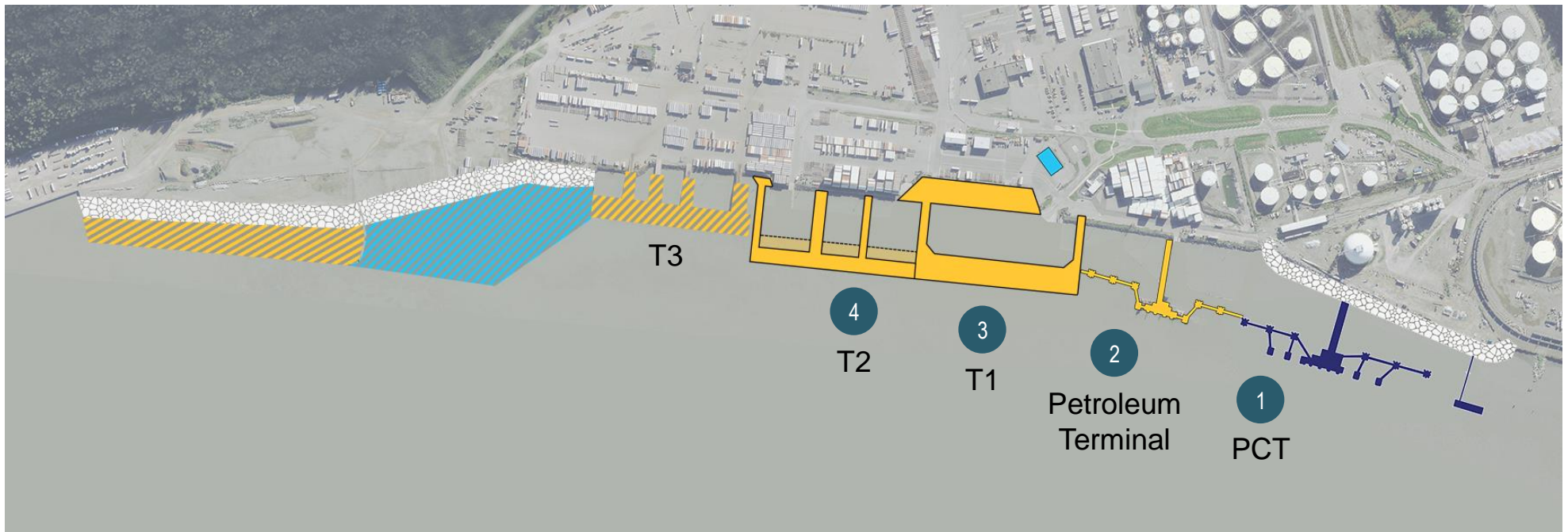
PAMP will replace deteriorating infrastructure at the Port that has surpassed its design life, this is required in order to provide safe and efficient operations in Anchorage going forward.

POA Modernization Program (PAMP) was created in 2014 to provide four new terminals via a phased program. The phased infrastructure projects allow the Port to remain open during construction.

- 1 Petroleum and Cement Terminal (PCT), first step of PAMP, was recently completed in 2022. PCT replaced the “severely corroded” Petroleum, Oils and Lubricants Terminal 1 (POL1).
 - POA handles 80% of the state’s cement, making a safe and reliable bulk cement terminal essential for the economy.
- 2 Petroleum Terminal is planned for construction between 2029-2032. This terminal will replace Petroleum, Oils and Lubricant Terminal 2 (POL2).
 - Petroleum Terminal will enable POA to receive larger, more modern tankers. A second terminal also offers an alternative for crucial fuel products to enter Alaska if PCT becomes congested or must be closed.
- 3 4 Cargo Terminal 1 (T1) and Cargo Terminal 2 (T2): with construction planned for 2025-2030, T1 and T2 will replace existing cargo terminals and support cargo operations, military deployments and cruise activity.
 - T3, which is to the north (left) of T2, will be demolished as part of PAMP. This will effectively leave POA as a two-berth facility. Although there are technically three berths today, just T3 and T2 are used.

Other projects include a new administration building and stabilizing the shoreline to the left of T3.

