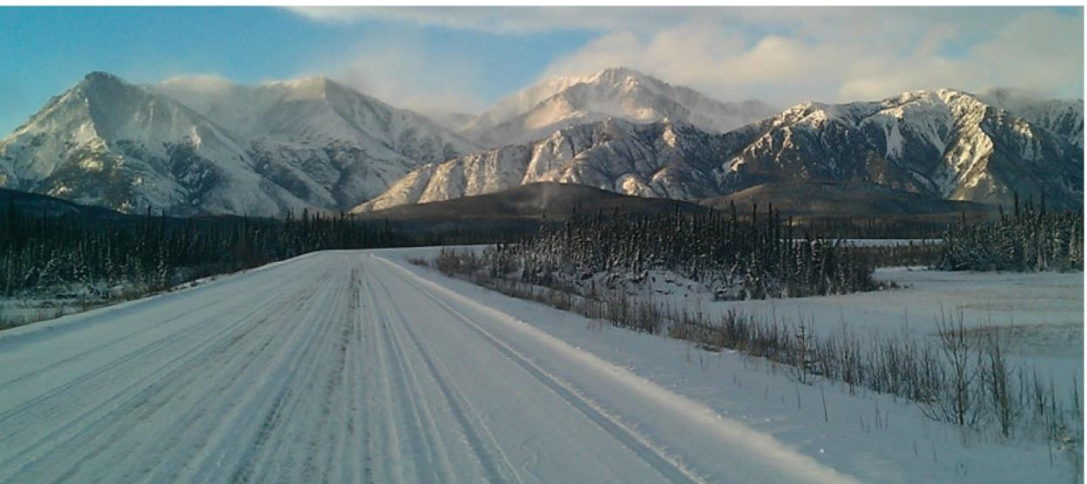
Alaska Statewide Long-Range Transportation Plan

LET'S KEEP MOVING 2036:

Freight Plan

September 2016



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EXECUTIVE SUMMARY

This document is the Freight Element of the Alaska Long-Range Transportation Plan (LRTP). It addresses comprehensively Alaska's major freight transportation modes: truck, air, water, rail, and pipeline. Special attention is paid to the critical role that Alaska's freight transportation system plays in the State's economy.

The Freight Element:

- Identifies and supports strategies, policies and actions to achieve Alaska's economic development and transportation goals
- Addresses federal guidance (established in the Fixing America's Surface Transportation [FAST] Act) for preparation of Statewide Freight Plans

While Alaska has addressed freight transportation in many prior studies and plans—such as modal system plans, facility development plans, metropolitan plans, and area plans—this is the first time that Alaska's freight transportation has been examined systematically in the context of long-range statewide transportation planning.

The Critical Role of Freight Movement in Alaska

Freight movement was critical to Alaska's initial settlement and development, and it remains extremely important today. Over 90% of discretionary revenues collected by the State come from the production of petroleum, and large shares of the State's workforce and wages are directly linked to freight-dependent industries. Alaska has large quantities of petroleum, zinc, coal, copper, gold, rare earth metals, and other valuable commodities that are in high demand around the world. Mining and fishing are key industries that provide employment for many Alaskans. Almost all of these products are exported to other states and countries. Alaska produces few of the consumer goods its workforce and population require, so these goods must be imported from other states and countries. As a result, Alaska's overall economy and quality of life depend on freight transportation "supply chains" that span the State, the nation, and the world.

Alaska's size and geography pose unique challenges for the freight transportation system of the state. Much of Alaska's freight is generated by remote resource extraction industries that require long transportation and service corridors, such as the Dalton Highway and the Trans-Alaska Pipeline System, through sparsely developed regions. Most of the population lives along the triangle created by Anchorage, Fairbanks, and Juneau, and these cities attract the bulk of consumer goods that enter the state and are connected by major seaport, airport, and rail infrastructure, and also serve as hubs for truck transportation. Hundreds of smaller cities and communities are also located throughout Alaska's vast geographic area. Many of these communities are not connected to the road network and require basic goods such as food and fuel to be brought long distances by air or barge. The Essential Air Service Program and Bypass Mail Program provide subsidies to resupply these communities with much needed

goods. The costs associated with importing and distributing basic consumer goods results in consumer prices that are far above national averages, especially in Alaska's remote low population areas.

To serve its industries and population, the state of Alaska has invested heavily in its freight transportation infrastructure. The state has large seaports that handle containerized inbound cargo at Anchorage and other places, and seaports with specialized facilities to handle bulk commodities at Valdez, Nikiski, Seward, and elsewhere. It has two main international airports that serve as hubs for goods to reach remote airports and airstrips throughout the state, and many smaller airports serving other communities. Highways connect the main cities, while smaller roads and seasonal ice roads allow vehicles and trucks to wind inward toward the interior as far as geography and climate permit. Freight rail and pipelines provide services in critical corridors. In the lower 48 states, "last mile" connections usually refer to trucks; in Alaska, those connections are also made by snowmobile and/or all-terrain vehicles (ATVs). Alaska's freight transportation is truly multi-modal.

In Alaska, the relationship between commodity prices, resource development, and freight transportation infrastructure is especially close. Much of Alaska's freight movement is driven by private-sector resource development, especially petroleum and natural gas. The ongoing decline of North Slope oil production has been recognized as a source of uncertainty (for transportation demand) and risk (for State revenues), but with the recent dramatic declines in global energy prices, uncertainty and risk issues are elevated. How extensive will future private-sector resource development be, and where, and when? What transportation improvements will be required to serve it? How fast will Alaska's workforce and population grow and where, given that a large share of that workforce is supported directly and indirectly by resource industries? What are the likely impacts and opportunities associated with climate change and variability, and other global/external factors? How much funding will be available for the transportation system improvements that Alaska's communities and stakeholders may need or want, from public sources and from private owners and partners?

Against this backdrop, the Alaska Department of Transportation and Public Facilities (DOT&PF) and its state, regional, and local partners face the challenge of managing the existing freight infrastructure and planning for future needs. This Freight Element provides perspective on what drives the market demand for freight transportation in Alaska, how the market is served today, trends impacting the future, and the role that government can play. This Freight Element is intended to support decisions about freight transportation policies, strategies, and actions within the context of the state's broader LRTP.

Freight Element Conclusions

The Freight Element is based on a detailed review of domestic and international commodity flows, economic data, an assessment of Alaska's freight facility performance, recent freight plans (area and modal), and other information. Stakeholders representing owners, operators, freight service providers, and users of freight facilities were engaged throughout the process and the public was invited to provide feedback. The Freight Element is based on a systematic data-driven evaluation of the demand for freight transportation and how well it is met today. The primary conclusions regarding planning for freight in Alaska from this analysis are summarized below.

1. Freight movement in Alaska results from specific demand drivers, primarily requirements to export natural resources from the state to national and international markets; import consumer goods and industrial supplies from other states and countries; and distribute goods within Alaska over very long supply chains.

1.1. The demand for freight transportation is driven by the amount and type of economic activity—in essence, commerce trade in goods. Demand for freight transportation arises from producing industries and consumers. Producing industries need access to inputs—raw materials, machinery and equipment, components, packaging, etc.—and access to markets where their products are sold. Consumers need access to basic necessities such as shelter, food, fuel, vehicles, clothing, appliances and electronics, and other supplies and property. In Alaska, the major producing industries include petroleum extraction, mining, commercial fishing and processing, construction, and power generation. Alaska also has a large government (particularly military) presence that requires the shipment of equipment, machinery, fuels, and supplies.

1.2. Alaska is characterized by a dramatic imbalance between its produced and consumed commodities—most of what Alaska produces is exported to other states and other countries, while most of what Alaska consumes is provided by other states and other countries. This creates an especially strong dependence on effective trading connections and services.

1.3. Alaska is a very large state with very long supply chains. Freight exported from Alaska must usually be moved long distances, from extraction and production facilities to ports and airports; freight imported must be distributed from a few critical gateway ports and airports to users distributed throughout the entire state. This means that more freight has to move more miles to serve Alaska than any other state.

1.4. Alaska has a unique geographic position midway between the lower 48 states and Asia, and serves as a gateway for pass-through air cargo. Alaska's freight infrastructure and its economic activity related to the handling of pass-through freight are therefore linked to larger global trades.

2. Freight demand in Alaska is served by multiple transportation modes: road, air, water, rail, and pipeline. Each has a critical role in the state's multi-modal system and must be considered in the context of the entire system.

2.1. Freight transportation demand is generally met through truck, air, water, rail, and pipeline, with a smaller share of tonnage and value served via rail. These five transportation modes accommodate services that represent the supply of freight transportation capacity to meet demand.

2.2. Each mode has a specific set of freight carriers (trucking companies, airlines, vessel operators, railroads, and pipeline operators), who utilize a variety of infrastructure

assets. Some of these infrastructure assets are unique to each mode, such as highways, waterways, railroads, and pipelines. Some, known as "intermodal" facilities, are designed to bring together different modes; these include ports (linking water with trucks, rail, and/or pipelines), airports (linking air with trucks and sometimes pipelines), and rail terminals (linking rail and trucks). Different networks and facilities have different owners, which may be public or private, and the vehicles and vessels that operate over these networks and through these facilities are both publicly and privately owned.

2.3. Alaska's freight movement is highly seasonal due to production and employment cycles, as well as changes in the availability of key infrastructure, especially roads and waterways.

3. Alaska's freight demand drivers are affected by critical trends. This plan is based on the high likelihood that the primary trends experienced in recent years affecting freight will continue. These trends include a growing population that is increasingly concentrated in urban areas; rising overall industrial production but high uncertainty regarding future energy production; and increasing seasonal/annual variability in demand due to climate change and other factors. Critical trends, acting on and over Alaska's freight transportation network, lead to changes in system performance and create both needs and opportunities.

3.1. Alaska's consuming population is expected to grow and to be increasingly concentrated in larger urban areas, consistent with economic opportunity. This will increase demand for urban freight deliveries of consumer goods.

3.2. Alaska's overall economy and its freight-intensive industries will continue to expand, creating increased demand for inbound, outbound, and within-state goods movement.

3.3. The future levels and economics of energy and other resource production will have large impacts on transportation planning and freight demand in particular. For example, if energy production slows significantly, it could not only reduce the flow of resource commodities within and outbound from Alaska but also reduce in-migration and population growth, with the additional effect of flattening demand for inbound consumer goods. If, alternatively, resource production looks to increase rapidly, it may require the rapid development of new transportation capacity—pipelines, ports, etc.—not only to handle increasing volumes of resource commodities, but also to meet the consumer needs of a rapidly expanding workforce.

3.4. National forecasts anticipate that demand for non-energy related industrial goods and products, such as mixed freight, machinery, instruments, etc. in Alaska, will increase, creating greater demand on international gateways and supply chains. National forecasts also anticipate long-term declines in Alaska tonnages of crude petroleum and other energy products. However, there is a high degree of uncertainty regarding energy forecasts since production depends on global demand and pricing, availability of

competing supplies, the cost of production/transportation/export from Alaska, and other variable factors.

3.5. Since Alaska freight movement is driven largely by traded commodities, economic and population growth will lead to growth pressures at key trade gateways and on corridors linking these gateways to resources and consumers. As many of these gateways are located in urbanized areas, increased trade gateway traffic will compound urban growth issues associated with population growth.

3.6. Increasing average temperatures, rising sea levels, and related effects will exacerbate seasonal variations in freight demand and freight infrastructure availability, creating greater unpredictability and variability in freight commodity movements from season-to-season and year-to-year.

4. To provide acceptable freight system performance—defined as available, reliable, affordable, timely, safe and secure—the Freight Element addresses the following needs and opportunities: bringing more resources efficiently to markets; improving truck access to intermodal facilities (ports, airports, etc.); enhancing freight mobility in growing urbanized areas and key corridors; maintaining and enhancing critical trade gateway facilities; maintaining and enhancing critical connections with Alaska's rural communities; and doing so with constrained public funds.

4.1. The freight system involves different modes with different operational characteristics, and freight system users, owners, and operators measure performance differently. In addition, many freight trips involve multiple modes. The Freight Element adopts a "user's perspective" on performance. In general, freight system users value reliability, price, speed, safety, and security, in that order. In Alaska, an additional measure is important: whether a mode or service is available at all.

4.2. Freight element analysis identifies a high likelihood of the following needs and opportunities for freight transportation in Alaska:

- Providing freight transportation capacity to directly support new resource development if and when it occurs. This includes a variety of initiatives: new construction of a statewide liquid natural gas (LNG) pipeline; development of "roads to resources" under the state's roads to resources (R2R) program; improvement of the Dalton Highway, coastal ports, and possibly other infrastructure to accommodate proposed mining operations; construction of the Susitna Hydroelectric project; and potential development of an Arctic Port.

- Reducing truck congestion and improving travel time reliability and safety in urban areas and key corridors, especially for truck movement to/from ports, airports, and other major freight trip generators, while accommodating the needs of a changing population, which will be larger and increasingly concentrated in urban areas.

- Maintaining and improving trade gateways—seaports, airports, and land border crossings—which are the lifelines for Alaska's producers and consumers.

- Maintaining and improving multi-modal connectivity among and between Alaska's urban and rural communities, including the provision of alternative facilities, services, or modes to improve reliability, cost, and overall performance. Alaska's highway system reaches major cities, but its overall mileage is low; many communities are not connected or served by roads. Alaska's freight rail and pipeline systems operate in limited corridors. Alaska's ports serve coastal and river communities, but their ability to serve inland communities is constrained by the availability of other connections. Roads and ports may be usable only in certain seasons when ice stabilizes road surfaces or lack of ice makes marine traffic possible. As a result, Alaska is highly dependent on air cargo to reach and serve communities with commodities that in the lower 48 would normally be served by truck or rail. In some cases, the "last mile" move from an airport is by snowmobile or sled. In most of the U.S., freight shippers can choose from a full range of modal options, selecting the ones that best suit their needs for reliability, cost, speed, safety, and security; in Alaska, freight shippers may have little or no choice regarding transportation modes.

4.3. Freight planning must consider uncertainty and risk. The key areas where these considerations arise are as follows:

- How resource development and other freight drivers might evolve in the future. While the public sector may have some influence on future freight demand, the primary drivers are population growth and private industry activities. However, the public sector can play a very significant role in ensuring the multi-modal transportation system is positioned to meet future needs. Preserving and/or improving performance may involve repairing or expanding infrastructure, implementing new technologies or management practices, improving service availability and reliability, and/or adopting innovative policy, financing, and implementation approaches.

- Addressing impacts of climate change and increasing climate variability, which will impact both the transportation system and the underlying commodity movements and markets that generate demand and utilization over the system. These changes create risks such as increased seasonal fluctuations in demand and infrastructure availability, as well as potential long-term changes in Alaska's economy and infrastructure, but they also create opportunities, such as the potential to develop an Arctic Port.

- Managing freight transportation costs. With a high dependence on goods imported from other states and countries, a high dependence on air cargo (one of the most expensive forms of freight transportation), and long supply chain distances within

the state, the cost of goods in Alaska tends to be very high. Without "bypass mail" service, where rural air cargo is delivered at postal rates, the cost would be even higher.

- Addressing funding uncertainties. Much of Alaska's infrastructure is aging, and the costs to keep the system in operation are increasing. At the same time, system expansion and modernization will be required. The good news is that much of Alaska's freight infrastructure is privately owned, self-funded from revenue streams, or built through public-private partnerships administered through the Alaska Industrial Development and Export Authority (AIDEA) and other public partners. The bad news is that much of Alaska's freight infrastructure is funded through traditional transportation state and federal funding sources that are both projected to decline.

5. The LRTP includes goals, policies, and actions for the freight transportation system. These align outcomes, plans, and projects based on performance-based resource allocation; manage the system to increase performance and reduce risk; and provide accountability for the expenditure of public funds.

5.1. Freight movement is a partnership between public and private freight shippers, carriers, infrastructure owners and operators, and all levels of regulatory and financing responsibility (federal, state, regional, and local). No single entity or agency "controls" freight movement in Alaska or can define its future on its own. Nonetheless, among all state agencies, DOT&PF is best positioned to provide statewide multi-modal leadership and "stewardship of the whole" given that it owns and operates much of the state's freight transportation system (including roads, airports, and marine services).

5.2. The LRTP includes freight-related policies addressing New Facilities and Modernization; System Preservation; System Management and Operations; Economic Development; Safety and Security; Livability, Community and the Environment; and Accountability for Transportation System Performance.

5.3. The LRTP includes 40 specific freight actions designed to improve performance and advance these strategies and policies.

6. The Freight Element aligns with LRTP goals for performance-based resource allocation by creating first-generation approaches for freight system performance measurement; freight project prioritization and evaluation; and multi-modal freight investment at a program level.

6.1. Alaska's freight transportation infrastructure may accommodate, encourage, or constrain the demand for freight movement based on the level of performance offered; it can significantly affect industry location and expansion decisions, as well as larger population settlement patterns. Transportation system performance measurement—and management—is part of the Alaska Statewide Transportation Planning Process. This

Freight Element provides a first iteration of analysis and measurement of freight performance.

6.2. Alaska's freight transportation system is performing reasonably well today. Plan analysis identified the following performance risks that are expected to increase in coming years: congested truck routes and intermodal connectors; limited route and modal service choices, especially for rural communities; unreliability or unavailability of services due to seasonal effects or other disruptions; overall cost of goods; and missing infrastructure links and facility improvements that are needed to serve new industries and population growth.

6.3. The Freight Element builds on general freight performance categories, such as availability, reliability, affordability, speed, safety, and security, and provides a framework to quantify, measure, and monitor the following key freight performance metrics:

- Availability—Whether a modal service is available at all.
- Reliability—Includes door-to-door on-time performance, risk of temporary or sustained disruption, possibility that a service may not be available within a given planning horizon, and risk of losing connectivity or service due to reliance on a single mode. In repeated surveys, freight shippers rank reliability as the single-most important factor in freight transportation logistics decisions.
- Cost—Includes prices paid for transportation services, inventory, "buffering" against risks, and premiums paid because a preferred mode is not available (e.g., where air is used because trucking or water services are not provided).
- Speed—This is total delivery time. Some freight (for example, perishables) requires speed as a top priority and will pay premium prices for the fastest available services; other freight (for example, coal or stone) is less concerned with speed and more with price, and will prefer slower modes at lower prices.
- Safety and Security—This is the risk of loss, breakage, tampering, loss of visibility, or other loss of value during the shipment process.

6.4. As a means of linking performance analysis and prioritization, the Freight Element establishes an Alaska Freight Network that is the primary system used for freight transportation. The Freight Network identifies system elements and specific routes across all modes and regions that are especially important to freight. The Freight Network includes facilities and transportation services where freight performance monitoring and freight project development are to be emphasized in the statewide long-range plan.

6.5. The Freight Element can provide the data-driven basis for identifying any freight improvement projects if there is dedicated or reduced match federal funding available through the current or future federal transportation funds.

6.6. The Freight Element includes a starting point approach for estimation of freight project benefits and project prioritization across modes and geographies based on emerging best practices.

7. The Freight Element is a valuable resource for modal plan development and area/local freight planning, and complies with federal guidance for state freight plans.

7.1. Data and analysis developed in the Freight Element is designed to be used in a broad range of planning and analysis applications, at the area and local levels, and in the context of modal system planning.

7.2. Projects included within an approved statewide freight plan may be eligible for a new category of federal funding. The FAST Act establishes a new formula-based National Highway Freight Program (Title I, Section 1116) funded at $6.3 billion over five years. Up to 10% of funds may be used for rail or port projects. To be eligible for this funding, projects must be identified within an approved State Freight Plan. This Freight Element provides the basis from which projects eligible for current and future dedicated federal freight funding could be identified. This Freight Element satisfies federal guidance for statewide freight planning.

About This Document

This document is the Freight Element of the Alaska Long-Range Transportation Plan (LRTP). It comprehensively addresses Alaska's major freight transportation modes: truck, air, water, rail, and pipeline. Special attention is paid to the critical role that Alaska's freight transportation system plays in the State's economy.

The Freight Element:

- Identifies and supports strategies, policies, and actions to achieve Alaska's economic development and transportation goals
- Addresses federal guidance (established in the Fixing America's Surface Transportation [FAST] Act) for preparation of Statewide Freight Plans

While Alaska has addressed freight transportation in many prior studies and plans, such as modal system plans, facility development plans, metropolitan plans, and area plans, this is the first time that Alaska freight transportation has been examined systematically in the context of long-range statewide transportation planning.

Freight in the Long-Range Transportation Planning Process

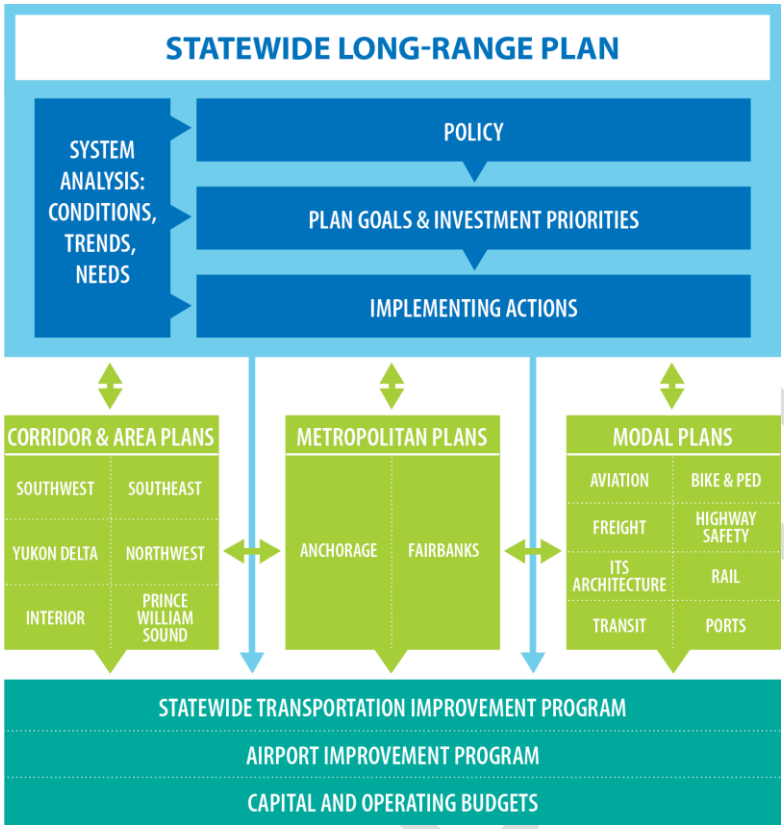
The statewide long-range transportation planning process is a policy planning process led by the Alaska Department of Transportation and Public Facilities (DOT&PF). The resulting LRTP is multimodal. The primary focus is planning for the transportation facilities and services that are owned and operated by the State of Alaska.

Multiple public and private stakeholders have a keen interest in the performance of Alaska's freight transportation system. In general, freight transportation performance is important to all Alaskans because the efficiency of freight transportation affects both the costs of goods and services in Alaska and the ability of the economy to export its products to national and international markets.

The LRTP is a policy-plan, an "umbrella" plan that sets direction by specifying policies, strategies, and implementing actions for the operation and management, preservation, and development of Alaska's transportation system, as shown in Exhibit 1. Many levels of government are involved in Alaska's transportation planning and the development of the LRTP. The LRTP implements federal law that requires all states to prepare long-range transportation plans that address national policy considerations.

The Freight Element of The LRTP is developed by the DOT&PF working with a variety of public and private stakeholders. As a policy plan, the LRTP and this Freight Element provide direction to area plans and other transportation planning agencies in the state on policy and strategies with which to align their plans. They in-turn develop plans with regional, metropolitan, or modal focuses that work toward achieving the goals of the LRTP. The last update of the LRTP was published in 2008 and had a planning horizon of 2030. This LRTP has a planning horizon of 2035.

Exhibit 1: Statewide Planning Process



Planning for Freight Transportation in Alaska

The Freight Element is based on a detailed review of domestic and international commodity flows, economic data, an assessment of Alaska's freight facility performance, recent freight plans (area and modal), and other information. Stakeholders representing owners, operators, freight service providers, and users of freight facilities were engaged throughout the process, and the public was invited to provide feedback. The Freight Element is based on a systematic data-driven evaluation of the demand for freight transportation and how well it is met today.

The overall structure of the Freight Element is illustrated in Exhibit 2. The primary Freight Element conclusions, which are used as organizing themes for the Freight Element, are summarized in Exhibit 3.

Exhibit 2: Freight Element Process Diagram

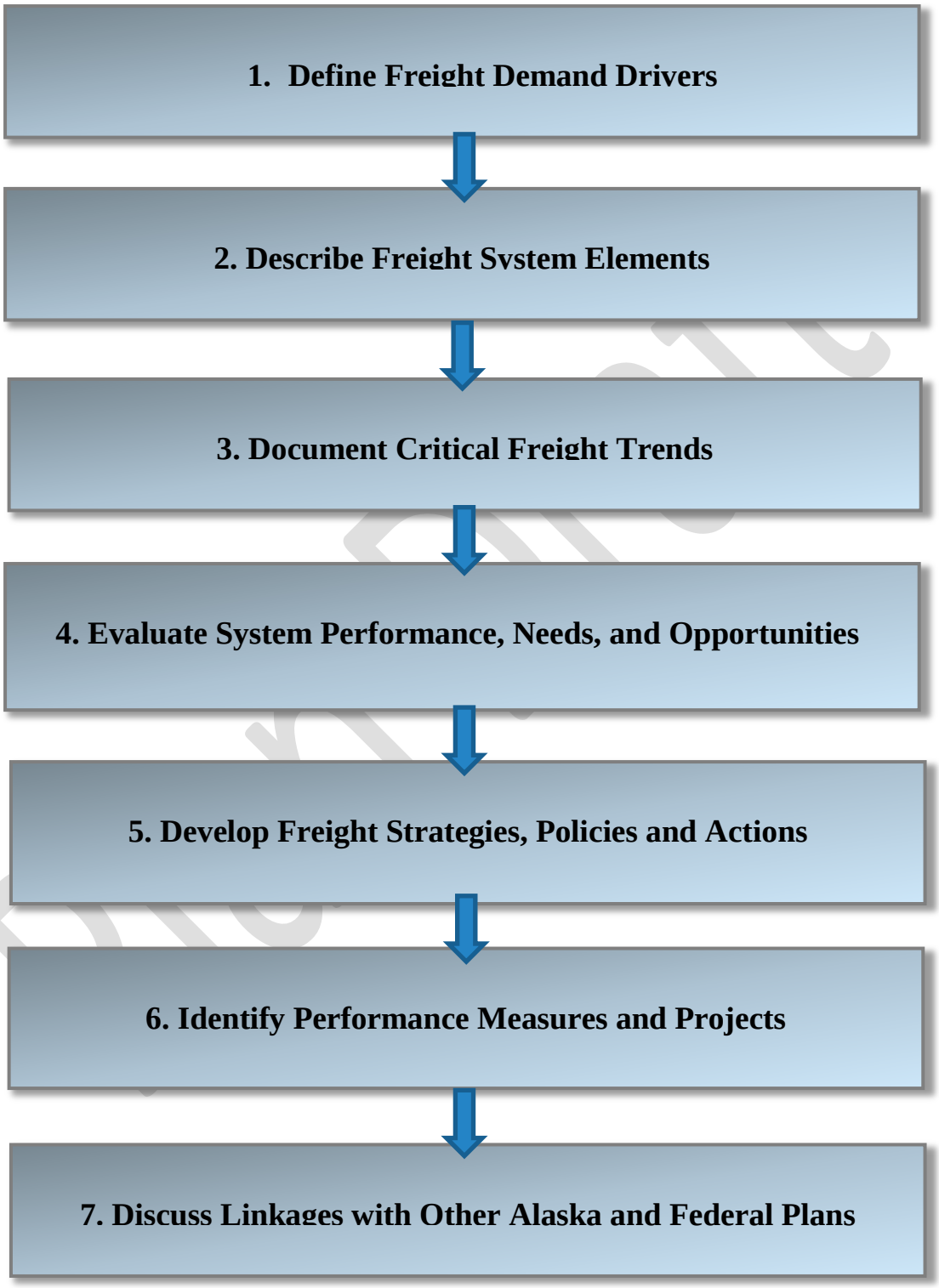


Exhibit 3: Primary Freight Element Conclusions

1. **Freight movement in Alaska results from specific demand drivers**, primarily requirements to export natural resources from the state to national and international markets; import consumer goods and industrial supplies from other states and countries; and distribute goods within Alaska over very long supply chains.
2. **Freight demand in Alaska is served by multiple transportation modes: road, air, water, rail, and pipeline**. Each has a critical role in the state's multi-modal system and must be considered in the context of the entire system.
3. **Alaska's freight demand drivers are impacted by critical trends**. This plan is based on the high likelihood that the primary trends experienced in recent years impacting freight will continue. These trends include a growing population that is increasingly concentrated in urban areas; rising overall industrial production but high uncertainty regarding future energy production; and increasing seasonal/annual variability in demand due to climate change and other factors. Critical trends, acting on and over Alaska's freight transportation network, lead to changes in system performance and create both needs and opportunities.
4. **To provide acceptable freight system performance—defined as available, reliable, affordable, timely, safe, and secure—the Freight Element addresses the following needs and opportunities**: bringing more resources efficiently to markets; improving truck access to intermodal facilities (ports, airports, etc.); enhancing freight mobility in growing urbanized areas; maintaining and enhancing critical trade gateway facilities; maintaining and enhancing critical connections with Alaska's rural communities; and doing so with constrained public funds.
5. **The LRTP includes goals, policies, and actions for the freight transportation system**. These align outcomes, plans, and projects based on performance-based resource allocation; manage the system to increase performance and reduce risk; and provide accountability for the expenditure of public funds.
6. **The Freight Element aligns with LRTP goals for performance-based resource allocation** by creating first-generation approaches for freight system performance measurement; freight project prioritization and evaluation; and multi-modal freight investment at a program level.
7. **The Freight Element is a valuable resource** for modal plan development and area/local freight planning, and complies with federal guidance for state freight plans.

Organization of the Freight Element

The remainder of the Freight Element is organized into the following sections:

- Freight Demand Drivers
- Freight System Elements
- Critical Freight Trends
- Performance, Needs, and Opportunities
- Freight Goals, Policies, and Actions
- Freight Performance Measurement, Prioritization, and Project Evaluation
- Relationships with Other Plans and Federal Guidance

Supplemental detail on truck counts is presented in the Appendix.

This Freight Element is organized and presented to satisfy federal guidance for statewide freight plans. The required and recommended components of state freight plans, and the sections of the Freight Element in which they are addressed, are listed in Exhibit 4. The *Relationship with Other Plans and Federal Guidance* section provides additional detail.

Exhibit 4: Federal Guidance and Organization of the Freight Element

FAST LRTP Requirements	Sections of *Let's Keep Moving 2035: Freight Element* Addressing Requirements
1. The Plan shall include an identification of significant freight system trends, needs, and issues with respect to the State.	*Freight Demand Drivers* *Freight System Elements* *Critical Freight Trends* *Performance, Needs, and Opportunities*
2. The Plan shall include a description of the freight policies, strategies, and performance measures that will guide the freight-related transportation investment decisions of the State.	*Freight Goals, Policies, and Actions* *Freight Performance Measurement, Prioritization, and Project Evaluation*
3. The Plan shall include a listing, when applicable, of: (a) multimodal critical rural freight facilities and corridors designated within the State under section 70103 of this title (b) critical rural and urban freight corridors designated within the State under section 167 of title 23.	*Freight Performance Measurement, Prioritization, and Project Evaluation* identifies an Alaska Multimodal Freight Network (AMFN) that includes all major freight facilities that play a significant role in the state's economy. Portions of the AMFN corresponding to federal designations defined under FAST are identified and may be periodically updated under separately adopted *Alaska Freight Element Implementation Guidance*.
4. The Plan shall include a description of how the plan will improve the ability of the State to meet the national multimodal freight policy goals described in section 70101(b) of this title and the national highway freight program goals described in section 167 of title 23.	*Relationship with Other Plans and Federal Guidance*
5. The Plan shall include a description of how innovative technologies and operational strategies, including freight intelligent transportation systems, that improve the safety and efficiency of freight movement, were considered.	*Freight Goals, Policies, and Actions*

Exhibit 4: Federal Guidance and Organization of the Freight Element (continued)

FAST LRTP Requirements	Sections of *Let's Keep Moving 2035: Freight Element* Addressing Requirements
6. In the case of roadways on which travel by heavy vehicles (including mining, agricultural, energy cargo or equipment, and timber vehicles) is projected to substantially deteriorate the condition of the roadways, the Plan shall include a description of improvements that may be required to reduce or impede the deterioration.	*Performance, Needs, and Opportunities* addresses infrastructure needs and planned improvements associated with natural resource (mineral, oil and gas extraction, timber, etc.) development, including existing roadways as well as potential future roadways. Freight priority projects consistent with this Freight Element, and investment plans to implement them, are identified and may be periodically updated under separately adopted *Alaska Freight Element Implementation Guidance*.
7. The Plan shall include an inventory of facilities with freight mobility issues, such as bottlenecks, within the State, and for those facilities that are State owned or operated, a description of the strategies the State is employing to address the freight mobility issues.	*Performance, Needs, and Opportunities*
8. The Plan shall consider any significant congestion or delay caused by freight movements and any strategies to mitigate that congestion or delay.	*Performance, Needs, and Opportunities* *Freight Goals, Policies, and Actions*
9. The Plan shall include a freight investment plan that, subject to subsection (c)(2), includes a list of priority projects and describes how funds made available to carry out section 167 of title 23 would be invested and matched.	The Freight Element is part of the LRTP, and the LRTP itself does not include projects or investments. Freight priority projects consistent with this Freight Element, and investment plans to implement them, are identified and may be periodically updated under separately adopted *Alaska Freight Element Implementation Guidance*.
10. The State Freight Advisory Committee shall be consulted in development of the Plan, if applicable.	The Freight Element was developed with the participation of diverse public and private sector stakeholders, as part of the larger public involvement process guiding development of the full LRTP.

FREIGHT DEMAND DRIVERS

Freight movement in Alaska results from specific demand drivers, primarily requirements to: export natural resources from the state to national and international markets; import consumer goods and industrial supplies from other states and countries; and distribute goods within Alaska over very long supply chains.

In this section of the Freight Element, a variety of data sources—federal economic data, Alaska state economic data and analysis, and federal commodity flow data—are used to define Alaska's key freight drivers and quantify their relative contributions, in terms of tonnage and value, to freight movement activity.

Producers and Consumers

The demand for freight transportation is driven by the amount and type of economic activity—in essence, commerce trade in goods. It is driven by producing industries and consumers. Producing industries need access to inputs such as raw materials, machinery and equipment, components, and packaging, as well as access to markets where their final products are sold. Consumers need access to basic necessities such as shelter, food, fuel, vehicles, clothing, appliances and electronics, and other supplies and property. In Alaska, the major producing industries include petroleum extraction, mining, commercial fishing and processing, construction, and power generation. Alaska also has a large government (particularly military) presence that requires the shipment of equipment, machinery, fuels, and supplies.

To understand what drives the demand for freight movement, it is useful to distinguish between "freight-intensive" industries, non-freight industries, and government. These three groups can be thought of as three pillars supporting Alaska's economy. Freight-intensive industries are defined as those that handle freight as part of their primary business; this includes manufacturers, construction firms, transportation and warehousing businesses, retailers, manufacturers, utilities, and other natural resource producers (agriculture, forestry, fishing, and hunting). Non-freight industries are predominantly in the service sector, and while they may absolutely depend on freight services—for example, hospitals and military installations need equipment and supplies—their business is not primarily about moving freight. This distinction is helpful because it allows the identification of economic activities that rely directly on freight transportation where a core aspect of their business involves the production, handling, receipt, and/or sales of goods and products (see Exhibit 5).

Alaska's Economy is Highly Dependent on Freight-Intensive Industries

According to federal data, Alaska's Gross State Product in 2013 exceeded $59 billion. Of that total, nearly 55% was derived from freight-intensive industries; 28% was from other industries; and 17% was from government. In other words, more than half of Alaska's Gross State Product depends on the performance of Alaska's freight transportation system. Nearly 30% depends on one industry sector—

mining—which includes petroleum, natural gas, coal, and other minerals. Nearly 11% depends on transportation and warehousing, which is the physical movement and handling of freight (see Exhibit 6).

Exhibit 5: Freight-Intensive and Non-Freight Industries

Freight-Intensive Industries (Goods and Services)	Non-Freight Industries (Services Only)
Mining (including petroleum, natural gas, and coal)	Health Care and Social Assistance
Construction	Professional, Scientific, Technical
Transportation and Warehousing	Accommodation and Food Services
Retail Trade	Finance and Insurance
Manufacturing (including processing of fish)	Administrative and Waste Services
Utilities	Other Services
Agriculture, Forestry, Fishing, Hunting	Information
	Real Estate, Rental and Leasing
	Management
	Arts, Entertainment, and Recreation
	Educational Services

Source: WSP | Parsons Brinckerhoff

Exhibit 6: Alaska Gross State Product, 2013

Industry	$ Millions	Share
All Industry, Total	**59,355**	**100.0%**
Mining	17,488	29.5%
Transportation and warehousing	6,479	10.9%
Construction	2,367	4.0%
Retail trade	2,089	3.5%
Manufacturing	1,753	3.0%
Wholesale trade	1,219	2.1%
Utilities	747	1.3%
Agriculture, forestry, fishing, and hunting	406	0.7%
Subtotal, Freight-Intensive Industries	**32,548**	**54.8%**
Subtotal of Other Industries	**16,640**	**28.0%**
Subtotal, Government	**10,167**	**17.1%**

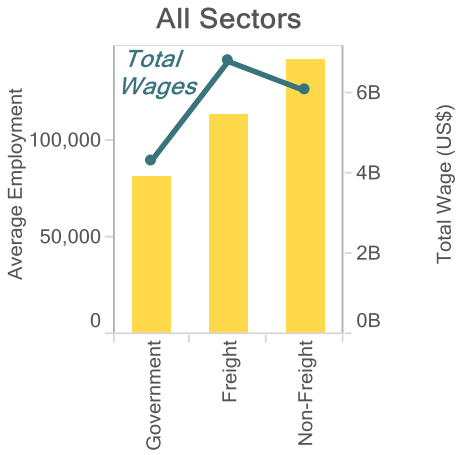
Source: Analysis of U.S. Bureau of Economic Analysis data

Other metrics such as population, employment, and wages can be used to understand these freight drivers in greater detail. Population is a key measure of purchasing demand; wages are key indicators of purchasing power created from various industry sectors; and distribution of employment illustrates important industry sectors and clusters.

Freight-Intensive Industries Generate High-Wage Jobs

In 2013, freight-intensive industries were directly responsible for 34% of the state's full-time employment and 39% of the state's wages from employment. On a per-employee basis, wages in freight industries were 40% higher than in non-freight-intensive industries and 11% higher than in government. Put another way: freight-intensive industries are directly responsible for 39% of Alaska's personal income and 34% of its jobs.[1] Additionally, wage-earners in freight-intensive industries make purchases that support a broad range of non-freight industries such as health care, real estate, and recreation (see Exhibit 7).

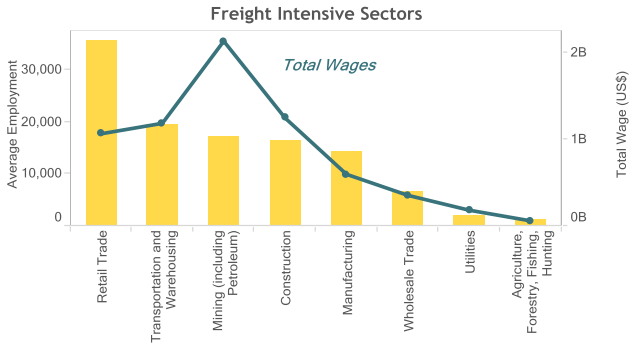
Exhibit 7: Employment and Wages by Major Industry Type, 2013



Source: Analysis of Alaska Department of Labor and Workforce Quarterly Census of Employment and Workforce (QCEW) data

Among the various freight-intensive industries, retail generates the highest employment, followed by transportation and warehousing, mining (including petroleum), construction, manufacturing, wholesale trade, utilities, and agriculture/forestry/fishing/hunting. Fishing is frequently noted as an important Alaska industry, but its annual employment and wages are relatively low in the Alaska Quarterly Census of Employment and Workforce (QCEW) data; in part this is because the processing of fresh fish is actually counted as a Manufacturing activity. From a wage perspective, mining generates the highest wages, followed by construction, transportation and warehousing, retail, manufacturing, wholesale trade, utilities, and agriculture/forestry/fishing/hunting (see Exhibit 8).

Exhibit 8: Employment and Wages in Freight-Intensive Industries, 2013



Source: Analysis of Alaska Department of Labor and Workforce QCEW

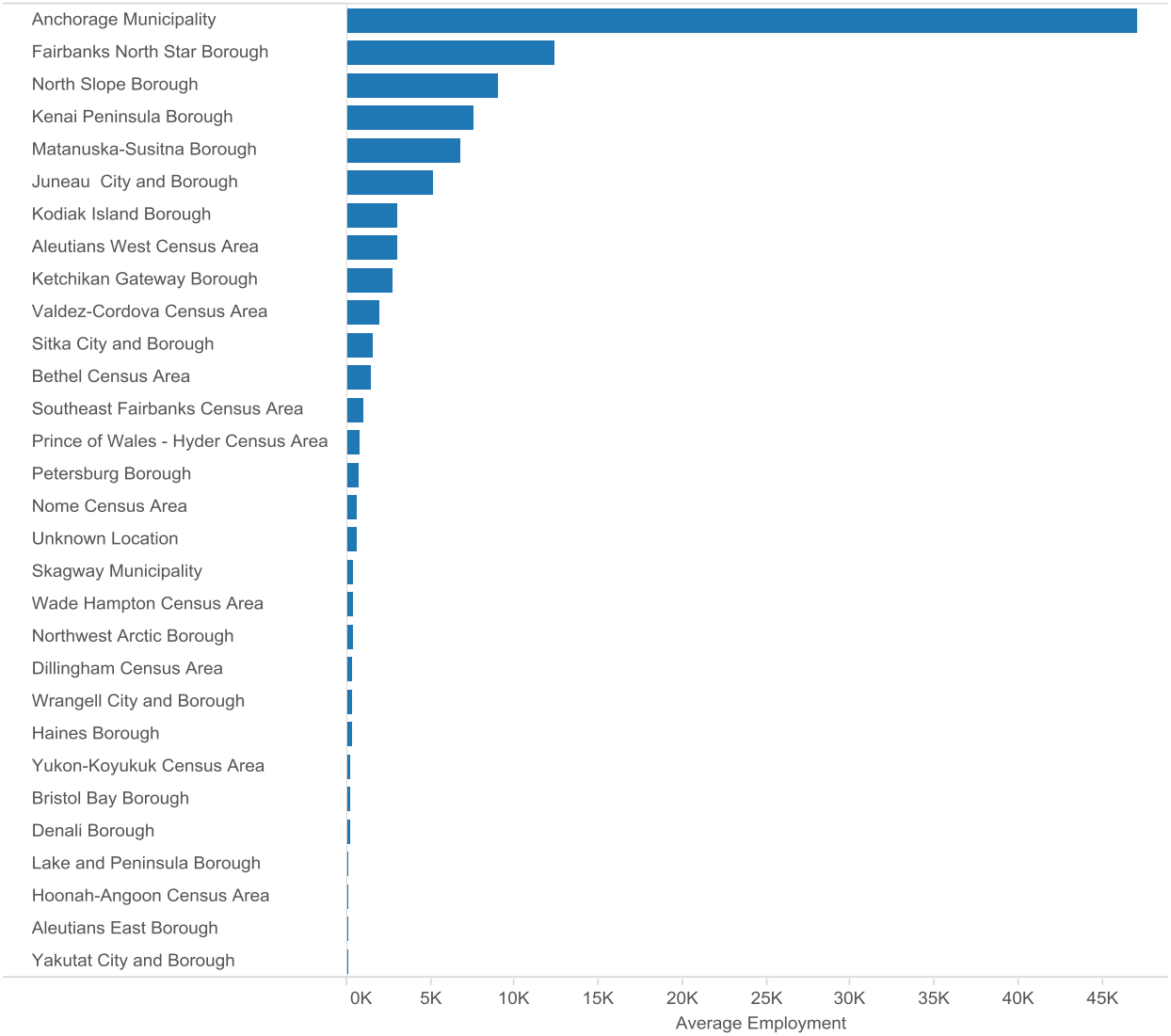
[1] Based on Alaska Department of Labor and Workforce Quarterly Census of Employment and Wages (QCEW) data. In 2013, Alaska had an estimated population of 735,132 and an estimated workforce of 565,724 (source: American Community Survey, 2013).

Alaska Boroughs Depend on Freight-Intensive Industries

While most Alaska boroughs have some employment in freight-intensive industries, freight employment tends to cluster primarily in Anchorage Municipality, which has by far the largest number of jobs in freight-intensive industries, and in Fairbanks North Star, North Slope, Kenai, Mat-Su, and Juneau (see Exhibit 9).

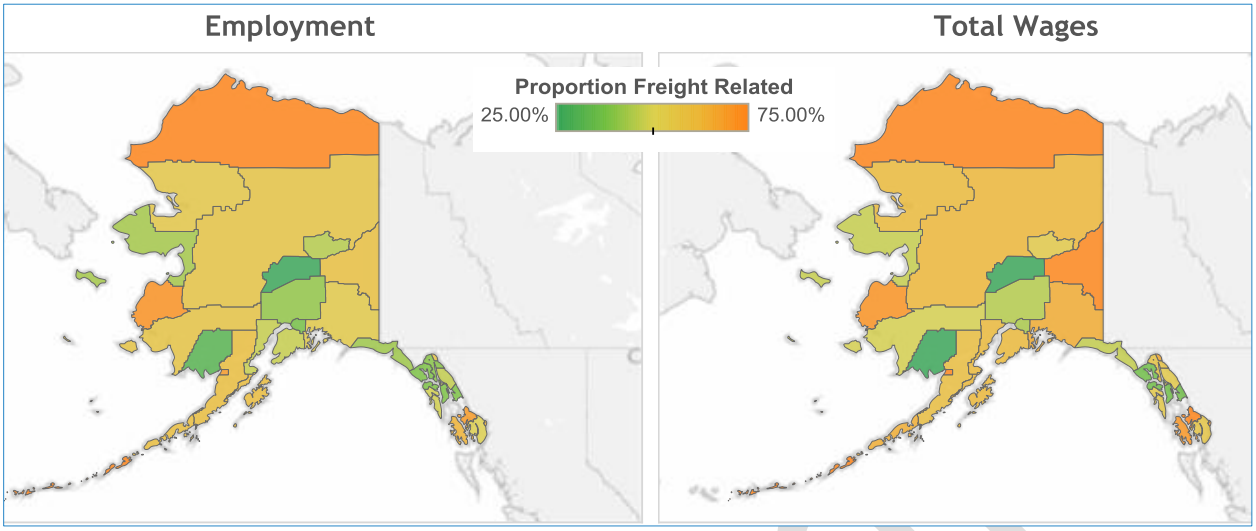
However, many of the boroughs with fewer freight employees actually have a very high share of their employment and wages in freight-intensive industries. Boroughs with the highest shares of non-government employment in freight-intensive industries include Aleutians West (89%), North Slope (75%), Wade Hampton (72%), and Wrangell (70%). Boroughs with the lowest shares include Denali (13%), Dillingham (31%), Anchorage (37%), and Hoonah-Angoon (38%) (see Exhibit 10).

Exhibit 9: Employment in Freight-Intensive Industries, 2013



Source: Analysis of Alaska Department of Labor and Workforce QCEW data

Exhibit 10: Share of Employment and Wages in Freight-Intensive Industries, 2013



Source: Analysis of Alaska Department of Labor and Workforce QCEW data. Note: excludes government employment.

Trade Imbalance and Dependence

Alaska is characterized by a dramatic imbalance between its produced and consumed commodities—most of what Alaska produces is exported to other states and other countries, while most of what Alaska consumes is provided by other states and other countries. This creates an especially strong dependence on effective trading connections and services. The following analyses quantify the imbalances and addresses implications for freight planning in Alaska.

To understand these factors, the Federal Highway Administration's Freight Analysis Framework (FAF) 3.5 data was used. FAF reports the tonnage and value for 42 different commodities (following the Standard Classification of Transported Goods system) and has been projected to 2012 (the most up-to-date "current" year available).[2] It is important to note that FAF represents the results of a freight model and is not an actual comprehensive survey or empirical accounting of commodity flows. For the most part, FAF results for Alaska generally align with the economic data presented in the *Producers and Consumers* section. The largest industries and activities have correspondingly large commodity flows. However, FAF data can be difficult to work with because there are many different ways to "slice" the data, such as by trade type (international versus domestic), by direction (inbound or outbound or internal), by linkage to Alaska's economy (origin-destination traffic versus "pass through"), by mode, and by commodity type.

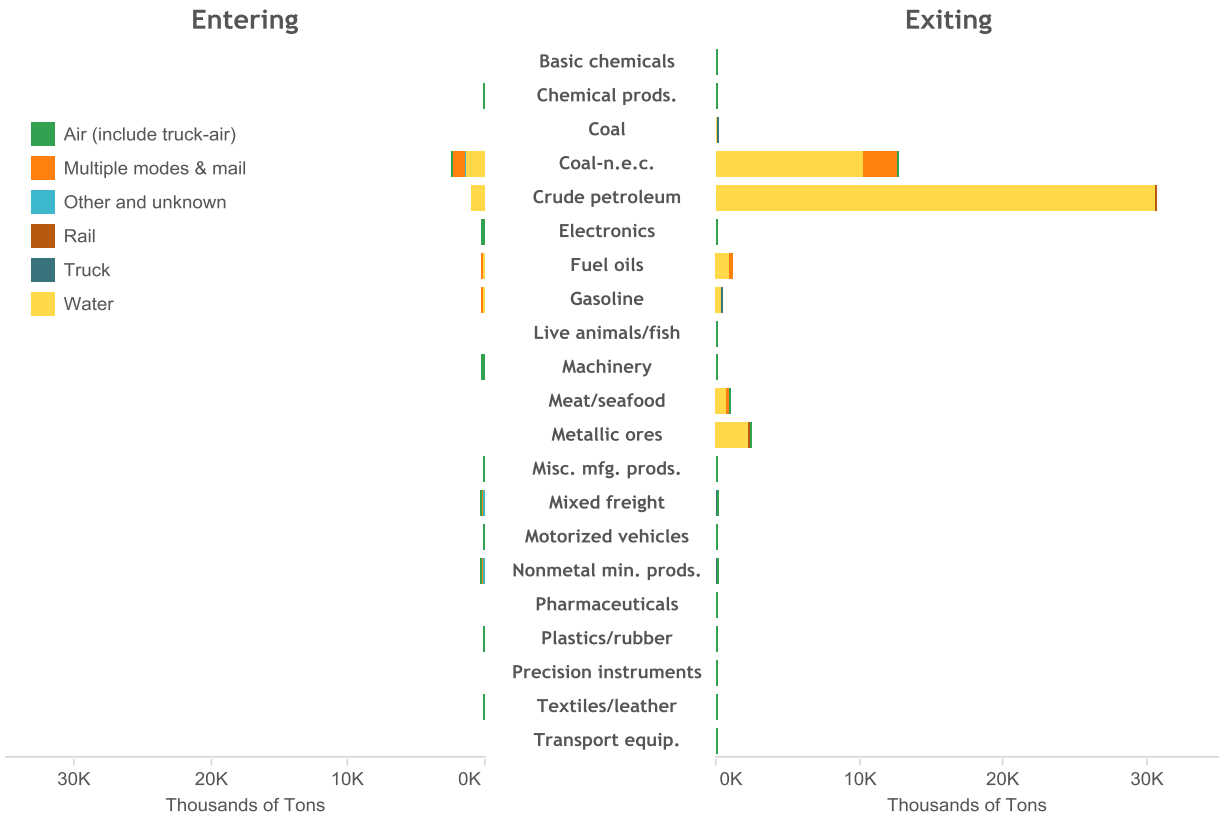
[2] FAF 3.5 is based on the 2007 Commodity Flow Survey (CFS). A new CFS was completed in 2012 and FAF will be updated to reflect that information. However, the update is not yet available. Because of the recession, most states saw relatively modest changes in freight tonnage between 2007 and 2012, meaning that 2007 CFS remains generally relevant, except in isolated cases such as movement of fuel by rail in the lower 48.

With respect to transportation modes, FAF uses the classifications and responses from the 2007 Commodity Flow Survey:

- Multiple modes and mail, which includes any reported combination of two or more modes
- Air (including truck-air), which includes air not in combination with any other modes except truck
- Rail, which includes rail not in combination with any other modes
- Truck, which includes truck not in combination with any other modes
- Water, which includes water not in combination with any other modes
- Pipeline, which includes pipeline not in combination with any other modes
- Other and Unknown

As shown in Exhibit 11 and Exhibit 12, it is clear that freight entering the state is mostly composed of relatively valuable lower-weight consumer goods and industrial machinery and supplies, primarily by air. Freight exiting the state, on the other hand, is dominated by heavy lower-value bulk commodities, especially petroleum, primarily by water.

Exhibit 11: Alaska Domestic and International Trade Tonnage, Excluding Pass-Through, 2012

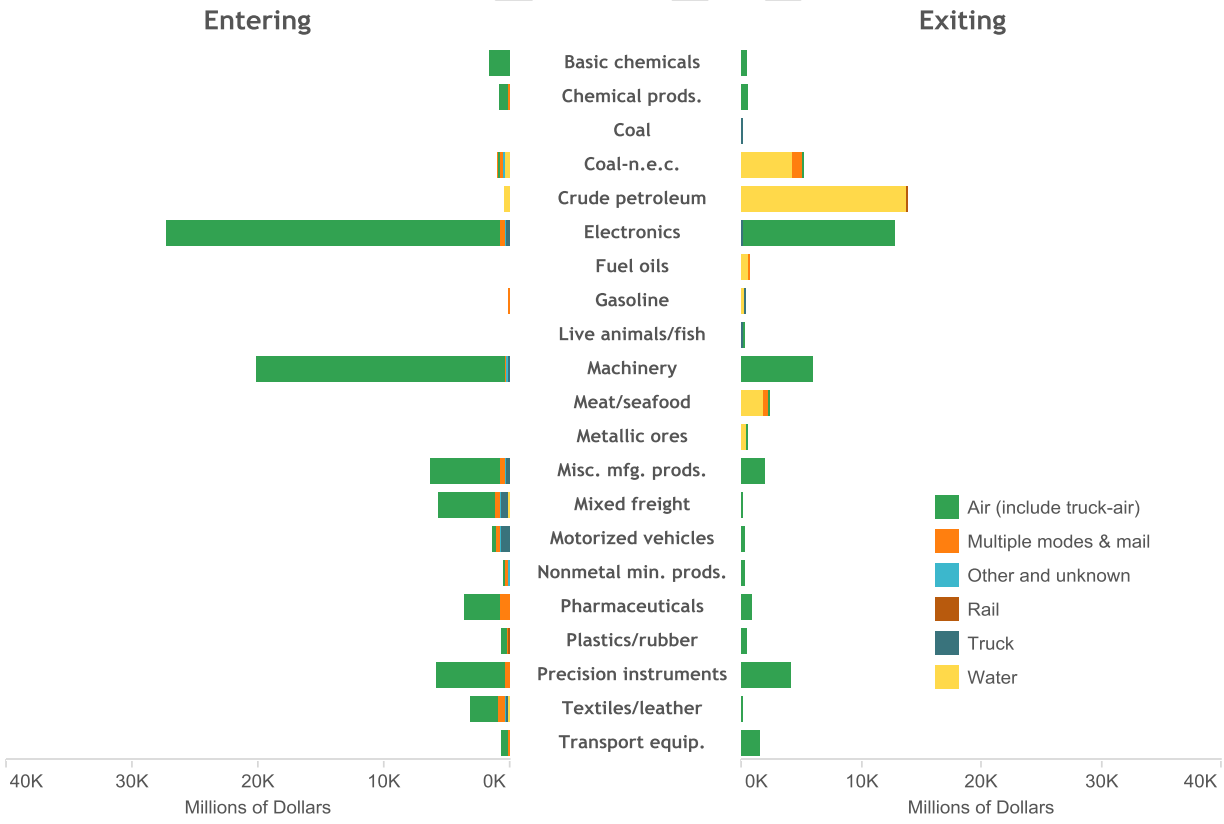


Source: WSP | Parsons Brinckerhoff Analysis of Freight Analysis Framework 3 data

Exhibit 11 shows the estimated tonnage of freight entering and exiting Alaska in 2012. This includes both international and domestic freight movement but excludes (for the moment) freight moving entirely within Alaska or passing through Alaska; those flows are discussed in Sections 0 and 0. From Exhibit 11, the largest tonnages are clearly exiting Alaska. Waterborne tonnage exiting Alaska is associated with crude petroleum and "coal n.e.c." (or "not elsewhere classified"); coal n.e.c. includes coal and petroleum-related products, including natural gas. Some coal n.e.c. is also moving by multiple modes, which in this case is primarily rail and water. Metallic ores, meat and seafood, and fuel oils report significant exiting tonnage. On the entering side, only coal n.e.c. shows significant tonnage.

However, the picture is very different from the perspective of commodity value. As shown in Exhibit 12, entering value is much higher than exiting value. The leading commodities entering Alaska are electronics, machinery, miscellaneous manufactured products, mixed freight (usually the contents of international shipping containers), precision instruments, pharmaceuticals, and textiles; the vast majority of these goods are entering as air cargo, although some arrive via multiple modes (typically involving water, as intermodal marine cargo). On the exiting side, crude petroleum and coal n.e.c. and meat/seafood moving by water and multiple modes are significant, as are electronics, machinery, and precision instruments moving by air.

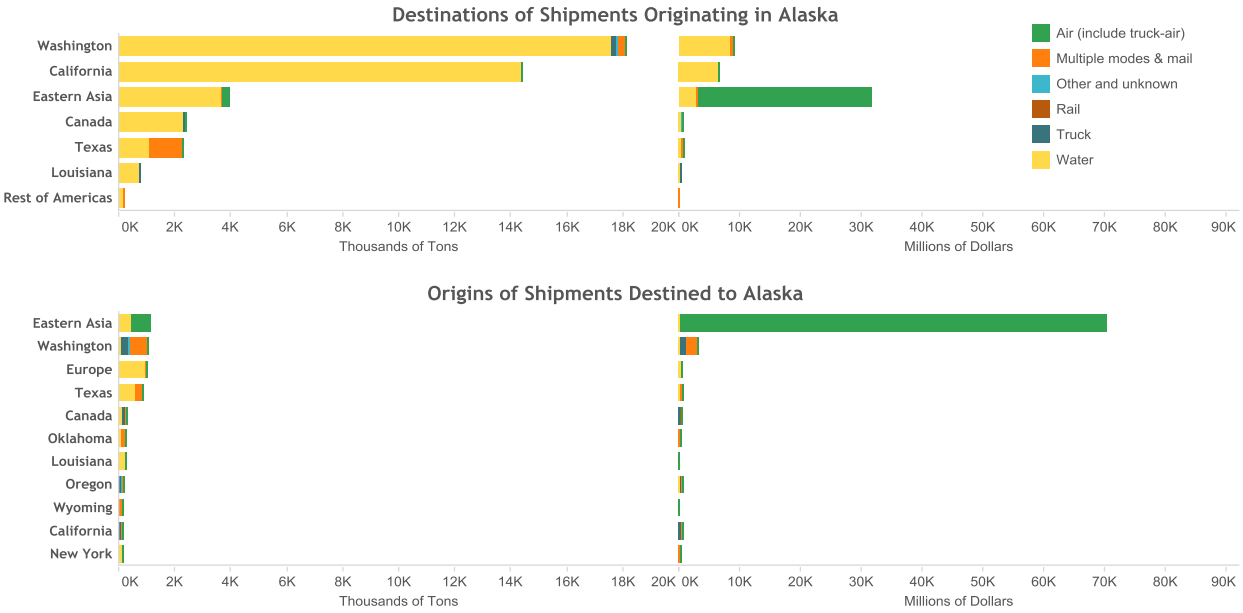
Exhibit 12: Alaska Domestic and International Trade Value, Excluding Pass-Through, 2012



Source: WSP | Parsons Brinckerhoff Analysis of Freight Analysis Framework 3 data

For shipments exiting Alaska, the leading trade partners for tonnage include California and Washington (which receive crude petroleum for refining), while the leading trade partner for value is Eastern Asia. For shipments entering Alaska, the leading trade partners for tonnage are Eastern Asia, Washington, and Europe, while the leading trade partner (by far) for value is Eastern Asia. The top origins and destinations for entering and exiting freight are shown in Exhibit 13.

Exhibit 13: Alaska Domestic and International Trade Partners, Excluding Pass-Through, 2012

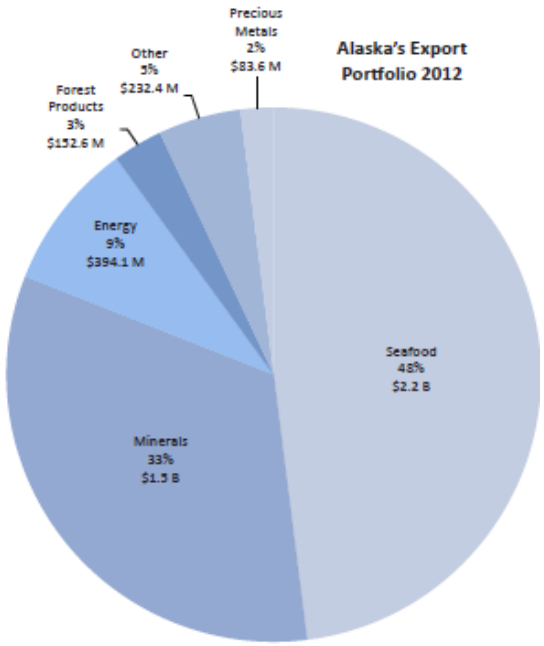


Source: WSP | Parsons Brinckerhoff Analysis of Freight Analysis Framework 3 data

The presence of international export shipments of high-value electronics, machinery, and precision instruments by air to eastern Asia in FAF is somewhat inconsistent with other data sources. For example, these commodities are not reported as Alaska export commodities by the 2012 Alaska Economic Performance Report.

The explanation may be intermediate handling. As described in the *Pass-Through Traffic* section, a substantial amount of high-value air freight is moving from the lower 48 states to Eastern Asia via Anchorage International Airport. Much of this freight is defined by FAF as "pass through" traffic; but in cases where freight is taken off one aircraft and re-loaded onto a different aircraft. FAF may count the export traffic as originating in Alaska. Physically, the freight is actually moving from Alaska soil to Eastern Asia, so FAF may not be incorrect in that sense. However, from an economic perspective, such moves are not related to Alaska's economy, other than the value of the re-handling activity, so Exhibit 14 is correct in omitting it. The same effect may be at work to some extent on the import side, accounting for some share of electronics, machinery, and precision instruments shown as entering Alaska by air from Eastern Asia. Because this discrepancy involves high-value, low-weight goods, it has very little impact on FAF tonnage data.

Exhibit 14: Alaska Export Commodities by Value, 2012



Source: Reproduced from the 2012 Alaska Economic Performance Report

In-State Supply Chains

Alaska is a very large state with long supply chains. Freight exported from Alaska must be moved long distances, from extraction and production facilities to ports and airports; freight imported must be distributed from a few gateway ports and airports to users distributed throughout the entire state. This means that each ton of freight has to move more miles to serve Alaska than any other state, leading to significantly higher freight costs for Alaska business and consumers than in other states (see later discussion in the *Performance, Needs and Opportunities* section). Exhibit 15 compares truck Vehicle Mile of Travel (VMT) and tonnage data from the Freight Analysis Framework; dividing the within-state truck VMT by the within-state truck tonnage yields an estimate of the average distance each ton of truck freight moves within a state. For most states, the average distance is 100 miles or less; in Alaska, it is nearly 200 miles.

Exhibit 15: Average Truck Trip Lengths (Miles per Ton) by State, 2012

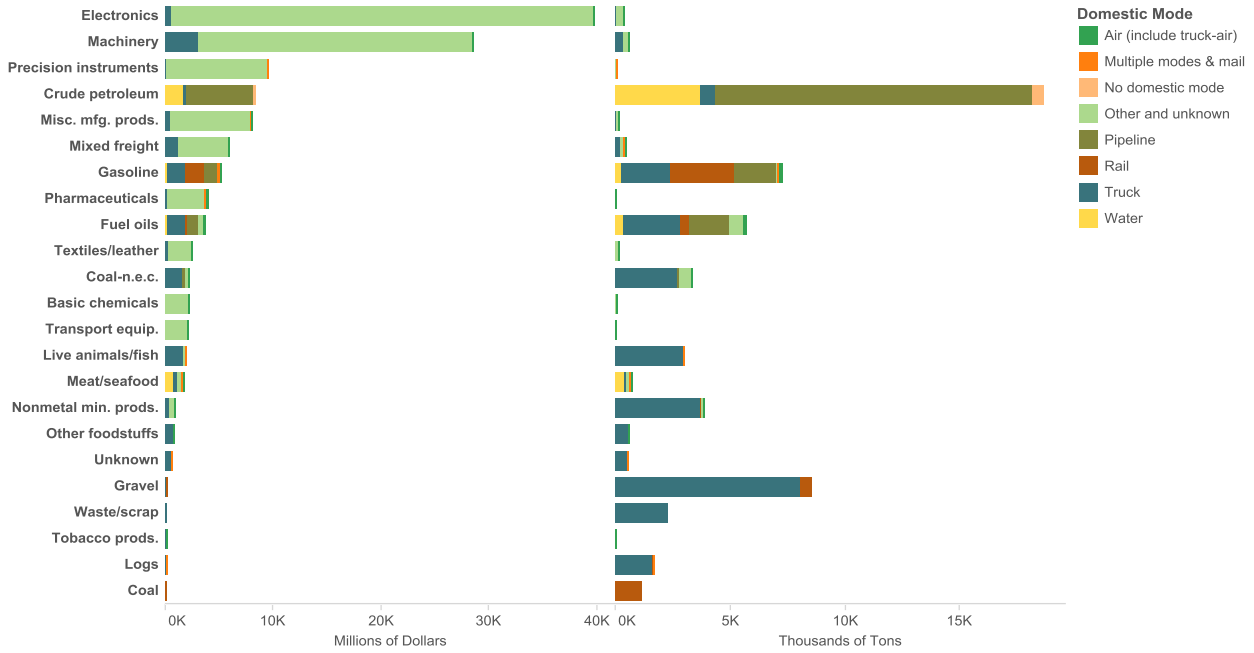
State	Within-State VMT	Within-State Tonnage	Average Miles per Ton
Alaska	11,981,000,000	61,705,000	194
Montana	10,635,000,000	76,593,000	139
Idaho	10,482,000,000	90,370,000	116
Texas	197,785,000,000	1,810,492,000	109
New Mexico	6,520,000,000	61,113,000	107
Nevada	8,504,000,000	84,796,000	100
Wyoming	9,409,000,000	94,254,000	100

Source: WSP | Parsons Brinckerhoff Analysis of Freight Analysis Framework 3 data

Data on commodity flows entirely within Alaska is summarized in Exhibit 16. Within-state flows may be linked to international trade with other countries, or domestic trade with other states, through Alaska's seaports and airports; or these flows may be purely between locations within Alaska without any linkage to domestic or international trade. Within-state flows are especially important because they describe most of the demand that must be accommodated by Alaska's transportation networks—its highways, railroads, waterways, airways, and pipelines—within the state itself.

Fuel oils, gasoline, petroleum, and coal account for the majority of tons moved internally within Alaska. Most of the petroleum is extracted at the Prudhoe Bay Oil Field in the North Slope area and transported through the 800-mile Trans-Alaska Pipeline to the Port of Valdez in the Pacific for export to refineries in the lower 48 states. Some of the petroleum extracted in the state gets refined locally at facilities in Kenai, North Pole, Prudhoe, and Valdez, mostly for local consumption of gasoline and oil byproducts. Some crude petroleum also moves within the state by water, while gasoline and coal are sometimes moved by rail. Gravel, nonmetallic minerals, fish, waste/scrap, and logs also represent significant tonnage and are moving mostly by truck. Trucking is also important for coal n.e.c., gasoline, and fuel oils. For value, the leading commodities are electronics, machinery, precision instruments, crude petroleum, miscellaneous manufactured products, mixed freight, gasoline, and pharmaceuticals.

Exhibit 16: Value and Tonnage of Internal Goods Movement, 2012



Source: Analysis of Freight Analysis Framework 3 data

An interesting aspect of FAF data for Alaska is the large share of value in Exhibit 16 that is associated with "other and unknown" freight modes. In fact, the majority of internal Alaska freight value is reported as being handled by other and unknown modes. Part of the reason is that the "other and unknown" category includes small shipments that may be handled in flyaway aircraft and/or delivery trucks. Other explanations may include an insufficient number of records to report a known mode or the loss of modal information for freight passing through warehouse/distribution or other processing facilities. Overall, most of the value is associated with internal air freight and trucking within Alaska given that "other and unknown" handles a majority of value but very little tonnage; the handling of high-value commodities is most consistent with freight typically moved by air and truck.

Pass-Through Traffic

Alaska has a unique geographic position, midway between the lower 48 states and Asia, and serves as a gateway for pass-through air cargo. Alaska's freight infrastructure, and its economic activity related to handling of pass-through freight, is therefore linked to larger global trades. Alaska is extensively used as a global gateway in supply chains that have origins and destinations outside of Alaska. This is due to Alaska being in a prime location for refueling international air cargo flights between the U.S. and Asia, which carry high-value goods such as electronics, machinery, precision instruments, and pharmaceuticals. Almost all of these refueling stops take place at Ted Stevens Anchorage International Airport (ANC), which has become a key part of many high-value supply chains around the world. Global package logistics companies such as UPS and FedEx have sorting and warehousing facilities near ANC. International air cargo is also handled at Fairbanks. This means that planning for ANC must consider service not only to Alaska, but to the world.

Exhibit 17 and Exhibit 18 provide comprehensive summaries of all Alaska freight flows by tonnage and value, considering not only entering and exiting domestic and international traffic, but also "pass through" traffic moving between foreign countries and other states via Alaska's trade gateways. Pass-through shipments account for just 2.5% of Alaska's freight tonnage, but over half (52.5%) of Alaska's freight value.

Exhibit 17: Domestic and International Trade Tonnage, 2012 (Thousands of Tons)

	Domestic O-D (89.3%)			International O-D (8.1%)				Through (2.5%)		
Top Commodities (thousands of tons)	Dom. Within AK (48.2%)	Dom. AK to US (37.3%)	Dom. US to AK (3.7%)	Intl. Export AK-Origin US-Gateway (2.1%)	Intl. Export AK-Origin AK-Gateway (3.9%)	Intl. Import US-Gateway AK-Destination (0.1%)	Intl. Import AK-Gateway AK-Destination (2.1%)	Intl. Import AK-Gateway US-Destination (1.6%)	Intl. Export US-Origin AK-Gateway (0.9%)	Total for all Trade Types
Crude petroleum (43.3%)	17,613	30,620					1,044			49,277
Coal-n.e.c. (13.9%)	667	10,050	2,430	2	2,641	2	2	3	6	15,803
Gravel (7.5%)	8,539	-	-		-					8,539
Gasoline (6.7%)	7,049	361				1	243	9		7,663
Fuel oils (5.7%)	4,987	648	-		518	1	273	109		6,536
Nonmetal min. prods. (3.9%)	3,797	140	309	-	11	1	10	174	15	4,458
Live animals/fish (2.7%)	2,937	-		5	24	-	5	50	11	3,031
Waste/scrap (2.2%)	2,264	225	-	14		-				2,503
Metallic ores (2.0%)	-	-		2,259	62	-	7	-	4	2,331
Logs (1.4%)	1,526	-	-		117		-			1,643
Meat/seafood (1.0%)	170	309	16	75	538	-	-	4	68	1,180
Coal (1.0%)	983	-			162	-				1,145
Machinery (0.9%)	360	-	24	3	51	5	160	311	161	1,076
Mixed freight (0.7%)	417	65	297	-	1	1	24	29	5	838
Electronics (0.7%)	62	21	34	2	37	1	223	326	80	787
Other (6.2%)	3,543	55	1,086	17	247	93	392	853	717	7,003
Totals	**54,914**	**42,494**	**4,196**	**2,377**	**4,409**	**105**	**2,383**	**1,868**	**1,067**	**113,813**

Source: Analysis of Freight Analysis Framework 3 data

Exhibit 18: Domestic and International Trade Value, 2012 (Millions of Dollars)

Top Commodities (millions of dollars)	Domestic O-D (17.2%)			International O-D (30.3%)				Through (52.5%)		
	Dom. Within AK (8.8%)	Dom. AK to US (5.6%)	Dom. US to AK (2.9%)	Intl. Export AK-Origin US-Gateway (0.2%)	Intl. Export AK-Origin AK-Gateway (9.6%)	Intl. Import US-Gateway AK-Destination (0.1%)	Intl. Import AK-Gateway AK-Destination (20.5%)	Intl. Import AK-Gateway US-Destination (33.8%)	Intl. Export US-Origin AK-Gateway (18.7%)	Total for all Trade Types
Electronics (25.6%)	715	71	979	21	12,731	13	26,310	33,406	15,105	89,350
Machinery (20.5%)	2,971	37	442	29	5,909	50	19,633	26,132	16,523	71,727
Misc. mfg. prods. (10.3%)	556	22	881	2	1,915	7	5,511	17,014	10,039	35,948
Precision instruments (7.6%)	42	-	481	4	4,083	5	5,309	8,167	8,581	26,672
Crude petroleum (6.4%)	7,956	13,850					425			22,231
Pharmaceuticals (5.2%)	493	8	925	1	869	-	2,661	10,059	3,083	18,100
Mixed freight (3.7%)	1,292	46	1,144	2	51	23	4,502	5,684	202	12,946
Textiles/leather (2.9%)	208	-	1,026	-	167	7	2,059	6,129	533	10,130
Transport equip. (2.1%)	41	6	121	6	1,493	6	506	1,265	3,906	7,351
Basic chemicals (2.1%)	22	-	20	2	486	2	1,618	3,729	1,294	7,173
Coal-n.e.c. (1.9%)	686	3,623	895	1	1,519	1	2	3	7	6,736
Gasoline (1.6%)	5,037	231				2	171	77		5,518
Chemical prods. (1.3%)	204	-	188	2	589	2	586	1,289	1,639	4,498
Fuel oils (1.2%)	3,370	233	-		355	-	59	3		4,019
Motorized vehicles (1.1%)	855	3	1,071	4	215	17	308	807	518	3,797
Other (6.5%)	6,324	1,290	1,808	460	3,037	54	1,939	4,224	3,722	22,861
Totals	**30,772**	**19,420**	**9,981**	**534**	**33,419**	**189**	**71,599**	**117,988**	**65,152**	**349,057**

Source: Analysis of Freight Analysis Framework 3 data

FREIGHT SYSTEM ELEMENTS

Freight demand in Alaska is served by multiple transportation modes:—road, air, water, rail, and pipeline. Each has a critical role in the state's multi-modal system, and must be considered in the context of the entire system.

This section describes the primary elements of Alaska's freight transportation system and their key attributes and interconnections. The system is described in terms of the extent of the assets that and their use. Basic information on system connectivity and transportation cost are provided. The performance of the system is considered in more detail in *the Freight Performance Measurement, Prioritization, and Project Evaluation* section of this Freight Element.

Modal Tonnage and Value

Freight transportation demand in Alaska is met through truck, air, water, rail, and pipeline, with a smaller share of tonnage and value served via rail. These five transportation modes accommodate services that represent the supply of freight transportation capacity to meet demand. They vary with respect to their shares of tonnage and value, and the type of trade they accommodate; each fills a critical niche in the overall multimodal transportation system.

As shown in Exhibit 19 and Exhibit 20, Alaska's freight transportation modes moved more than 120 million tons of freight worth nearly $454 billion in 2012. These numbers are higher than shown previously in Exhibit 17 and Exhibit 18 because most international trade usually generates two separate modal trips: one for the international move and one for the domestic move to/from an airport, seaport, or border crossing.

Looking at tonnage, around 51.0% of tonnage was moving within Alaska; 41.0% was exiting; 5.6% was entering; and 2.4% was passing through. Around 45.1% of tonnage was moved by water; 26.7% by truck; 14.6% by pipeline; 4.3% by multiple modes and mail; 4.2% by rail; 3.0% by air; and 2.2% by other and unknown (assumed to be fly-away aircraft and delivery trucks).

Looking at value, around 18.0% of value was moving within Alaska; 11.8% was exiting; 29.9% was entering; and 40.4% was passing through. Around 62.73% of value was moving by air; 22.6% by other and unknown (assumed to be fly-away aircraft and delivery trucks); 5.8% by water; 4.8% by truck; 1.9% by pipeline; 1.7% by multiple modes and mail; and 0.5% by rail.

Each of Alaska's freight modes has an independent story in terms of their tonnages and values, their typical commodities carried, their physical networks and facilities, their operations, and their users. However, these modal stories are also highly interconnected. As described above, most international traffic also has a "domestic" leg, often involving a modal transfer (pipeline to water, truck to water or air, etc.). A single piece of freight may be handled multiple times, by multiple international and domestic modes, on its way from origin to destination. The overall performance of Alaska's freight transportation

system depends not only on the independent activities of its various freight modes, but also on their combined intermodal efficiencies.

Exhibit 19: Alaska Freight Tonnage by Mode, 2012

(thousands of tons)	Within (51.0%)	Exiting (41.0%)	Entering (5.6%)	Through (2.4%)	Total
Water (45.1%)	4,859	45,515	3,256	493	54,123
Truck (26.7%)	30,580	388	780	269	32,017
Pipeline (14.6%)	17,535	-	-	-	17,535
Multiple modes and mail (4.3%)	281	2,950	1,888	7	5,126
Rail (4.2%)	4,972	93	29	1	5,095
Air (including air-truck) (3.0%)	426	324	720	2,164	3,634
Other and unknown (2.2%)	2,574	10	11	1	2,596
Total	**61,227**	**49,280**	**6,684**	**2,935**	**120,126**

Source: Analysis of Freight Analysis Framework 3 data

Exhibit 20: Alaska Freight Value by Mode, 2012

(millions of dollars)	Within (18.0%)	Exiting (11.8%)	Entering (29.9%)	Through (40.4%)	Total
Air (including air-truck) (62.7%)	848	30,262	71,393	182,263	284,766
Other and unknown (22.6%)	102,274	54	126	131	102,585
Water (5.8%)	1,683	21,154	3,078	274	26,189
Truck (4.8%)	3,593	470	17,759	67	21,889
Pipeline (1.9%)	-	-	8,726	-	8,726
Multiple modes and mail (1.7%)	4,957	1,406	821	404	7,588
Rail (0.5%)	19	25	2,090	1	2,135
Total	**81,771**	**53,371**	**135,596**	**183,140**	**453,878**

Source: Analysis of Freight Analysis Framework 3 data

Understanding Freight Carriers, Networks, and Facilities

Each mode has a specific set of freight carriers (trucking companies, airlines, vessel operators, railroads, and pipeline owners), who use a variety of infrastructure assets. Some of these infrastructure assets are unique to each mode, such as highways, waterways, railroads, and pipelines. Some, known as "inter-

modal" facilities, are designed to bring together different modes; these include ports (linking water with trucks, rail, and/or pipelines), airports (linking air with trucks, and sometimes pipelines), and rail terminals (linking rail and trucks). Different networks and facilities have different owners, which may be public or private; and the vehicles and vessels that operate over these networks and through these facilities are both publicly and privately owned. This section presents key information for each mode.[3]

Trucking

In the lower 48 states, trucks carry far more tonnage and value than other modes. In Alaska, trucks carry somewhat lower shares, but this is largely due to two factors: the absence of trucks passing through Alaska on their way to other states and Alaska's dependence on air and water trade. Despite a smaller overall role than in other states, trucking is an essential part of freight movement in Alaska to move goods from seaports and airports to industrial customers and consumers, and to distribute non-traded goods internally within Alaska. It is the only mode that provides door-to-door, on-demand service, which makes it unique.

Trucking can be categorized into the following types of activities:

- **Intercity/long-haul** trucking moves freight from one city to another or over long distances via main highways.
- **Drayage** trucking provides connections to/from ports, terminals, distribution centers, and other logistics facilities, which are often located in urban areas.
- **Urban deliveries** are the final legs of supply chains, where (typically) smaller trucks are used to deliver goods to stores or customers.

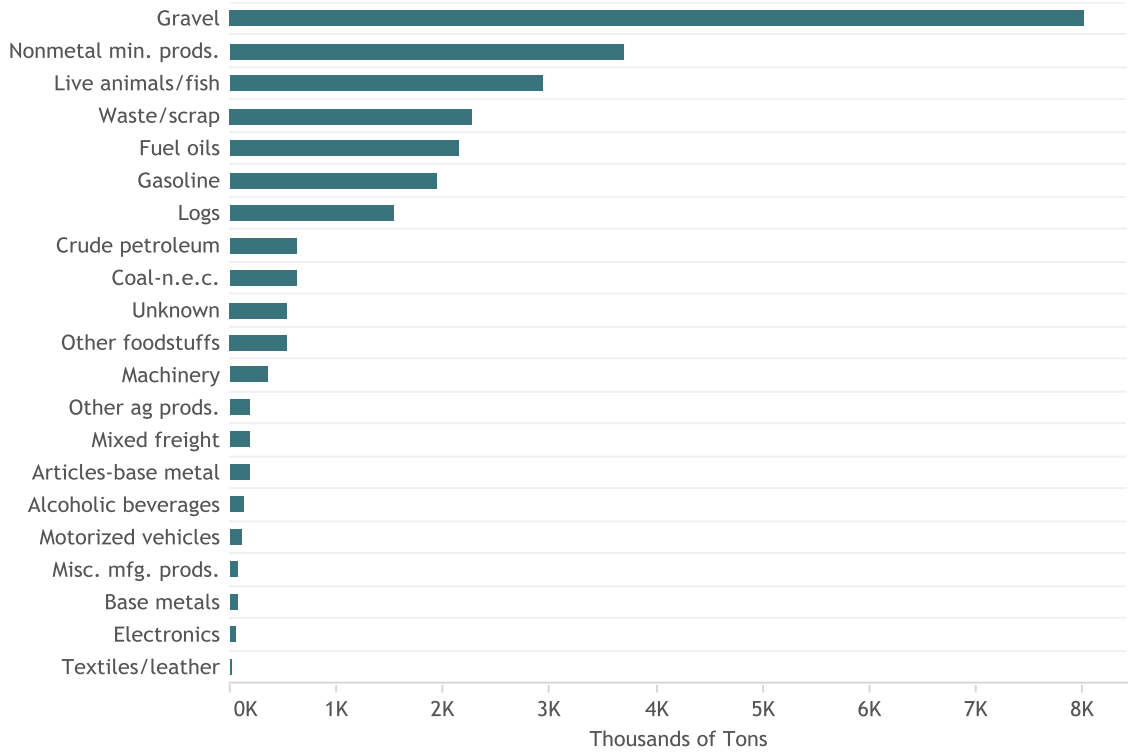
Commodity Flows by Truck

Isolating just the truck mode in the FAF commodity flow data and ranking each commodity by tonnage provides additional insights into the functional role of trucking in Alaska. The results are shown in Exhibit 21 and Exhibit 22.

- By tonnage, the leading truck commodities are gravel, nonmetallic minerals, fish, waste/scrap, fuel oils, gasoline, and logs.
- By value, the leading truck commodities are machinery (typically industrial), fish, gasoline, fuel oils, mixed freight (typically containerized or moving to/from warehouse/distribution facilities), motor vehicles and foodstuffs, and a wide range of consumer and industrial products.

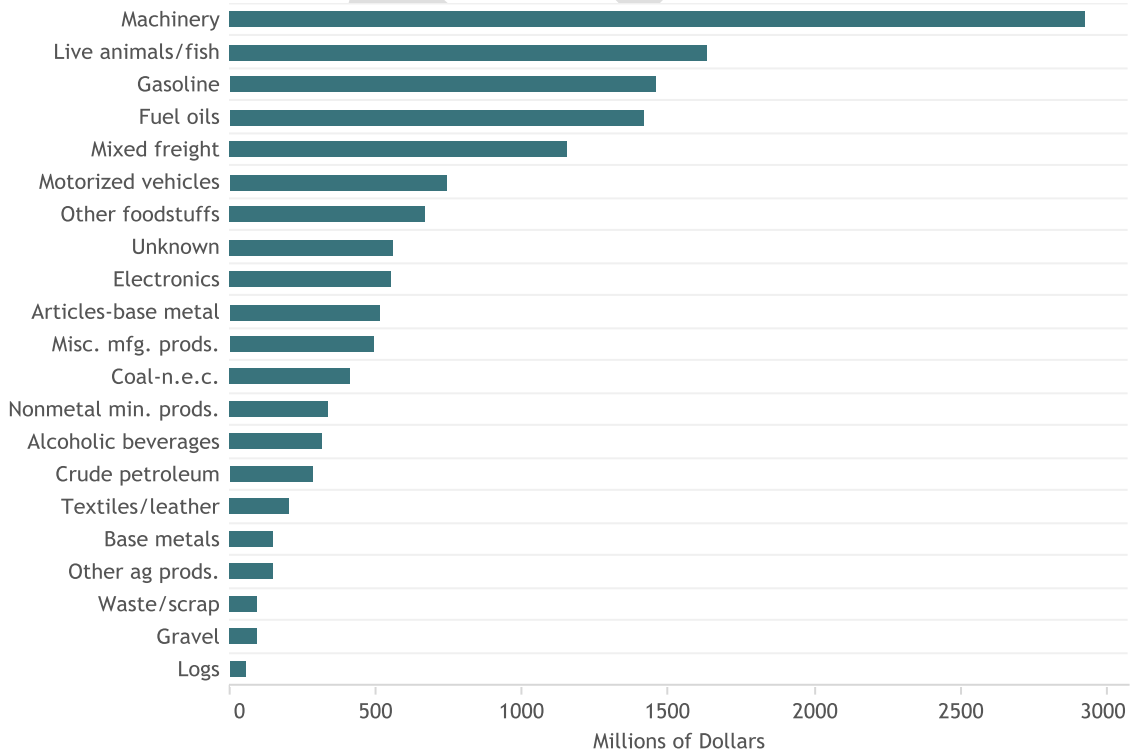
[3] Note that facility-specific volume estimates presented below may differ from FAF estimates presented earlier. This is due to differences in data sources and processing/reporting methods, and also to how tonnage moving within Alaska is treated. For freight with both an origin and a destination in Alaska, FAF counts each ton once, while facility-level volumes count each ton twice: once at the origin facility and once at the destination facility. Both types of data are useful and important, but full agreement is not to be expected.