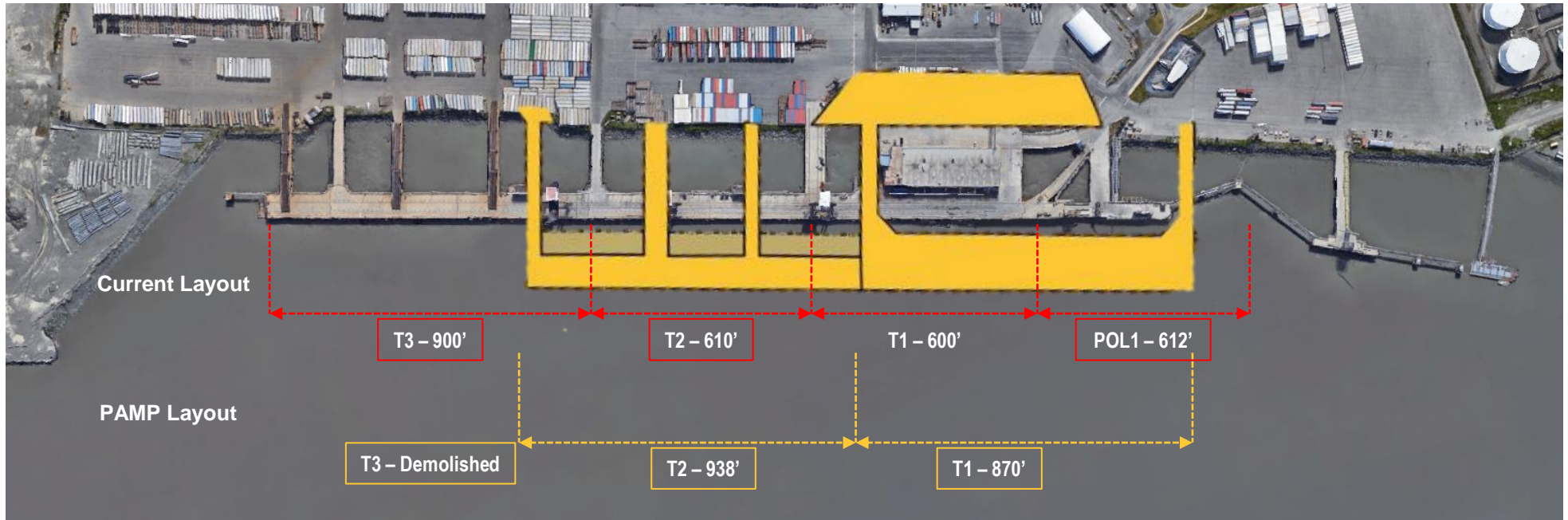
PAMP INFRASTRUCTURE PROJECTS



Sources: Port of Alaska

Cargo Terminal Operations Overview

Building new cargo terminals will improve resiliency and redundancy at the Port and provides an opportunity to prepare infrastructure for potential changes to the future fleet calling the Port.



PAMP will build larger, safer, and more stable cargo terminals

Building two cargo terminals could limit the impact to the state's economy if one terminal must be shut down, creating resiliency through redundancy.

T1 will be 870 feet long, capable of accommodating the 710-foot container vessels currently calling the Port. T2 will be extended from 610 feet in length to 938 feet.

The new cargo terminals will be 140 feet farther from the shore than the existing terminals to reduce sedimentation impact, improve berthing safety, and allow for continued Port operations during construction. New and larger cranes will also be purchased for container handling at the Port.

Improving resiliency at the cargo terminals limits the risk of Port shutdown and subsequent supply shortages / complications

The Port's current cargo terminals are responsible for importing a significant share of the essential everyday goods consumed by Alaska's population. Other cargo handling terminals such as Seward and Whittier do not have sufficient infrastructure to handle the state's cargo volume as efficiently as POA. PAMP will make the Port's cargo terminals and Alaska's supply chains more resilient.

- The new cargo terminals are built with resiliency in mind, not growing volume through the Port.

M&N expects the fleet calling POA to change over the coming decades. Demolishing the existing cargo terminals allows POA to rebuild with the future fleet in mind

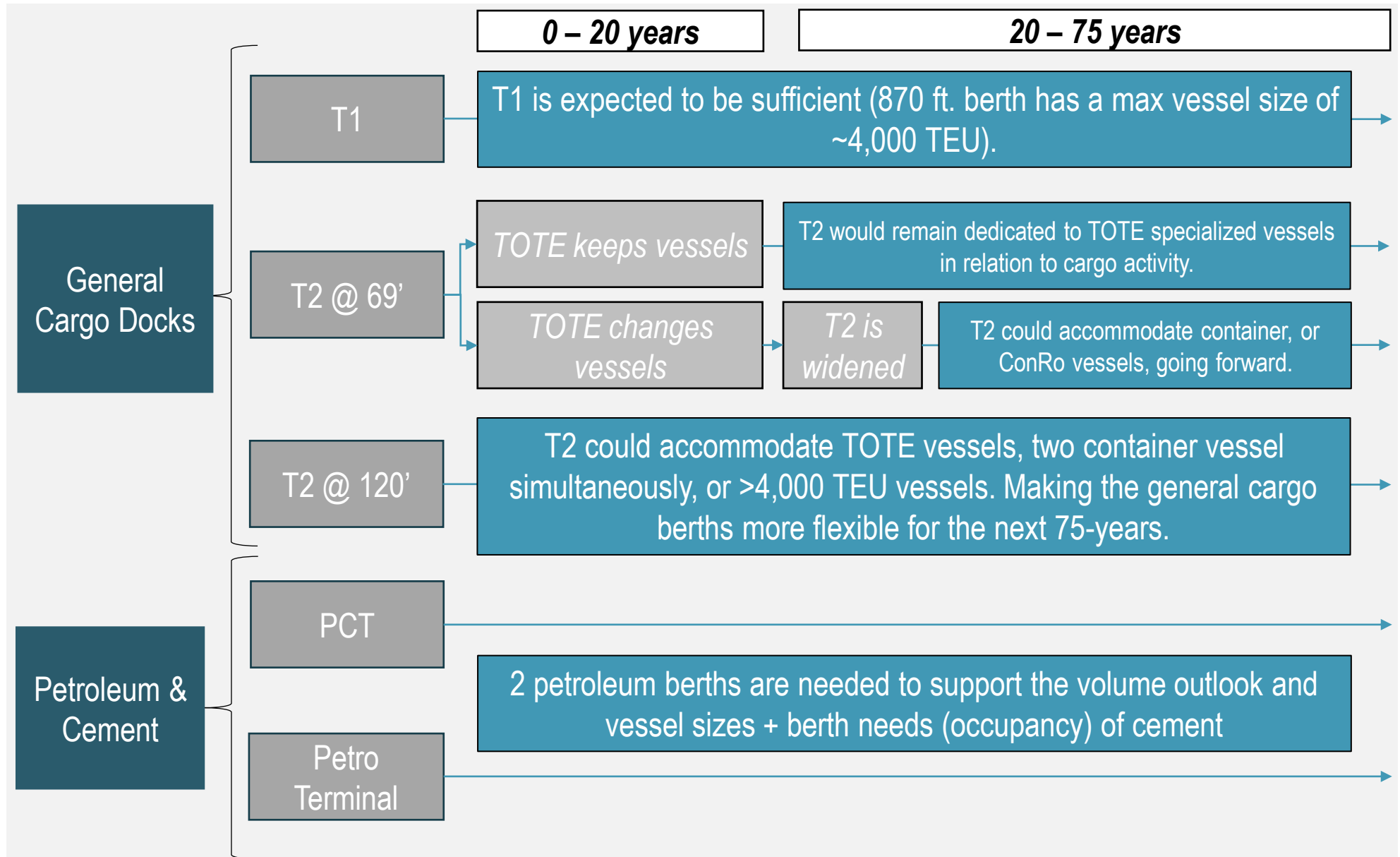
Demolishing the existing proprietary TOTE terminal could allow POA to build a new, flexible terminal capable of accommodating both the specialized RoRo TOTE vessels as well as other types such as ConRo and LoLo which are more commonplace in the global container market.

- The Port is likely to receive more cruise and LoLo vessels going forward given the underlying trends in the cruise and container markets respectively.

Sources: Port of Alaska

PAMP Assessment

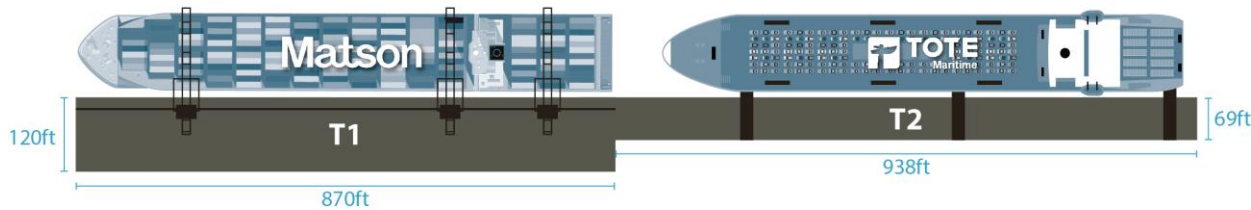
1) Developing T2 as an identical structure as T1 appears supported by the future market conditions, industry standards, observed practices, stakeholder comments and the potential impact on costs related to delay and/or unforeseen operational disruptions