Exhibit 21: Truck Shipments within Alaska by Tons, 2012



Source: Analysis of Freight Analysis Framework 3 data

Exhibit 22: Truck Shipments within Alaska by Value, 2012



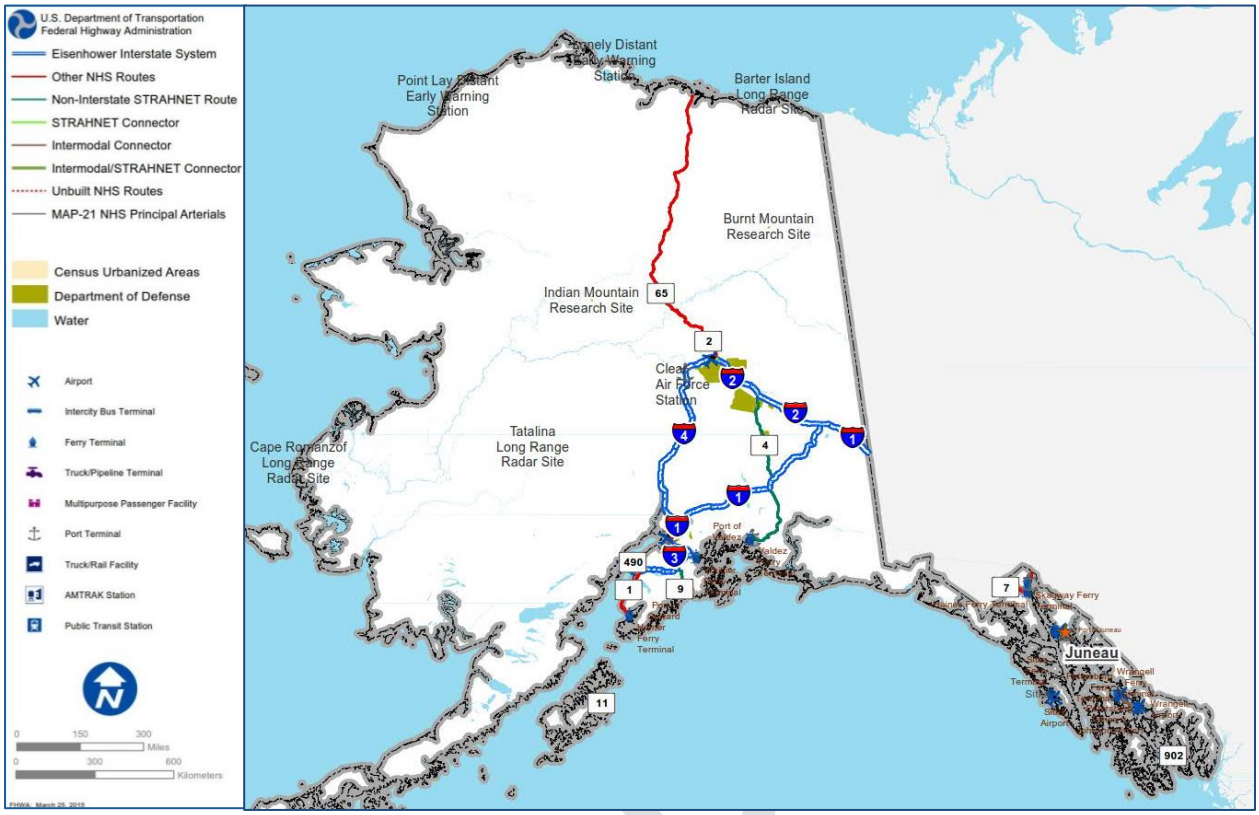
Source: Analysis of Freight Analysis Framework 3 data

Key Truck Corridors

Alaska has a relatively simple highway system where often there is only one route between important origins and destinations. According to USDOT data, Alaska ranks 47th in highway mileage (despite having the largest area of any state in the U.S.); it has 16,301 miles of publicly owned roads and 1,173 bridges; and it has several highway crossings with Canada (Alaska Highway, Haines Highway, Liard Highway, and others). Key trucking corridors can be identified based on location and functional classification, truck volumes, and truck percentages (share of total vehicle trips that are due to trucks).

Starting with location and functional classification, as shown in Exhibit 23, Alaska has four main highways. The A-1 is 408 miles long and connects Anchorage to the Canadian Border (best known as the Alaska Highway). This road continues through Canada until reaching the U.S. in the state of Washington. The A-2 is 202 miles long and connects Fairbanks to the A-1 (best known as the Glenn Highway). The A-3 is 148 miles long and connects Anchorage to Soldotna, after which it continues as the Sterling Highway until reaching the port town of Homer (the entire route from Anchorage is commonly known as the Sterling Highway). Finally, the A-4 connects Anchorage to Fairbanks, the second-largest city in the state (best known as Parks Highway). Four other highways are as important and in some cases carry comparable traffic volumes. The Dalton Highway extends from Fairbanks to the Arctic Ocean, spanning 414 miles (red on the map). The Richardson Highway is 368 miles long and connects Fairbanks to the Port of Valdez (dark green on the map). The Seward Highway connects the port town of Seward (light green on map) to Anchorage, joining the Sterling Highway after 37 miles.

Exhibit 23: Main Highways in Alaska



Source: http://www.dot.alaska.gov/stwdplng/transdata/pub/NHS_map_Alaska.pdf

To identify the links in the road network that are most critical to trucking operations, Alaska DOT&PF truck count data was tabulated from count stations throughout the state: 97 in the Southeast Region, 63 in the Northern Region, and 103 in the Central Region. This data consisted of estimates of truck Annual Average Daily Traffic (AADT) and truck traffic percentages. However, each region used a different methodology and reported the results differently. To compile the results, several assumptions and approximations were needed to maximize the consistency of the data and allow comparisons between regions. These assumptions are discussed in the Appendix, along with detailed truck counts and truck percentages for key trucking corridors.

Highlights from the corridor counts in the Appendix are summarized in Exhibit 24. Annual Average Daily Truck Traffic (AADTT) can exceed 3,000 trucks per day on the Seward Highway in Anchorage, while truck percentages can reach as high as 82% on the Dalton Highway.

Exhibit 24: Leading Alaska Truck Corridors

Route	Estimated Annual Average Daily Truck Traffic (both directions combined) at Highest AADTT Segment	Estimated Truck Percentage (share of total AADT associated with trucks) at Highest Percentage Segment
Dalton Highway	Over 100	82%

Route	Estimated Annual Average Daily Truck Traffic (both directions combined) at Highest AADTT Segment	Estimated Truck Percentage (share of total AADT associated with trucks) at Highest Percentage Segment
Seward Highway	Up to 3,000	18%
Parks Highway below Denali	Over 2,000	22%
Sterling Highway	Nearly 2,000	15%
Steese Expressway	Over 1,400	14%
Tongass Expressway	Up to 1,200	13%
Parks Highway above Denali	Nearly 1,000	21%
Richardson Highway	Over 700	28%

Source: Analysis of Alaska DOT&PF Annual Traffic Volume Reports. The reports cover different years ranging between 2004 and 2012 depending on the region and route. Please refer to the Appendix for details.

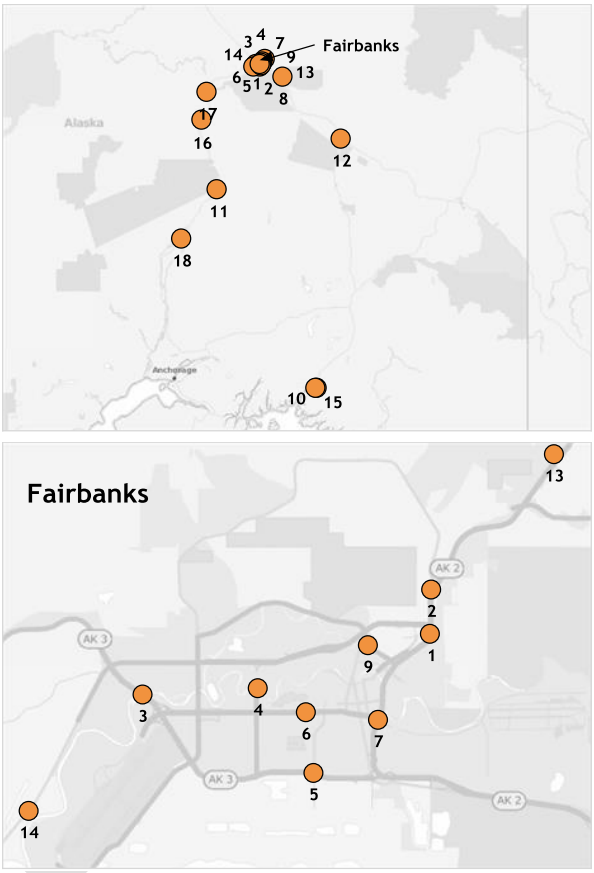
Truck AADT and Percentage—Northern Region

In the Northern Region the roads with the highest truck AADT are located in Fairbanks (see Exhibit 25). Most notably, Steese Highway exiting Fairbanks to the north has high truck volumes. Roads that access Fairbanks International Airport and other logistics facilities also see substantial truck volumes, either from drayage or intercity operations. Trucks entering Fairbanks use George Parks Highway and Richardson Highway to the same extent, depending on whether they come from Anchorage or elsewhere. Richardson highway at Valdez reports high truck counts, likely from the petroleum operations there. Overall, truck volumes in the Northern Region tended to be smaller than those in the Central and Southeast Regions. Ranking roads by truck percentages reverses these patterns; now the top segments are in rural areas (not shown on this map). The road in Alaska with the highest proportion of truck traffic is Dalton Highway, which heads north from Fairbanks to the oil-rich region of Prudhoe Bay in the Arctic. Trucks account for over half of the traffic on this road, reaching to over 80% near Prudhoe Bay. This proportion is likely even higher in winter when travel northward becomes more difficult. High truck percentages from 20% to 25% are found throughout the main highways, including Parks, Richardson, and Alaska.

Exhibit 25: Top Truck Flows at Count Stations in Northern Region

Northern Region in 2012

	Rank Label	Truck AADT	Truck %
Steese Expressway South of Johansen Express..	1	1,624	7%
Steese Expressway North of Farmers Loop	2	1,168	8%
Parks Highway at Chena Bridge	3	960	6%
Peger Road at Chena Bridge	4	954	6%
Parks Highway at Lathrop Street	5	945	7%
Airport Way between Lathrop Street and Wilb..	6	760	4%
Airport Way between Steese Expressway and ..	7	720	4%
Richardson Highway at Moose Creek	8	719	9%
College Road at Bentley Mall	9	480	3%
Richardson Highway at Valdez	10	470	10%
Parks Highway at MP 216 (230 used for AADT)	11	429	17%
Richardson Highway South of Fort Greely Entr..	12	426	22%
Steese Highway AVC	13	420	14%
Chena Pump Road between Ludecker Road an..	14	371	6%
Richardson Highway at Valdez Scalehouse (MP ..	15	299	8%
Parks Highway at Rex Bridge (Jack Coghill)	16	271	21%
Parks Highway at Nenana	17	261	18%
Parks Highway at Little Coal Creek	18	230	18%
Richardson Highway South of Quartz Lake Road	19	226	19%
Richardson Highway at Birch Lake	20	203	17%
Ballaine Road North of Farmers Loop Road	21	202	4%
Steese Highway North of Fox	22	198	11%
Valdez Airport Road North of Richardson High..	23	196	12%
Chena Hot Springs Road East of Nordale	24	185	6%
Glenn Highway at Nelchina Maintenance Camp	25	176	22%



Source: Analysis of Alaska DOT&PF Annual Traffic Volume Reports

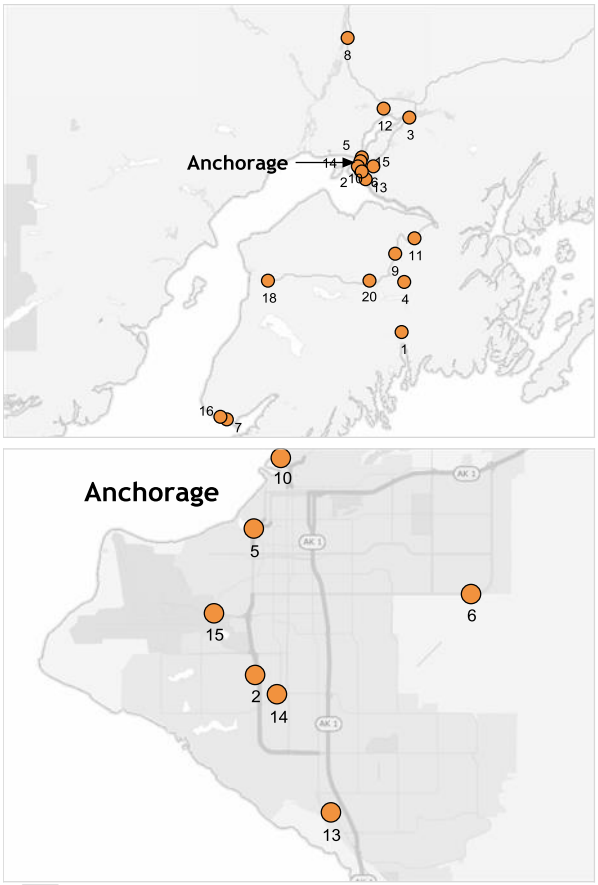
Truck AADT and Percentage—Central Region

The Central Region has the highest truck volumes in the state. As shown in Exhibit 26, the top locations are on roads that access key logistics facilities. The first and fourth truck flow can be found on the way to the Port of Seward, which is primarily used to export cargo. The whole route has high truck volumes all the way to Anchorage. The second and fifth truck volumes can be found on the roads that connect to Ted Stevens Anchorage International Airport, a major cargo handling facility in the state. The Sterling Highway, which provides access to the Port of Homer, also sees significant truck volumes. The roads connecting to the Port of Anchorage also see high truck volumes, which is unsurprising given that the Port of Anchorage it is the main gateway for containerized imports in the state. In fact, this is the road with the highest percent of truck traffic in this region, ranging between 30 and 50%. The road that connects to the cargo facilities of Ted Stevens Anchorage International Airport also has high truck percentages. Parks, Sterling, Seward, and Glenn Highways have truck percentages of 15 to 20%.

Exhibit 26: Top Truck Flows at Count Stations in Central Region

Central Region 2012

	Rank Label	Truck AADT	Truck %
Seward Highway - South of 76th Ave (WIM)	1	3,101	7
Minnesota Drive, Anchorage - North of Dimond B..	2	2,294	6
Glenn Highway - At Eklutna Flats	3	1,797	6
Seward Highway - North of Bird Creek	4	1,481	17
Minnesota Drive, Anchorage - At Chester Creek	5	1,366	4
Tudor Road, Anchorage - West of Patterson Street	6	1,049	4
Sterling Highway - Btwn Soundview Ave & Thom..	7	1,035	12
Parks Highway - At Milepost 64	8	1,035	17
Seward Highway - North of Portage Glacier Rd	9	979	12
Ocean Dock Road, Anchorage - Port of Anchorag..	10	942	48
Seward Highway - At Bertha Creek Bridge	11	936	14
Knik Goose Bay Road, Wasilla - Btwn Hollywood/..	12	797	7
Old Seward Highway, Anchorage - Btwn Hamilton..	13	790	8
Dimond Boulevard, Anchorage - West of Arctic Bl..	14	788	3
International Airport Road, Anchorage - West of F..	15	779	5
Sterling Highway - Btwn Roger's Loop & Diamon..	16	758	13
Kenai Spur Road - West of Beaver Loop Rd	17	740	8
Sterling Highway - East of Soldotna	18	718	8
Seward Highway - At Potter Marsh	19	712	8
Sterling Highway - Btwn Bean Creek Rd & Quartz ..	20	692	13
Parks Highway - North of Talkeetna Spur Rd	21	687	22
Mountain View Drive, Anchorage - West of Park St	22	666	6
Bridge Access Road, Kenai - North of Kalifornsky..	23	653	6
Eagle River Loop, Eagle River - North of Eagle Ri..	24	642	8
Sterling Highway - At Milepost 127	25	621	15
Whitney Road, Anchorage - 1/2 Way Btwn North ..	26	620	32
Elmore Road, Anchorage - Btwn 84th Ave & Cove..	27	609	4
Main Street, Wasilla - North of Herning Ave	28	600	6
Dimond Boulevard, Anchorage - Btwn Sand Lake ..	29	588	12
Raspberry Road, Anchorage - Btwn Changepoint ..	30	548	6



Source: Analysis of Alaska DOT&PF Annual Traffic Volume Reports

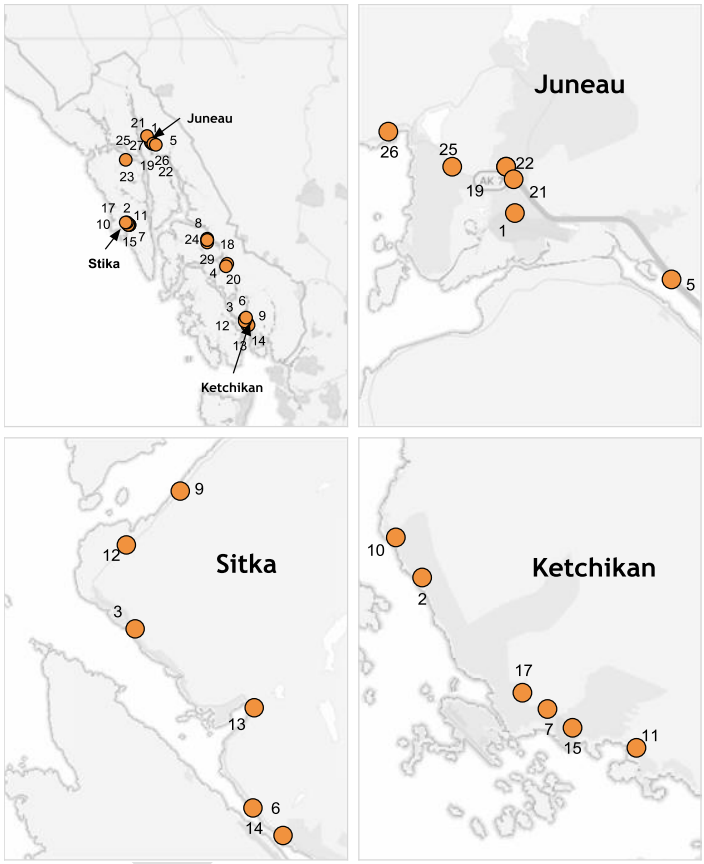
Truck AADT and Percentage—Southeast Region

The Southeast Region has surprisingly high truck volumes considering it has smaller cities that are not as well connected by roads and since it is not linked to other Alaska regions by road or rail, except through the Haines and Skagway Highways. Volumes on Haines Highway were recorded as reaching 100 to 150 AADT, with a high fraction of truck travel; for Skagway Highway, the truck share of AADT could not be determined from available data. The highest truck volumes are observed in the urban centers of Juneau, Sitka, and Ketchikan, all seeing some segments with over 1,000 AADT. These high volumes are probably caused by the lack of circuit in the road network, leading to truck drivers having few, if any, options to reach their destinations; therefore trucking concentrates on a few roads. The locations with high volumes are often near locally important logistics facilities, such as seaports and airports. Trucking in these areas is mostly local, providing drayage or delivery services. Trucks are rarely used to travel between main cities because of the lack of direct road connections (see Exhibit 27).

Exhibit 27: Top Truck Flows at Count Stations in Southeast Region

Southeast Region 2003 - 2011

	Rank	Truck AADT	Truck %
Egan Drive @ Sunny Pt. - Yandukin	1	1,773	6
Halibut Pt. Road @ Harbor Mt. Rd - Cascade ..	2	1,325	13
N. Tongass Hwy @ Beechwood Dr. - Pond Re..	3	1,246	13
Zimovia Hwy. @ Pat Creek - End	4	1,156	58
Egan Drive @ McNugget - Yandukin	5	1,093	4
N. Tongass Hwy @ Carlanna Creek Br. - Shor..	6	1,083	11
Sawmill Ck. Road @ Lake - Jeff Davis	7	1,060	12
Nordic Dr. @ Sing Lee Alley - Ferry Term	8	1,051	15
N. Tongass Hwy @ 1st waterfall Cr. - End	9	985	10
Halibut Pt. Road @ Granite Creek. - Harbor ..	10	876	8
Sawmill Ck. Road @ Thimbleberry Creek - Mill	11	834	9
N. Tongass Hwy @ N. Point Higgins - Big Tur..	12	806	9
N. Tongass Hwy @ Ward Lake Rd. - Mill Entr..	13	725	7
N. Tongass Hwy @ Rose's Caboose	14	588	6
Sawmill Ck. Road @ USPS - Rookies Night Club	15	495	6
Kaltian Ave. @ H.P.R. - Thompson Harbor	16	414	9
Lake St. @ Lake Street	17	366	4
Haugen Dr. @ Mitkof Hwy. - 6th Street	18	355	11
Riverside Dr. @ Vintage - James Blvd.	19	353	9
Zimovia Hwy. @ Wrangell Institute - Shoema..	20	328	16
Mendenhall Blvd. @ Mendenhall Loop - End	21	327	9
Riverside Dr. @ Vintage - James	22	306	7
Hoonah Airport Rd @ Ferry - Seaplane Float	23	303	21
Haugen Dr. @ 6th St. - Hammer	24	282	8
Glacier Highway - Egan @ Engineers Cutoff -..	25	234	12
Glacier Highway - Egan @ Waydelich Cr Br - ..	26	222	12
Glacier Highway - Egan @ Dotson's Landing -..	27	220	10
Katlian Ave. @ Thompson Harbor - Cold Stor..	28	197	5
Mitkof Hwy. @ Swan Observatory - Crystal L..	29	197	18
N. Douglas Hwy @ Fish Creek Bridge - Boat ..	30	192	19



Source: Analysis Alaska DOT&PF Annual Traffic Volume Reports

Air

Alaska has around 300 communities, of which only 100 are connected by the road network.[4] As a result, Alaska relies heavily on other modes of transportation for local freight transportation services. While ports can serve communities that are accessible by water, other communities can be reached only by air. There are around 1,100 airports in the state, including 26 Federal Aviation Administration (FAA) Part 139 public use airports and another 3,000 airstrips.

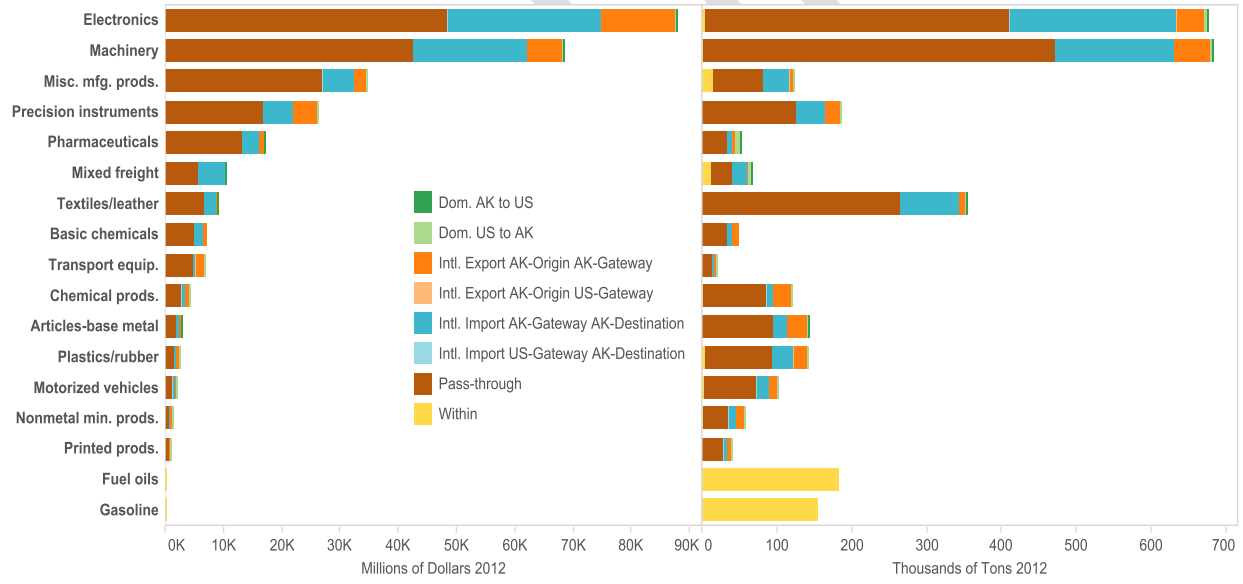
[4] Fried, N. and Keith, B. Alaska Economic Trends: Transportation, January 2005.

Commodity Flows by Air

As shown in Exhibit 28, the leading air cargo commodities by tonnage are electronics, machinery, miscellaneous manufactured products, and precision instruments. The majority of value, as previously described, is associated with trade flows between other states and other countries that use Alaska as a gateway. However, air cargo is clearly critical for shipping and receiving similar goods with an Alaska origin or destination, especially imported goods. Air cargo also plays a very critical and unusual role in distributing freight throughout Alaska, in that the main air cargo commodities moving within Alaska are fuel oils and gasoline. These are heavy, low-value commodities that in the lower 48 states rarely if ever move by air due to the high cost of air freight. However, for some Alaska communities, there is no alternative.

Rural communities throughout Alaska rely on air cargo shipments for basic consumer goods. The U.S. Postal Service's Bypass Mail Program delivers air freight at postal rates. This program operates mainly out of Fairbanks International Airport (FAI). Mail services are provided by a larger number of local airlines departing FAI and ANC. Many of these airlines are supported the Federal Essential Air Service Program. In 2013, the program served 43 communities in Alaska, representing 27% of all communities supported by the program in the U.S.

Exhibit 28: Air Shipments to, from, within, and through Alaska, 2012



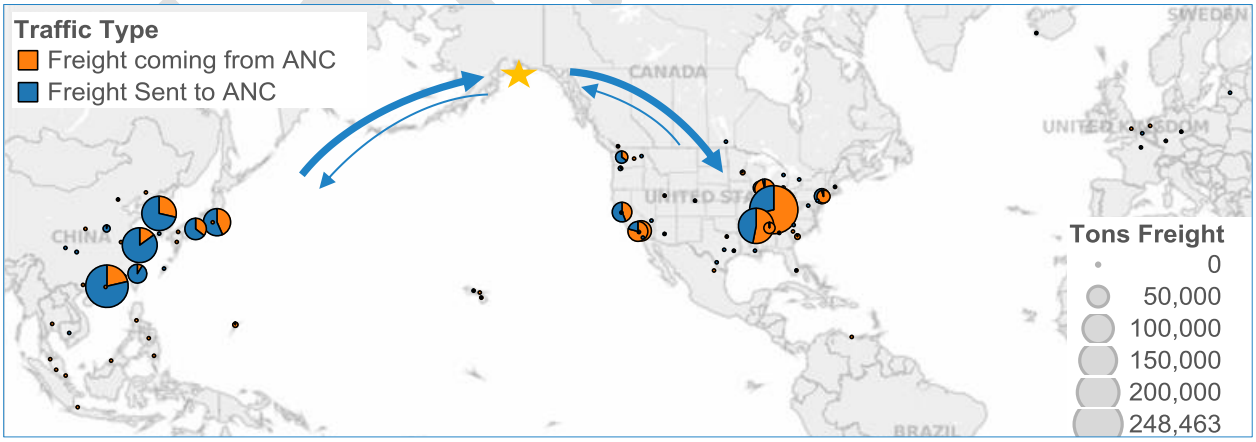
Source: Analysis of Freight Analysis Framework 3 data

Ted Stevens Anchorage International Airport

Alaska's largest airport is Ted Stevens Anchorage International Airport (ANC). ANC is owned and operated by DOT&PF. In 2011, ANC had the fourth-highest cargo volume in the world, according to the ranking produced by Airports Council International (ACI). In 2013, ANC had the second highest tonnage of all U.S. airports at 2,668,856 tons, trailing only Memphis International Airport, the global air hub of FedEx, according to ACI. Of this amount, an estimated 1,607,979 tons is associated with enplaned (loaded) and deplaned (unloaded) cargo; the other 1,060,877 tons are associated with cargo that lands and takes off again without being unloaded. This pass-through cargo is associated with international shipments that stop in Alaska only to refuel. ANC is located strategically between Asia and the U.S, as seen in Exhibit 29, serving as an excellent stopping point for these flights. Most of these shipments are going to the U.S, but the reverse route also contributes significantly to cargo landings. ANC publications note that ANC is located within 9.5 hours of 90% of the industrialized world.[5] Nearly all ANC international cargo flights have Asian origins or destinations. FAF data estimates higher pass-through air tonnage (more than 2 million tons), but this may reflect different treatment of freight passing through warehouse/distribution facilities or other differences.

For enplaned and deplaned cargo (which excludes freight that simply lands and takes off again), the top freight airlines at ANC in 2013 were UPS (606,572 tons), FedEx (336,884 tons), Alas Air (298,949 tons), Polar Air Cargo Airways (195,629 tons), and Alaska Airlines (39,393 tons). Of these, Alaska Airlines and a set of smaller airlines (Everts Air Cargo, Northern Air Cargo, Lynden Air Cargo, among others) provide air freight services within Alaska. ANC has significant traffic with other airports in Alaska; however, these shipments are critically important to remote areas that are often difficult to reach with other modes. Alaska's other cargo airports receive most of their freight via ANC.

Exhibit 29: Air Freight to/from ANC, Excluding Within-State Moves, 2013



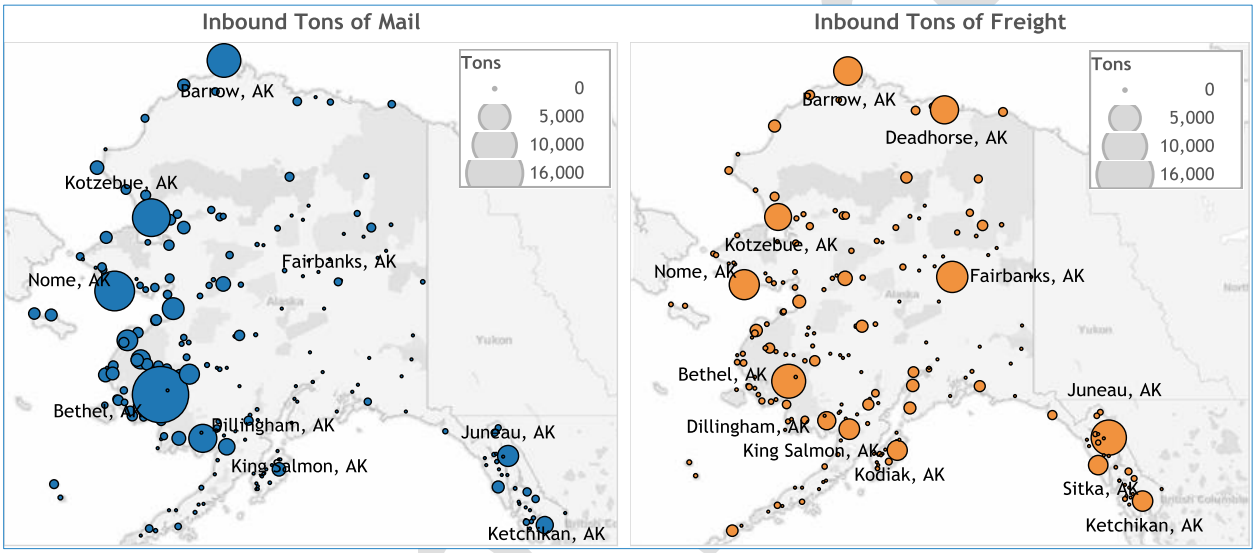
Source: Analysis of USDOT T-100 Air Cargo data

[5] Ted Stevens Anchorage International Airport, 2014 Master Plan Update.

Other Cargo Airports

Fairbanks International Airport (FAI) is the second-busiest airport in Alaska and the seventh-largest air cargo airport at 13,996 tons of enplaned and deplaned freight and mail (see Exhibit 31). It serves as a distribution hub for many communities in the interior, handling 60% more departing cargo than arriving cargo.[6] As with ANC, it is owned and operated by DOT&PF. Other airports handling over 10,000 tons of enplaned and deplaned mail and freight in 2013 include Bethel, Kotzebue, Nome, Deadhorse, Juneau, and Barrow (see Exhibit 30).

Exhibit 30: Inbound Tons of Mail and Freight in 2013, excluding ANC Airport



Source: Analysis of USDOT T-100 Air Cargo data

[6] DOT&PF, Economic Contributions of Alaska Airports: Fairbanks International.

Exhibit 31: Deplaned and Enplaned Freight and Mail, All Alaska Airports, 2013

		Deplaned (tons)		Enplaned (tons)		Total
		Domestic	International	Domestic	International	
1	Anchorage, AK	300,067	507,325	642,358	158,229	1,607,979
2	Bethel, AK	21,615		10,104	-	31,719
3	Kotzebue, AK	10,606	-	8,012	-	18,618
4	Nome, AK	12,306	-	5,358	10	17,674
5	Deadhorse, AK	4,039		11,040	-	15,079
6	Juneau, AK	8,297		6,353	-	14,650
7	Fairbanks, AK	5,079	81	8,682	154	13,996
8	Barrow, AK	9,602		2,243	-	11,845
9	Kodiak, AK	2,794		4,802	-	7,596
10	Dillingham, AK	5,427		1,522	-	6,949
11	Ketchikan, AK	3,407	-	2,310	-	5,717
12	Unalakleet, AK	3,051		2,382	-	5,433
13	Emmonak, AK	2,751		2,128	-	4,879
14	Sitka, AK	2,480		2,294	-	4,774
15	King Salmon, AK	3,317	-	1,292	-	4,609
16	Alpine, AK	2,536		1,653	-	4,189
17	St. Mary's, AK	2,211		1,935	-	4,146
18	Aniak, AK	2,398		1,708	-	4,106
19	Galena, AK	1,970		950	-	2,920
20	Togiak, AK	1,145		1,209	-	2,354
21	Cordova, AK	780		1,560	-	2,340
22	Unalaska, AK	1,091		1,170	-	2,261
23	Red Dog, AK	1,689		301	-	1,990
24	Yakutat, AK	477		1,397	-	1,874
25	Nixon Fork Mine, AK	1,335		362	-	1,697
	All Other	49,315	52	8,871	-	58,238
	Total	**459,785**	**507,458**	**731,996**	**158,393**	**1,857,632**

Source: Analysis of USDOT T-100 Air Cargo data

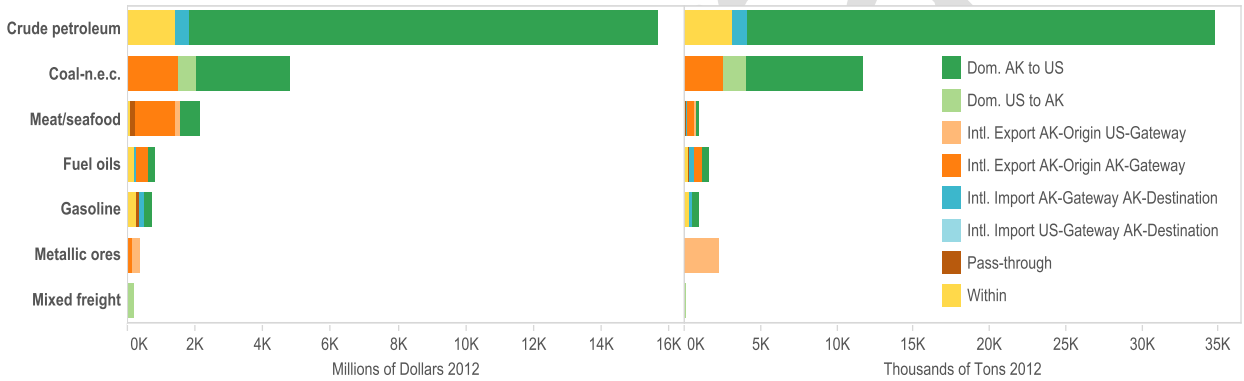
Marine

Waterborne transportation plays a central role in the movement of people and goods throughout Alaska. Around 84% of the population lives in coastal areas, with almost all major cities located on coastal shipping routes or navigable inland waterways. Alaska depends on water for trade with other states and countries, to export the state's products, and to receive critical supplies and consumer goods.

Commodity Flows by Water

As shown in Exhibit 32, the leading waterborne commodities by tonnage and value are crude petroleum, coal n.e.c., seafood, and ores, moving outbound primarily to other states or global markets. However, water is also critically important in receiving inbound containerized goods from U.S. and foreign ports. FAF understates the importance of water with respect to inbound containers and is actually reporting that tonnage and value in the category of "multiple modes and mail." Finally, water is important for the movement of bulk materials, primarily petroleum, domestically within Alaska.

Exhibit 32: Water Shipments to, from, within, and through Alaska, 2012



Source: Analysis of Freight Analysis Framework 3 data

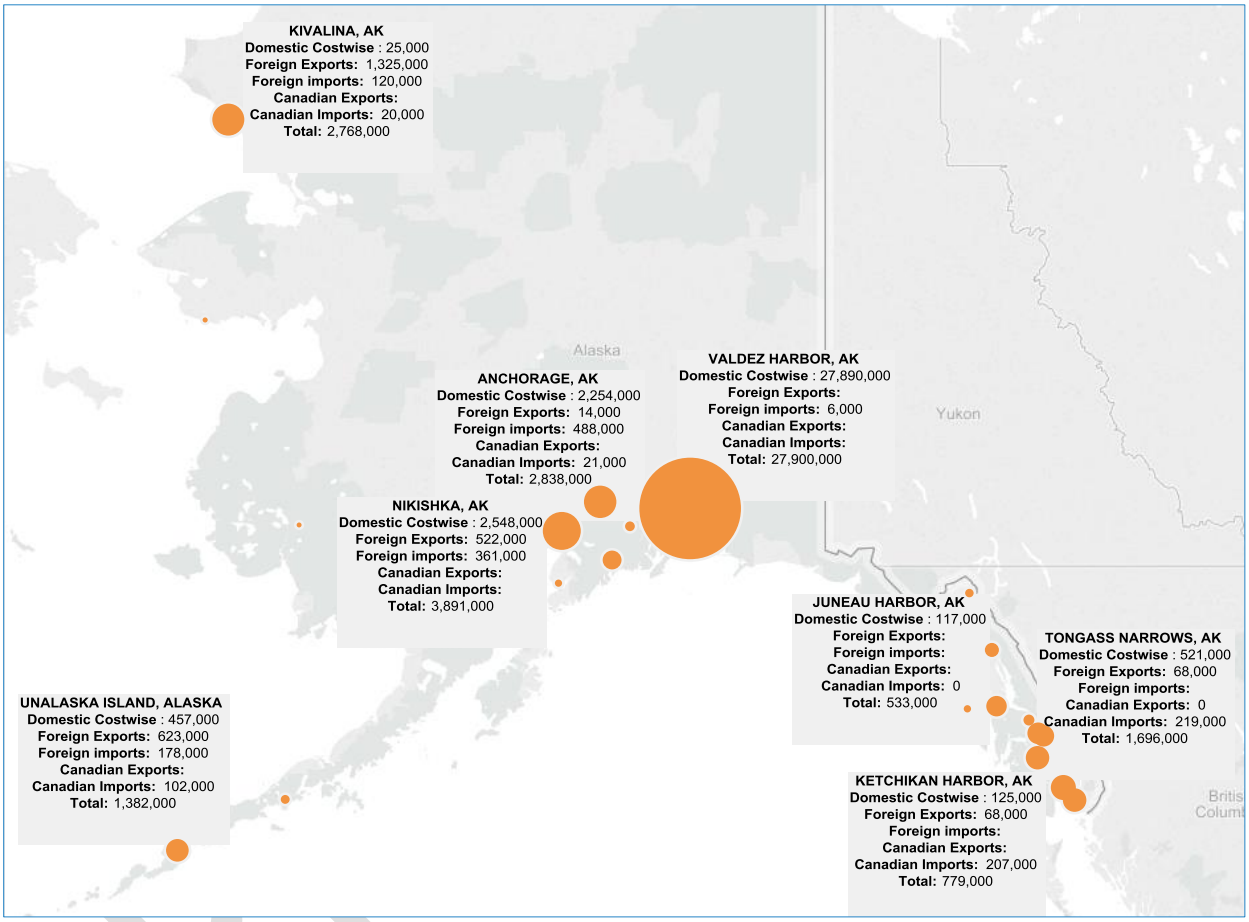
Waterborne transportation is critical for the entire state but especially for communities and regions with ocean-oriented economies. In the Southeast Region, around 26% of all employment income comes directly from marine trades, particularly from fishing and related activities.[7] This represents the bulk of exports and plays a central role in the economy. Marine transportation is the primary way that products enter and leave the region. Freight barges bring around 90% of the goods consumed, and on return trips they carry fish and other exports. In the Southwest the seafood industry is the largest sector of the economy and is responsible for the majority of private jobs. Much of the marine economy in this area revolves around the Aleutian Islands, which is home to the largest fishing port in the U.S. at Dutch Harbor.

[7] The Maritime Economy of Southeast Alaska, Southeast Conference, 2013

Port Locations and Tonnages

Just as ANC has a dominant share of tonnage for Alaska's air cargo, the Port of Valdez has a dominant share of tonnage for Alaska's waterborne freight. However, as with airports, each of Alaska's marine ports plays a critical role in serving local and regional transportation needs. Major port locations and tonnages are shown in Exhibit 33 and Exhibit 34.