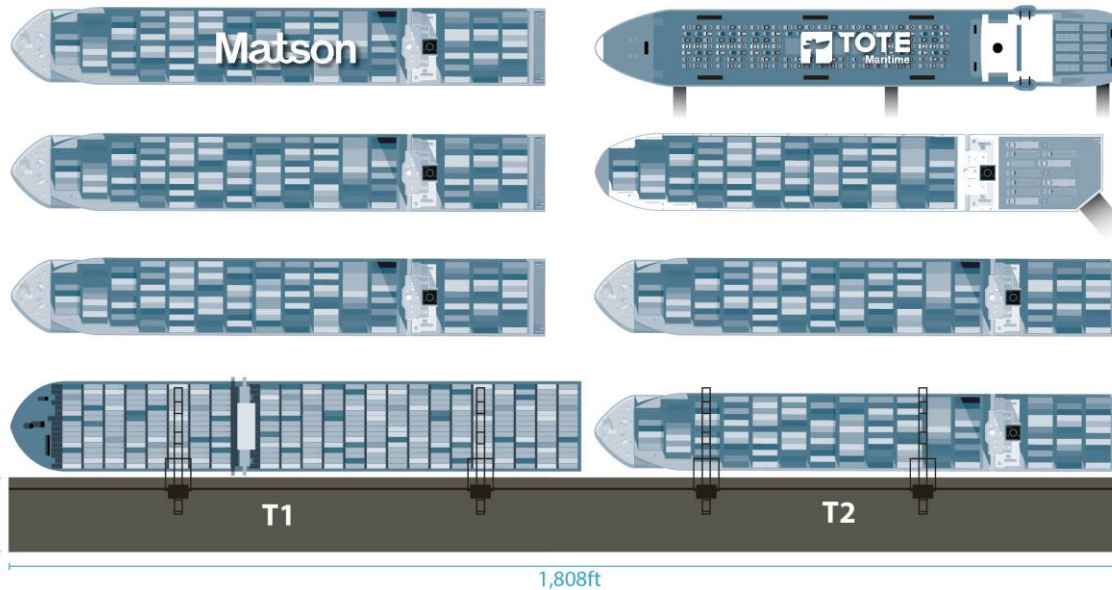
Flexibility of Berths

Two uniform width berths allow for the extension of the crane rail the full length of the berths. This creates a greater degree of flexibility to handle a range of vessels (sizes and types) across the full general cargo dock facility at the POA.

Option 1: Non-Uniform Berth



Option 2: Uniform Berth



Option 1

- Will provide adequate berthing capabilities for the current / near future Matson & TOTE vessels
- Containerized lift-on, lift operations will be limited to T1 as there is no crane rail extension to T2

Option 2

- Will also allow the existing / near future Matson & TOTE vessels to be serviced
- With the extension of crane rail, could allow for two cellular container vessels, or one cellular vessel and one ConRo vessel, to call using both berths simultaneously
- Additionally, this option would allow for a larger container vessel or other type of ship to call (cruise, LMSR), and still allow for either a Matson or TOTE vessel to call

Benefits of a Uniform Berth Offering

- If the objective of PAMP is to develop modern port infrastructure that will prove to be as necessary and adaptive in 75-years as it would be today, then the utility of the uniform berth offering is apparent.
- As designed Option 1 (Non-Uniform Berth), in M&N's assessment, is sufficient to meet the needs of Matson and TOTE over the coming 20-year period, given the guidance from the respective carriers of their intent to deploy and maintain vessels of similar size to POA.
- Option 1's utility, however, is greatly reduced should TOTE alter operations / vessels following the retirement of their existing vessels.
- Option 2 would allow first for Matson and TOTE to keep their same operations in the coming 20-year period, secondly, provide for a greater ability to handle a mixture of vessels during this first 20-year period, and allow for adaptation in the future for larger or different vessels to call POA should TOTE change operations.

11



Economic Cost Analysis

Introduction to the Economic Cost Calculations

The analysis presented in this section addresses the economic cost associated with service disruption at POA's container berths

In an attempt to quantify the importance of POA, M&N has estimated the economic costs in a scenario where POA is shutdown for a week.

This analysis does not claim to encompass fully the economic costs associated with a shutdown. However, this should help in understanding the service POA provides its customers¹.

This analysis only considers the impacts on containerized cargo.

A service disruption would lead to cargo being rerouted either through another maritime port or by land (truck)

In the event of a disruption at POA's container docks cargo would either

1. be redirected through alternate port gateways (e.g. Seward or Whittier) utilizing barge service, or
2. be trucked up from Tacoma via the Alaskan Highway, or
3. a combination of the two routes

M&N has followed the US Department of Transportation's (USDOT) guidelines for measuring the cost of transportation.

These provide the inputs and approaches for calculating transportation costs associated with vessels, barges and trucks. Costs are calculated for:

- Operations
- Safety
- Emissions

These, along with an estimate of the cost to the broader economy resulting from higher transportation costs form the basis of the overall assessment

CARGO DIVERSION OPTIONS



1 – The intent of the analysis is to establish a benchmark estimate of the estimated economic cost of a singularly defined event (scenario). M&N acknowledges that there is a wide range of conditions which could, and would, differ from the defined scenario. These include but are not limited to the possibility of disruption to the military, the cost of shifting / housing labor to new locations (e.g. Anchorage to Seward) to support heightened levels of activity, the types of goods which would be shipped in the event of an emergency and how this would impact the total volume of displaced cargo. The analysis presents an estimated range of costs, an order-of-magnitude, which are indicative of the overall costs of service disruption at POA's general cargo docks.

Economic Cost Calculations (Base Case)

The costs of diverting containerized cargo away from POA includes a combination of increased trucking, shipping, emissions, and port labor costs.

Under the base case assumptions, every week the cargo docks at POA are closed have an economic impact of about \$40 million.

Base case assumptions are grounded in the belief that if POA were to be shutdown, all container cargo would be split between moving through Seward and trucked from Tacoma via the Alaska Highway.

M&N's previous work discusses the challenges associated with other regional ports for handling POA's cargo.

- There are both marine and highway infrastructure shortfalls at each of the regional ports that are discussed as potential options.
- Seward has been marked as the most likely port option for handling cargo during any emergency scenarios at POA. However, its weaknesses should be mentioned:
 - Small cargo dock, with no crane rails. Therefore, smaller barges would need to be used.
 - Long truck trip with various points of failure. In the case of an earthquake these points of failure could also be compromised.
 - Smaller storage areas could prove to be an issue, but under emergency scenarios could accommodate some volumes.

As part of the base case scenario, M&N assumes that 50% of total containers will be diverted to Seward as part of this analysis.