Exhibit 33: Locations of Major Ports by Tonnage, Excluding Internal/Local Moves, 2012



Source: Analysis of U.S. Army Corps of Engineers Waterborne Commerce of the U.S. data

Exhibit 34: Alaska Port Tonnages, 2012

Name	Foreign Imports	Foreign Exports	Canadian Imports	Canadian Exports	Domestic Coastwise	Internal and Local	Total
Valdez Harbor	6,000				27,890,000	4,000	27,900,000
Nikiski	361,000	522,000			2,548,000	460,000	3,891,000
Anchorage	488,000	14,000	21,000		2,254,000	61,000	2,838,000
Kivalina (Red Dog Mine)	120,000	1,325,000	20,000		25,000	1,278,000	2,768,000
Tongass Narrows		68,000	219,000	0	521,000	888,000	1,696,000
Revillagigado Channel		68,000		212,000	515,000	704,000	1,499,000
Clarence Strait		135,000		7,000	645,000	699,000	1,486,000
Unalaska Island (including Dutch and Iliuliuk Harbors)	178,000	623,000	102,000		457,000	22,000	1,382,000
Sumner Strait		2,000		0	647,000	608,000	1,257,000
Wrangell Narrows		2,000	0		452,000	773,000	1,227,000
Seward Harbor	4,000	890,000			66,000	0	960,000
Chatham Strait		79,000	5,000	0	572,000	300,000	956,000
Ketchikan Harbor		68,000	207,000		125,000	379,000	779,000
Icy Strait		149,000		16,000	574,000	21,000	760,000
Stephens Passage				0	188,000	543,000	731,000
Juneau Harbor			0		117,000	416,000	533,000
Lynn Canal		27,000		11,000	119,000	319,000	476,000
Petersburg Harbor		2,000	0		0	320,000	322,000
Whittier Harbor			27,000		184,000	43,000	254,000
Kodiak Harbor		47,000	0		166,000	0	213,000
Skagway Harbor		27,000	11,000		23,000	133,000	194,000
Valdez Harbor (Small Boat Harbor)					152,000	0	152,000
Sitka Harbor			26,000		6,000	112,000	144,000
Homer	98,000				8,000	34,000	140,000
All Other	13,000	68,000	0	0	319,000	189,000	589,000
Total	**1,268,000**	**4,116,000**	**638,000**	**246,000**	**39,061,000**	**8,950,000**	**54,279,000**

Source: Analysis of U.S. Army Corps of Engineers Waterborne Commerce of the U.S. data

Port of Valdez

Alaska's main trade flow is the export of crude petroleum by sea. The Port of Valdez handles 92% of Alaska's crude petroleum exports; this makes the port central to Alaska's economy, as crude petroleum exports account for 43% of all exports and imports by value and 65% by tonnage. The Trans-Alaska Pipeline moves oil from the Prudhoe Oil Field to the Port of Valdez to be shipped to refineries in the U.S., mainly in California and Washington State.

Port of Anchorage

The Port of Anchorage is Alaska's main consumer goods port. In addition, the Department of Defense designated it as a Strategic Seaport (there are only 19 in the U.S.) because it plays an important role in mobilizing and replenishing the nearby military bases of Joint Base Elmendorf-Richardson and Wainwright, especially for jet fuel (delivered from the port by pipeline). The Port of Anchorage has two Petroleum and Lubricants docks and three General Cargo berths. The Port of Anchorage handles 2.3 million tons of liquid bulk each year, primarily refined petroleum products. The majority of aviation fuel for Ted Stevens Anchorage International Airport (around 66%) enters through the port and is delivered to the airport via direct pipeline. Overall more goods enter Alaska through this port than exit. Aside from petroleum products, the port also imports considerable quantities of groceries, manufacturing equipment, lumber, vehicle parts, cement, and other goods (see Exhibit 35).

Exhibit 35: Top Commodity Flows through Port of Anchorage, 2012

	Inbound (tons)		Outbound (tons)	
Top Commodities	Foreign Imports	Coastwise (U.S. domestic)	Foreign Exports	Coastwise (U.S. domestic)
Manufactured Products	2,000	1,019,000		129,000
Gasoline	216,000	422,000		25,000
Groceries		210,000		1,000
Kerosene	132,000			
Vehicles and Parts	3,000	94,000	0	18,000
Cement and Concrete	115,000	0		0
Lumber		98,000		2,000
Iron and Steel Scrap		0		34,000
Lube Oil and Greases		28,000		5,000
Fab. Metal Products	16,000	15,000	0	1,000
Misc. Mineral Products		29,000		1,000
Distillate Fuel Oil		7,000		5,000

Source: Analysis of U.S. Army Corps of Engineers Waterborne Commerce of the U.S. data

Other Higher-Volume Ports

Other higher-volume ports with key roles in freight transportation in Alaska include the Port of Seward, the Port of Nikiski, the Port of Kivalina, and the Ports of Unalaska. In the Southeast Region, numerous ports link populations in Ketchikan and Juneau, although these are mostly for personal transportation and handling of inbound shipments for local consumption. The following are of note:

- The majority of tonnage at Nikiski is petroleum moving in coastwise domestic trades.
- The Port of Kivalina handles outbound shipments of smelted products and non-ferrous ores, accounting for 1.1 million tons and 1.2 million tons, respectively, in 2012. Almost all of the non-ferrous ores are transported domestically, while the smelted products are shipped to foreign countries. This port also plays a key role in the importation of distillate fuel oils from Canada and other sources, adding up to 210,000 tons in 2012.
- The two main ports of Unalaska, at Dutch Harbor and Iliuliuk, serve primarily to export seafood products to foreign countries and import distillate fuel oils to power fishing boats and heat homes.
- Seward is specialized in exports of coal lignite brought from the Usibelli coal mine by the Alaska Railroad, which accounted for 890,000 tons in 2012, shipped almost entirely to foreign countries.

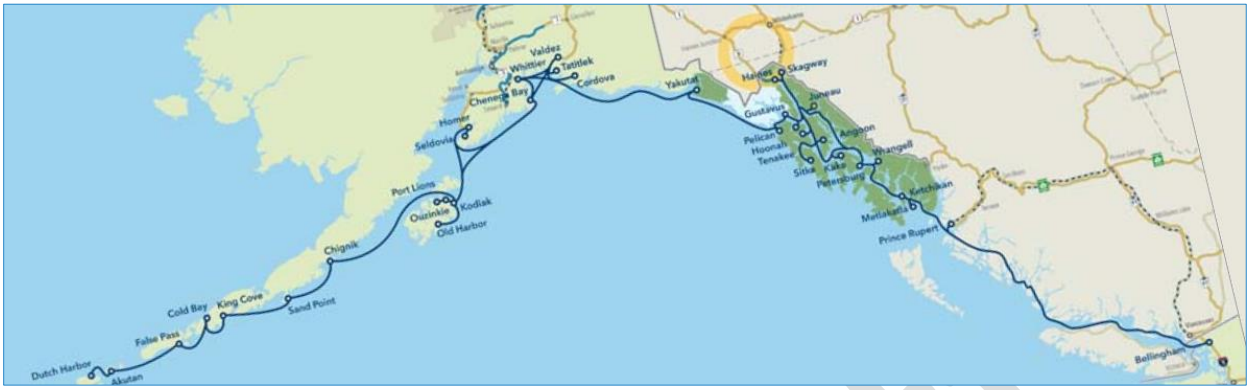
A wider network of public and private ports service communities all around Alaska and is just as vital as the larger ports. One source estimated that they numbered 240 in the Southeast Region and 236 in the Central Region.[8] Typically, these ports consist of wharves or piers where barges or vessels can be tied up, and facilities (cranes, pumps, conveyors, etc.) for loading or unloading freight to covered or uncovered storage areas.

Alaska Marine Highway System

The Alaska Marine Highway System (AMHS) is a ferry system operated by DOT&PF that serves Alaska and connects to the lower 48 states (see Exhibit 36). The AMHS primarily carries walk-on passenger traffic, autos, and bicycles, but it also carries trucks, serving as a "floating bridge" between distant waterfront communities.

[8] Fay, G., Schworer, T., Guettabi, M. and Armagost, J., 2013. Analysis of Alaska Transportation Sector to Assess Energy Use and Impacts of Price Shocks and Climate Change Legislation, Institute of Social and Economic Research, University of Alaska Anchorage

Exhibit 36: Alaska Marine Highway System



Source: Alaska DOT&PF

Today the AMHS has 11 vessels that stop at 32 ports stretched over 3,700 miles of coastline. For the last 10 years AMHS has carried, on average, over 317,000 passengers, over 104,000 vehicles, and over 3,400 freight vehicles per year. The system is funded one-third by operational revenues and two-thirds by subsidies from the Alaskan Government. In the Southeast Region, the AMHS is the primary mode for providing transportation between many communities.

Rail

The Alaska Railroad Corporation transports both freight and people through the central region of the state. It connects Fairbanks to the Ports of Seward and Whittier, passing through Anchorage (see Exhibit 38). The railroad consists of 470 miles of standard gauge track and an additional 40 miles of branch lines and sidings (it is a Class II railroad). At Whittier, rail barges (barges with rail tracks, allowing railcars to be rolled on and off) continue all the way to Seattle, making many stops along the way; what the AMHS is for trucks, this service is for railcars. At Seward there are large freight facilities for loading cargo ships.

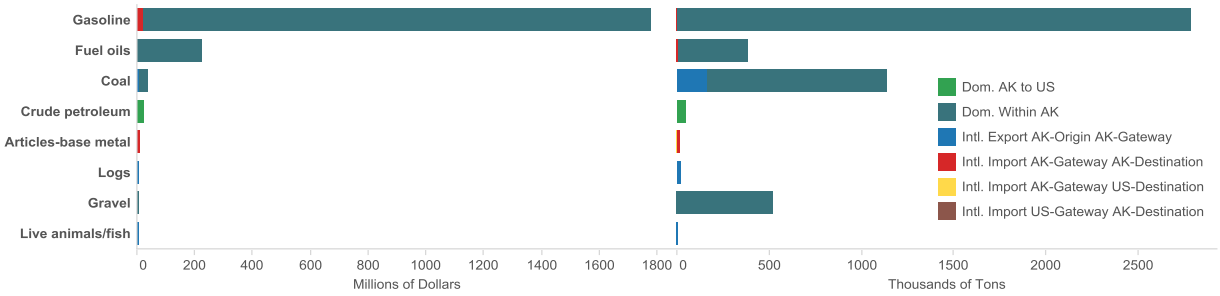
This is Alaska's most important railroad, and it has its origins when Congress passed legislation in 1914 seeking to build a railroad that connected the interior of the state to an ice-free port in the south, allowing for the commercialization of coal and other mineral resources. This project accelerated the economic development of the state and led to Anchorage forming where the rail headquarters was located. The railroad was purchased by the state from the federal government in 1985 and was converted into a state-owned enterprise.

Most of the business of the Alaska Railroad comes from the movement of freight, representing 80% of its operating revenues (not considering grants). The top commodities moved in 2013 were sand and gravel (2.0 million tons), coal (1.4 million tons), petroleum products (947,000 tons), chemicals (155,000 tons), and intermodal (104,000 tons).[9] Most of this coal comes from the Usibelli coal mine located near Fairbanks and is then taken by rail to the Port of Seward which has a specialized coal-handling terminal. The railroad also moves a significant quantity of petroleum, but this has declined because of decreasing

[9] DOT&PF, Alaska State Rail Plan, Draft, October 2014

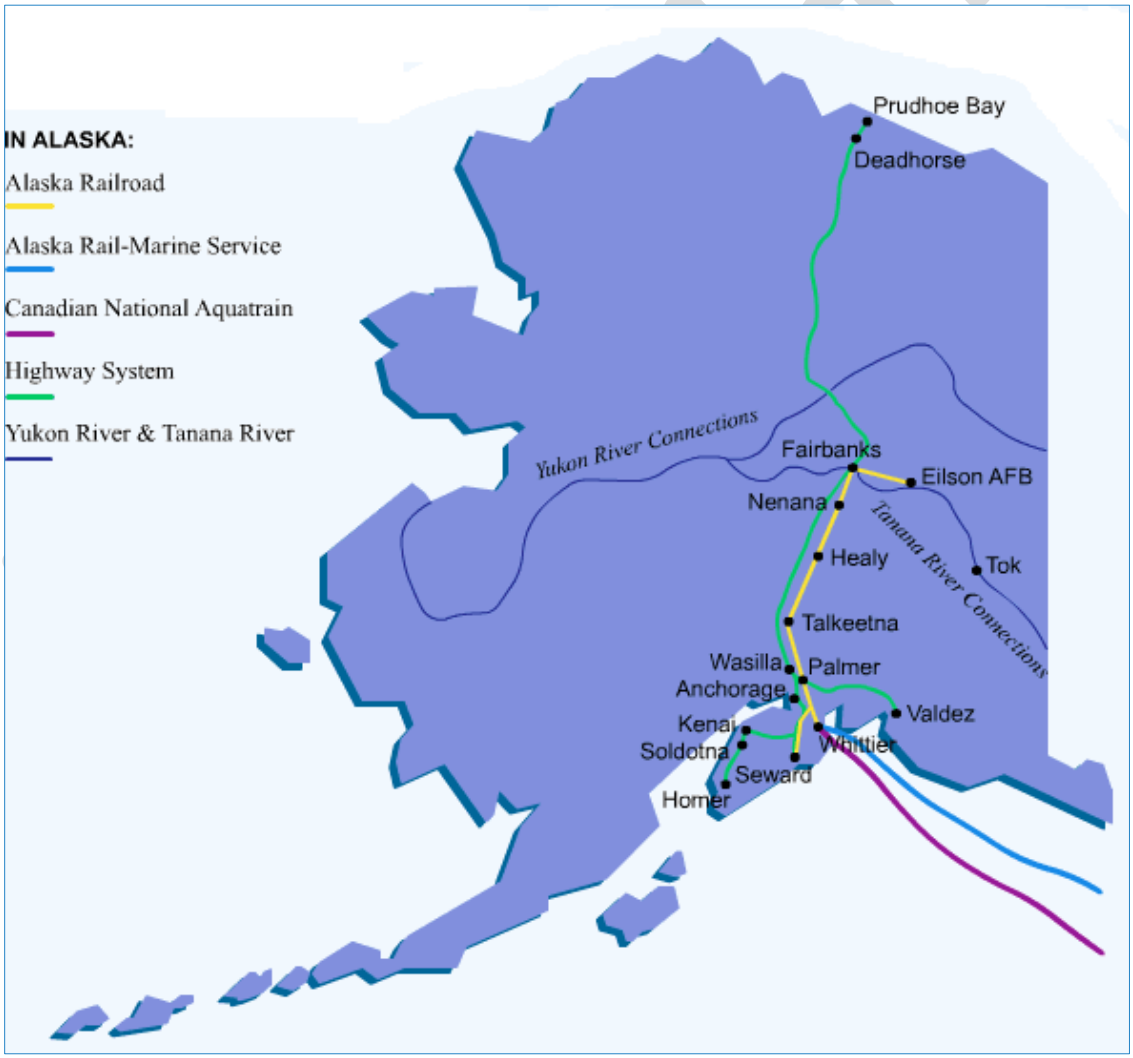
extraction. The railroad also moves a significant quantity of petroleum, but this has declined because of decreasing extraction; note that in 2012, the USDOT Freight Analysis Framework showed much higher volumes for petroleum, and much lower volumes for sand and gravel (Exhibit 37).

Exhibit 37: Rail Shipments to/from and within Alaska by Tons and Value, 2012



Source: Freight Analysis Framework 3

Exhibit 38: The Alaska Railroad



Source: Alaska Railroad Corporation

Pipelines

For any cargo that flows, pipelines are a very efficient way to move large quantities over long distances. Alaska's most well-known pipeline, the Trans-Alaska pipeline, is operated by the Alyeska Pipeline Service Company and was commissioned in 1977 to link the Prudhoe Bay Oil Fields in northern Alaska to the Port of Valdez in the Pacific (see Exhibit 39). It is one of the largest pipelines in the world, spanning 800 miles and having a diameter of 48 inches. Oil shipments though this pipeline peaked in 1988 at 2 million barrels a day and have been declining since; in 2012, volume was 548,000 barrels per day (source: www.alyeskapipeline.com).

Exhibit 39: Map of Trans-Alaska Pipeline

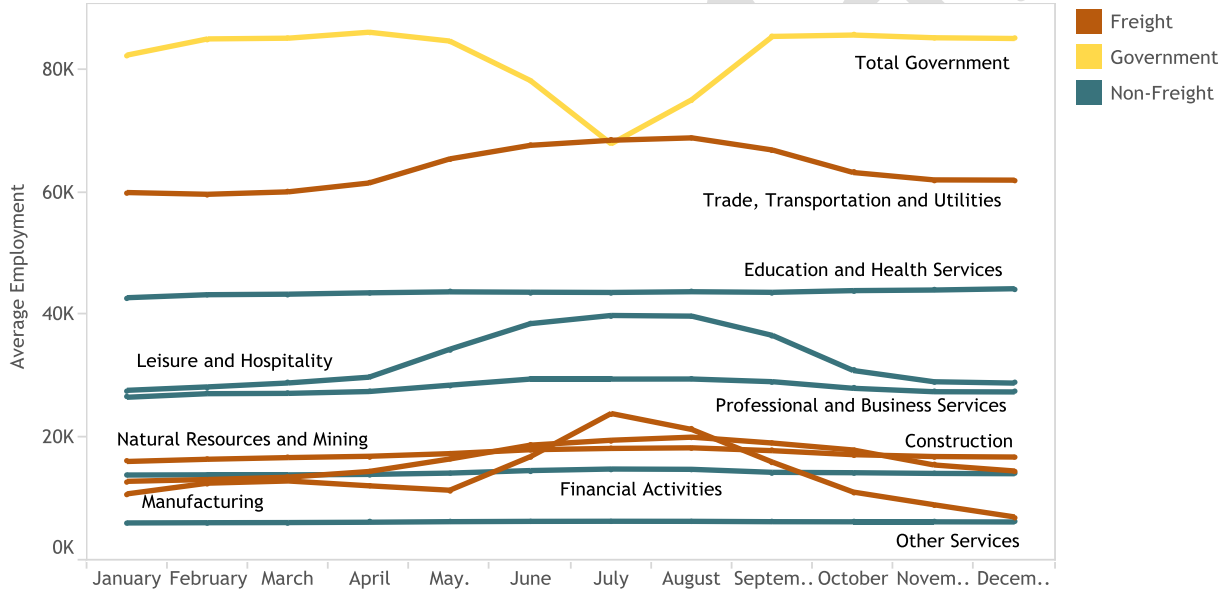
Source: www-tc.pbs.org/wgbh/amex/pipeline/map/map.gif

Seasonal Variations in Modal Activity

Alaska's freight movement is highly seasonal due to production and employment cycles, as well as changes in the availability of key infrastructure, especially roads and waterways.

Alaska's severe winters have a large impact on the composition of the economy throughout the year. As can be seen in Exhibit 40, government activity declines in summer; leisure and hospitality employment increases in summer, with other professional services remaining relatively constant; and freight-intensive industries show a general increase in summer, with a fairly dramatic spike in manufacturing largely due to commercial fishing and processing, timber harvesting, and other seasonal activities. The highly seasonal nature of Alaska's economy means that freight transportation demand and requirements are seasonal as well. Imports of consumer goods decrease in winter as the state's population decreases, but imports of heating fuel and other sources of energy increase; materials to support tourism and leisure activities are most needed in summer.

Exhibit 40: Seasonality of Employment by Industry, Averaged 2009 to 2013

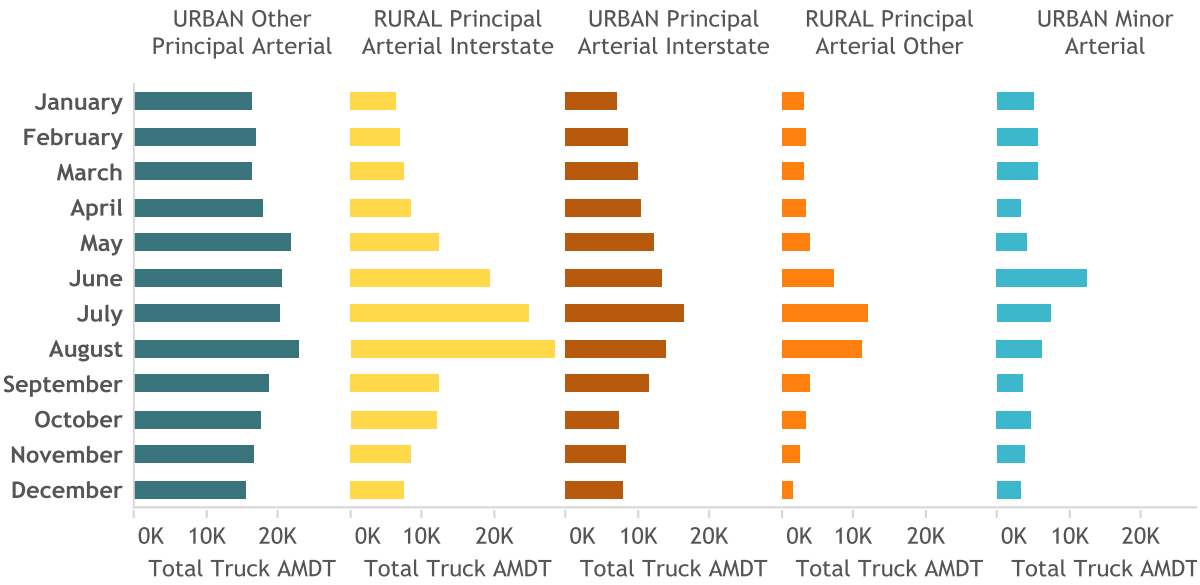


Source: Analysis of Alaska Department of Labor and Workforce Development data

The transportation infrastructure available to meet seasonally fluctuating freight needs is also variable. In warmer months, coastal and river communities can be reached by barge shipments of fuel and other heavy bulk commodities; in colder months, when ports and rivers freeze, these communities may be reachable only by air. Trucking in Alaska is also highly seasonal, partly in response to changes in demand and partly due to the availability of roads. During spring (April to June), it is necessary to restrict the weight of trucks passing through certain road segments. The thawing process during this time of the year makes the subgrade vulnerable to heavy loads, reducing the life of the road. Truck weight is usually restricted by 75% to 85%. The Dalton Highway was reconstructed to minimize the type of weight restrictions required. However, some remote communities and industrial production sites are reachable only in colder months when ice roads can be constructed across tundra and frozen waterways. Overall,

the least seasonal fluctuations occur on urban roads where demand is largely driven by the needs of urban populations and movements to and from major gateway facilities, and where roads in good condition are typically available all year. The most seasonal fluctuations occur on rural roads where demand is largely driven by industrial production with seasonal peaking characteristics. Exhibit 41 reports average monthly truck trips by different road classifications for the Central Region.

Exhibit 41: Seasonality of Trucking in the Central Region (2010, 2011, and 2012)



Source: Analysis of Alaska DOT&PF Annual Traffic Volume Reports

CRITICAL FREIGHT TRENDS

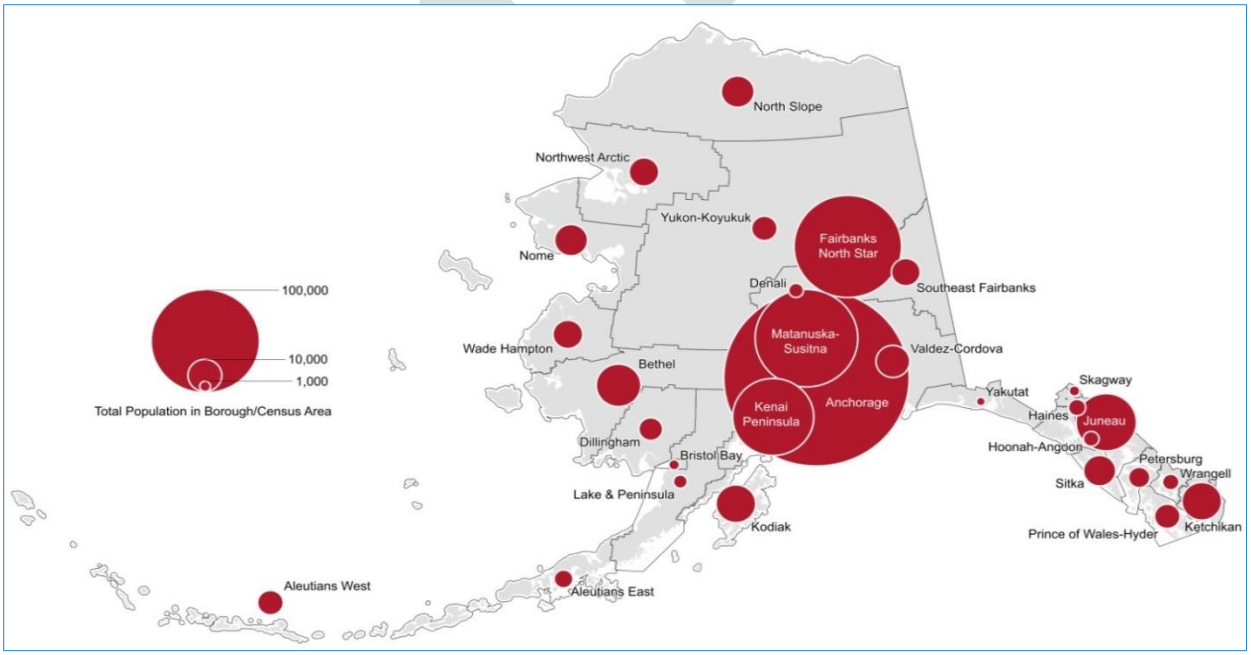
Alaska's freight demand drivers are affected by critical trends. This plan is based on the high likelihood that the primary trends experienced in recent years affecting freight will continue. These trends include a growing population that is increasingly concentrated in urban areas; rising overall industrial production but high uncertainty regarding future energy production; and increasing seasonal/annual variability in demand due to climate change and other factors. Critical trends, acting on and over Alaska's freight transportation network, lead to changes in system performance and create both needs and opportunities.

In this section of the Freight Element, critical statewide and modal trends are examined using available state and federal data to identify possible effects on the freight drivers identified in the *Freight Demand Drivers* section and the *Freight System Elements* section. In particular, potential changes in the ways that freight demand will need to be accommodated in the future are identified.

Population Growth will Drive Increased Consumption

Alaska's consuming population is expected to grow and to be increasingly concentrated in larger urban areas, consistent with economic opportunity (see Exhibit 42). This will increase the demand for urban freight deliveries of consumer goods, resulting in more freight tonnage and (especially) more truck movement.

Exhibit 42: Alaska Population by Borough/Census Area



Source: Analysis of Alaska Department of Labor and Workforce Development Research and Analysis Section data

In 2012, Alaska's population of over 730,000 lived predominantly in urban areas scattered throughout the vast geography of the state. Only two cities have more than 50,000 people—Anchorage and Fairbanks—but 66% of all Alaskans live in areas designated by the Census Bureau as Urban. By 2042, Alaska's population is projected to exceed 925,000. Alaska will add nearly 193,000 residents, and 88% of the added growth will be in three regions: Mat-Su Borough, Anchorage, and Fairbanks North Star Borough (see Exhibit 43).

Exhibit 43: Projected Alaska Population Growth, 2012 to 2042

2012 Rank	Area	2012	2042	Added	% Change	Growth Rate
	Alaska Total	**732,298**	**925,042**	**192,744**	**26%**	**0.8%**
3	Matanuska-Susitna Borough	93,801	166,338	72,537	77%	1.9%
1	Anchorage Municipality	298,842	364,871	66,029	22%	0.7%
2	Fairbanks North Star Borough	100,343	132,030	31,687	32%	0.9%
4	Kenai Peninsula Borough	56,756	65,647	8,891	16%	0.5%
6	Bethel Census Area	17,600	23,696	6,096	35%	1.0%
15	Southeast Fairbanks Census Area	7,218	11,112	3,894	54%	1.4%
14	Wade Hampton Census Area	7,700	11,400	3,700	48%	1.3%
10	Nome Census Area	9,869	12,997	3,128	32%	0.9%
13	Northwest Arctic Borough	7,716	9,926	2,210	29%	0.8%
5	Juneau, City and Borough	32,832	33,617	785	2%	0.1%
7	Kodiak Island Borough	14,041	14,435	394	3%	0.1%
19	Dillingham Census Area	4,988	5,341	353	7%	0.2%
26	Lake and Peninsula Borough	1,673	1,779	106	6%	0.2%
28	Skagway Municipality	961	1,005	44	5%	0.1%
11	North Slope Borough	9,727	9,757	30	0%	0.0%
22	Haines Borough	2,620	2,649	29	1%	0.0%
21	Aleutians East Borough	3,227	3,120	(107)	-3%	-0.1%
29	Yakutat, City and Borough	622	459	(163)	-26%	-1.0%
23	Wrangell, City and Borough	2,448	2,243	(205)	-8%	-0.3%
27	Bristol Bay Borough	987	779	(208)	-21%	-0.8%
17	Aleutians West Census Area	5,881	5,639	(242)	-4%	-0.1%
25	Denali Borough	1,871	1,609	(262)	-14%	-0.5%
16	Prince of Wales-Hyder Census Area	6,439	6,027	(412)	-6%	-0.2%
24	Hoonah-Angoon Census Area	2,210	1,534	(676)	-31%	-1.2%
20	Petersburg Borough	3,269	2,574	(695)	-21%	-0.8%
12	Sitka, City and Borough	9,084	8,300	(784)	-9%	-0.3%
9	Valdez-Cordova Census Area	9,953	8,985	(968)	-10%	-0.3%
8	Ketchikan Gateway Borough	13,938	12,762	(1,176)	-8%	-0.3%
18	Yukon-Koyokuk Census Area	5,682	4,411	(1,271)	-22%	-0.8%

Source: Analysis of Alaska Department of Labor and Workforce Development Research and Analysis Section data

This urbanization trend has been primarily driven by two factors. One is that the population of Alaska is getting older. The number of people over 65 is expected to triple by 2035, and the majority of them will live in or around Anchorage, which will see the fastest growth of senior population in the state. Older people are settling in Anchorage because it offers better health services and conveniences. The other factor driving urbanization is economic opportunity. Cities are seeing the fastest job creation rates in the state, and they often have much lower costs of living. In Matanuska-Susitna, the availability of affordable land and housing combined with its proximity to Anchorage has made it an attractive place to settle.

These demographic trends will have a large and specific impact on freight infrastructure in Alaska. The consumption of goods will likely increase in proportion to population growth. This means significant growth in consumer goods entering Alaska, primarily via the Port of Anchorage and Ted Stevens Anchorage International Airport; significant growth in urban freight delivery activities in Anchorage, Mat-Su, and Fairbanks; and significant growth in distribution links (primarily truck and air) between Anchorage and Mat-Su, Fairbanks, and other Alaska communities.

Most of the remote communities along the Bering Sea are forecast to see their populations increase. By 2035, the Bethel Census Area will have increased by 29%, Wade Hampton by 40%, Nome by 26%, and Northwest Artic by 24%. While the total number of people migrating might not be large in the aggregate, as a percentage it is significant.

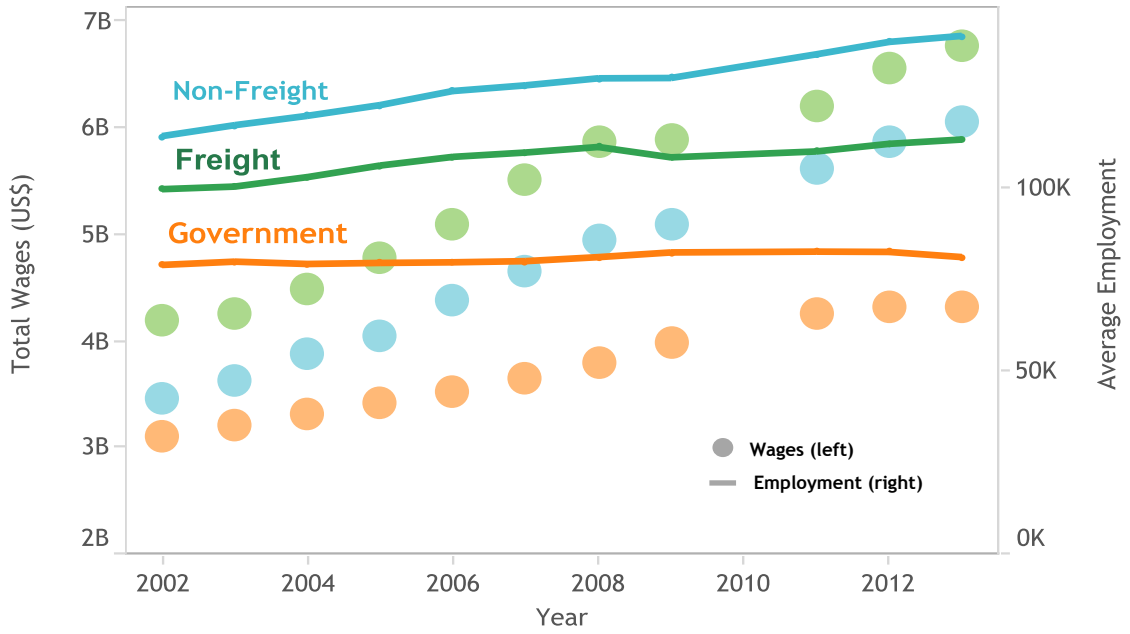
However, the Southeast Region of Alaska is expected to see decreases in population. Although the projected decreases are small in absolute terms, they are large in percentage terms because the population base is small. These communities will continue to require effective freight services and connections, but planning for these communities does not need to accommodate increasing levels of consumer demand for freight, although some may need to accommodate increased levels of produced commodities.

Overall Growth in Freight-Intensive Industries

Alaska's overall economy and its freight-intensive industries will continue to expand, creating increased demand for the movement of inbound, outbound, and within-state goods movement. This will create increased volumes of freight by all modes, in both urban areas (where gateway and logistics facilities are located) and in rural areas (where resource extraction and other freight activities are located).

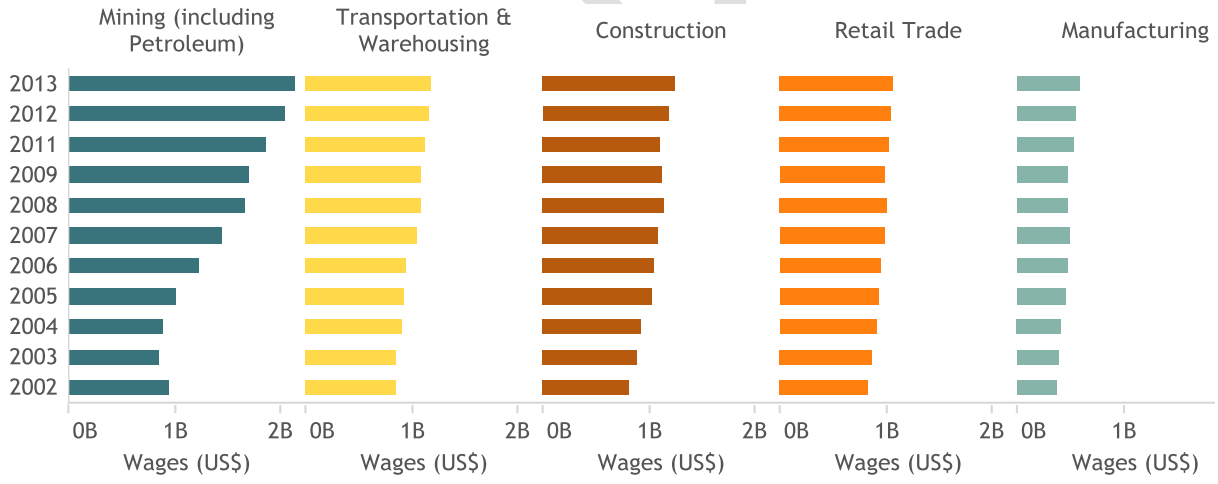
Over the past 10 years, employment growth in Alaska has been driven largely by non-freight-intensive industries (as defined previously in Exhibit 5). While the number of jobs in freight-intensive industries has grown only modestly since 2002, freight-intensive industries have been and remain the leading source of wages in Alaska. Since 2002, total wages in the transportation, construction, retail, and manufacturing sectors have grown modestly, while total wages in the mining sector have nearly doubled (see Exhibit 44 and Exhibit 45).

Exhibit 44: Total Non-Freight, Freight, and Government Wages (left axis) and Employment (right axis) by Sector, 2002 to 2013



Source: Analysis of Alaska Department of Labor and Workforce Development Research and Analysis Section data

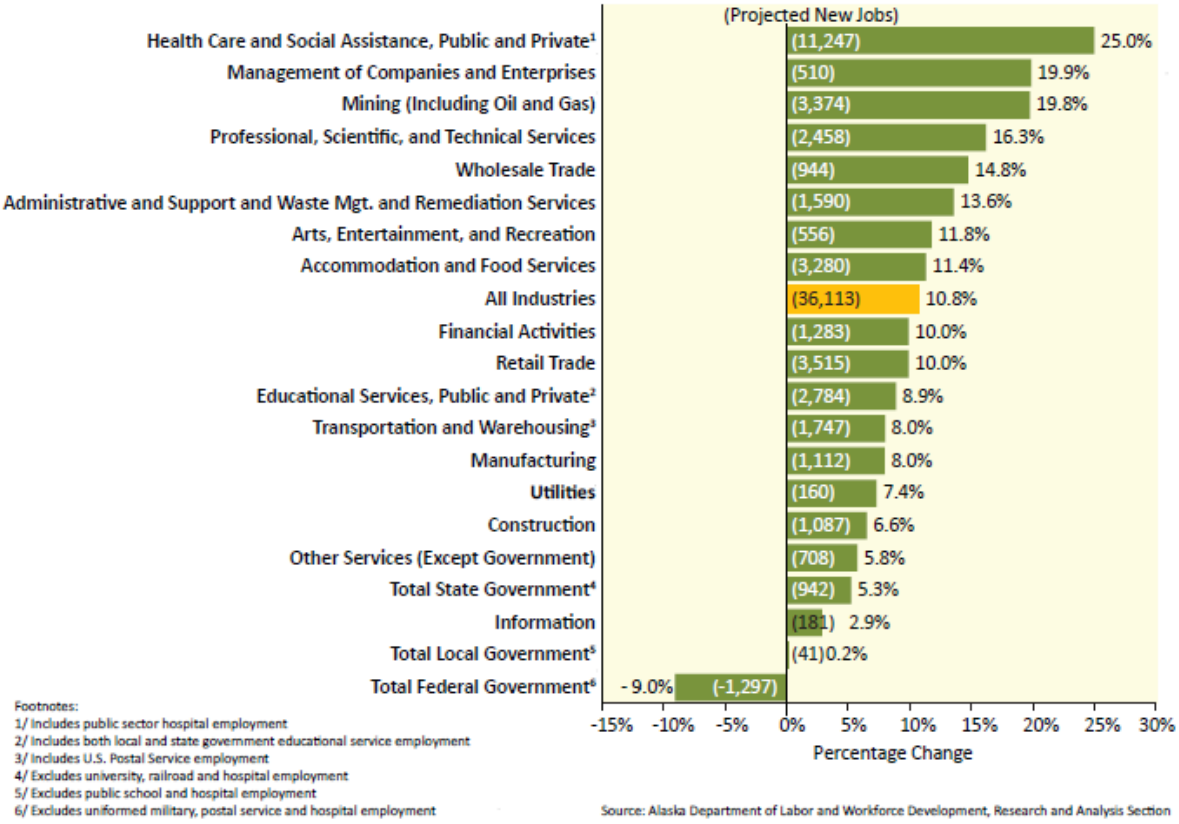
Exhibit 45: Composition of Total Wages in Freight Intensive Industries, 2002 to 2013



Source: Analysis of Alaska Department of Labor and Workforce Development Research and Analysis Section data

Looking ahead to 2022, Alaska is projected to add 36,113 new jobs, a 10.8% increase over 2012. An estimated 11,939 new jobs will be in freight-intensive industries. Mining is projected to see especially strong growth (3,374 jobs representing a 19.8% increase). Wholesale trade, retail, transportation and warehousing, manufacturing, utilities, and construction are projected to grow by 6.6% to 14.8% (see Exhibit 46).

Exhibit 46: Alaska 2012 to 2022 Industry Projections (New Jobs and Percentage Change)



Source: Alaska Department of Labor and Workforce Development Research and Analysis Section graphic

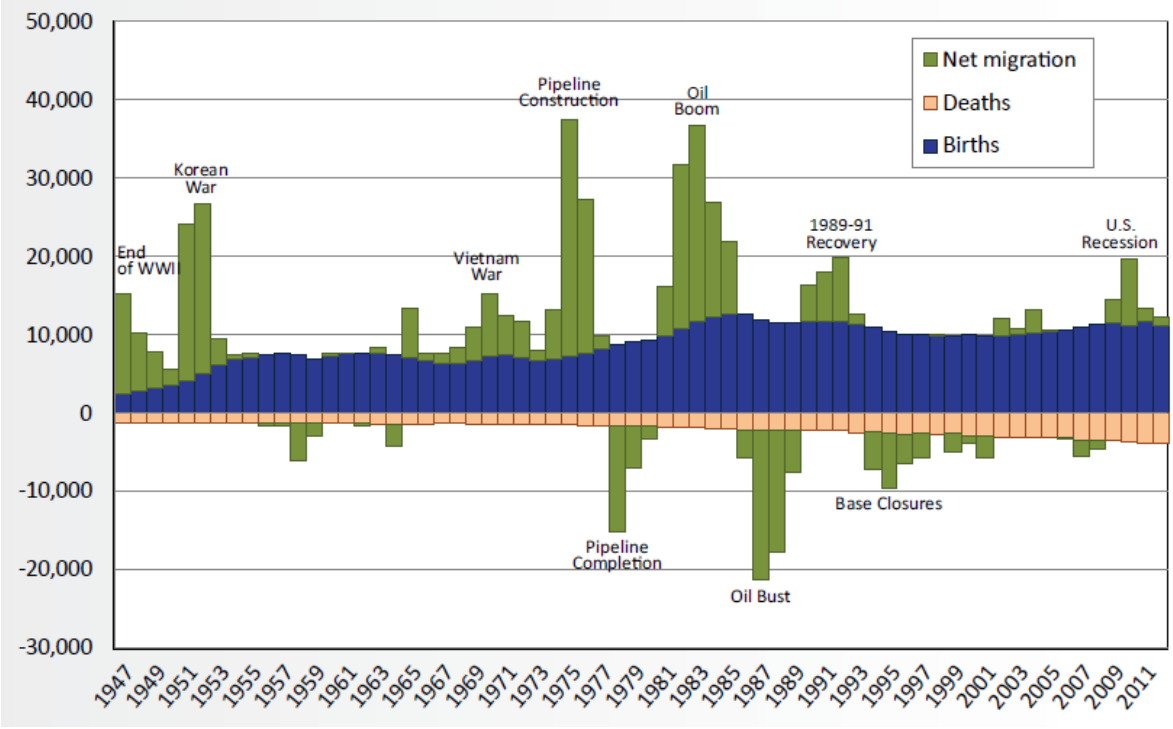
Changes in Resource Development Industries

The future levels and economics of energy and other resource production will have large impacts on transportation planning and freight demand in particular. For example, if energy production slows significantly, it could not only reduce the flow of resource commodities within and outbound from Alaska, but also reduce in-migration and population growth, with the additional effect of flattening demand for inbound consumer goods. Alternatively, if resource production increases rapidly, it may require the rapid development of new transportation capacity, such as pipelines or ports, not only to handle increasing volumes of resource commodities, but also to meet the consumer needs of a rapidly expanding workforce.

Impacts on Population

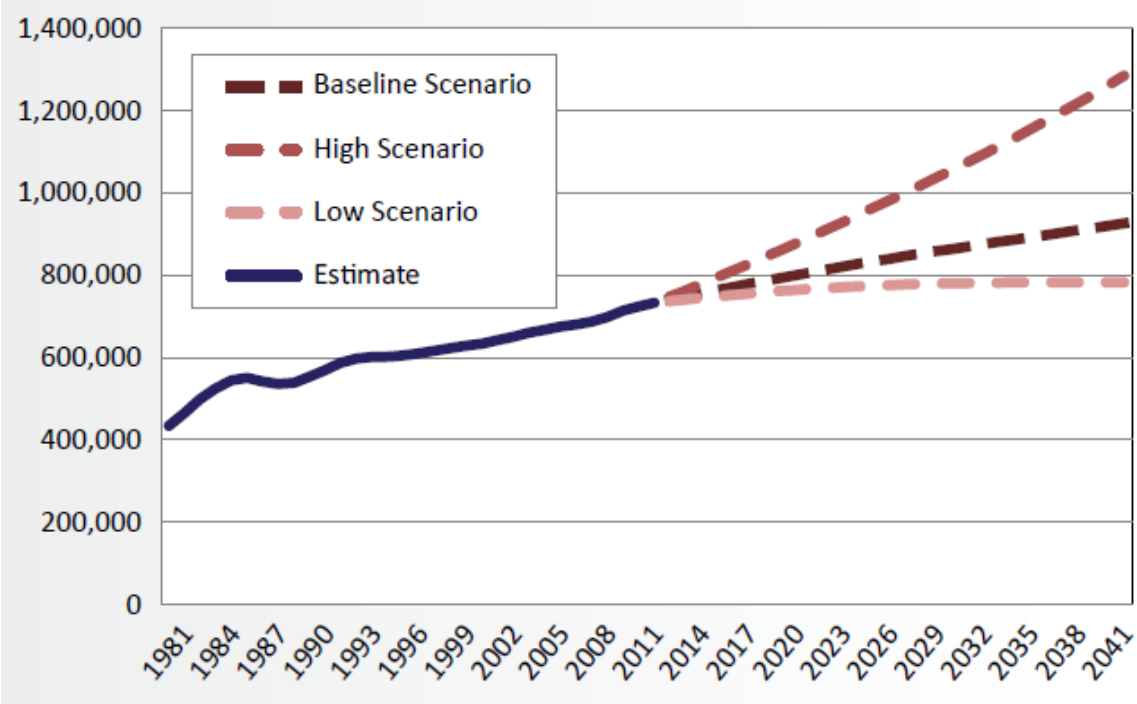
Historically, large swings in Alaska's population have been directly linked to resource development. This is clearly shown in an interesting graphic prepared by the Alaska Department of Labor (see Exhibit 47). There are actually three forecasts for Alaska population growth: a baseline forecast (discussed in the *Population Growth will Drive Increased Consumption* section) that assumes stable migration; a high forecast that assumes more in-migration in response to rising economic opportunity; and a low forecast that assumes more out-migration in response to declining economic opportunity (see Exhibit 48). Resource development is a proven driver for migration, so to some extent, Alaska's population will reflect the vitality of its resource industries.

Exhibit 47: Alaska Population Trends and Migration Events



Source: Alaska Department of Labor and Workforce Development Research and Analysis Section graphic

Exhibit 48: Population Growth Alternative Scenario Projections



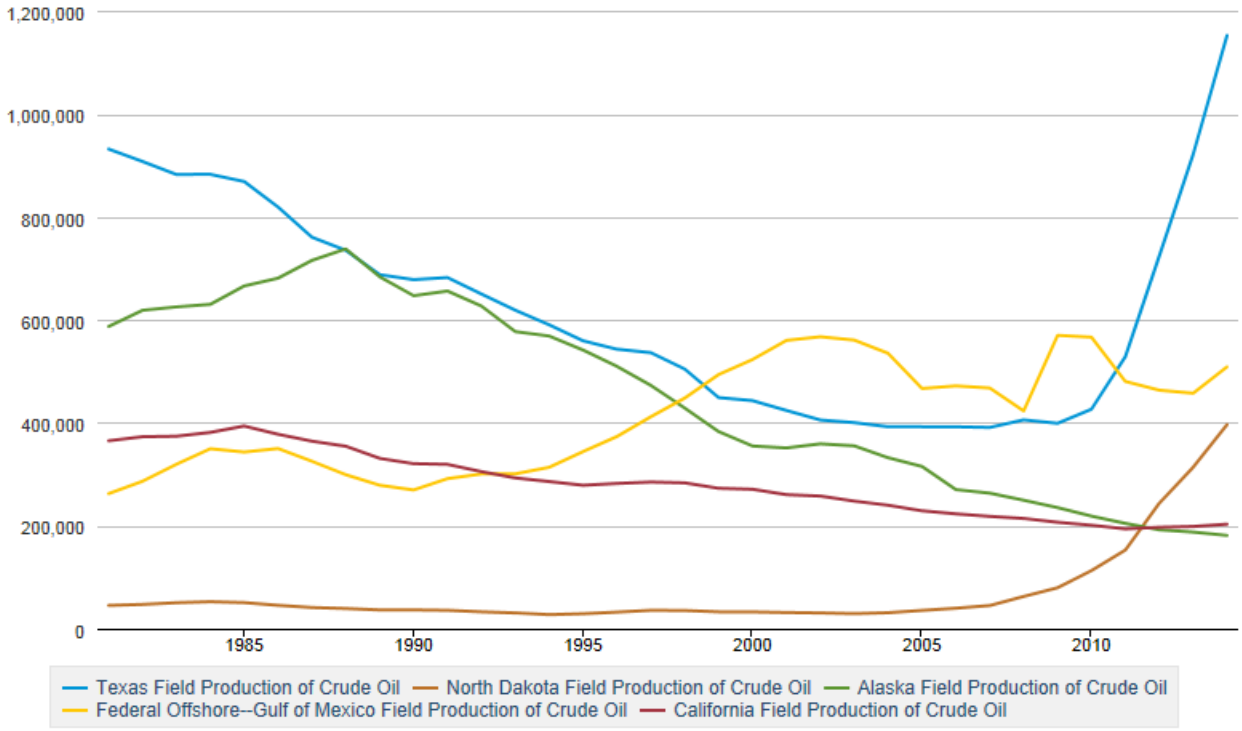
Source: Alaska Department of Labor and Workforce Development Research and Analysis Section graphic

Oil

Oil has unequivocally been Alaska's most important commodity. Historian Terrence Cole estimated that the Prudhoe Bay field has been worth more to the state than everything "dug out, cut down, caught, or killed since the beginning of time".[10] However, oil production has been declining since the late 1980s, as can be seen from Exhibit 49. In the 1970s and 1980s, oil was also produced from fields in Cook Inlet, but this has diminished significantly since then (in 2012, production was 12,154 barrels per day). In the late 1980s, Alaska was tied with Texas as the leading U.S. producer of crude, and its volume declines tracked those of Texas through the late 1990s; over the same period, development of Gulf of Mexico reserves increased significantly. However, since the mid-2000s, there has been a dramatic recovery in Texas and a dramatic increase in North Dakota production, due in part to hydraulic fracturing technology; while at the same time, Alaska's production has declined; Alaska now trails Texas, the Gulf of Mexico, North Dakota, and California. Alaska's Department of Revenue anticipates continuing declines, at roughly the same year-over-year losses, through 2023.

[10] Alaska Economic Trends, June 2013.

Exhibit 49: Leading U.S. Crude Oil Producing States/Regions, 1981 to 2013 (thousands of barrels)

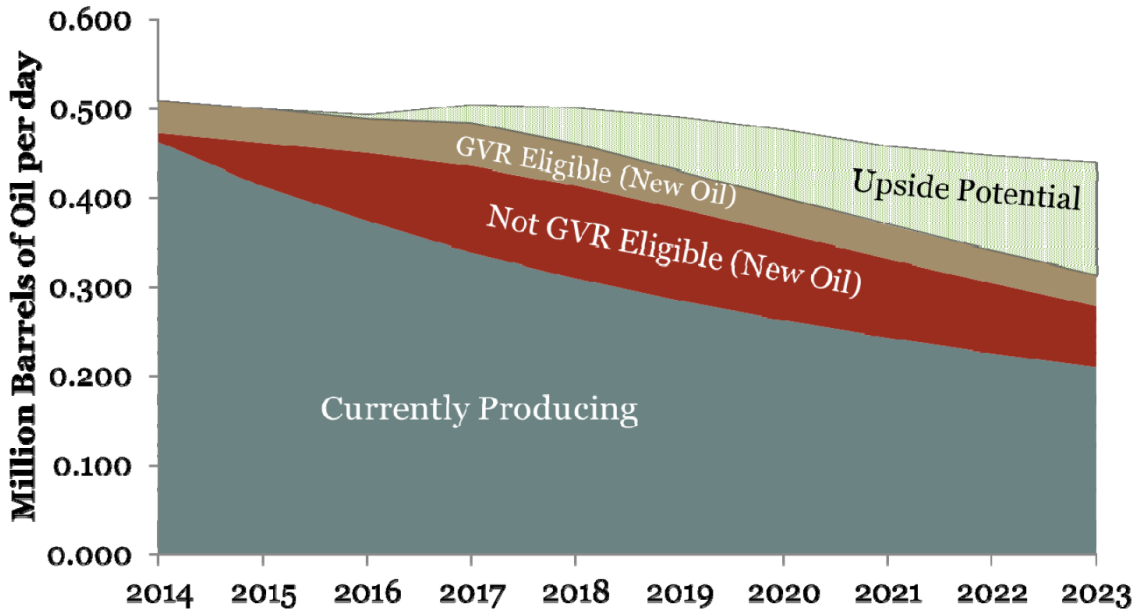


Source: Alaska Department of Labor and Workforce Development Research and Analysis Section graphic. More recent data (https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=MCRFPAK1&f=M) suggests Alaska Field production has slowed and is currently on pace for around 170,000 thousand barrels per year.

Exhibit 50 shows the potential for new oil production in the future. *Non-GVR Eligible New Oil* includes petroleum from infill drilling at existing fields, incremental oil production from enhanced recovery methods, and development of new fields (considering those under development and under evaluation).[11] The "upside potential" wedge represents the best-case scenario where all potential oil production enhancements are realized. The Gross Value Reduction New Oil (GVR) category considers oil production from new fields that fall into a reduced tax bracket that incentivizes exploration and extraction.

[11] State of Alaska Department of Revenue, Revenue Source Book - Fall 2013.

Exhibit 50: Near-Term Oil Extraction Potential



Source: J. Tichotsky, Alaska State Revenues: Overview, History, and Forecast, Presentation to Forum on Alaska's Fiscal Future, October 4, 2014

Declining oil production in the North Slope has increased interest to explore elsewhere in the state. This includes several parts of the Central Region, near the Bering Sea (and recently near the Outer Continental Shelf), although no exploration efforts are currently underway or are planned for the near future.[12] If this were to materialize, Dutch Harbor could again become a key oil gateway in the region. Many decades ago, Shell Oil Company used this harbor to support Arctic explorations. Another possibility is the development of an Arctic Port, as currently under study by Alaska and various federal agencies. An Arctic Port could provide vessel operation services and support for increased global trade via polar waterways, and also support offshore oil operations as they may develop in the future. This opportunity is discussed later in the *Performance, Needs and Opportunities* section.

A more optimistic position on North Slope crude production is offered in a DOT&PF report on Dalton Highway Corridor Traffic Estimates (Draft, April 30, 2014). That report anticipates the potential for near-term increases in production:

"Almost all of the truck traffic on the Dalton Highway Corridor to the north of Coldfoot currently serves the oil exploration and production activities on the North Slope. The development activities are conducted through leases on federal and state lands in Prudhoe Bay, Kuparuk, Qugruk, Colville River, Nikaitchuq, Milne Point, Nuiqsuit, Ignik/Sikumi, Beechey Point, Point Thompson, and the National Petroleum Reserve-Alaska (NPR-A). The primary companies involved in the oil activities are ConocoPhillips, BP, ExxonMobil, Brooks Range Petroleum, ENI, Repsol, and Pioneer Natural Resources. With the opening of TAPS in 1977, oil production on the North Slope rose to a peak of over 2 million barrels per day (BPD) in 1988. Since 1988 the oil production has been decreasing, with the average

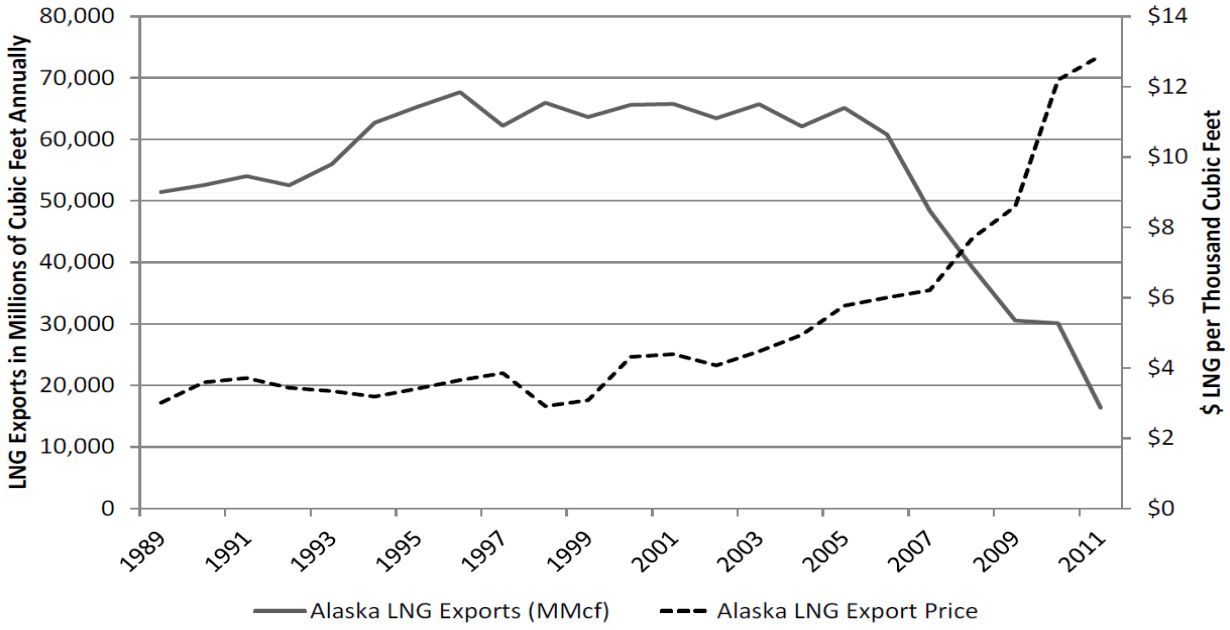
[12] Southwest Alaska Transportation Plan Update, Phase 1 Report.

production in 2013 at about 500,000 bpd. According to Alaska Department of Revenue Tax Division records, production in March 2014 was 546,000 bpd. According to the major stakeholders, increased exploration efforts on the North Slope are occurring in 2014, particularly in the Point Thompson and NPR-A. The anticipated opening of new production wells in these areas, coupled with new technologies enabling better production in the legacy fields, should see an increase in the overall production of oil on the North Slope during the coming years. With this increase in exploration and production, truck traffic volumes serving the North Slope are estimated to increase by about 25% during the next five years."

Natural Gas

Natural gas was once Alaska's most important export, but over the last decade production has declined rapidly and today it does not supply any international markets. From 1969 to 2011, liquefied natural gas (LNG) was exported from Cook Inlet (near Anchorage) to Japan. During this time, Alaska invested significantly in liquefaction technology, becoming a world leader in the handling and transporting of natural gas. However, natural gas exports ended when dwindling reserves at Cook Inlet increased extraction costs above international prices (see Exhibit 51). Gas from this location was still economical for nearby communities, such as Anchorage, leading it to be used primarily for meeting local electricity and heating needs. Natural gas from Cook Inlet will continue to play a major role in meeting the energy needs of nearby communities, especially those of Anchorage.

Exhibit 51: Alaska LNG Exports and Price



Source: State of Alaska Department of Revenue, Revenue Sources Book—Fall 2013 graphic

Natural gas deposits in the North Slope are very large, but historically commercialization has proven difficult because of high transportation costs to domestic and international markets. This is about to change as a consortium comprised of the State of Alaska, TransCanada (a pipeline builder), and three major oil companies is planning a project that will finally allow access to this valuable resource via an

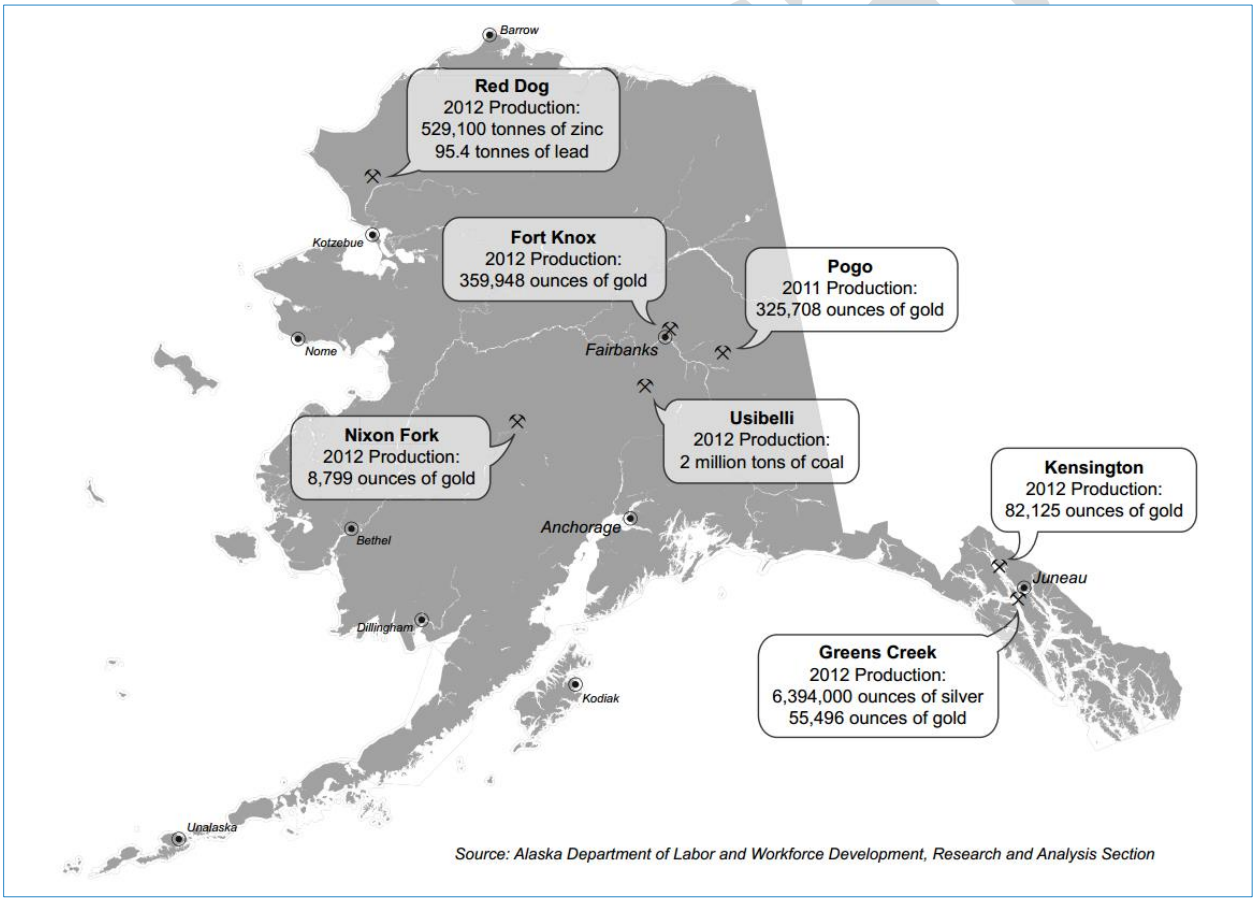
800-mile pipeline that will connect gas deposits in the North Slope with a liquefaction and storage facility that is being built in Nikiski. This opportunity is discussed in more detail in the *Performance, Needs and Opportunities* section.

Minerals

Alaska has significant deposits of zinc, gold, silver, coal, and other valuable resources distributed throughout the state. Often, high transportation costs and environmental effects have made the extraction of these valuable resources unfeasible; but in cases where these challenges could be overcome, mineral extraction has been a significant contributor to the state's economy.

Most of Alaska's mineral production comes from the six facilities shown in Exhibit 52. The only coal mine in the state is in Usibelli, which exports half of its production (primarily to Asia); the rest is used to supply coal-fired power plants in Fairbanks to meet the city's electricity needs.

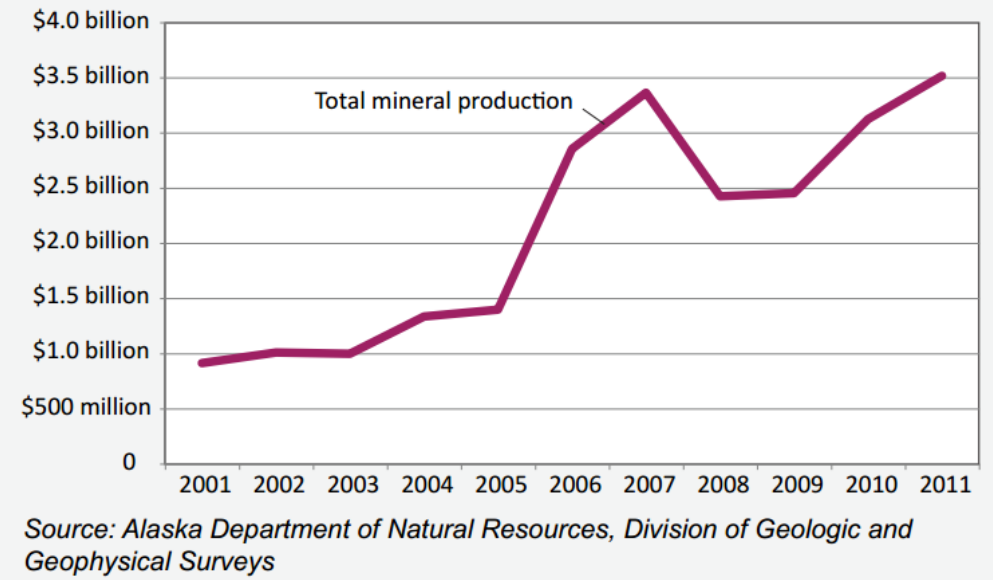
Exhibit 52: Largest Mines in Alaska



Source: Alaska Economic Trends, June 2013

As shown in Exhibit 53, the value of mineral production in Alaska has grown dramatically, from $1 billion in 2001 to $3.5 billion in 2011. This trend is expected to continue, albeit to a lesser degree in the near future because most of the growth has come from mines that have recently leveled off their production. However, there are opportunities for new mines to come on line relatively soon. For example, the Pebble Mine Project found very large deposits of copper and gold in Bristol Bay; however, this project has been controversial because of how its operations might affect the nearby ecology, especially fisheries.

Exhibit 53: Mineral Production Boom

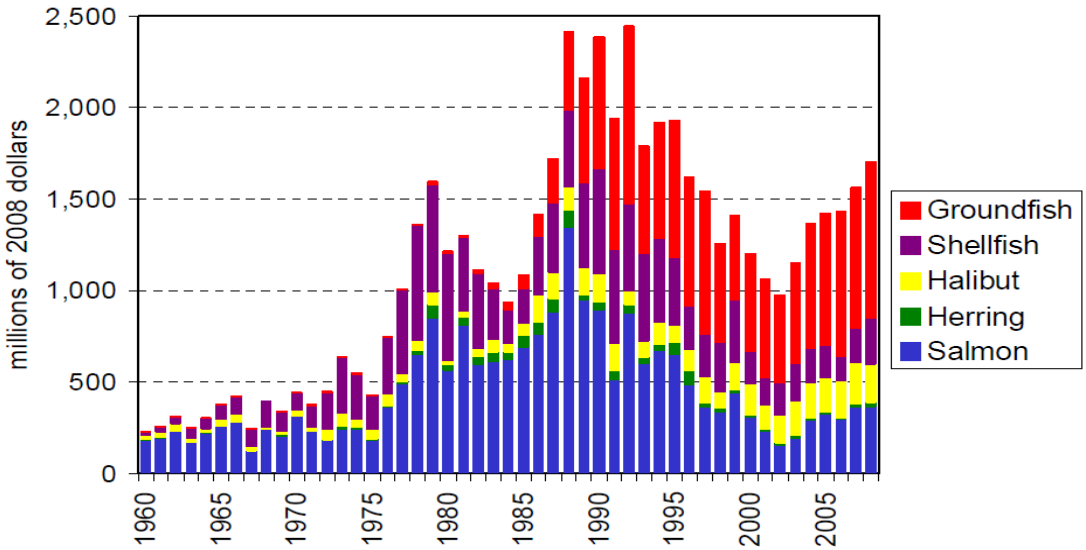


Source: Alaska Economic Trends, June 2013 graphic

Seafood

Fishing is the most important economic activity in many parts of Alaska. The Southeast and Southwest Regions are critically dependent on the productivity of local fisheries, and exports to domestic and international markets. As Exhibit 54 shows, the main seafood exports are salmon, halibut and other groundfish (fish that live on or near the bottom), and shellfish.

Exhibit 54: Value of Alaska Seafood Harvest



Source: Exhibit from Presentation: "An Introduction to the Economy of Alaska" by Gunnar Knapp in 2012, data from National Marine Fisheries Service

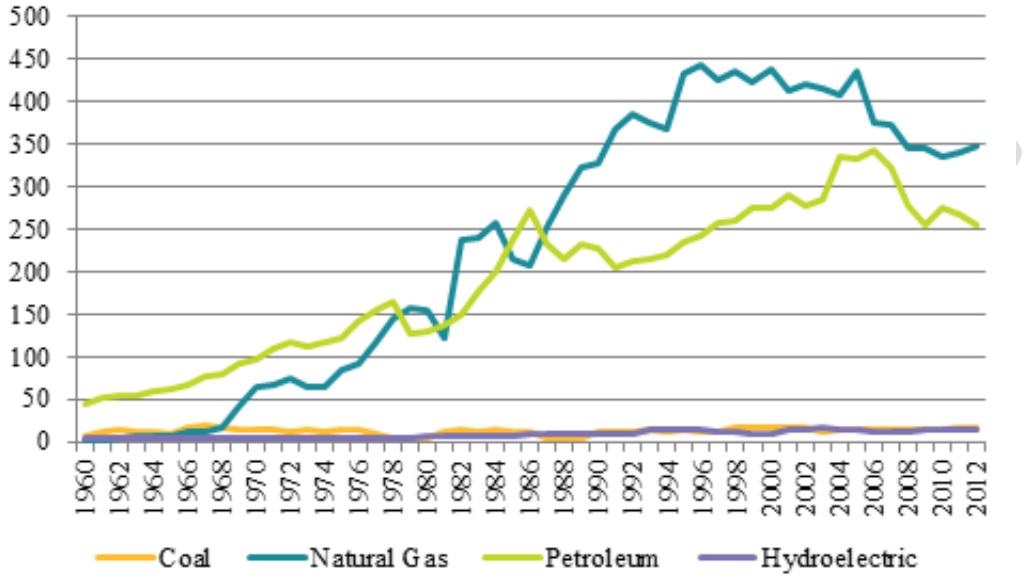
The drop in the 1990s resulted from a worldwide decrease in prices following the explosion of farm fishing. Farm fishing, however, is illegal in Alaska (for finfishes), which has served as a positive differentiator, protecting the quality and brand of Alaska's seafood. However, producers have had to reduce prices in order to be more competitive in global markets. Farm fishing of shellfish is allowed in Alaska and is a growing sector.

Some fish stocks in Alaska have declined over the years, but as a whole they are healthier than in most places in the world. The early introduction of fishing regulations has maintained stocks at sustainable levels for decades. Most forecasts show that fishing activity in the state is not expected to grow or decline in the near-term. As a consequence, freight transportation needs from fish production are not likely to change. Local port infrastructure that caters to fishing will require upkeep and maintenance, but probably not significant capacity expansions. However, forecasting the fishing industry is a difficult task because it can fluctuate considerably. It is affected by many external factors that include changes in climactic conditions from El Niño, decadal Pacific Oscillations, and global warming.

Power Generation

Alaska's residents, industries, and transportation services consume fuel produced from a variety of sources, including coal, natural gas, petroleum, and hydroelectric facilities (see Exhibit 55). In 1960, petroleum was the leading source of fuel consumed in Alaska; since the late 1980s, and continuing to the present, the leading source has been natural gas. Power-generating facilities are a major consumer of fuels, and generate significant freight traffic, usually by barge, rail, or truck.

Exhibit 55: Alaska Energy Consumption by Source, 1960-2013 (trillions of BTUs)



Source: Analysis of U.S. Energy Information Administration data, www.eia.gov/state/seds/data.cfm?incfile=/state/seds/sep_use/total/use_tot_AKcb.html&sid=AK

While comparatively lower in volume, coal and hydroelectric also play important roles. According to the Susitna-Watana Hydro Project, Alaska currently receives 21% of its electricity from 40 hydropower projects throughout the state; a planned new facility on the Susitna River is designed to serve more than 50% of current electrical demand for "rail belt" Alaska (source: www.susitna-watanahydro.org/). Greater reliance on hydro power means less demand for other fuels and reduced freight trip generation. Construction of the Susitna-Watana project will, however, generate significant construction-related freight traffic.

Commodity and Modal Trends and Forecasts

National forecasts anticipate that demand for non-energy-related industrial goods and products—mixed freight, machinery, instruments, etc.—will increase, creating greater demand on international gateways and supply chains. National forecasts also anticipate long-term declines in Alaska tonnages of crude petroleum and other energy products. However, there is a high degree of uncertainty regarding energy forecasts since production depends on global demand and pricing, availability of competing supplies, the cost of production/transportation/export from Alaska, and other variables.

Exhibit 56: Forecasted Changes in Tonnage to, from, and through Alaska, 2011 to 2040

Changes in Tons (000) Between 2011 and 2040	Air (include truck-air)	Multiple modes and mail	Other and unknown	Pipeline	Rail	Truck	Water	Total Change	Average Annual Growth Rate
DOMESTIC TRADE									
Dom. AK to US	1	-1,168	0		-19	642	-13,490	**-14,034**	**-2.2%**
Dom. US to AK	22	129	2			167	-636	**-316**	**-0.3%**
INT'L TRADE, NOT PASS-THRU									
Intl. Export AK-Origin AK-Gateway		161	2,217	251	1,829	1,773	646	**6,877**	**2.9%**
Intl. Export AK-Origin US-Gateway	2	54	4		73	291	4,123	**4,547**	**4.4%**
Intl. Import AK-Gateway AK-Destination		3	1,181	-39	15	70	115	**1,345**	**1.5%**
Intl. Import US-Gateway AK-Destination	1	37	0		0	90	1	**129**	**2.9%**
INT'L TRADE, PASS-THRU									
Intl. Export US-Origin AK-Gateway	1,760	169	15		2	154	65	**2,165**	**4.7%**
Intl. Import AK-Gateway US-Destination	3,822	3	2		0	411	257	**4,495**	**3.7%**
Total Change	**5,608**	**-612**	**3421**	**212**	**1,900**	**3,598**	**-8,919**	**5,208**	**0.4%**
Average Annual Growth Rate	**4.1%**	**-0.6%**	**4.1%**	**1.5%**	**2.0%**	**2.7%**	**-1.1%**	**0.4%**	

Source: Analysis of Freight Analysis Framework 3 data

Forecasting how the economy will develop in the future is fundamental to understanding freight transportation needs. Projected changes in traded commodities—those moving to, from, or through Alaska—are summarized in Exhibit 56 and Exhibit 57 by trade type and transportation mode.[13] Looking at tonnage, the key takeaways are as follows:

- Domestic trade from Alaska to other states will decline significantly at -2.2% per year, mostly due to declining movements of crude petroleum from Alaska to other states by water. Domestic trade from other states to Alaska will also decline slightly, at -0.3% per year.
- International exports from Alaska are forecast to increase substantially by 2.9% per year (through Alaska gateways) and by 4.4% per year (through other U.S. gateways, primarily seaports).
- International imports to Alaska are forecast to increase by 1.9% per year (through Alaska gateways) and by 2.9% per year (though other gateways, although this represents minimal traffic).
- International pass-through traffic is forecast to increase substantially by 4.7% per year in the export direction and by 3.7% per year in the import direction.
- Despite the decline in crude petroleum tonnage, total trade volume is projected to increase overall at a rate of 0.4% per year. Modes that will see annual tonnage growth include air (4.1%), other and unknown (4.1%), truck (2.7%), and rail (2.0%). Pipeline is also showing growth, at 1.5%; this reflects trade tonnage and excludes in-state tonnage where TAPS volumes are declining. Modes where annual trade tonnage growth is projected to be negative include water (-1.1%, due primarily to reduced crude petroleum shipments) and multiple modes and mail (-0.6%).

Changes in trade tonnage will impact the need to distribute goods within Alaska; production and consumption of non-traded commodities will also impact the volume of goods distributed within Alaska. As shown in Exhibit 57, annual demand is expected to rise for the following modes: other and unknown (3.1%, which is assumed to include fly-away air cargo and truck deliveries); multiple modes and mail (1.6%, which includes intermodal freight services); trucking (0.4%, in addition to truck tonnage included in the previous two modes); and rail (0.2%). Annual demand is expected to decline for water (-0.8%) and pipeline (-2.8%), largely due to projected declines in North Slope crude petroleum production. FAF also shows declines for domestic air (-1.4%), although this decline is very small compared to the growth in other and unknown, which is assumed to include air.

[13] USDOT's Freight Analysis Framework includes projections of changes in freight tonnage for the period 2011-2040. It uses Global Insight's "Macroeconomic Service Long-Term Trends Scenario" which provides a comprehensive picture of how the economy will evolve into the future, by industry and region. This forecast is generated by using a set of assumptions and models to extrapolate historical trends. The Freight Analysis Framework combines these results with other similar models around the world to generate a high-level forecast of commodity flows by mode. It must be emphasized that these forecasts do not consider any of the potential development projects—enhanced oil recovery and Arctic Port, new LNG pipeline, new mining activity, or new hydro power generation—that could significantly increase tonnage and value handled in future years.

Exhibit 57: Forecasted Changes in Tonnage within Alaska, 2011 to 2040

	Difference 2011 to 2040 (000')	Average Annual Growth Rate, 2011 to 2040
Other and Unknown	3,148	3.1%
Truck	2,834	0.4%
Rail	287	0.2%
Multiple Modes and Mail	139	1.6%
Air (includes truck-air)	-109	-1.4%
Water	-919	-0.8%
Pipeline	-6,922	-2.8%

Source: Analysis of Freight Analysis Framework 3 data

Modal Network and Facility Trends and Forecasts

Since Alaska freight movement is driven largely by traded commodities, economic and population growth will lead to growth pressures at key trade gateways and on corridors linking these gateways to resources and consumers. As many of these gateways are located in urbanized areas, increased trade gateway traffic will compound urban growth issues associated with population growth.

Trucks

According to analysis of regional traffic reports:

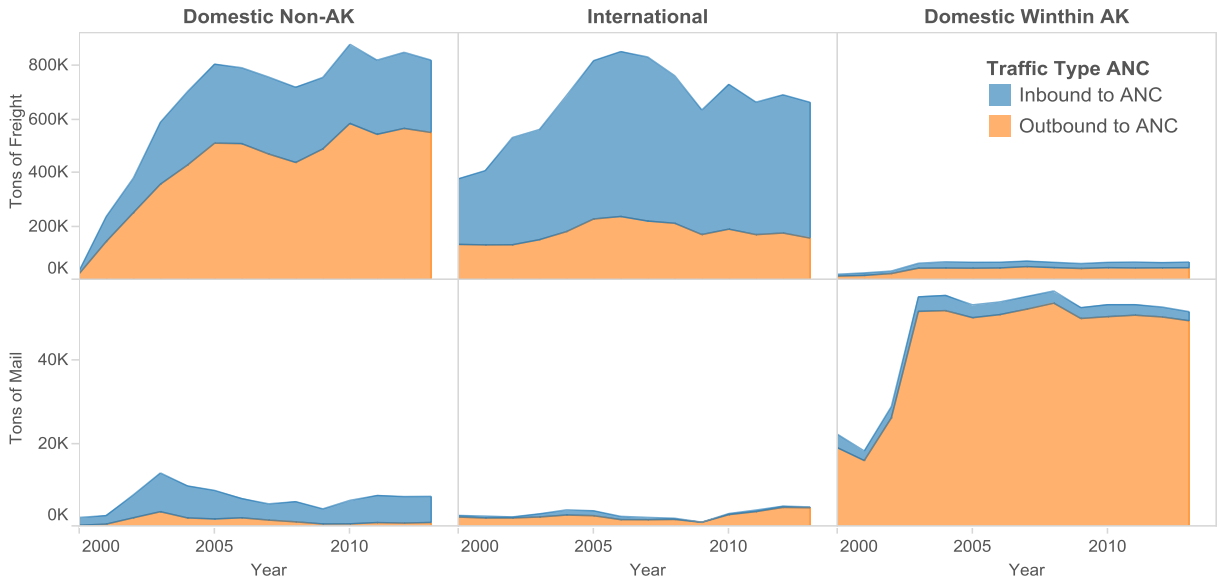
- In 2013, combination trucks traveled 122 million miles in Alaska, with 34% of these occurring on interstate highways, 40% on arterials, and 26% on other roads. Combination trucking activity is on the rise, seeing a 33% increase in Alaska from 2010 to 2013. Around half of the miles driven by these types of trucks are in urban areas and the other half in rural areas.
- While combination trucking activity is increasing rapidly in the state, single-unit trucking activity has remained stagnant. In 2013, these trucks drove 3% fewer miles than in 2010; however, they still contributed to 360 million miles on Alaska's roads. Just as with combination trucks, single-unit trucks were used in equal proportions for urban travel and for rural travel.

Air Cargo

Historic air cargo trend data is available for ANC; projections are available for ANC, FAI, and Alaska's aviation system as a whole from the 2013 Alaska International Airport System Planning Study.

Since 2004, ANC air cargo has remained generally constant, with some yearly fluctuations (see Exhibit 58). Domestic non-Alaska freight peaked before the recession, dipped slightly, and has recovered to similar levels. International freight also peaked before the recession, but has not recovered to pre-recession levels. Mail tonnage grew but has been relatively constant for the past decade. Looking ahead, the 2013 Alaska International Airport System Planning Study projects that ANC, transit (or pass-through) tonnage will grow at 2.7% per year, while domestic and international cargo enplaned or deplaned will grow at 4.3% per year (see Exhibit 59). Within-state air cargo enplaned at ANC is projected to grow at 0.8% (see Exhibit 60).

Exhibit 58: Cargo Operations at ANC Airport



Source: Analysis of USDOT T-100 Air Cargo Data

Exhibit 59: Domestic and International Trade Tonnage at ANC, 2010 to 2030

Tons (000s)	Enplaned	Deplaned	Transit
2010	366	412	2,030
2015	400	451	2,199
2020	526	593	2,688
2025	678	765	3,071
2030	844	950	3,442
Average Annual Growth Rate 2010 to 2030	4.3%	4.3%	2.7%

Source: 2013 Alaska International Airport System Planning Study

Exhibit 60: Intra-Alaska Cargo Tonnage at ANC, 2010 to 2030

Tons (000s)	Enplaned	Deplaned
2010	89	21
2015	97	23
2020	100	23
2025	102	23
2030	104	24
Average Annual Growth Rate 2010 to 2030	0.8%	0.6%

Source: 2013 Alaska International Airport System Planning Study

At Fairbanks International Airport (FAI), transit tonnage is projected to grow at 3.0% per year, while domestic cargo enplaned or deplaned is projected to grow at 4.3% per year—rates that are very similar to ANC (see Exhibit 61). However, within-state air cargo is projected to be relatively unchanged (see Exhibit 62).

Exhibit 61: Domestic and International Trade Tonnage at FAI, 2010 to 2030

Tons (000s)	Enplaned	Deplaned	Transit
2010	0.07	0.15	6.6
2015	0.08	0.17	7.2
2020	0.11	0.22	9.0
2025	0.13	0.28	10.5
2030	0.17	0.35	11.9
Average Annual Growth Rate 2010 to 2030	4.3%	4.3%	3.0%

Source: 2013 Alaska International Airport System Planning Study

Exhibit 62: Intra-Alaska Cargo Tonnage at FAI, 2010 to 2030

Tons (000s)	Enplaned	Deplaned
2010	16.9	4.8
2015	17.1	5.2
2020	17.1	5.0
2025	17.0	4.8
2030	17.1	4.7
Average Annual Growth Rate 2010 to 2030	0.1%	-0.1%

Source: 2013 Alaska International Airport System Planning Study

At other airports in Alaska, air cargo tonnages are expected to increase moderately, at an average rate of 1.8%. The Northern region is expected to grow the fastest at 1.9%, with the Southeast the slowest at 1.4% (see Exhibit 63).

Exhibit 63: Enplaned and Deplaned Air Cargo Forecasts Excluding ANC and FAI, 2008 to 2030

Tons (000s)	Central	North	Southeast	Total
2008	93.4	111.5	34.1	**238.9**
2015	101.1	118.8	36.8	**256.8**
2020	111.0	132.9	39.5	**283.5**
2030	136.7	169.8	46.1	**352.7**
Average Annual Growth Rate (%) 2008 to 2030	1.7%	1.9%	1.4%	**1.8%**

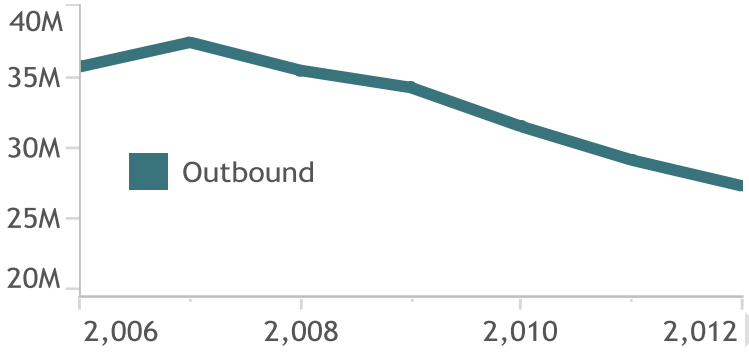
Source: Alaska Aviation System Plan Forecasts, Prepared by HNTB Corporation, June 2011

Marine Cargo

Historic trends and future projections for marine cargo tell a mixed story: future volumes will largely depend on the extent of resource development projects and construction activity supported by marine freight.