Given these constraints, it is not reasonable to assume all volumes can be handled at Seward. Therefore, it is extremely likely that a portion of volumes, specifically more of the perishable goods such as food products, will be trucked from Tacoma via the Alaskan Highway. Today, there is cargo that already utilizes this route.

- As part of the base case scenario, M&N assumes that 50% of total containers will be trucked up the Alaskan Highway

A 50 / 50 split between moving volumes via Seward and the Alaskan Highway would result in 6 barge calls and 2,100 truck trips from Tacoma per week .

- Six barges per week was considered the maximum Seward could handle at its single berth facility, based on the required time to turnaround (unload and reload) a barge
- The following page illustrates how the economic cost of a week one week shutdown varies with the Seward vs Alaskan Highway split assumptions.

There are some significant costs that have not been considered as part of this analysis, including the potential cost of using air cargo to transport some goods. Air cargo is significantly more expensive than both truck and barge. Additionally costs such as relocation and housing of labor to support higher level of barge activity in Seward, and / or the purchase / mobilization of additional equipment and fuel etc.

COST ANALYSIS SUMMARY – 50 / 50 SCENARIO

Category		Costs per Week (2023 US\$)
Increased Truck Operating Costs	via Seward	\$1,240,764
	via Alaskan Highway	\$14,902,357
Increased Truck Safety Costs	via Seward	\$175,844
	via Alaskan Highway	\$1,600,740
Increased Truck Emission Costs	via Seward	\$212,968
	via Alaskan Highway	\$1,938,683
Increased Vessel Operating Costs	via Seward	\$287,170
Increased Vessel Emission Costs	via Seward	(\$69,026)
Increased Port Labor Costs	via Seward	\$330,431
Increased Transportation Costs per Week		\$20,619,930
Macro Economic Impact	1.9x	\$18,557,937
Increased Economic Costs per Week		\$39,177,868

SUMMARY OF ASSUMPTIONS

Category	Units	Costs (2022 US\$)
Increased Truck Operating Costs	Truck operating cost	\$ / mile \$1.32
	Truck driver time	\$ / hour \$33.50
	Highway maintenance	\$ / mile \$0.16
	Highway congestion	\$ / mile \$0.10
Increased Truck Safety Costs	Fatal crashes	per 100 million miles \$ / fatality 1.67 \$12,500,000
	Injury crashes	per 100 million miles \$ / injury 53 \$217,600
	Property damage only crashes	per 100 million miles \$ / crash 138 \$5,000
Increased Truck Emission Costs	CO2 emissions	g / gallon of diesel burned 10,180 \$ / ton (2023) 228
	Container vessel	knots 21.0 \$ / day / TEU \$19.00
Increased Vessel Operating Costs	Capacity (TEU)	2,100
	Barge	knots 8.0 \$ / day / TEU \$25.00 Capacity (TEU) 750
Increased Vessel Emission Costs	Container vessel	g / TEU / nm 150
	Barge	g / TEU / nm 250

Economic Cost Analysis

Calculating the economic cost of a service disruption at POA, helps to understand the value of the infrastructure that is being considered under PAMP

In an attempt to quantify the value of POA's infrastructure to the overall economy, M&N has estimated the economic costs in a scenario where the POA's general cargo docks (container terminals) are shutdown for a week.

- This analysis does not claim to fully encompass the economic costs associated with a shutdown. However, it should help establish the overall range and order-of magnitude.
- This analysis only considers the impacts on containerized cargo.

A service disruption would lead to cargo being rerouted either through another maritime port or by land (truck)

- In the event of a disruption at POA's container docks cargo would either (1) be redirected through alternate port gateways utilizing barge service, (2) be trucked up from Tacoma via the Alaskan Highway, or (3) a combination of the two routes

M&N has followed the US Department of Transportation's (USDOT) guidelines for measuring the cost of transportation.