Looking at recent trends, the Port of Valdez has seen significant declines in volume since 2006 due to reduced production of North Slope crude moved by pipeline to the port for shipment to out-of-state refineries (see Exhibit 64). If declines continue, as currently projected, the same level of year-over-year traffic losses can be anticipated. Alternatively, if crude production stabilizes or increases, port volumes could stabilize or increase.

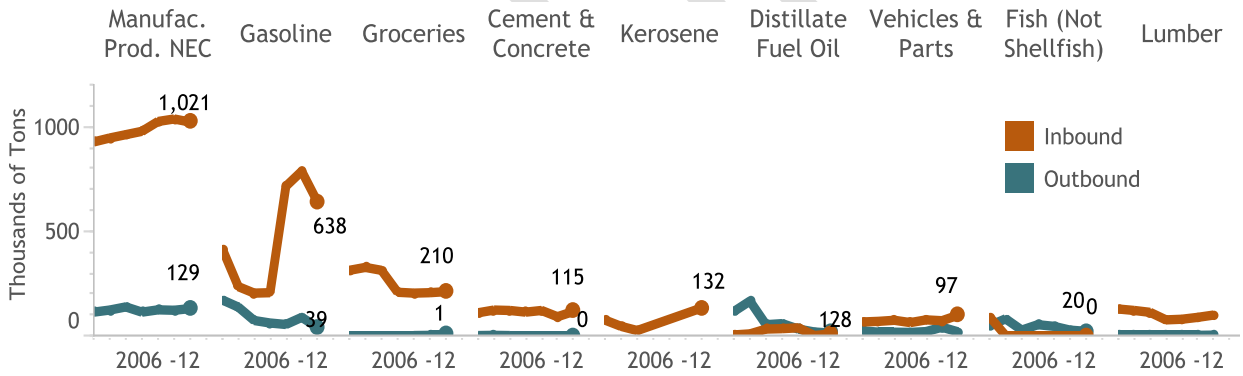
Exhibit 64: Crude Petroleum Exports from Port of Valdez, 2006 to 2012 (millions of tons)



Source: Analysis of U.S. Army Corps of Engineers data

The Port of Anchorage handles a diverse set of commodities that in many cases are basic necessities for Alaska's population and industries, in contrast to Valdez which handles essentially one commodity bound for U.S. and global markets. Manufactured products have grown steadily; gasoline has spiked and then declined; but overall activity at the Port of Anchorage has remained relatively steady through the past decade (see Exhibit 65).

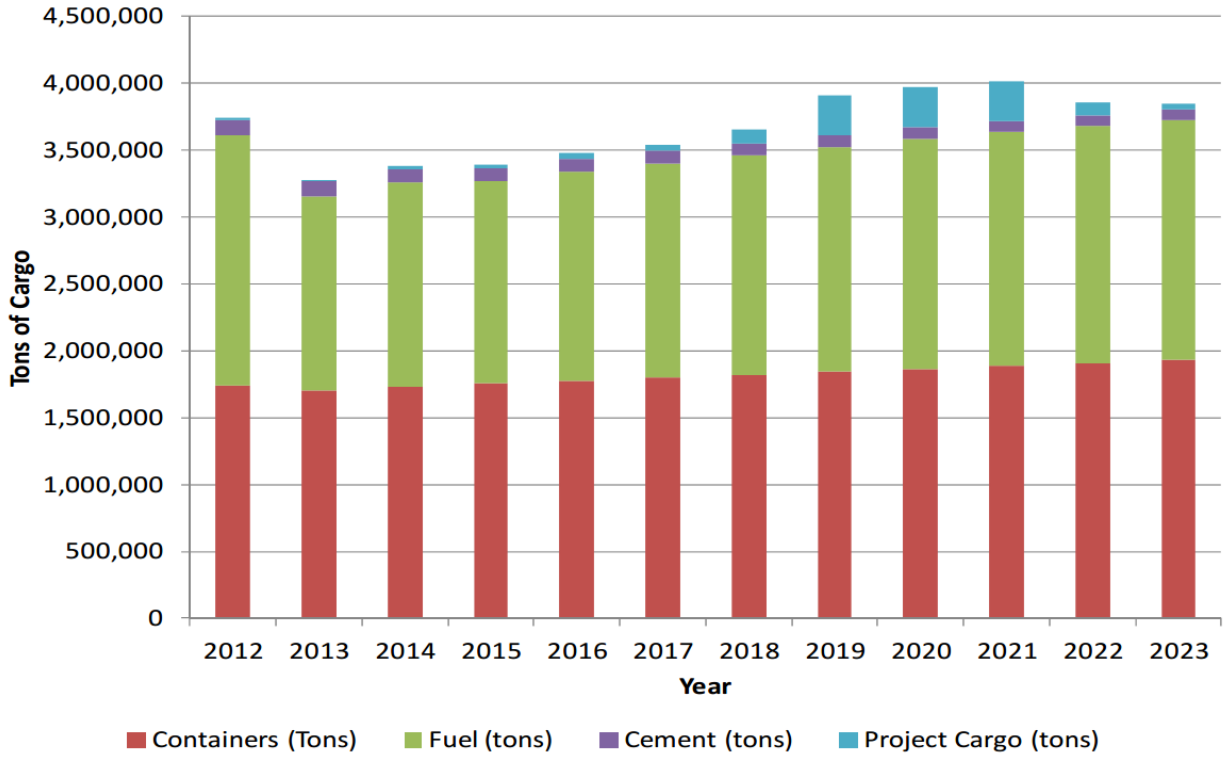
Exhibit 65: Commodity Flows through Port of Anchorage, 2006 to 2012



Source: Analysis of U.S. Army Corps of Engineers data

Container traffic through the Port of Anchorage is expected to increase at a rate of 1.3% through 2023. Fuel volumes are expected to decrease slightly, then rebound slightly. The Port of Anchorage will also have tonnages of cement, materials, and large/heavy "project cargo" coming in to support its planned expansion and other planned construction projects throughout the state (see Exhibit 66).

Exhibit 66: Forecasted Cargo at Port of Anchorage



Source: Exhibit from Port of Anchorage Business Plan Update, April 2014. Analysis, Northern Economics

Finally, another important trend is that vessel traffic through the Northern Sea Route has been growing rapidly over the last few years. In 2013, 71 vessels took this route, up from 46 the year before.[14] It is difficult to predict how many vessels will use this route in the future because of the lack of historical data or precedent to draw from. One estimate cited by the U.S. Army Corps of Engineers calculated that the figure could be as high as 1,200 ships per year by 2020—a dramatic increase and one that could potentially support Arctic Port development, as described in the *Performance, Needs and Opportunities* section.

Rail

Rail tonnage is expected to grow at a modest rate of 0.2% per year through 2035. However, as shown in Exhibit 67, the composition of rail commodities will change. Petroleum products will decrease at a fast pace of 4.7% per year, although they currently represent only 19% of cargo. Volumes of most commodities are expected to remain roughly unchanged. Coal will increase moderately at 1.8% per year. These forecasts do not include the effect of potential new rail extensions that could be built over the coming decades.

[14] U.S. Army Corps of Engineers.

Exhibit 67: Forcasted Tonnage by Rail, 2013 to 2035

Tons (000)	Stone, Sand, Gravel	Petroleum Product	Coal	Chemicals	Iron/Steel Products	Intermodal	Total
2013	2,025	947	1,427	155	70	104	**5,110**
2025	2,124	606	1,687	207	63	104	**5,147**
2035	2,187	418	1,939	264	58	107	**5,310**
Annual Growth (%)	0.5%	-4.7%	1.8%	3.2%	-1.1%	0.2%	**0.2%**

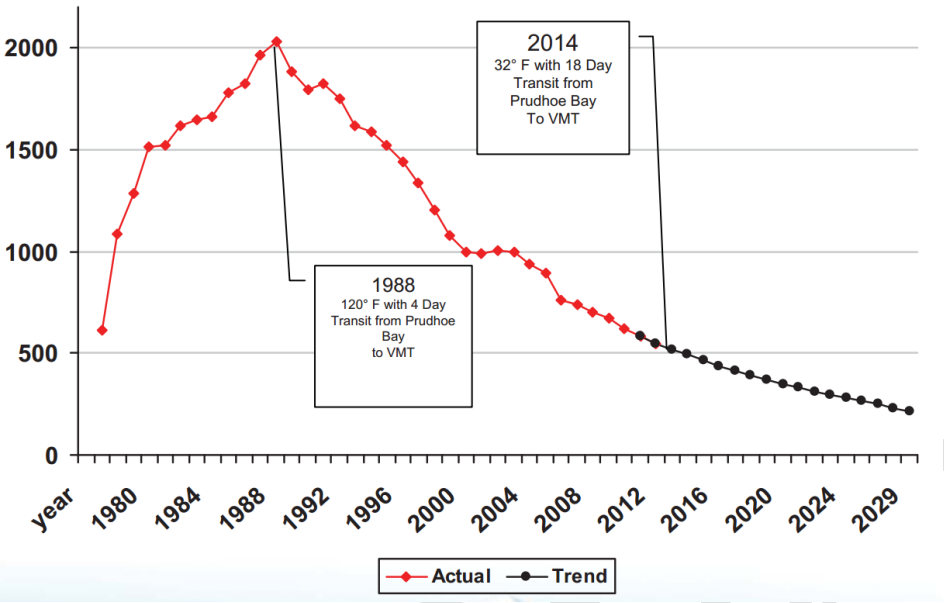
Source: Alaska State Rail Plan - Draft, October 2014

Pipeline

Projections for the pipeline's future use are very uncertain as they depend on the amount of exploration and drilling that occur, especially in the Arctic National Wildlife Refuge region. The pipeline currently serves as the only alternative for transporting Alaska's oil so it can be exported and commercialized. As volume on the pipeline has decreased, so has the travel speed of the petroleum. Travel times from Prudhoe Bay to Valdez are over four times longer today than during peak flow in the late 1980s.

Exhibit 68 shows how volumes on this pipeline have been decreasing since peaking in the late 1980s. Forecasts indicate that these declines will continue into the foreseeable future. From this Exhibit, the average rate of annual decrease can be calculated to be -4.5% from 2014 to 2029. This is more negative than FAF's prediction of an average annual decline of -2.8% through 2040, and clearly does not reflect the possibility of increased near-term production increases on the North Slope.

Exhibit 68: Forecasted Volumes (thousands of barrels per day) on Trans-Alaska Pipeline



Source: Alyeska Pipeline, Declining throughput: a continuum of challenges, January 2013. Fact Sheet. www.alyeska-pipe.com/TAPS (Accessed Feb 2015)

Likelihood of Increased Seasonal Variability

Increasing average temperatures, rising sea levels, and related effects are likely to exacerbate current seasonal variations in freight activity and the availability of freight infrastructure, creating greater unpredictability and variability in freight commodity movements from season-to-season and year-to-year. One set of anticipated effects relates to water resources and transportation, the other to surface transportation.

- It is expected that climate change effects are likely to produce longer periods of warmer temperatures. On the plus side, this will allow more Alaska ports to operate in ice-free conditions for more of the year, reducing their dependence on other modes. Ocean warming will also support dramatically increased vessel traffic in Arctic shipping lanes, which leads to the federal interest in an Arctic deep-water port; such a facility, as previously described, could benefit Alaskans by supporting offshore oil exploration and possibly the shipment of natural resources. Warmer temperatures may improve Alaska's harvest of timber and other agricultural products. On the minus side, ocean warming may lead to acidification, significantly changing the characteristics of Alaska's fisheries, such as the types and numbers of fish or when and where they are found, which would affect the demand for transporting this commodity. Overall, it would be expected to see more goods being moved in warmer months by water.

- Longer periods of warmer temperatures, and more unstable climatic conditions, will affect the reliability and performance of Alaska's transportation system. Roads, bridges, rail lines, and any low-lying infrastructure may be subject to increased flooding from more severe storms and more extreme snowmelt. Roads and runways built on permafrost, which serve as important infrastructure links throughout the state.[15] will see increased damage and more frequent temporary closures as their substrate thaws and becomes unstable. Ice roads will be available for less time each year. This could lead to concentrations of traffic in shorter travel windows. However, for roads not built on permafrost or ice, the opposite effect may occur, as commercial traffic could be increasingly spread throughout longer warm-weather periods.

[15] U.S. EPA, http://www.epa.gov/climatechange/images/impacts-adaptation/PermafrostHighways-large.gif (accessed July 2015).

PERFORMANCE, NEEDS AND OPPORTUNITIES

To provide acceptable freight system performance—defined as available, reliable, affordable, timely, safe, and secure—freight planning should address the following needs and opportunities: bringing more resources efficiently to markets; improving truck access to intermodal facilities (ports, airports, etc.); enhancing freight mobility in growing urbanized areas; maintaining and enhancing critical trade gateway facilities; maintaining and enhancing critical connections with Alaska's rural communities; and doing so with constrained public funds.

This section considers the current performance of Alaska's freight transportation system, as well as its anticipated future performance.

The LRTP Freight Element establishes a starting point for Alaska freight performance measurement. Few states have established a formal set of freight performance measures despite encouragement from federal legislation. There is a challenge in making such measures of value because the freight system involves different modes with different operational characteristics; freight system users, owners, and operators measure performance differently; and many freight trips involve multiple modes. The Freight Element adopts a "user's perspective" on performance. Generally, freight system users value reliability, price, speed, safety, and security, in that order. In Alaska, an additional measure is important: whether a mode or service is available at all either annually or seasonally. A challenge for any Alaska communities is the availability of service.

Based on the prior analysis, in the prior sections, of Alaska's freight infrastructure and the key trends and drivers affecting it, the following freight-related performance goals for the Alaska transportation system have been identified:

- Providing freight transportation capacity to directly support resource development
- Reducing truck congestion and improving travel time reliability and safety in urban areas
- Maintaining and improving trade gateways: seaports, airports, and land border crossings
- Maintaining and improving multi-modal connectivity among and between Alaska's urban and rural communities

Additionally, the Alaska LRTP in addressing freight recognizes that the type, location, and extent of demand for freight are uncertain. The LRTP positions Alaska to plan for such risks as:

- The extent and timing of resource development
- Climate change, variability, and disruptions
- Managing freight transportation costs within an environment of constrained funding

Initiative Areas

Providing Infrastructure for Resource Development

Resource development generally involves the movement of heavy bulk commodities, including but not limited to petroleum, metals, coal and other minerals, stone, and timber. Nationally, these types of commodities generate significant movements of heavy trucks, with corresponding impacts to the nation's highways, and are an area of special emphasis in the FAST Act. For Alaska, performance issues related to resource development fall into three broad categories:

- Sufficiency of existing infrastructure and service capacity, speed, reliability, cost, etc.
- Provision of missing connections, without which resources cannot be brought to market
- Accommodation of temporary demand related to resource facility construction and start-up

The related needs and opportunities include a variety of initiatives: new construction of a statewide liquid natural gas (LNG) pipeline; development of "roads to resources" under the state's "R2R" program; improvement of the Dalton Highway, coastal ports, and possibly other infrastructure to accommodate proposed mining operations; construction of the Susitna-Watana Hydro Project; and potential development of an Arctic Port to support exploration of offshore petroleum reserves.

In general, because resource development is market driven it is important that the state respond flexibly when market conditions result in a project-specific need for freight-related infrastructure improvements. As a state government, Alaska can neither afford to invest in infrastructure ahead of demand nor "pick winners," meaning those who will be successful with resource development.

Alaska LNG Pipeline and Export Project

The Alaska LNG pipeline is planned to follow the route shown in Exhibit 69, connecting gas deposits at Prudhoe Bay and Port Thomson on the North Slope with a liquefaction and storage facility being built at Nikiski. This project is estimated to cost from $45 billion to $65 billion and will likely represent the largest single investment in Alaska freight infrastructure over the coming decade. The project is sponsored by ExxonMobil, BP, ConocoPhillips, and TransCanada in partnership with the State of Alaska's Department of Natural Resources, Department of Revenue, and Alaska Gasline Development Corporation.

The pipeline is being designed to deliver 3.5 billion cubic feet of gas per day; the LNG facility will produce up to 20 million metric tons (around 22 million short tons) per year for export by ship to East Asian markets via the Port of Nikiski. Additionally, Alaska's mines could benefit from the natural gas produced at Prudhoe and Port Thomson, including the proposed Pebble, Donlin, Ambler, and Livengood mines.

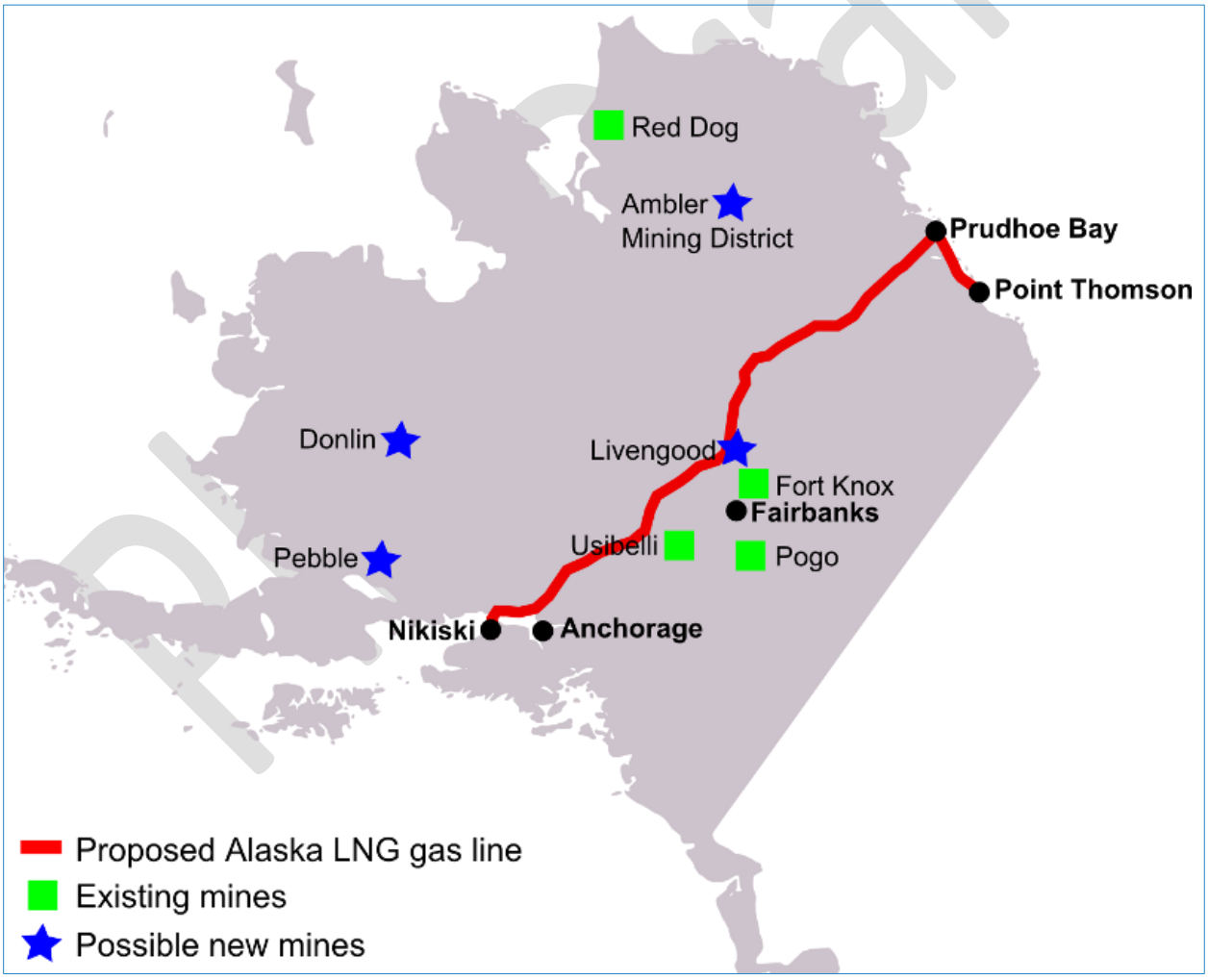
To provide a sense of scale to this number, based on the data in Exhibit 56 earlier, the forecast is for Alaska to add 5.2 million tons of traded freight between 2011 and 2040. Therefore, this project alone represents around four times as much trade tonnage growth as all other commodities combined. Put

another way, crude petroleum shipments from Valdez are projected to drop by 14 million tons between 2011 and 2040; potentially this project could more than offset that tonnage loss.

Today, the Port of Nikiski handles less than 4 million tons per year. Historically, it handled LNG from the local BP plant, but over the past decade those LNG volumes have been declining. This project will dramatically increase tonnages exported from Nikiski, putting it nearly on par with Valdez as Alaska's leading tonnage seaport. Plant and pipeline construction will also generate significant movements of building materials and machinery to Alaska (largely via port) and within Alaska (via truck, rail, and air) to construction sites.

In March 2015, the Federal Energy Regulatory Commission issued a notice of intent to prepare an Environmental Impact Statement (EIS) for the project. Natural gas exports are expected to begin at the earliest in 2023, although the start date may depend to some extent on global LNG prices.

Exhibit 69: Proposed Natural Gas Pipeline



Source: Bill White, 2014. Alaska Natural Gas Transportation Projects, Office of the Federal Coordinator

Other LNG Production and Transportation

Several other LNG production and transportation initiatives are being, or have recently been, considered. Descriptions of these projects, cited and adapted from www.arcticgas.gov/guide-alaska-natural-gas-projects, are presented in Exhibit 70.

Exhibit 70: Other Alaska LNG Initiatives

North Slope LNG and the Interior Energy Project: Ideas have been generated for moving North Slope natural gas to the Fairbanks area where energy costs are much higher than in Southcentral Alaska and only a small amount of natural gas is available from Cook Inlet via truck deliveries from a privately owned LNG plant north of Anchorage. In 2013, the Alaska Legislature approved a $333 million cash-and-loan package requested by Gov. Sean Parnell for a small-volume North Slope LNG plant as well as storage and distribution infrastructure in the state's Interior. A year earlier, state lawmakers approved $30 million in tax credits for the LNG storage tanks that the Fairbanks area would need to receive trucked deliveries. In January 2014, the AIDEA board chose global infrastructure firm MWH Americas Inc. to acquire a gas supply from North Slope producers, develop and run the LNG plant at Prudhoe Bay, and find gas buyers in the Fairbanks area. In January 2015, AIDEA and MWH ended their agreement. That leaves the project in limbo as of early 2015.

Southcentral LNG: A Japanese company Resources Energy Inc. is proposing a smaller-scale LNG plant in Southcentral Alaska. As conceived, the smaller-scale plant would cost around $1 billion and make up to 1 million metric tons of LNG per year, or an average of about 133 million cubic feet of natural gas per day, for export to Japan by 2019. In late 2014, the company said its preferred site is Port MacKenzie, across Knik Arm from Anchorage. California-based WesPac Midstream is also looking at building a Port MacKenzie LNG plant, which would be a smaller plant to serve Alaska markets, particularly Fairbanks. The plant capacity would be up to 250,000 gallons of LNG per day, or about 160,000 metric tons a year.

Cook Inlet LNG: Out of concern that aging Cook Inlet fields might not produce enough gas for local needs after doing so for nearly 50 years, in 2011 two Anchorage electric utilities and a gas utility jointly began considering the idea of importing liquefied natural gas or compressed natural gas to Southcentral Alaska. Since then, their sense of urgency has eased as Cook Inlet producers have increased gas production to cover the next several years. In June 2011, the U.S. Geological Survey said that the Cook Inlet region still holds an estimated 19 trillion cubic feet of natural gas that could be produced using current technology.

LNG Pipeline to Alberta: The Pipeline to Alberta project conceived an approximately 1,700-mile, 48-inch buried pipeline from the Prudhoe Bay field on Alaska's North Slope to the British Columbia–Alberta border in Canada. From there, the gas could flow to the Lower 48 via an extensive network of existing pipelines. The gas pipeline would run parallel to the trans-Alaska oil pipeline from Prudhoe Bay to Delta Junction, then continue into Canada roughly parallel to the Alaska Highway. The project is inactive.

LNG Pipeline to Southcentral: The project conceived a 727-mile, 36-inch buried pipeline from the Prudhoe Bay field on Alaska's North Slope to the Big Lake area north of Anchorage. From there, the gas could flow to consumers, utilities, and other industry via the local distribution pipelines of ENSTAR Natural Gas Co. The pipeline also would supply the Fairbanks area. The line would parallel the trans-Alaska oil pipeline from Prudhoe Bay to just north of Fairbanks, then continue south to Big Lake, roughly parallel to the Parks Highway. The project also is known as the "bullet line," the in-state line, and the Alaska Stand Alone Pipeline, or ASAP. Many of its supporters intend the line as a backup plan if the Alaska LNG project does not advance.

Source: Cited and adapted from www.arcticgas.gov/guide-alaska-natural-gas-projects

Roads to Resources Program

DOT&PF's R2R program addresses the sufficiency of existing resource access roads as well as the provision and funding (including private participation) of new multimodal (not just highway) resource connectors. Key attributes of the program are summarized in Exhibit 71, Exhibit 72, and Exhibit 73.

Exhibit 71: DOT&PF's Roads to Resources Program

The Roads to Resource Program Initiative (R2R) works with state agencies, resource developers, and other interested parties, including local governments, and Native corporations, to design and build projects that support development of natural resources in the oil and gas, alternative energy, mining, timber, fisheries, and agriculture industries. In addition to traditionally- funded public projects, R2R anticipates and analyzes prospects for Public-Private Partnerships (P3) to fund projects that will generate enough revenue to pay off planning and construction costs.

Duties include, [but are not limited to, the following]:

- Identify resource development projects that require construction of transportation access. R2R considers not only road access, but also marine, rail, and aviation- related transportation improvements.
- Work in support of the Department of Natural Resources and resource industries in assessing, designing, and permitting transportation improvements necessary for economic viability in developing a resource.
- Select projects based on a broad range of technical and social criteria, including state and regional economic benefit through creation of local jobs, improved transportation access and reduced cost of living for rural Alaskan communities, and evaluation of impacts to cultural, subsistence, and environmental resources.

Source: Cited and adapted from http://dot.alaska.gov/roadstoresources/highlights.shtml

Exhibit 72: R2R Initiatives—Northern Region

Foothills West Transportation Access ([Road to Umiat)]: This project will provide access to known gas and oil reserves on the north side of the Brooks Range, about 100 miles west of the Dalton Highway. DOT&PF is currently evaluating plans for future EIS work.

Ambler Mining District Access: This project is to provide an all-season transportation access road [of approximately 20 miles] to promote exploration, development, and production of known mineral resources in the Ambler mineral belt. This will be an example of private funding where AIDEA will raise the money from the bond market to build the road.

Road to Tanana: This project is to provide improved road access to known mineral developments in the Manley region mineral belt to support mining opportunity expansion and resource exploration, plus provide an all-season road to the Yukon River near the community of Tanana. The road will improve access to Tanana by connecting to the Elliot Highway near Fairbanks. Construction began in late 2013.

Dalton Highway Traffic Forecast: This is an effort to look into the future to determine what to expect in the future for the Dalton Highway in light of anticipated new activity on the North Slope from shale petroleum and other exploration and production activity. In addition, substantial new traffic is expected as a result of new mine development in the Ambler Mining District and construction and operation of a North Slope LNG plant.

Source: Cited and adapted from http://dot.alaska.gov/roadstoresources/highlights.shtml

Exhibit 73: R2R Initiatives—Central and Southeast Regions

West Susitna Surface Access Reconnaissance Study: This is a study to determine what resource developments on the west side of the Susitna River might benefit from surface access—most likely an industrial haul road—and where to route the access, including potential river crossing sites. An initial report is expected in January 2014. Early indications point to resource opportunities that would benefit from surface access, so a follow-up study is anticipated that will refine the economic parameters and lead to a go/no-go decision. For more information, visit the West Susitna site.

Mat-Su Borough, Little Susitna River Access: A $400,000 project to extend a road to the east bank of the Little Susitna River that will enable winter roads on the west side for timber extraction.

Kake–Petersburg Road: Wholly funded in the FY13 state budget, this project will upgrade 23 miles of existing logging and build 22 miles of new road to provide surface access between the two cities. Western Federal Lands Division, a sub-agency of the Federal Highway Administration (FHWA), will prepare the environmental documents and provide project leadership.

LiDAR for Southeast Alaska Corridors: This was a $5 million capital budget item for aerial topographic mapping of transportation corridors in Southeast Alaska. The project began in early FY13 with the selection of corridors and some initial flying. The route from the current highway terminus in Sitka to Katlian Bay was flown in the fall of 2012 and substantial flying is planned for the summers of subsequent years.

Bostwick Road to Vallenar Bay: Funded at $5 million, this project has been re-routed and the work will be done by the Department of Natural Resources Forestry Division, Ketchikan office.

Mill Access Road Upgrade: This $2.5 million project will upgrade 3 miles of single-lane road on Gravina Island between Lewis Reef Road and the site previously occupied by the Seley Sawmill. Bridge evaluation and preliminary work is underway.

Ketchikan to Shelter Cove Road: This project, funded from two voter-approved General Obligation (GO) Bonds, will be ready for construction soon. There will be preliminary resurfacing of an existing road segment, and a reconnaissance report has been published. Right-of-way transactions are underway, along with environmental work and permitting.

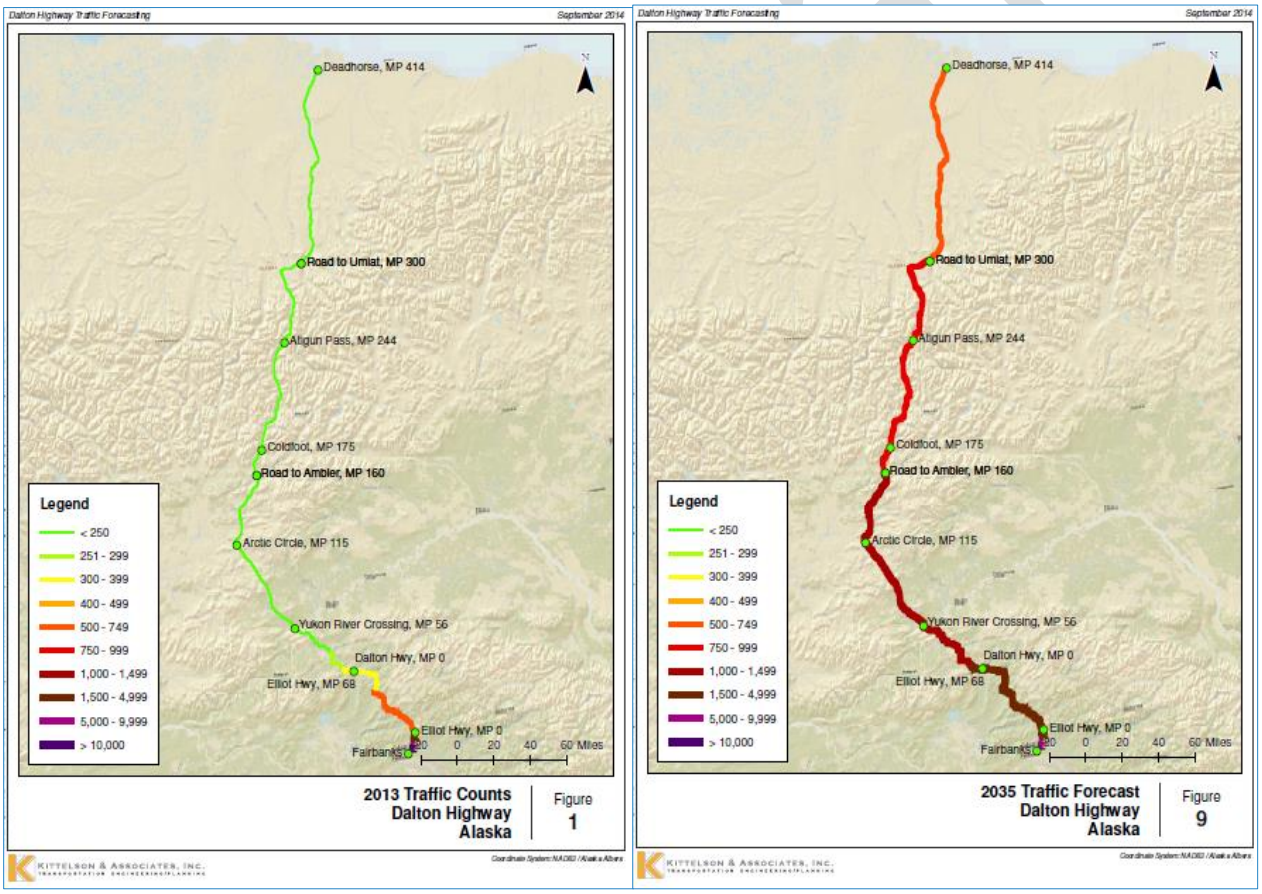
Sitka, Road Extension to Katlian Bay: This project was funded at $14 million in the 2012 GO Bond. A reconnaissance site visit occurred in the fall of 2012 and LiDAR was flown at that time as well.

Source: Cited and adapted from http://dot.alaska.gov/roadstoresources/highlights.shtml

Dalton Highway Traffic Forecast

As noted in Exhibit 72, the Dalton Highway Traffic Forecast study looks at current traffic volume on the Dalton Highway, as well as potential future demand from expanded North Slope LNG production and from additional mining activity that would use the Dalton Highway for access. The forecast will assist DOT&PF in planning for capital improvements and seasonal maintenance (winter storms and avalanches, summer permafrost melt, etc.) on this critical trucking corridor. Key drivers of future demand growth include an anticipated North Slope LNG refinery; an anticipated North Slope LNG pipeline; increased North Slope oil exploration and production for the Trans-Alaskan Pipeline System; oil and gas exploration in the Alaskan Outer Continental Shelf; shale oil exploration on the North Slope; and three R2R projects (Foothills West, Road to Ambler, and Road to Tanana). As shown in Exhibit 74, AADT over the full extent of the Dalton Highway could increase substantially by 2035 with implementation of planned and potential resource projects.

Exhibit 74: Dalton Highway AADT (All Vehicle Types), Actual 2013 and Forecast 2035



Source: Dalton Highway Traffic Forecast Study, Kittelson and Associates, September 2014

Mining Access Improvements

Planned or proposed access improvements to support new mining activities include the following:

- The Livengood Gold Project, located northwest of Fairbanks, is already accessible by road.
- The Ambler Mining District (copper, zinc, lead, and gold) will be accessed by the R2R Road to Ambler Project.
- The Chuitna Coal Project on the west side of Cook Inlet is proposed to move coal outbound through a new port facility.
- The Donlin Gold Project, located in southwest around 277 miles west of Anchorage and 145 miles northeast of Bethel, would need to develop a barge landing on the Kuskokwim River, deep-water port improvements at Bethel, a 30-mile road from the barge landing to the mine site, an airstrip, and a pipeline for receiving natural gas.
- The Pebble Project (copper, gold, and molybdenum) is located in the Bristol Bay Region, around 17 miles northwest of Iliamna and 200 miles southwest of Anchorage. The project would need to build a deep-water port at Inishkin Bay and a haul road between the port and the mine site.

Other mine-serving transportation improvement concepts include Brooks to Norton Sound Rail (an idea to develop a rail connection between coal fields at the western end of the Brooks Range and a year-round deep-water port at Nome) and the "G7G" Northern Pacific Tidewater Project (which would create a mine and port-serving rail corridor between the Alaska Railroad terminating point at Delta Junction and the Canadian transcontinental rail network at Fort McMurray, Alberta).

Susitna-Watana Hydro Project

Susitna-Watana Hydro is proposing a dam on the Susitna River, about 87 miles upriver from Talkeetna, for the generation of hydroelectric power. Construction of the facility would generate substantial demand for movement of bulk materials, equipment, and machinery.

Arctic Port

As previously noted, with reduced quantities and frequencies of ice in northern global waters, commercial (U.S. and foreign flag) and military vessel traffic using the Northwest Passage is expected to increase dramatically in coming decades. However, north of Prince Rupert in British Columbia and the U.S. Coast Guard station at Juneau, there are no major ports on this route for vessel servicing, accident and emergency response, regulatory/security enforcement, or military operations.

In response, DOT&PF and the U.S. Army Corps of Engineers have co-sponsored the Alaska Deep-Draft Arctic Ports Study as a means of evaluating potential locations for a new port. The new port would serve as the northernmost port for the U.S. Coast Guard, Navy, and National Oceanic and Atmospheric Administration; it would provide critical support services to vessels traversing the Northwest Passage; it could potentially serve as a base of vessel operations to support exploration of offshore petroleum

reserves; and it could potentially support the inbound movement of industrial machinery and local supplies, along with the outbound movement of oil, gas, and mining products.

Preliminary investigations considered a huge extent of Alaska's Arctic coastline, from Bethel to Prudhoe Bay. Initial screening narrowed the sites to Nome, Point Spencer, and Cape Riley. Nome is served by local roads but is not connected to Alaska's larger highway system; there is a seasonal road north from Nome to the vicinity of Point Spencer and Cape Riley, but connecting roads would need to be built.

Improving Urban Freight Movement and Reducing Performance Risks

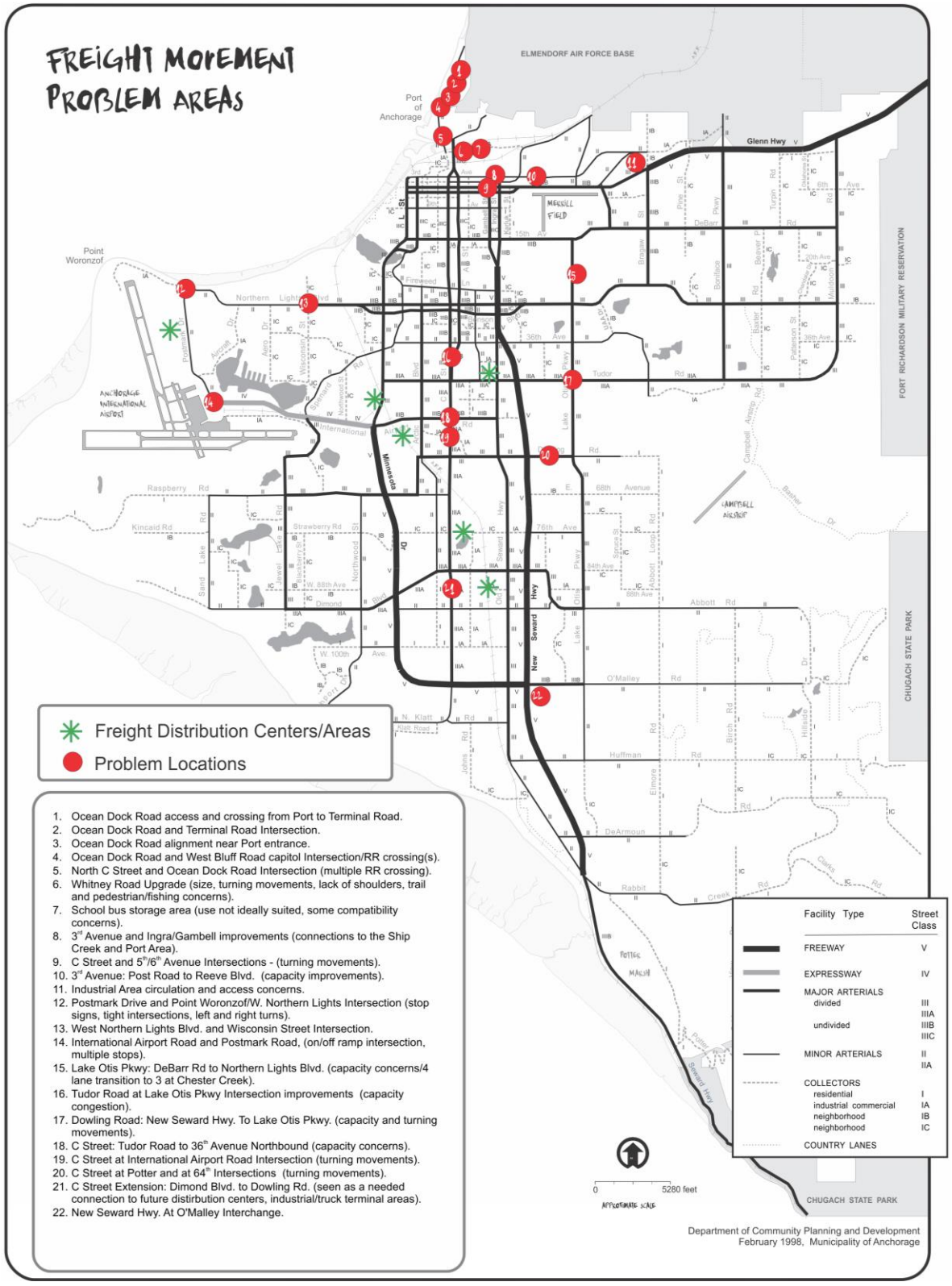
Reducing truck congestion and improving travel time reliability and safety in urban areas and key corridors is a key performance area addressed in the LRTP, especially for truck moves to/from ports, airports, and other major freight trip generators, and while also accommodating the needs of a changing and growing population increasingly concentrated in urban areas. The policy direction is that DOT&PF will collaborate with other units of government so that freight-related performance is addressed in area and Metropolitan Planning Organization (MPO) plans.

As part of ongoing planning, Anchorage Metropolitan Area Transportation Solutions (AMATS) has identified a set of "Freight Movement Problem Areas" in Anchorage (see Exhibit 75) and Fairbanks Metropolitan Area Transportation System (FMATS) has identified "Freight Issues and Constraints" (see Exhibit 76).

Roadway congestion is one of the main sources of unpredictability and costs of supply chains. It causes unnecessary costs to trucking firms in greater fuel consumption and costs to shippers in increased inventories from unreliability. Roadway congestion, especially in urban areas, represents a significant source of freight infrastructure bottlenecks in Alaska. To date, there has not been a systematic state-wide definition of what constitutes an acceptable truck "problem area," "issue," or "constraint." An important opportunity to establish a consistent state-wide measure of truck network performance is available, using truck travel speed data from FHWA. FHWA's National Performance Management Research Data Set (NPMRDS) includes truck travel speeds based on Global Positioning System transponder reports and provides useful information for much of Alaska.[16]

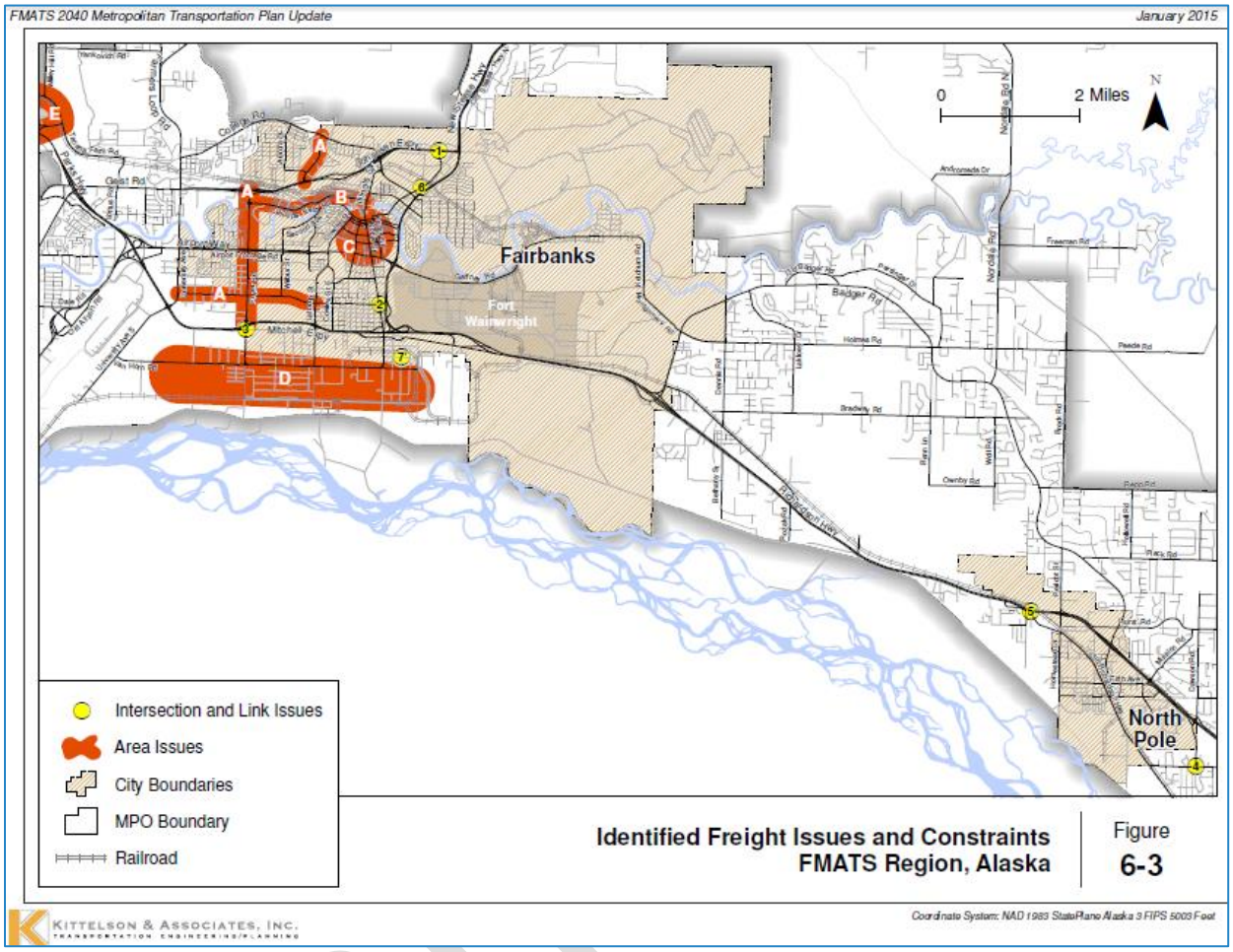
[16] As a demonstration analysis, the NPMRDS information was used to identify the travel times of trucks along key road segments in Alaska, every 5 minutes, from March 1, 2014 to September 1, 2014 (only summer). Travel speeds were recorded by segment for every hour of the day, and ratios between uncongested and congested travel speeds by segment were calculated. This ratio represents a Planning Travel Time Index; the higher the index, the greater the difference between uncongested and congested speeds. The data therefore supports measurement of three basic performance indicators: overall speed; congested (low speed) locations; and low-reliability locations (where the Planning Travel Time Index is high). For this study, the index was defined as the ratio of the 80th Percentile Travel Time to the 10th Percentile Travel Time.

Exhibit 75: Anchorage Freight Movement Problem Areas (AMATS)



Source: AMATS

Exhibit 76: Fairbanks Freight Issues and Constraints (FMATS)



Source: FMATS 2040 Metropolitan Transportation Plan Update

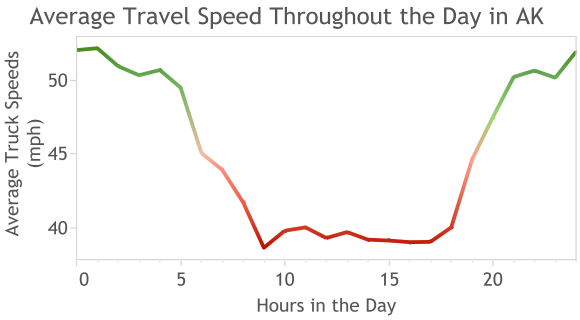
The results indicate that, as expected, most of the unreliability occurs in urban areas. The key seven highways in the state operate at near free flow on most miles, with the exception of a couple of miles on Sterling Highway at Soldotna (Kenai Peninsula), upstream of key on-ramps; a segment of the Parks Highway through Denali and Yukon-Koyukuk close to Fairbanks; at the junction where Alaska Highway branches out to the Richardson Highway; and at the point where the Alaska Highway crosses the border into Canada (where the data is presumably measuring border crossing processing delays).

Exhibit 77 shows the overview of the analysis. Only weekdays were considered, as on weekends travel patterns are very different and there is less congestion. Planning Travel Time Indices were only calculated for road segments that had more than 50 records in the database. Exhibit 78 and Exhibit 79 provide detailed views of the results for downtown Anchorage and Fairbanks, respectively. Two maps are provided for each, showing all travel directions.

Exhibit 77: Weekday Truck Travel Time Index Results for Alaska, 3/01/2014 to 08/31/2014

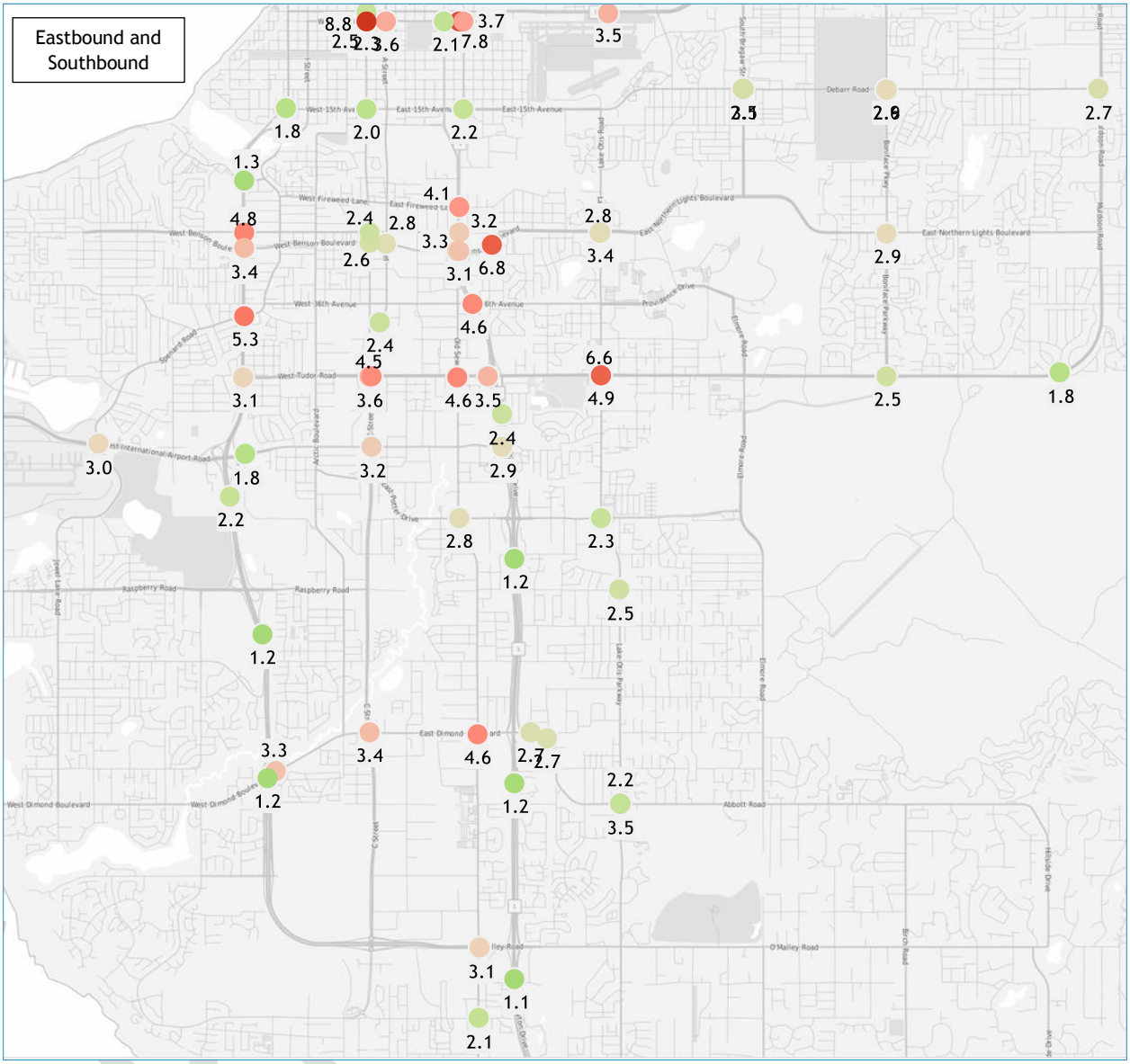
Road Segments with the Highest Trucking Congestion

Road ID	Location	Road Name	Road Direction	Planning Travel Time Index
133P04781	Southeast Fairba..	Alaska Hwy	Northbound	11.32
133P04219	Kenai Peninsula	Sterling Hwy	Northbound	11.11
133N04244	Anchorage	C St	Southbound	8.80
133N04222	Kenai Peninsula	Sterling Hwy	Southbound	8.38
133P04162	Anchorage	6th Ave	Eastbound	7.76
133P04107	Anchorage	Seward Hwy	Northbound	7.27
133P04321	Anchorage	Old Seward Hwy	Northbound	7.11
133P04399	Anchorage	Benson Blvd	Eastbound	6.78
133N04261	Anchorage	Lake Otis Pky	Southbound	6.59
133N04473	Matanuska-Susitna	E Parks Hwy	Southbound	6.40
133P04612	Fairbanks North ..	Richardson Hwy/S..	Northbound	6.29
133N04364	Anchorage	Tudor Rd	Westbound	5.88
133N04639	Fairbanks North ..	Johansen Expy	Westbound	5.41
133N04127	Anchorage	Minnesota Dr	Southbound	5.34
133N04637	Fairbanks North ..	Johansen Expy	Westbound	5.23
133N04246	Anchorage	C St	Southbound	5.00
133P04366	Anchorage	Tudor Rd	Eastbound	4.86
133N04129	Anchorage	Minnesota Dr	Southbound	4.77
133N04323	Anchorage	Old Seward Hwy	Southbound	4.64
133P04364	Anchorage	Tudor Rd	Eastbound	4.63
133P04639	Fairbanks North ..	Johansen Expy	Eastbound	4.62
133N04107	Anchorage	Seward Hwy	Southbound	4.60
133P04108	Anchorage	Seward Hwy	Northbound	4.59
133P04250	Anchorage	A St	Northbound	4.57
133P04645	Fairbanks North ..	Airport Way	Eastbound	4.51
133N04239	Anchorage	C St	Southbound	4.49
133N04408	Anchorage	15th Ave	Westbound	4.45
133P04934	Juneau	Null	Northbound	4.40
133N04472	Matanuska-Susitna	E Parks Hwy	Southbound	4.33
133N04363	Anchorage	Tudor Rd	Westbound	4.29
133P04126	Anchorage	Minnesota Dr	Northbound	4.24
133P04518	Matanuska-Susitna	S Knik-Goose Bay ..	Northbound	4.22



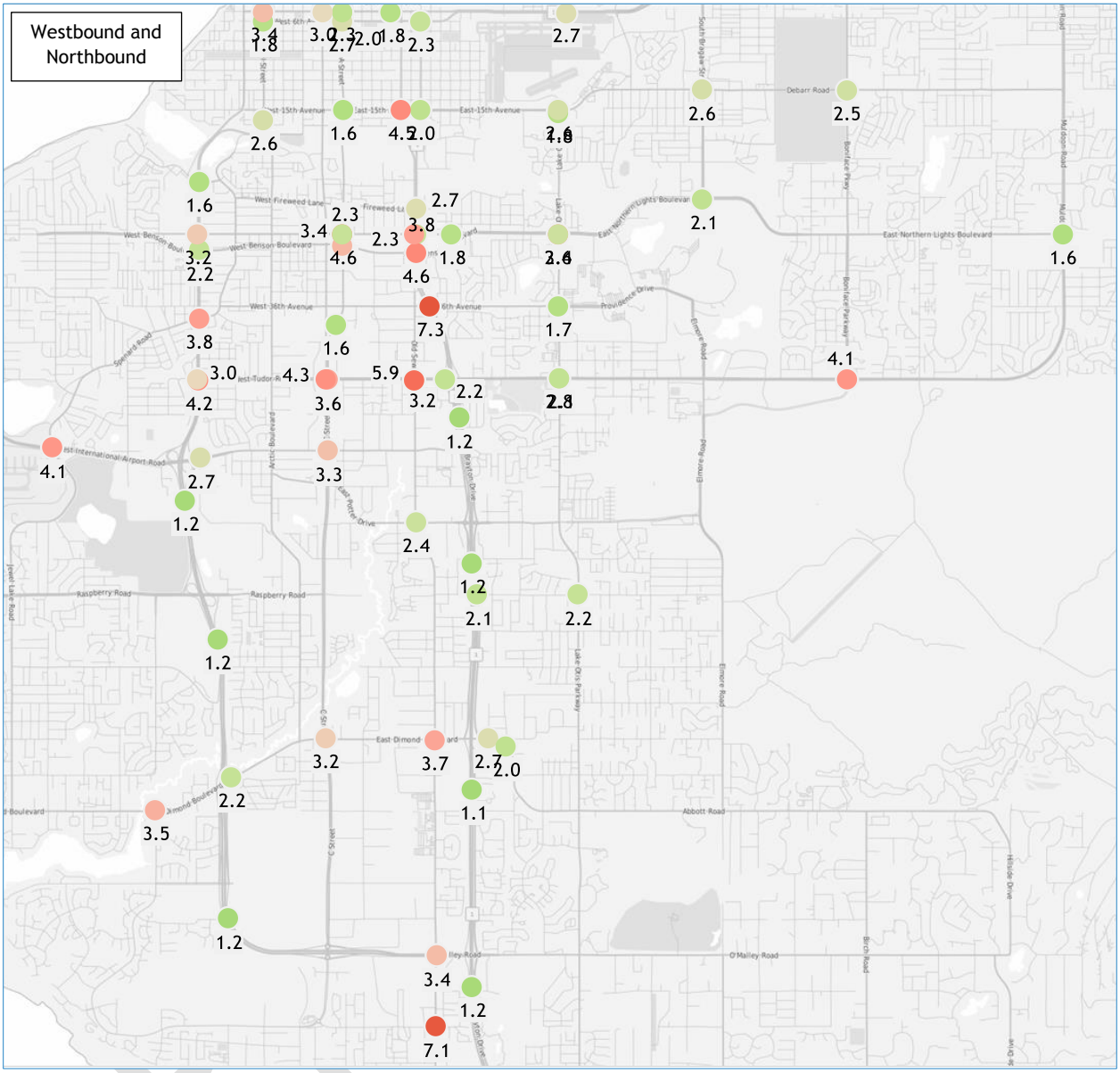
Source: Analysis of National Performance Management Research Data Set

Exhibit 78: Weekday Planning Travel Time Indices in Anchorage, 3/01/2014 to 08/31/2014



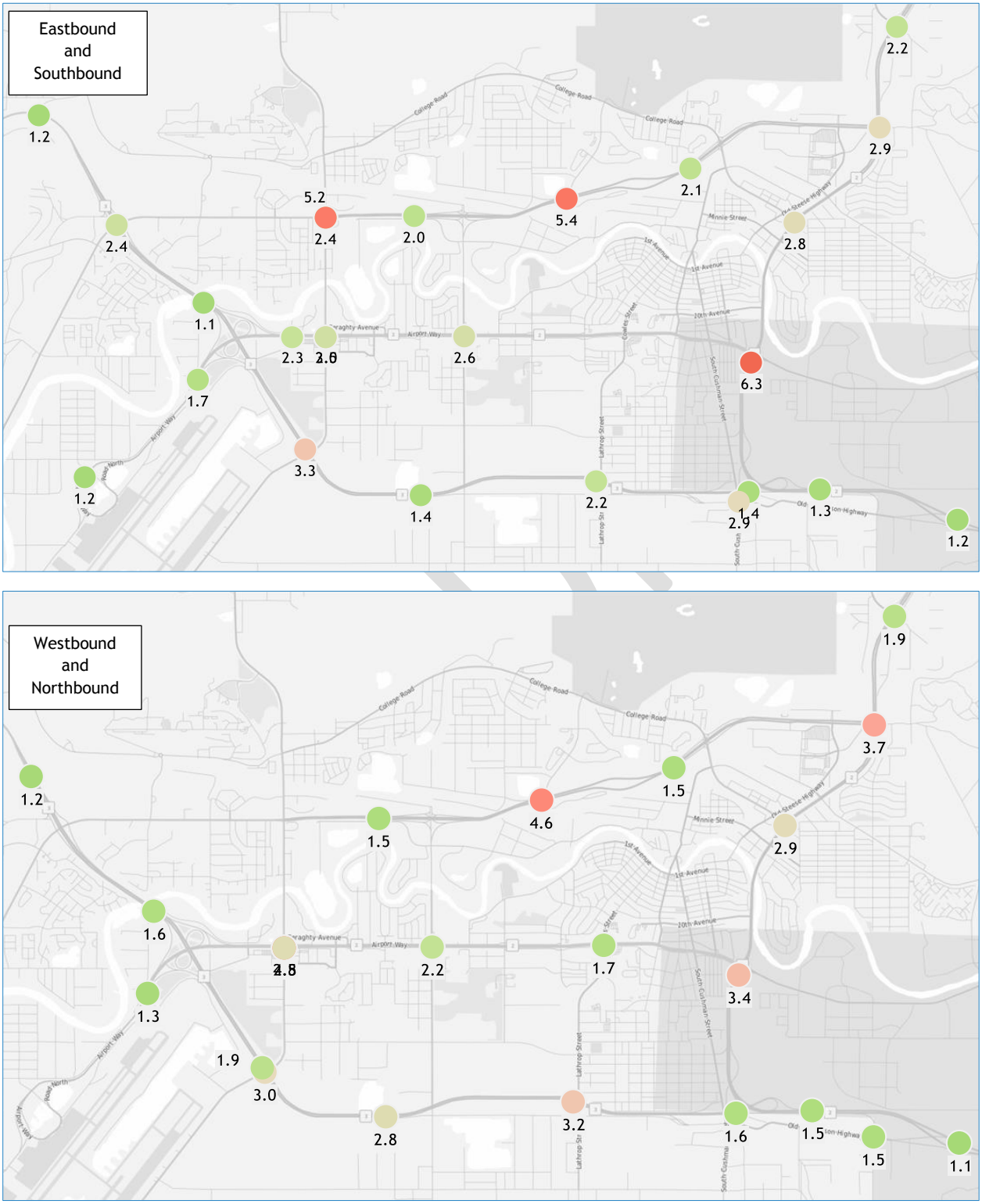
Source: Analysis of National Performance Management Research Data Set

Exhibit 78: Weekday Planning Travel Time Indices in Anchorage, 3/01/2014 to 08/31/2014 (continued)



Source: Analysis of National Performance Management Research Data Set

Exhibit 79: Weekday Planning Travel Time Indices in Fairbanks, 3/01/2014 to 08/31/2014



Source: Analysis of National Performance Management Research Data Set

Maintaining and Improving Trade Gateways

Alaska's seaports, airports, and land border crossings are the lifelines for producers and consumers. Maintaining and improving their performance are essential for Alaska's economy and the well-being of its population.

Generally, ports and airports measure performance based on volumes (tonnage, units handled, value handled, vessels or aircraft handled), utilization (tons or units per acre), and financial returns (profit/ loss, return on investment). These are measures that are appropriate to their facilities as independent entities but do not necessarily reflect their role and value within the larger multimodal freight transportation system.

When thinking about the goals of a high-functioning freight transportation system for Alaska—one that is reliable, affordable, fast, safe, secure, and connected—then the performance priorities for trade gateways are as follows:

- **Ensuring the viability and performance of critical marine import gateways that serve Alaska consumers and industries.** Most of Alaska's inbound marine cargo arrives through the Port of Anchorage. The port, in cooperation with federal agencies, has been undertaking a major inter-modal expansion project to increase its vessel berthing capacity. Construction of new berths has been underway for some time, but their completion has been delayed due to a combination of issues, ranging from design to construction practice to program management. It is possible the construction project may be completed by 2020, at which time it will provide additional capacity and reliability for inbound marine cargo. The need for truck access improvements to reduce delays and improve reliability has also been identified, both in Ship Creek near the main entrance to the port (to address truck congestion and at-grade rail crossings) and through Anchorage (to improve overall accessibility by trucks). These import commodities come primarily from ports in the U.S., but Canada also plays a large role, especially in supplying the Southeast Region.

- **Ensuring that Alaska's major commodity exporting seaports provide adequate capacity and performance to meet market requirements.** Alaska's leading tonnage export ports (e.g., Valdez, Nikiski, Kivalina, Unalaska, Seward, and Ketchikan) are listed in Exhibit 34 and all play a role in the state's economy. As previously noted, major expansion at the Port of Nikiski would be required to support the Alaska LNG project. Expansion is also underway at Port MacKenzie, in the Upper Cook Inlet. Port MacKenzie is capable of handling a variety of inbound and outbound products (gravel, coal, wood chips, cement, manufactured products, etc.) and is looking at LNG development and a direct connection to the Alaska Railroad. Port MacKenzie does not appear on the list of Alaska's leading tonnage ports in 2012 (Exhibit 34) because it handled no tonnage that year.

- **Ensuring the viability and performance of critical air cargo gateways.** Ted Stevens Anchorage International Airport is the dominant air cargo gateway. According to the recent Alaska International Airport System Planning Study, the increasing number of aircraft operations at ANC could result in unacceptable levels of runway delay within a 20-year planning horizon. Runway delay means not only late flights, but also increasing unreliability, as aircraft miss delivery windows or airport

curfews. One recommendation of the study is to explore capacity improvements at ANC; another is to explore the potential for Fairbanks International Airport to support the state's international air cargo operations.

- **Ensuring some share of air cargo that passes through Alaska's gateways, as part of moves between other countries and the lower 48, undergoes value-added handling** (sorting, deconsolidation, and consolidation, etc.). This may offer an opportunity to derive greater economic value from pass-through activity.

Maintaining and Improving Multi-Modal Connectivity

Maintaining and improving multi-modal connectivity among and between Alaska's urban and rural communities is an essential planning consideration that includes the provision of alternative facilities, services, or modes to improve reliability, cost, and overall performance for rural communities. Alaska's highway system reaches major cities, but its overall mileage is low; many communities are not connected or served by roads. Alaska's freight rail and pipeline systems operate in limited corridors. Alaska's ports serve coastal and river communities, but their ability to serve inland communities is constrained by the availability of other connections. Roads and ports may be usable only in certain seasons when ice stabilizes road surfaces or lack of ice makes marine traffic possible. As a result, Alaska is highly dependent on air cargo to reach and serve communities with commodities that in the lower 48 would normally be served by truck or rail. In some cases, the "last mile" move from an airport is by snowmobile or sled. In most of the U.S., freight shippers can choose from a full range of modal options, selecting those that best suit their needs for reliability, cost, speed, safety, and security. In Alaska, freight shippers may have little or no choice regarding transportation modes.

In part, the lack of modal redundancy results from economic considerations: because of insufficient demand or lack of "economies of scale," in many cases it has been uneconomical to provide anything other than air or water service. However, this can result in emergencies when the available modal system is unavailable due to disruption. There are practical limits to improving modal redundancy for freight service to rural communities, but opportunities should be carefully considered.

Addressing Risk and Uncertainty

The Freight Element considers uncertainty and risk. The key areas where these considerations arise are as follows:

- How resource development and other freight drivers might evolve in the future
- Addressing impacts of climate change and increasing climate variability
- Managing freight transportation costs
- Addressing funding uncertainties

Resource Development Questions

The planning process must recognize risks and uncertainties regarding how resource development and other freight drivers might evolve in the future. Improving performance may involve repairing or

expanding infrastructure, implementing new technologies or management practices, improving service availability and reliability (reducing seasonal risks, etc.), and/or adopting innovative policy, financing, and implementation approaches.

For example, with respect to resource development, the question of performance is largely binary: if transportation improvements are provided, the resource can be produced and moved to market; if not, then nothing can happen. Alaska's approach has been that the beneficiaries of resource-driven transportation improvements should be primarily responsible for the cost of those improvements. When Alaska's public agencies are not financially invested, they are still critical decision-makers in the approval and implementation process. Resource development markets are highly volatile and subject to global pricing and competitiveness factors; those pressures may delay the implementation of certain projects or accelerate the timeline for others.

The discussion on population growth demonstrates the significant role resource development has played in Alaska's in-migration and overall economic growth. Whatever the State of Alaska, federal regulatory agencies, and private investors agree to and accomplish with respect to resource development will undoubtedly have significant impacts on Alaska's freight volumes and freight transportation needs.

Climate Change and Disruption

Climate change is expected to affect Alaska disproportionately because of its unique geographical location. In the past 50 years, average temperatures have increased twice as fast as in the contiguous U.S.[17], with interior regions experiencing the most rapid increases. [18] Over this period, precipitation has increased by 10% on average,[19] except in the Arctic where large decreases have been observed. Freezing and thawing cycles are changing, and the permafrost is degrading from increased temperatures.[20] The Arctic is warming faster than anywhere else in the world, which is causing significant reductions in ice formation on sea and land. It is expected that by 2037, there will be no sea ice left during summer.[21] These changes to Alaska's climate, geography, and geology are expected to affect freight transportation in the following ways:

- Changes in permafrost near the Arctic will reduce the amount of time during the year that ice roads are passable.[22]

[17] Karl, T. R., Melillo, J. M., and Peterson, T. C. (2009). *Global Climate Change Impacts in the United States*. *Society*.
[18] Markon, C. J., Trainor, S. F., and Chapin, F. S. (2012). *The United States National Climate Assessment - Alaska Technical Regional Report*. Reston, Virginia, 148
[19] Wendler, G., and Shulski, M. (2009). "A Century of Climate Change for Fairbanks, Alaska." 62(3), 295–300.
[20] Markon, C. J., Trainor, S. F., and Chapin, F. S. (2012). *The United States National Climate Assessment - Alaska Technical Regional Report*. Reston, Virginia, 148
[21] Markon, C. J., Trainor, S. F., and Chapin, F. S. (2012). *The United States National Climate Assessment - Alaska Technical Regional Report*. Reston, Virginia, 148
[22] Clement, J. P., Bengston, J. L., and Kelly, B. P. (2013). *Managing for the Future in a Rapidly Changing Arctic: A Report to the President*. Washington, D.C., 59.

- Increased coastal extreme weather events will accelerate coastal erosion. This, combined with rising sea levels (small in this part of the world) and soil subsidence, is likely to force the relocation of communities. There are an estimated 180 coastal communities in Alaska that are at risk for erosion. Of these, the state has identified six that are in immediate jeopardy and may require relocation.[23]
- The melting of Arctic sea ice will lead to the opening of the Northwest Passage, which presents new opportunities and challenges for international shipping.
- More frequent extreme precipitation events are likely to accelerate asset deterioration.

Cumulatively, these effects are likely to exacerbate seasonal fluctuations in freight demand and freight infrastructure availability, as described in the *Critical Freight Trends* section. They may also lead to permanent changes in Alaska's economy and its freight transportation infrastructure.

Incorporating climate change impacts into the planning processes will help mitigate the effects of many of these environmental factors on freight infrastructure. Designing according to historical standards might not be appropriate in many cases, as forecasts of storm frequency and strength could be higher. The resiliency of the infrastructure is therefore an important consideration in planning, design, and benefit-cost evaluation. Alaska has many transportation links on which disruptions would affect a large proportion of the state's population or economy. Efforts should be made to forecast potential impacts while keeping in mind the uncertainties involved in climate models and the risk tolerances of local communities. Infrastructure that is already built should be monitored often to see how it might be affected in order to increase certainty and react more quickly to adverse impacts.

Significant research has been conducted to understanding how climate change will affect Alaska. Much of this work has been sponsored by the Alaska government, which has been proactive on these issues. In 2007, the governor of Alaska created a Climate Change Sub-Cabinet to develop policies for adapting to and mitigating climate change and outlining future research needs. This group authored the Adaptation Advisory Group Draft Final Report in 2009 which provided a preliminary assessment of various adaptation strategies. However, this report only addressed freight needs indirectly; if and when it is updated, a more extensive treatment of freight would be useful.

Addressing recurring climate-related and geologic disruptions (e.g., icing of harbors and rivers, melting of winter roads, avalanches, debilitating storms, fires, floods, and earthquakes) is already part of "normal" planning for DOT&PF and other Alaska infrastructure owners and operators. Disruptions that might be once in a decade events in the lower 48 are business as usual for Alaskans. Nevertheless, these represent significant risks to system operations, and the state incurs significant costs in preparing for and addressing them. With climate change, the frequency of disruptive events will likely increase.

Transportation Cost

Alaska has some of the highest costs of living and conducting business in the U.S., primarily because of high transportation costs. This results from the large size of the state, its difficult geography, and the

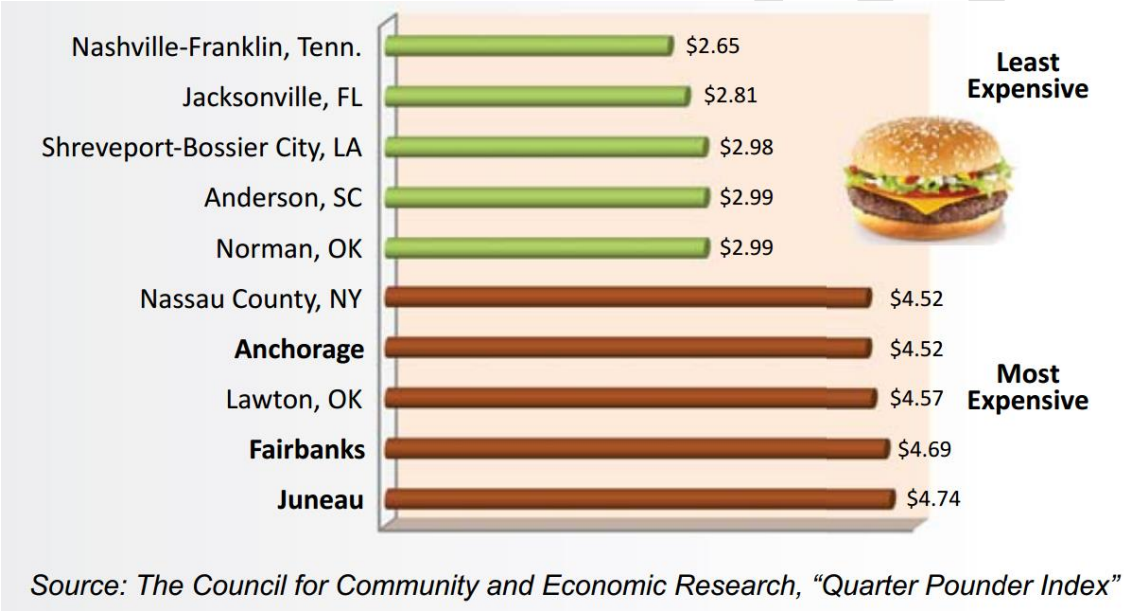
[23] Connor, B., and Harper, J. (2013). "How Vulnerable Is Alaska's Transportation to Climate Change?" *TR News*, Washington, D.C., (284), 23–29.

relatively small population that lives there. There are relatively few users for the freight transportation assets that exist, which does not allow for economies of scale to reduce unit transportation costs, as happens elsewhere in the U.S. The costs for industrial materials and consumer goods are well above national averages.

With a high dependence on goods imported from other states and countries, a high dependence on air cargo (one of the most expensive forms of freight transportation), and long supply chain distances within the state, the cost of goods in Alaska tends to be very high. Without "bypass mail" service, where rural air cargo is delivered at postal rates, the cost would be even higher.

Exhibit 80 shows the "Quarter Pounder Index" that is often used as an informal measure of the cost of everyday consumables. By this measure, three of the four most expensive locations for which data is available in the U.S. are located in Alaska.

Exhibit 80: Cost of a McDonalds "Quarter Pounder" in 2013



Source: Alaska Economic Trends, July 2014

The overall cost of living in Portland, Oregon, is 79% of the cost of living in Anchorage, and Anchorage is among the most affordable locations in Alaska due to its size and relative accessibility. Exhibit 81 shows that living costs are significantly higher elsewhere in the state, especially for food, electricty, and other necesities. For example, electricity costs in Bethel are about three times higher than in Anchorage, and gasoline is almost twice as expensive. Other places like Nome have even higher costs.

Exhibit 81: Alaska Prices of Food and Other Essentials

Community	Food at home for a week*	Percent of Anchorage	Electricity 1,000 kwh	Heating oil (#1)/gallon	Unleaded gas/gallon	Propane per gallon	Lumber 2"X4"X8'
Anchorage	$164.56	100%	$140.84	$3.50	$3.90	$3.73	$3.53
Bethel	$336.85	205%	$404.63	$7.12	$7.13	$10.16	$7.01
Cordova	$248.65	151%	$277.85	$4.45	$5.03	$4.40	$5.89
Fairbanks	$167.29	102%	$323.31	$4.55	$4.59	$5.64	$7.01
Haines	$223.54	136%	$225.51	$4.36	$4.59	$3.99	$4.39
Homer	$191.86	117%	$202.87	$3.61	$4.23	$4.12	$3.86
Kenai-Soldotna	$168.59	102%	$200.04	$3.27	$4.13	$4.15	$3.73
Ketchikan	$177.91	108%	$124.70	$4.04	$4.13	$3.68	$4.10
Palmer-Wasilla	$173.61	105%	N/A	N/A	N/A	N/A	N/A
Portland, OR	$130.27	79%	$119.00	$3.88	$3.65	$2.83	$2.57
Sitka	$201.04	122%	$100.70	$3.94	$4.48	$3.35	$4.19
Tok	$230.22	140%	$336.73	$4.43	$4.23	$3.47	$4.45
Unalaska/Dutch Harbor	$223.83	136%	N/A	N/A	N/A	N/A	N/A
Valdez	$215.77	131%	$184.00	$4.20	$4.47	$3.87	$4.70

*Weekly cost for a family of four with children ages 6 to 11. Note: Not all covered communities were available.
Source: University of Alaska Fairbanks, Cooperative Extension Service

Source: Alaska Economic Trends, July 2014

Energy costs are a particularly important issue, as many Alaskan communities depend on barges or even aircraft to supply them with motor vehicle fuel and heating fuel. Exhibit 82 shows the costs of heating fuel and gasoline at many communities throughout the state. It also indicates the primary mode of transportation that was used to transport these essential products to these locations. Communities served by refineries and trucks enjoy the lowest costs, while communities dependent on air generally see the highest costs.

Exhibit 82: Alaska Energy Prices by Mode of Transportation, January 2014

Community[1]	Heat. fuel #1, residential	Gasoline, regular	Method of transportation
Anvik	$6.00	$6.50	Barge
Arctic Village	$10.00	$10.00	Air
Atqasuk[2]	$1.40	$4.10	Barge/Air
Barrow[3]	–	$7.00	Barge
Chenega Bay	$7.22	$7.60	Barge
Cordova	$4.34	$4.80	Barge
Delta Junction	$4.08	$3.81	Truck
Dillingham	$5.97	$7.09	Barge
Emmonak	$6.20	$6.59	Barge
Fairbanks	$4.09	$3.69	Refinery/Truck
Glennallen	$3.80	$4.25	Truck
Gambell	$6.25	$6.75	Barge
Homer	$3.82	$3.92	Barge/Truck
Hoonah	$4.28	$4.54	Barge
Hooper Bay	$6.90	$6.55	Barge
Hughes	$9.00	$8.25	Air
Huslia	$7.00	$6.00	Barge
Juneau	$4.31	$4.09	Barge
Kodiak	$4.00	$4.17	Barge
Kotzebue	$6.15	$7.99	Barge
Nelson Lagoon	$6.25	$6.40	Barge
Nenana	$4.62	$4.09	Truck
Nondalton	$6.28	$6.28	Air
Pelican	$5.14	$5.01	Barge
Petersburg	$4.02	$4.32	Barge
Port Lions	$4.95	$4.85	Barge
Russian Mission	$5.80	$6.45	Barge
Unalaska	$4.44	$5.11	Barge
Valdez	$4.20	$4.19	Refinery/Barge

[1]This is a partial list of the 100 communities surveyed.
[2]The North Slope Borough subsidizes heating fuel.
[3]Barrow uses natural gas as a source of heat.
Source: Department of Commerce, Community, And Economic Development, Current Community Conditions: Fuel Prices Across Alaska, January 2014 Update

Source: Alaska Economic Trends, July 2014

It is doubtful whether Alaska costs can be reduced to levels found in the lower 48, but the provision of efficient multi-modal freight transportation will go a long way to ensure those costs are as low as possible. Ultimately, it will be necessary for Alaska to address needs and seize opportunities within the context of projected constraints in state funding, along with uncertain federal assistance.

Transportation Funding

Much of Alaska's infrastructure is aging, and the costs to keep the system in operation are increasing. At the same time, system expansion and modernization will be required. The good news is that much of Alaska's freight infrastructure is privately-owned, self-funded from revenue streams, or built through public-private partnerships administered through AIDEA and other public partners. The bad news is that

much of Alaska's freight infrastructure is funded through traditional transportation state and federal funding sources that are both projected to decline.

Alaska's budget comes from very different sources than the rest of the U.S. Around half comes from taxes and royalties on the extraction of petroleum, mostly from North Slope oil fields. This represents over 90% of discretionary funds available to the state. Having such a large fraction of revenues come from a single source exposes the state to significant funding uncertainty. Revenues are tied to the price of oil in international markets, which has fluctuated considerably in recent years. Additionally, recent regulatory changes (including Senate Bill 21) have reduced state revenues from petroleum, especially when prices drop. This bill was introduced in the hopes of spurring new resource exploration and economic growth. In 2009, the Alaska Transportation Finance Study[24] recommended that the state increase fuel taxes, vehicle registration fees, and vehicle sales taxes, as well as encourage local governments to impose sales taxes. However, this approach to revenue enhancement has not advanced. At the federal level, the shortfalls at the Highway Trust Fund will continue to increase competition for scarce resources from around the country. Further compounding the problem, construction costs in Alaska have increased rapidly over the last few years. Current budgets are insufficient, leading to an accumulation of deferred maintenance costs from aging infrastructure.[25] This is a common problem throughout the U.S.; in some cases, the budget is only sufficient to fund maintenance, to the exclusion of new projects.

Generally, Alaska's freight infrastructure is funded through the following mechanisms.

- **Roads:** The traditional funding source for road projects in Alaska, or elsewhere in the U.S., is the Highway Trust Fund. This is managed by FHWA and follows processes laid out in national transportation policies, including MAP-21. It represents the bulk of roadway funding, but other non-traditional sources are becoming more relevant with constrained budgets. One of these alternatives, which has not been used significantly in the past for transportation projects, is the issuance of State General Obligation Bonds; another is the use of Grant Anticipation Revenue Vehicle Bonds to pay for projects that have already received federal funds. Impending funding shortfalls have increased interest in partnering with the private sector to build strategically important projects for the state. So far, Private-Public Partnerships have been used in specific projects, but not widely, throughout Alaska for several reasons. Foremost, involving the public sector usually delays new construction or upgrading projects considerably. If federal funds are used, project timelines tend to grow even more. It is not atypical for new road sections to take five to seven years from concept to opening. In contrast, the private sector desires to operate on much faster schedules. Moreover, for these arrangements to be successful and coordination possible, the private sector needs to be composed by one or a few firms that have closely aligned objectives. Alaska's R2R program is an example of a successful partnership strategy; under R2R, state agencies work with local governments, Native corporations, the Department of Natural Resources, resource developers, and interested third parties to build transportation infrastructure projects that facilitate the extraction and

[24] Alaska Municipal League, Alaska Transportation Finance Study, January 2009.
[25] Alaska Municipal League, Alaska Transportation Finance Study, January 2009.

commercialization of natural resources. The objective is to boost development of oil, gas, alternative energy, mining, timber, fisheries, and agricultural industries. R2R aims to provide funding through traditional financing mechanisms, but also through Public-Private Partnerships with user fees. The program also supports several studies on issues of resource development, user fees, and trans-border transportation.

- **Airports:** Most airport capital expenses are funded through the federal Airport Improvement Program. This program is supported by the Airport and Airway Trust Fund, which collects taxes on passengers, air cargo, and aviation fuel. To receive these funds, airports are often required to be open year-round, which is an issue in some places of Alaska where travel demand is highly seasonal. These funds cannot be used to pay for maintenance and operations costs. Most non-primary airports (less than 10,000 passenger enplanements) receive operational subsidies from DOT&PF, which has been unable to fully fund all airports in recent years.[26] The Ted Stevens Anchorage International Airport 2014 Master Plan Update recommended that capital projects be financed with grants and revenues from operations. The grants could come from the FAA's Airport Improvement Grants and other federal sources. Airport revenues could come from facility charges and airport revenue bonds. This Master Plan stresses that no improvement project needs to be financed with general state funds. Many states have created their own airport improvement grant programs, but Alaska has not. These funds typically collect revenues from user fees and distribute them to public-use airports. Introducing this program has been contemplated in Alaska.

- **Railroads**: Rail capital projects in Alaska are funded by a mix of federal, state, and private sources. The Federal Railroad Administration has provided significant funds over the years, but the total amount fluctuates considerably from year to year. For federally funded projects, the state typically has provided 9% to 25% matching contributions from the state-owned Alaska Railroad Commission (ARRC). In addition, the ARRC also makes their own internal investments without matching funds and issues bonds that are repaid with Federal Transit Administration formula funds. ARRC receives no state funding for operations, but does receive state funding for capital projects.

- **Ports:** Some of Alaska's ports are privately operated and self-funded. Others, such as the Port of Anchorage, are funded in part through internal operating revenues but also require local, state, and federal funding support for capital projects. Federal funding for port improvements can be extremely difficult and time-consuming to obtain; the types of improvements that are eligible for federal funding are very limited; the budget of the U.S. Army Corps of Engineers is chronically and consistently underfunded by Congress; and the Corps is subject to a variety of internally and externally imposed procedures for project analysis and funding prioritization. Some funding for the AMHS is recovered through operating revenues, but the majority of its funding comes from the state's General Fund.