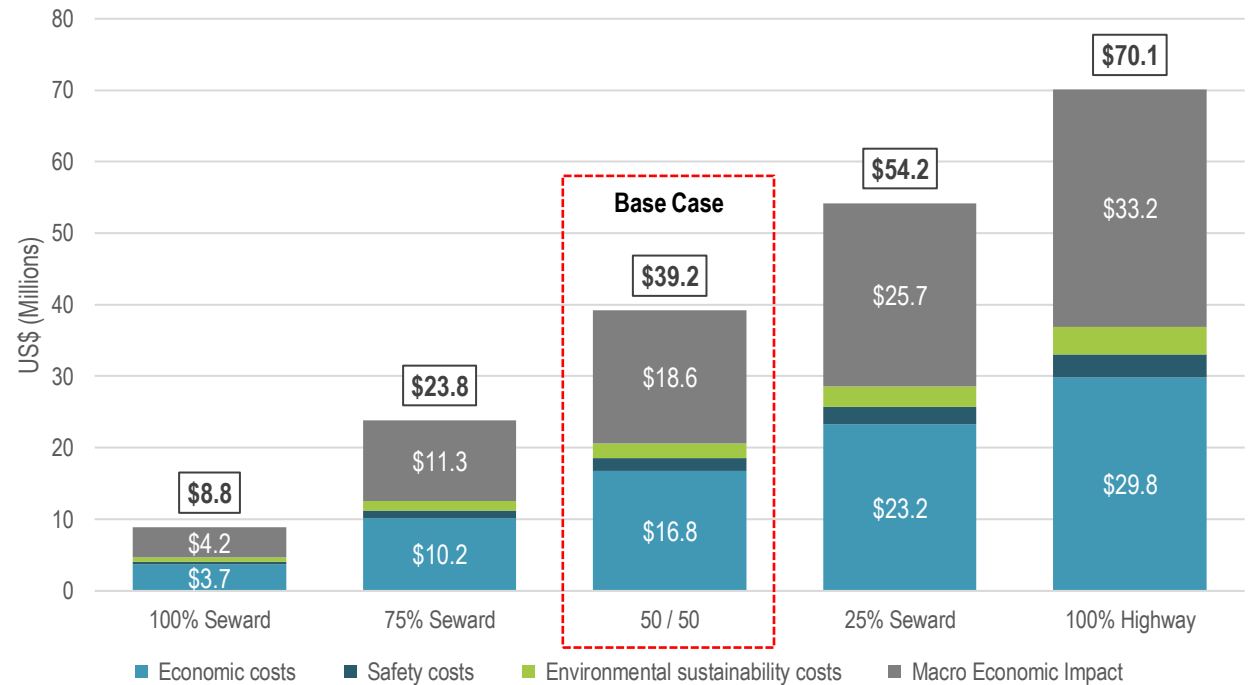
Regional Input-Output Multipliers (RIMS) are an established approach to understanding the relationship between how a change in one industry impacts others (or the economy) as a whole.

- For the purpose of the analysis, which is to estimate the total economic impact of POA, and in this case by the cost of a service disruption, M&N utilized the 1.9X output multiplier.¹

Under the base case assumptions, every week the cargo docks at the POA are closed have an economic impact of about \$40 million.

Depending on the assumed split between cargo diversion through Seward vs Alaskan Highway, the economic cost of a one-week shutdown can vary significantly, as depicted in the chart on the right.

ECONOMIC COSTS ASSOCIATED WITH ONE WEEK POA SHUTDOWN



M&N ran the analysis to reflect varying splits between barge and truck and determined the impact to range from \$8.8 – to - \$70.1 million per week. The truck routing is comparatively more expensive, and therefore as reliance on truck increases so does the cost.

The graph above presents the calculated economic costs of rerouting the almost 8,000 TEU per week:

- 100% barge through Seward (plus the truck trips to/from Anchorage); 75% barge through Seward / 25% truck via the Alaskan Highway; 50% barge / 50% truck – the Base Case; 25% barge / 75% truck and 100% truck

The value in presenting the range is that a rerouting event would likely result in a combination of barge and truck movements which could be influenced / constrained by exogenous factors e.g. barge and / or truck availability, dock and equipment availability and /or other limitations which are not taken into consideration in the analysis presented.

¹ – Developed by the US Bureau of Economic Analysis; for the Water Transportation industry in the State of Alaska

Trucking Costs

Increase in trucking costs for delivering cargo to Anchorage in the case of a POA shutdown are sourced from USDOT BCA guidelines.

Trucking costs reference the USDOT's Benefit-Cost Analysis (BCA) standard guidelines for 2024 which is used in support of grant applications. M&N uses the USDOT BCA's guidance which strictly defines parameters regarding trucking costs, including operating, safety, and emission costs.

BCAs are used for estimating and comparing expected benefits and costs of a potential infrastructure project in a systematic process.

- Estimated benefits are based on the projected project impacts that will accrue over a defined period of time. The anticipated benefits are then compared to the expected costs of the project which include the resources to develop and maintain the new or upgraded facility over time.

The purpose of a BCA is to provide an objective analysis of a prospective project that calculates expected results from each scenario, to build or not build the new or improved asset and estimates the investment's value.

Input Highway Trucking Costs

If POA is shut down and cargo needs to be diverted, it is assumed that a portion of containers will be transported by truck from the Port of Seward and the remaining via the Alaskan Highway.

- The truck diversion round trip distance for:
 - The Port of Seward = 252 miles = 2 truck trips per box of 126 miles each
 - The Alaskan Highway = 2,294 miles

The following operating, safety, and emission costs per truck follows the USDOT BCA standard guidance:

Operating Costs

- Operating costs per truck are \$1.32 per mile with an average speed at 45mph and fuel efficiency of 7 miles per gallon.
- Truck travel time savings are \$33.5 per hour for an average vehicle occupancy of 1 driver.
- Maintenance repair costs are \$0.1644 per mile.
- Congestion costs in urban and rural settings are \$0.3450 and \$0.0750 per mile. Noise pollution costs are \$0.0437 in urban and \$0.0037 in rural areas.

Safety Benefits

- The urban and rural shares of an impacted highway are 10% and 90%.
- The property damage only rate per truck is 138 incidents per 100 million vehicle miles traveled (VMT) and the crash monetized value is \$5,000 per crash.
- The injury rate is 53 persons per 100 million VMT and the injury monetized value is \$217,600 per injury.
- The fatality rate is 1.6681 person per 100 million VMT and the fatal crash monetized value is \$14,022,900 per crash while the fatality monetized value is \$12,500,000 per fatality.

Emissions

- CO₂ emissions per gallon of diesel are 10,180 grams per gallon.

Sources: USDOT BCA 2024 Guidance, USDOT Traffic Safety Facts, USDOT Federal Highway Administration, EPA

Vessel vs Barge

Vessels have an advantage because of size and speed, though barges offer reliable service and can call at a wider range of port facilities



COMPARATIVE ATTRIBUTE TABLE

	Capacity	Speed	Water Depth	Equipment Needed to Unload	Time to Unload
Vessel	~1,200 – 1,600 TEU	20 – 23 knots	30ft	STS Crane, RoRo	14 – 24 hours (30 – 100+ moves an hour)
Barge	720 TEU	8 knots	18ft	Top Pick, Fork Lift, MHC, RoRo	24 hours (15 – 30 moves an hour)

- Vessel services provides larger ships (more capacity) which are faster through the water and quicker to unload at berth provided the right equipment is available (STS cranes or ramps)
- In order to meet the average weekly volume of 8,000+ TEU / week (4,000+ lifts) handled at POA 11 fully laden barges would be required to meet carry the equivalent volume
- Given the sailing speed, and time to unload, realistically just 6 barges would be able to call a single dock facility (e.g. Seward), suggesting that the remaining 6 barges worth of cargo would have to be either have to be handled at a second port or be trucked in
- Sailing speeds indicate limit barges to less-than half that of the larger ocean-going vessels. It takes 9 days to reach Anchorage from Seattle by barge (compared to 3 via vessel)

Vessel Costs

M&N has compared the total vessel costs (operating plus emissions) of container vessels calling Anchorage and smaller barges calling Seward.

M&N determined the operating and emission costs of one call and the number of calls per week for container vessels going to Anchorage and barges to Seward.

The size of each vessel type reflects the number of calls needed each week to move a set number of TEU.

In 2023, container vessels called POA four times per week. Barges are smaller and require more calls per week to transport cargo.

The operating cost per call for each vessel type (container and barge) is multiplied by the number of calls each vessel needs to move a week's worth of cargo.

- M&N used vessel operating cost per day per TEU, or in other words the daily cost of operating a vessel based on its size. This figure comes from Alphaliner, the market standard for accessing information on shipping lines and their operations.
 - On average, a ~1,700 TEU container vessel costs \$19 per day per TEU, lower than a 720 TEU barge, which runs at \$25 per day per TEU.
 - Container vessels can travel at higher speeds than barges, reducing the operating costs per day.
- This figure is multiplied by the number of days a vessel needs to make one call.
 - Container vessel is assumed to travel at a speed of 21 knots (nm per hour) over a 1,447 nautical mile journey to make one call. This equates to three days per call.
 - A barge to Sward would travel 1,282 nautical miles moving at 8 knots. This equates to a seven-day journey for one call.
 - A barge travels much slower than a container vessel and requires more days for one call. Vessel speeds are sourced from Vessel Tracker.
- Operating cost per day per TEU is then multiplied by the number of TEU moved per call.
 - A container vessel to POA carried 1,901 TEU per call.
 - A small barge can carry an assumed 750 TEU per call.

Emission cost per call for each vessel type is multiplied by the number of calls per week.

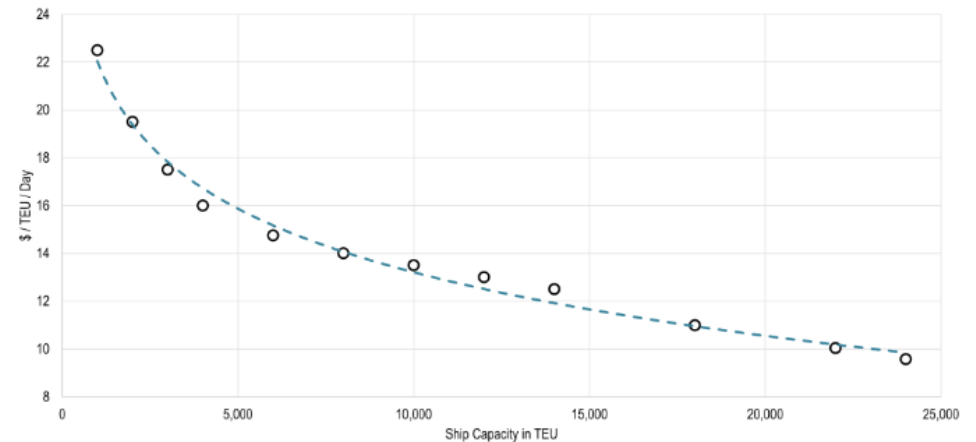
The International Council on Clean Transportation has estimated average container ship carbon intensities on a per TEU per nautical mile basis.

- A container ship emits an average of 150 CO₂g per TEU per nautical mile travelled.
- Barges are comparably dirtier and emit 250 CO₂ per TEU per nautical mile travelled.

This is multiplied by each vessel's distance of haul and volume to determine emissions per call.

Based on the number of calls per week, we can compare emissions costs between container vessels and barges.

AVERAGE OPERATING COSTS PER TEU PER DAY (SOURCE: ALPHALINER)



Labor Costs

Labor availability would play a crucial role in a scenario where POA is shutdown for a week. Labor costs would increase significantly under such circumstances.

Labor availability and costs would be a challenge in a scenario where POA volume needs to be diverted to Seward.

Seward does not have the labor pool size or expertise needed to properly handle the volumes. Therefore, assuming multiple barge calls per week is somewhat unreasonable from a labor availability standpoint.

For the purposes of this analysis, however, it is assumed that necessary labor would be available when needed to service barges in Seward.

M&N has made high-level assumption on what labor costs are per vessel call at POA currently.

- Based on interviews with Matson and TOTE, they indicated the general number of dock workers they need per shift to service a vessel.
 - Matson = 75 workers per shift
 - TOTE = 140 workers per shift
- Matson and TOTE's vessel call times also vary significantly. Based on 2023 vessel data (source: vessel tracker), the two liners had the following vessel call times:
 - Matson = 20.8 hours per call
 - TOTE = 14.0 hours per call
- Based on Bureau of Labor Statistics, water transportation employees in Alaska average \$2,377 in weekly wages, or \$59.43 / hour (based on 40-hour work week).
- For barges calling Seward, it was assumed that there would need to be a 315 dock workers on payroll for the week to service the barges that would be calling essentially 24/7.
 - This results in a total labor cost of \$748,818 = 315 workers x \$2,377 / week
 - 315 workers = 75 workers per shift for 7 days at a max of 40 hours per week

SUMMARY OF ASSUMPTIONS: DOCK LABOR COSTS

	Units	US\$	Total	
Port of Alaska		Matson	TOTE	
	Dock Labor	# / shift	75	140
	Time at berth	hours / call	20.8	14.0
	Vessel calls	calls / week	2.0	2.0
	Average wage	US\$ / hour	\$59.43	\$59.43
	Weekly Labor Costs	US\$ / week	\$185,422	\$232,966
Seward		Barge		
	Labor pool size	# / week	315	
	Working hours	hours / week	40	
	Average wage	US\$ / hour	\$59	
	Weekly Labor Costs	US\$ / week	\$748,818	\$748,818
Difference	Increase in Labor cost	US\$ / week	\$330,431	

RIMS Multiplier

The economic impact (to the broader economy), is established using the RIMS II multipliers maintained by the US Bureau of Economic Analysis

Regional Input-Output Multipliers (RIMS) are an established approach to understanding the relationship between how a change in one industry impacts others (or the economy) in its entirety.

The multipliers estimate the impact from changes in final demand on one or more regional industries in terms of output, employment, and labor earnings. The multipliers are based on estimates of local area personal income and on the national input-output (I-O) accounts.

<https://www.bea.gov/help/glossary/rims-ii-multipliers>

- For the Analysis M&N utilized the most recent multiplier data set for the Water Transport industry (RIMS II Code 48300), Type 1 and Type II
- The data set provides:
 - 1) represents the total dollar change in output that occurs in all industries within the state for each additional dollar of output delivered to final demand by the selected industry.
 - 2) represents the total dollar change in earnings of households employed by all industries within the state for each additional dollar of output delivered to final demand by the selected industry.
 - 3) represents the total change in number of jobs that occurs in all industries within the state for each additional million dollars of output delivered to final demand by the selected industry. Because the employment multipliers are based on regional data, the output delivered to final demand should be in regional year dollars.

For the purpose of the analysis, which is to estimate the total economic impact of POA, and in this case by the cost of a service disruption, M&N utilized the 1.9X output multiplier

- For every \$1.0 million of incremental (higher) transportation costs resulting from a disruption, an additional \$0.9 million of economic activity was lost as a result statewide
- The additional transportation costs are not considered a benefit to the economy because the analysis assumes that these costs will be transferred back to the final consumers / users in the form of higher prices.

RIMS II MULTIPLIERS

RIMS II Multipliers (2012/2021)
Table 3.5 Total Multipliers for Output, Earnings, Employment, and Value Added by State
34 - Water transportation (Type II)

STATE	Multiplier					
	Final Demand				Direct Effect	
	Output/1/ (dollars)	Earnings/2/ (dollars)	Employment/3/ (jobs)	Value-added/4/ (dollars)	Earnings/5/ (dollars)	Employment/6/ (jobs)
1. Alabama	█	█	█	█	█	█
2. Alaska	1.8749	0.4153	6.4396	0.7397	2.7579	4.9566
3. Arizona	█	█	█	█	█	█
4. Arkansas	█	█	█	█	█	█
5. California	█	█	█	█	█	█
6. Colorado	█	█	█	█	█	█

Source: US Bureau of Economic Analysis



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