- **Pipelines**: Pipeline infrastructure is typically privately built, except in the case of utility services (gas, etc.) to Alaska residents.

[26] Alaska Aviation System Plan

The question of funding for freight improvements is largely inseparable from the overarching question of funding for Alaska's transportation system as a whole, but it does have one important distinction: freight investments generate economic returns for Alaska in the form of industry productivity, reduced consumer costs, and jobs. There is a direct and observable payback to Alaska from its freight transportation investments.

Looking ahead, the key opportunities combine revenue enhancement and cost management: increased use of private funding and public-private partnership structures in cases where private interests benefit from transportation investments; procedures to identify annual freight needs and annual funding; strategies to increase the total combined pool of state and federal funds; and a strategy for prioritizing public investments in maintenance and new construction for freight facilities.

FREIGHT GOALS, POLICIES, AND ACTIONS

The LRTP includes goals, policies, and actions for the freight transportation system. These align outcomes, plans, and projects based on performance-based resource allocation; manage the system to increase performance and reduce risk; and provide accountability for the expenditure of public funds.

Freight movement is a partnership between public and private freight shippers, carriers, infrastructure owners and operators, and all levels of regulatory and financing responsibility—federal, state, regional, and local. No single entity or agency "controls" freight movement in Alaska, or can on its own define its future. Nonetheless, among all state agencies, DOT&PF is best positioned to provide statewide multi-modal leadership and "stewardship of the whole," given that it owns and operates much of the state's freight transportation system (including roads, airports, and marine services).

In this section, freight-related goals, policies, and actions developed as part of the larger LRTP process are presented. These goals, policies, and actions are designed to respond to Alaska's freight drivers, system conditions, critical trends, and needs and opportunities, and were crafted with substantial input from a wide range of public and private-sector stakeholders.

LRTP Goals, Policies, and Actions

The Policy Plan of the Long-range Transportation Plan provides the overall umbrella for statewide transportation planning, under which the Freight Element falls. The direction for the plan is applicable to this Freight Element:

1. Align outcomes, plans, and projects based on performance-based resource allocation
2. Manage the system to increase performance and reduce risk
3. Increase revenue and provide accountability

The goals, policies, and actions described below implement each of these strategies. It is also important to note that based on the Freight Element analysis, much of the Policy Plan goals, policies, and actions in themselves address freight performance.

Freight Policies

The LRTP includes freight-related policies addressing New Facilities and Modernization; System Preservation; System Management and Operations; Economic Development; Safety and Security; Livability, Community, and the Environment; and Accountability for Transportation System Performance.

1 New Facilities and Modernization

Develop new capacity and connections that cost-effectively address transportation system performance. Make the existing transportation system better and safer by applying state-of-the-art technologies and techniques that support productivity, improve reliability, and reduce safety risks to improve performance of the system.

Policy 1.A: Develop the multimodal transportation system to provide safe, cost-effective, and reliable accessibility for people and freight.

- We will identify multimodal solutions and regional priorities for the development of the transportation system through area, corridor and modal plans that appropriately and realistically address the values of communities and stakeholders.
- We will address efficient intermodal connections between roads, airports, rail, harbors, transit terminals, and bicycle and pedestrian facilities through area, corridor and modal plans to improve asset utilization, safety, reliability, and the cost-effective movement of people and freight.
- We will evaluate projects for funding by considering the overall benefits and costs to the State in meeting Long-Range Transportation Plan New Facilities and Modernization goals.
- We will ensure modernization investments for rural and non-rural Alaska are evaluated through a decision-making methodology applicable to their circumstances.

Policy 1.B: Prioritize new construction projects by considering overall benefits and costs over time to the State as the key consideration.

- We will continue to add new strategic links to the system based on their benefits and costs in improving access, connectivity, and efficiency, as well as their resulting economic benefit.
- We will reduce the vulnerability of the Alaska Transportation System to safety and security risks from seismic events, climate change, and man-made disasters by incorporating those considerations in project development.

Policy 1.C: Upgrade and modernize passenger and freight transportation systems to increase productivity and reliability, and to reduce safety risks.

- We will invest in modernizing and upgrading facilities based on the expected impact of these projects on asset condition, reliability, and safety.
- We will continue to consider all approaches: use of new technologies, travel demand management, coordination with land use and development control, and nontraditional approaches to modernizing the Alaska Transportation System.
- We will continue to support the modernization and improvement of transit systems in Alaska.

2 System Preservation

Manage the Alaska Transportation System to meet preservation performance targets and acceptable levels of service for all modes of transportation.

Policy 2.A: Apply asset management best practices to preserve the existing transportation system.

- We will strengthen our asset management systems and practices, including those for highway and airport pavements, and bridges. We will add culverts and other assets when it is cost effective.
- We will reduce the risks due to the limited redundancy in the Alaska Transportation System from natural disasters, climate change, and other events through corridor planning and our asset management plan.
- We will work toward optimal life-cycle management practices for all assets and capital equipment.
- We will coordinate with MPOs when establishing performance targets for asset management of the federally funded surface transportation system.
- We will improve and use our management systems to support our asset management plan.
- We will address failed and failing assets using a risk-based approach, recognizing that we cannot afford full reconstruction or replacement of the growing backlog of such assets.
- We will support local governments in Alaska in meeting federal transit asset management requirements.
- We will monitor and report annually via Federal Highway Administration (FHWA) Highway Performance Monitoring System (HPMS) reporting, the condition of our bridge and pavement assets.

Policy 2.B: Increase understanding of, and communicate DOT&PF's responsibilities for, system preservation as the owner of highways, airports, harbors, marine terminals, and vessels.

- We will monitor and report annually, to the extent practicable, the condition of our assets.
- We will adhere to the reporting timeframes established in the Final Rule for National Performance Management Measures.
- We will communicate the anticipated level of service and predict future system conditions based on the planned allocation of funds for preservation and maintenance treatments.
- We will address bicycle and pedestrian needs as a part of system preservation and modernization.

- We will establish and communicate our performance metrics and targets, planned funding levels, and prioritization framework for asset preservation to the general public.
- We will consider the performance of passenger and freight movement in system preservation decisions.

3 System Management and Operations

Manage and operate the system to improve operational efficiency and safety.

Policy 3.A: Ensure the efficient management and operation of the passenger and freight transportation system.

- We will preserve transportation corridors and pursue corridor management.
- We will increase understanding of, and communicate DOT&PF's operational responsibilities for, highways, bridges, airports, and vessels.
- We will support cost-effective and sustainable efforts by the Alaska Railroad, local public transit providers, and regional entities that improve the department's ability to manage and operate its facilities.

Policy 3.B: Use technology and Intelligent Transportation Systems where cost-effective.

- We will deploy Intelligent Transportation Systems that increase asset utilization and transportation system capacity, and reduce safety and security risks.
- We will follow national developments in intelligent infrastructure and connected and autonomous vehicles, and seek opportunities to cost-effectively and sustainably apply changing technology in Alaska.
- We will follow commercial development in unmanned aerial technologies and evaluate their application for use in Alaska's rural and remote areas.
- We will apply research results and technology transfer to our design, construction, and maintenance practices to reduce costs and improve efficiency and safety.

4 Economic Development

Promote and support economic development by ensuring safe, efficient, and reliable access to local, national, and international markets for Alaska's people, goods, and resources, and for freight-related activity critical to the State's economy.

Policy 4.A: Identify new construction and modernization needs that address travel demand growth, economic development, travel and tourism needs and funding strategies through area and metropolitan plans.

- We will monitor and plan for acceptable levels of mobility and reliability to support the Alaska economy.
- We will target system development investments based on their benefits, costs, and sustainability in supporting market-driven economic development.
- We will continue to include a Freight Element in the Statewide Long-Range Transportation Plan to identify transportation infrastructure barriers to economic development.

Policy 4.B: Preserve and operate Alaska's multimodal transportation system to provide efficient and reliable access to and from local, national, and international markets to support economic development goals.

- We will focus on preserving and modernizing the existing system while recognizing that system development is also necessary in Alaska.
- We will maintain and operate the system to provide acceptable reliability and performance.
- We will provide safe, secure, reliable, and cost-effective freight transportation infrastructure for Alaska's freight shippers, receivers, and communities to support Alaska's economic vitality and growth.
- We will monitor climate change to plan for its impacts on transportation-related economic development.
- We will preserve and identify cost-effective opportunities to increase freight modal choices available to rural communities.

5 Safety and Security

Improve transportation system safety and security.

Policy 5.A: Improve transportation system safety in Alaska.

- We will use new technology to improve safety for people and freight through Alaska's Intelligent Transportation Systems Architecture and related use of new technology.
- We will address airport safety and the role of aviation in ensuring health and safety across Alaska in DOT&PF's aviation system plan.
- We will ensure safe transportation by means of timely compliance with national and federal safety standards.

Policy 5.B: Work with federal, local, and state agencies to provide a safe, secure, and resilient transportation system and emergency preparedness for all modes.

- We will improve system resiliency of freight and passenger transportation to reduce the safety and security risks of natural events such as earthquakes, climate change, and man-made disasters (e.g., accidents).
- We will address the security of airports, vessels, and highways in our operating plans, manuals, and guidelines.
- We will partner with other governmental agencies, private and public transportation providers, and their customers to address security.
- We will address security and resiliency as part of our emergency preparedness and response planning.
- We will address security and resiliency as we plan and develop infrastructure projects.
- We will apply technology to improve security and resiliency in all transportation modes.

6 Livability, Community, and the Environment

Incorporate livability, community, and environmental considerations in planning, delivering, operating, and maintaining the Alaska Transportation System.

Policy 6.A: Address quality-of-life, livability, and community considerations in the Statewide Long-Range Transportation Plan, area and corridor plans, asset management, and other plans and project investment decisions.

- We will continue to emphasize effective public involvement, consultation, and cooperation with local units of government, stakeholders, and local communities in the development of transportation plans at all levels.
- The State shall consider the formation of Regional Transportation Planning Organizations as appropriate.
- We will recognize the critical role of transportation in all aspects of quality of life.
- We will address livability and community considerations in project development and work with local governments for roads that are managed to serve local and regional mobility needs.
- We will consider the accessibility needs of mobility-impaired individuals, including the senior population, in designing facilities.

Policy 6.B: Preserve the integrity of the ecosystems and the natural beauty of the State, limit the negative impacts, and enhance the positive attributes – environmental, social, economic, and human health – from the Alaska Transportation System.

- We will evaluate and consider environmental outcomes in area plans, modal plans, and project development.

- We will approach transportation planning and project development to minimize adverse environmental, economic, or social impacts on the State and its traveling public.
- We will support Planning and Environmental Linkage where appropriate and consider Programmatic Mitigation Plans and efforts during the planning process.
- We will use the area and modal planning processes to consult with resource agencies in the early identification of environmental sensitivities, avoidance areas, and potential mitigation measures.
- We will monitor the issues and assess the actions we can take to address climate change concerns.
- We will promote environmentally friendly, affordable transportation solutions.

Policy 6.C: Support energy conservation, specifically in our consumption of fossil fuels to address climate change.

- We will implement strategies for energy conservation of our transportation system that are identified in area plans, metropolitan plans, and community plans.
- We will support transit, ride sharing, trip reduction, non-motorized transportation, and the use of alternative fuels where economically feasible.
- We will continue the State's role in establishing and supporting coordinated community transit systems.

Policy 6.D: Develop transportation plans in close coordination with local communities to ensure transportation investment decisions reflect Alaskans' quality of life values.

- We will coordinate with local jurisdictions to provide transportation enhancements such as waysides, trailheads, and trails for residents and visitors as funding becomes available.
- We will coordinate with and support local land use planning to ensure livable communities.
- We will encourage local jurisdictions to make land use decisions that protect the efficient functioning of the highway system.

7 Results-Based Alignment for Transportation System Performance

Ensure broad understanding of the level, source, and use of transportation funds available to DOT&PF; provide and communicate the linkages between this document, National Goals and Performance Measures, State Performance Targets, area transportation plans, asset management, other plans, program development, and transportation system performance.

Policy 7.A: The statewide plan will provide the framework from which DOT&PF sets investment priorities.

- We will monitor, forecast, and report transportation system performance with an emphasis on the federally funded surface transportation system.
- We will provide information for performance-based planning and budgeting.
- We will promote and work to improve coordination between public transportation and human services transportation.
- We will use best practice techniques and technology for involving public and private sector stakeholders in the transportation planning process.

Freight Actions

The LRTP includes 40 specific freight actions designed to implement and advance these strategies and policies. Many of the full set of Goals and Actions included in the Policy Plan address all users of the transportation system and therefore address the freight travel demands and associated trends analyzed in this Freight Element. The actions that address freight and that were informed by technical analysis and stakeholder input are listed in Exhibit 83 through Exhibit 89.

Exhibit 83: Freight Actions—New Facilities and Modernization

LRTP Action #	Description
1.1	Focus State surface transportation finance responsibilities on the Interstate, Non-Interstate National Highway System, Alaska Highway System, and other high-functional class routes.
1.2	Establish an approach to better align needs analyses in area plans and other transportation plans with goals for surface transportation using a performance based approach to planning-level project evaluation.
1.3	Continue to participate in U.S. Army Corps of Engineers ports planning and federal efforts to monitor and plan for increased Arctic maritime traffic and the transportation infrastructure needs that it may generate for Alaska.
1.6	Incorporate demand management and multimodal solutions into transportation plans at all levels.
1.8	Monitor and regularly evaluate performance of the Alaska Transportation System in meeting freight demand as part of the statewide transportation planning process on an ongoing basis (this Statewide Long-Range Transportation Plan establishes a Statewide Freight Vision and identifies a framework for the Alaska Freight Transportation Network).
1.9	Establish a formal methodology to evaluate freight projects using cost-effectiveness as a key criterion and provide for consistent application in area and modal plans.
1.10	Implement and adapt to new technologies applicable to Alaska, such as Intelligent Transportation Systems, NextGen aviation technologies, and others, to improve asset utilization, system productivity, and reduce safety risks.
1.11	Maintain and report core freight-related multimodal performance measures to inform system expansion and upgrading decisions. Through the Freight Element, establish FAST-compliant highway metrics reflecting system performance, user experience, and other factors based on readily available information. Identify metrics for other freight modes that are available today or that could be developed in the future.

Exhibit 84: Freight Actions—System Preservation

LRTP Action #	Description
2.1	Establish Asset Management Plans for DOT&PF bridges and pavements. o Support consistency in area plans to address overarching asset management plans.
2.2	Implement a formal and consistent process for linking the asset management plans for pavement, structures, vessels, airports, and where applicable, ancillary assets to capital project selection and scope.
2.3	Implement a formal and consistent process for linking asset management plans to DOT&PF's capital improvement program and Statewide Transportation Improvement and Airport Improvement Program(s) development.
2.4	Strengthen analytical and reporting capabilities, including supporting data reliability and accessibility, to support asset management planning and federal reporting.
2.5	Work toward coordination of maintenance activities and the timing of work performed through DOT&PF's Capital Improvement Program process through incorporation of maintenance considerations in asset management plans.
2.6	Work with the U.S. Army Corps of Engineers and other agencies to ensure that federal responsibilities for maintaining navigation channels are met in an adequate and timely manner.

Exhibit 85: Freight Actions—System Management and Operations

LRTP Action #	Description
3.1	Address corridor preservation and access management in area, corridor and local plans to preserve the transportation system.
3.4	Support broader use of Intelligent Transportation System technologies in the truck freight network to improve routing, coordination, reliability, and overall system efficiency.
3.5	We will collaborate with MPOs and coordinate with their Intelligent Transportation Systems plans to establish regional approaches.

Exhibit 86: Freight Actions—Economic Development

LRTP Action #	Description
4.1	Support and facilitate Alaska's continued economic development and growth by providing access to new resource development areas, new intermodal infrastructure, and other major freight generating projects through the private development of required transportation infrastructure, and where public investments are required, recover those costs from the proceeds of resource development.
4.2	Work with the Alaska Industrial Development and Export Authority and other partners to coordinate funding and development opportunities for freight transportation facilities and supporting economic development.
4.3	Monitor and take all available actions for the continuation of the U.S. Postal Service bypass mail program.
4.4	Implement the freight rail policy and plan priorities established by the State Rail Plan.

Exhibit 87: Freight Actions—Safety and Security

LRTP Action #	Description
5.1	Address the safety goals and implement the strategies established in the Alaska Strategic Highway Safety Plan and subordinate safety plans.
5.2	Identify the facilities that present the greatest risks from lack of redundancy in Alaska's primary transportation corridors and appropriate risk response strategies.
5.3	Address lack of redundancy and climate change resiliency in asset management plans, project identification, and prioritization within area, corridor and metropolitan plans.
5.4	Incorporate emergency freight management in Alaska's emergency response plan.
5.5	Work with federal partners to streamline and reduce the cost of security measures related to international trade.

Exhibit 88: Freight Actions—Livability, Community, and the Environment

LRTP Action #	Description
6.1	Align project design elements with the primary purpose of the project.
6.2	Implement the process and methods required for the early identification and evaluation of environmental outcomes in area and modal planning.
6.3	Review industrial and resource roads and alternative mechanisms to fund them.
6.4	Work cooperatively with federal agencies and industry partners to support practical strategies that reduce fuel consumption and emissions from freight movement through a combination of improved logistics, higher efficiency, lower emission vehicles, and/or alternative fuels.
6.5	Reestablish and maintain the Statewide Freight Advisory Committee comprised of public and private sector owners, operators, customers, and others.

Exhibit 89: Freight Actions—Accountability for Transportation System Performance

LRTP Action #	Description
7.1	Communicate the current and forecast levels of funding available for transportation and pursue increased transportation revenue.
7.2	Collaborate with local units of government and, where applicable, private entities, to transfer state-owned and/or state-maintained local facilities that have no regional or statewide function to local ownership and local financing mechanisms.
7.3	Advance regional funding approaches for major new construction and transit service needs identified in area and MPO plans.

FREIGHT PERFORMANCE MEASUREMENT, PRIORITIZATION, AND PROJECT EVALUATION

The Freight Element aligns with LRTP goals for performance-based resource allocation by creating first-generation approaches for: freight system performance measurement; freight project prioritization and evaluation; and multi-modal freight investment at a program

Freight Planning as a Tool of Public Policy

Alaska's freight transportation infrastructure may accommodate, encourage, or constrain the demand for freight movement based on the level of performance offered; it can significantly affect industry location and expansion decisions, as well as larger population settlement patterns. Transportation system performance measurement— and management—is part of the Alaska Statewide Transportation Planning Process. This Freight Element provides a first iteration of analysis and measurement of freight performance.

Freight performance is assessed against the overall goal "to maintain and improve Alaska's multi-modal freight transportation system, providing an acceptable level of performance in light of anticipated population growth, desired economic expansion, and known or anticipated risks."

Performance-Based Planning

This Freight Element finds that Alaska's freight transportation system is performing reasonably well today. However there are observable performance risks: congested truck routes and intermodal connectors; limited route and modal service choices, especially for rural communities; unreliability or unavailability of services due to seasonal effects or other disruptions; overall cost of goods; and missing infrastructure links and facility improvements that are needed to serve new industries and population growth.

While these challenges exist without having a formal performance measurement system in operation, the value of such a system is to consistently quantify performance (across different years and modes and locations) to monitor changing needs and opportunities, as well as to track our progress toward meeting our objectives for system performance.

First-Generation Freight Performance Measures

To advance LRTP actions related to performance-based planning, the Freight Element has formulated a set of first-generation performance measures that:

- Describe a framework for multimodal freight system performance measurement in Alaska
- Define an Alaska Multimodal Freight Network
- Describe a framework for creating freight project prioritization tools

These first-generation approaches are designed to be applicable to Alaska's context and a starting point for the wider use of performance-based planning practices for freight.

Framework for User-Based Multimodal Performance Measurement

Freight performance measures allow the State to monitor performance in each of these categories. Best practices establish objectives and performance measures simultaneously because they support each other. Performance measures provide indicators of accomplishment of objectives. The approach taken is to establish the most useful indicators using existing datasets (or with any proposed new ones).

Performance measurement should measure those outcomes the government can impact. Performance measures should also be within the influence of the government agency implementing the plan—high level measures of the economy or general wellbeing might be desirable to support ambitious objectives, but it will be difficult to connect them in a convincing way to freight goals and actions. Grounding performance measures in data and keeping them within reach of feasible interventions is necessary to ensure that progress can be quantified and adjustments made in time. Selecting as few performance measures as possible also helps focus efforts on aspects that matter to shippers, the economy, and the broader society.

The Freight Element builds on the general user-based freight performance categories identified earlier—availability, reliability, affordability, speed, safety, and security—and proposes a framework to quantify, measure, and monitor key freight performance metrics:

- **Availability**: Whether a modal service is available at all. Measures could include number/share of communities served by a given mode, number/share of residents served by a given mode, and number/share of freight-intensive business establishment locations served by a given mode. All of these measures could be calculated from available information.

- **Reliability and Resiliency**: This includes door-to-door on-time performance, risk of temporary or sustained disruption, possibility that a service may not be available within a given planning horizon, risk of losing connectivity or service due to reliance on a single mode, etc. In repeated surveys, freight shippers rank reliability as the most important factor in freight transportation logistics decisions. Measures could include highway travel time reliability (can be calculated from NPMRDS data using the same method presented earlier) and number/duration of highway closure events (should be available from existing data); port and airport delivery reliability (vessel arrivals and departures versus schedule) and number/duration of closure events, which should be available from ports and airports; and rail delivery reliability (train arrivals and departures versus schedule) and number/duration of closure events, which should be available from the Alaska Railroad. Essentially, this would provide a systematic mechanism for bottleneck identification across all Alaska freight modes and geographic regions.

- **Cost**: This includes prices paid for transportation services, inventory, "buffering" against risks, and premiums paid because a preferred mode is not available (e.g., where air is used because trucking or water services are not provided). Useful transportation cost data is challenging to develop and would require new techniques (for example, perhaps confidential rate surveys of key freight facilities, shippers, and carriers) but represents a critically important benchmark. Response resistance and confidentiality issues would need to be successfully addressed.

- **Speed**: This is total delivery time. Some freight (for example, perishables) requires speed as a top priority, and shippers will pay premium prices for the fastest available services; other freight (for example, coal or stone) is less concerned with speed and more with price, and shippers will prefer slower modes at lower prices. Travel speed is most important for time-sensitive freight, which is typically moving by truck or air. The NPMRDS data on average travel speed, combined with improved truck counts (e.g., regular, systematic, and at more locations) would allow for the accurate estimation of average travel speeds in key trucking corridors. For air cargo, aircraft arrival and departure data would provide the needed information. It is more difficult to obtain the total end-to-end delivery time, including time outside of trucks or aircraft for pick-up, drop-off, waiting at terminals, etc. For this, the best approach might be a shipper or customer survey program that could address all modes and would not have to be limited to truck or air shipments. As with cost, response resistance and confidentiality issues would need to be successfully addressed.

- **Safety and Security**: This is the risk of loss, breakage, tampering, loss of visibility, or other loss of value during the shipment process. Crash and incident data should be available for highways, airports, ports, railroad, and pipeline modes. Carriers and insurance companies would have additional information, but may not be positioned to release it. The promise of confidentiality, and care in aggregation, might help address any concerns.

Apart from crash and incident data, it is not clear that any other states are actually calculating these measures, although it is known that several states have considered similar types of measures. These measures are the "cutting edge" of performance-based planning for freight, and these measures (or similar ones) are expected to be more broadly adopted in the future.

Framework for FAST Act Compliant Performance Measures

This section proposes several additional measures that can be used to evaluate the performance of the Alaska Multimodal Freight Network introduced in the previous section. This list was developed based on the state-of-practice of freight planning[27] and an understanding of Alaska's specific situation. Moreover, they were selected according to guidance from MAP-21 in section 23USC150(c): National Goals and Performance Management Measures. The guidance issued in MAP-21 was preliminary in nature, and final provisions have not yet been published.

The American Association of State Highway and Transportation Officials (AASHTO) finds that MAP-21 performance guidance remains in effect. According to AASHTO (see http://fast.transportation.org/Documents/AASHTO%20Summary%20of%20FAST%20Act%202015-12-16%20FINAL.pdf):

The FAST Act makes no significant changes to the performance-based planning and programming policy requirements included in MAP-21. The notable changes are:

[27] For a summary, see Transportation Research Board's NCFRP10 Performance Measures for Freight Transport Report.

- *Expands the scope of the planning process to include addressing resiliency and reliability as well as enhancing travel and tourism of the transportation system. Specifically, includes the phrase "improve the resilience and reliability of the transportation system."*
- *Encourages consideration of intermodal facilities that support intercity buses as part of the metropolitan and statewide planning process. Specifically, includes the language "…intermodal facilities that support intercity transportation, including intercity buses and intercity bus facilities, and commuter van pool providers" as additional content in the statewide transportation plan and the transportation improvement program.*
- *Clarified what "private providers of transportation" include.*
- *Requires State DOTs to incorporate the performance measures of a transit agency not represented by a metropolitan planning organization (MPO) into its long range transportation plan regardless if it is in an urban or rural area.*
- *Changed to a "shall" regarding the inclusion of description of performance measures and the system performance report in a State's long-range transportation plan.*
- *Adds language that the long-range transportation plan shall consider public ports and freight shippers.*

One additional requirement, not cited above, is for Port Performance Measures to be separately developed and reported.

It is expected that final rules will require states to officially adopt performance measures and targets, and follow-up with Freight Conditions and Performance Reports to track progress. It is expected that states will have some flexibility when selecting measures for non-highway modes, but for freight moving on the National Highway System, the USDOT will establish common measures.

Federal guidance on the freight performance management framework has generally focused on trucking and highways. However, as described throughout this Freight Element, Alaska relies on many modes of freight transportation, so it may be appropriate to extrapolate federal guidance to other modes, where applicable.

The following sections provide a starting point for Alaska freight performance measurement in anticipation of eventual final performance measure requirements.

Demand Measures

Federal guidance states that that one of the main performance measures should be the cargo volumes moving through freight facilities. For Alaska this could include the following:

- Truck tonnage and value
- Rail tonnage and value
- Air cargo tonnage and value

- Port tonnage and value
- Pipeline tonnage and value

No guidance is provided as to whether geographical detail is needed, but the recommended approach is to report volumes by regions in Alaska because each of them is very different. The necessary data is available and is in fact cited in this Freight Element.

System Efficiency, Reliability, and Resiliency

Trucking congestion, reliability, and resiliency is a recommended user measure allowing for bottleneck identification (as described above) and is also an important area in the FAST Act. Federal guidance suggests that states pick from two methodologies for evaluating trucking congestion: estimating hours of truck delay or calculating Planning Travel Time Indices (as described in the *Improving Urban Freight Movement and Reducing Performance Risks* section). Historically, the former has been a more popular approach because it relied on less data and could be estimated at key bottlenecks using truck counts, speed data, and roadway information. However, the recent emergence of a data set (the National Performance Management Research Data Set) that records the position and speed of trucks throughout the highway system (including key arterials) and throughout the year has allowed for the Planning Travel Time Indices approach to become feasible. Use of the Planning Travel Time Indices is recommended for this measure because that information is available directly from NPMRDS and does not require additional data on truck volumes or time-of-day distributions.

Environmental Measures

Federal guidance emphasizes monitoring and mitigating environmental impacts from transportation, and the final rules will likely require that states measure mobile emission sources in their performance measures. Alaska could elect to measure any or all of five criteria pollutants those that are most relevant, including the following:

- Greenhouse gas emissions
- Nitrogen oxide emissions
- Volatile organic compound emissions
- Particulate matter emissions
- Ozone emissions

Fairbanks today is a nonattainment area for PM-2.5, and both Anchorage and Fairbanks are classified as "serious:" maintenance areas by the U.S. Environmental Protection Agency for carbon monoxide.

Safety Measures

Improving safety is another area of emphasis in federal guidance. Toward this end, the following performance measures, which are also recommended user-based measures, can be generated as follows:

- **Total injuries and fatalities from truck-related accidents:** This information is already collected by State Departments of Transportation for planning processes. The Alaska Strategic Traffic Safety Plan published in 2012 includes actions to improve the collection of this type of data and works toward making roads safer. The FAST Act will also require that the number of injuries and fatalities be reported on a per-mile basis. This would control for exogenous variations in truck mileage over the years. Many of the actions that Alaska could take to improve safety will be more noticeable on a mileage basis.

- **Accidents at rail at-grade crossings:** In Alaska, these types of accidents are relatively rare, but data is collected by law and can be included in reporting.

Infrastructure Condition Measures

Infrastructure condition affects the costs and reliability of moving goods throughout the state, which in turn affects trade and economic activity. Moreover, having infrastructure in poor condition is costly in the long-run, crowding-out investments in facility development or modernization, which also ultimately affects goods movement negatively. Alaska has unique environmental factors that accelerate the deterioration of its infrastructure, requiring that performance measures in this category be selected carefully and appropriately. These could include the following:

- **Pavement condition** is a critical performance measure that will likely be required. Extensive data on pavement condition already exists for highways and key arterials. This performance measure will only be calculated on roads that belong to the Alaska Multimodal Freight Network.

- **Bridge condition** is a critical performance measure that will likely be required, especially for freight operations as heavy trucks can disproportionately cause bridge deterioration. In addition, structurally deficient bridges can limit the weight of the trucks that can traverse them, creating bottlenecks in the system and affecting the efficiency of goods movement.

Resiliency

The FAST Act adds an explicit reference to resiliency as a performance measure. As described in the *Freight Planning as a Tool of Public Policy* section, this Freight Element recommends performance measures addressing resiliency not only at the modal level, but also at the broader user level and across all elements of the intermodal transportation system and logistics networks serving Alaska, to the extent practical.

Targets and Future Progress Reporting

MAP-21 stated that performance measurement targets should be selected by each state, in coordination with local MPOs (AMATS and FMATS in this case) and other relevant stakeholders. These targets should be set realistically, albeit supporting statewide transportation planning goals. Monitoring systems should be created in the state to track these performance measures and report progress every two years to USDOT through the Freight Conditions and Performance Reports (starting in 2018). In addition, states would also be required to report progress toward mitigating bottlenecks identified in

the National Freight Plan, independent of progress achieved in the state's own performance measures. At the local level, MPOs would be required to prepare Metropolitan System Performance Reports every four to five years that provide a more detailed accounting of progress at the urban level.

What does this mean for Alaska today? It suggests that, first, Alaska should move to quantify its current baseline performance under the anticipated federal performance measures. Second, to the extent possible, Alaska should "hindcast" these measures to identify how they have been changing. Third, Alaska should begin considering what sorts of changes (which measures, what quantities) represent desirable progress toward achieving the state's freight goals and policies. This is not a simple or easy process, and will require considerable work and discussion, but the work can begin today based on the information above.

Finally, it is important to note that federal guidelines do not represent final rulemaking; final rules are expected later in 2016. The approach outlined above not only positions Alaska for compliance, but also, and more importantly, provides Alaska with a toolkit of measures that speak directly to the health and vitality of its critical freight transportation infrastructure.

State and Federal Network Designations

The Alaska Multimodal Freight Network

A properly defined Alaska Multimodal Freight Network is a valuable tool in planning, programming, and performance measurement. It can be used on a "go forward" basis to focus performance monitoring and measurement, track bottlenecks and needs as they emerge, identify policies and projects to address those bottlenecks and needs, and seek partners in funding those needs. It can also serve as a guidepost in evaluating and recommending Alaska transportation system components for applicable federal designations.

This Freight Element identifies an initially recommended Alaska Multimodal Freight Network (the Freight Network). It emphasizes transportation infrastructure that plays a critical role in supporting the economy of the state, allowing it to export valuable natural resources and import indispensable consumer products that improve quality of life. Links and nodes were selected as part of this network because they handle significant quantities of freight, in tonnages or value, without which large segments of the state's economy could not operate. The Freight Network includes the following:

- Network elements and facilities where freight performance should be monitored on an ongoing basis
- Network elements and locations where freight project development should be emphasized

Network elements and facilities for federal agencies to consider as the appropriate definition of freight transportation network for Alaska. Identifying a Freight Network does not imply that the remainder of the freight infrastructure in the state is unimportant. The Freight Network includes primarily major facilities, corridors, and connectors, but it also recognizes that last-mile deliveries to smaller communities, through small ports and small airport and landing strips, are essential. Issues and needs

for smaller facilities will become obvious to their users without the need for ongoing performance monitoring at a system level.

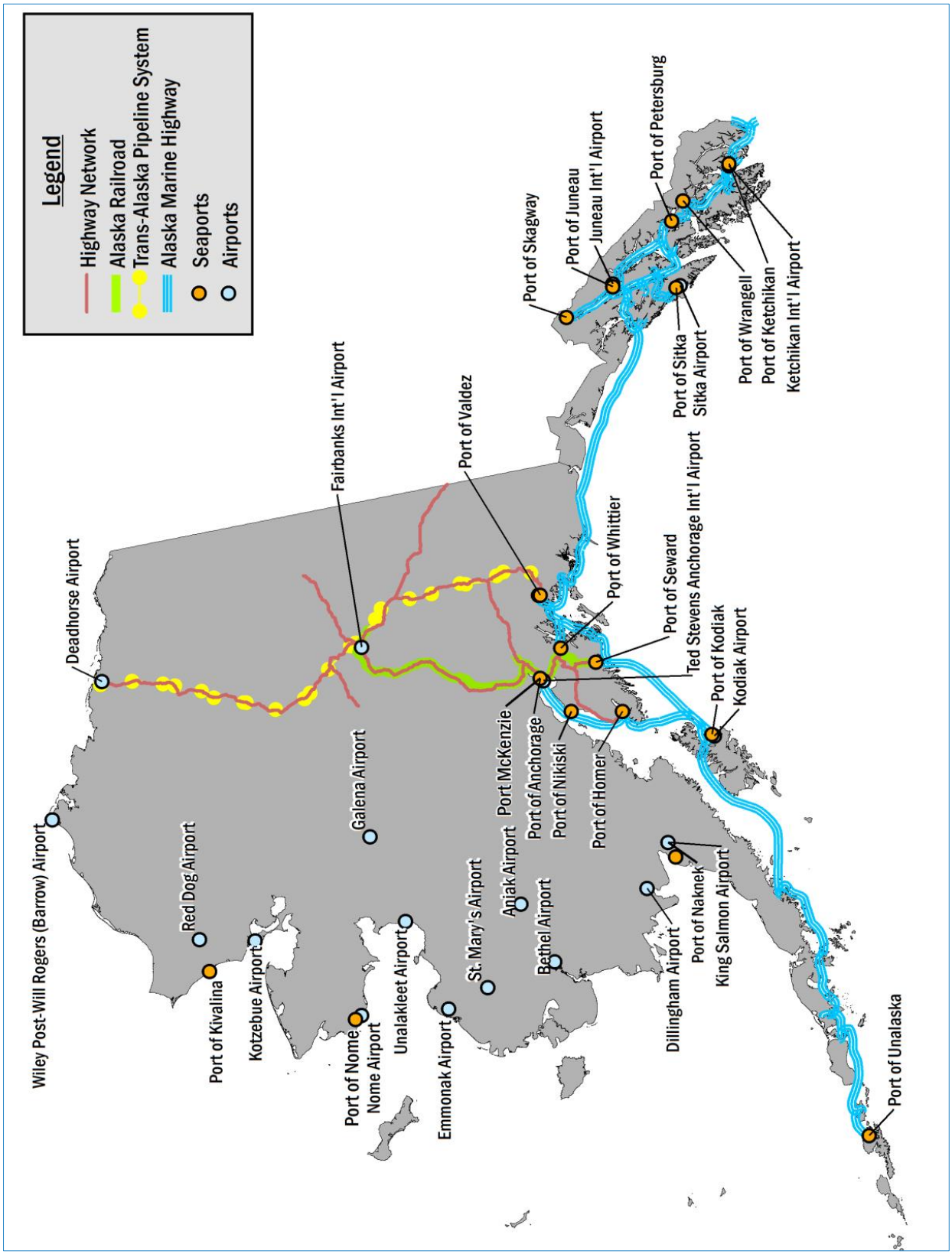
The initially recommended Freight Network, shown in Exhibit 90, is composed of the following:

- Highways
    - Parks Highway
    - Seward Highway
    - Sterling Highway
    - Dalton Highway
    - Richardson Highway
    - Glenn Highway
    - Alaskan Highway
    - Steese Expressway in Fairbanks
    - Airport Way in Fairbanks
    - Minnesota Drive in Anchorage
    - International Airport Road in Anchorage
    - Ocean Dock Road in Anchorage
- Seaports that handle more than 140,000 tons per year (which represent 98% of all seaports in the state),[28] plus other strategically important seaports
- Airports that handle more than 1,500 tons per year (which represent 88% of all air cargo tons handled in the state)[29]
- Alaska Pipeline
- Alaska Railroad
- Alaska Marine Highway, Coastal Corridors, and Inland Waterways

The Freight Network is conceived as a "living" system, with procedures for adding or modifying facilities and routes to be included, and possibly including a hierarchy of designations.

[28] As reported in the U.S. Army Corps of Engineers Waterway Data
[29] As reported in the Bureau of Transportation Statistic's T-100 Data

Exhibit 90: Initially Recommended Alaska Multimodal Freight Network



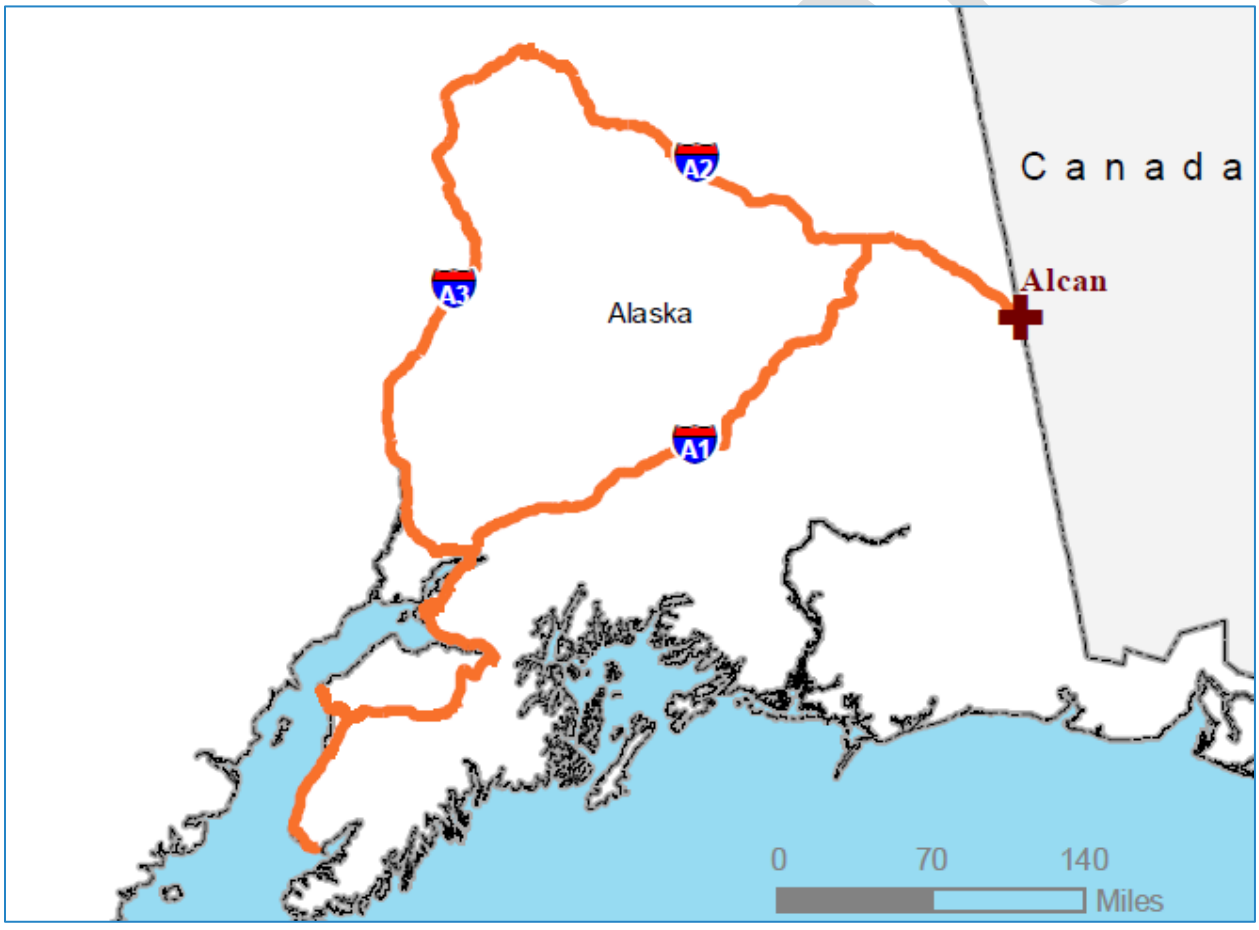
Source: WSP | Parsons Brinckerhoff

National Highway Freight Network

The FAST Act establishes a National Highway Freight Network (NHFN). The NHFN consists of the following elements:

- The Highway Primary Freight System defined by FHWA and shown in Exhibit 91, initially consisting of 41,518 centerline miles, with the potential to add 3% more mileage every five years
- Critical Rural Freight (highway) corridors, which are to be designated by states
- Critical Urban Freight (highway) corridors, which are to be designated by MPOs
- The remainder of the Interstate system

Exhibit 91: Designated Highway Primary Freight System for Alaska



Source: US Department of Transportation

Additionally, the FAST Act directs USDOT to designate a new National Multimodal Freight Network (NMFN) within one year of enactment. The NMFN is to include the NHFN; Class I freight railroads; ports handling at least 2 million short tons per year; the Great Lakes and St. Lawrence Seaway; MARAD-

designated Marine Highway routes; the 50 leading U.S. airports for landed weight; and other assets that may be identified by USDOT or recommended by the states.

The National Freight Highway Program formula funds are intended to support improvements to routes designated as part of the NHFN by the USDOT, states, and MPOs. Additionally, the FAST Act also establishes a freight-specific competitive grant program—Nationally Significant Freight and Highway Projects (Title I, Section 1105)—that is intended to support highway and non-highway freight assets. It is not explicit in law, but it is expected that projects addressing facilities on the National Multimodal Freight Network, which includes by definition the National Highway Freight Network, will be preferred.

Therefore, it is critically important that DOT&PF, FMATS, and AMATS develop strong recommendations for Critical Rural Freight Corridors and Critical Urban Freight Corridors to be included on the National Highway Freight Network, and for non-highway assets to be included on the National Multimodal Freight Network. Alaska has a total of 1,222.23 miles on the USDOT-designated Primary Highway Freight System, representing 2.944% of all Primary Highway Freight System mileage; Alaska can designate up to 244.44 miles as Rural Freight Corridors and 122.22 miles as Urban Freight Corridors.

The Alaska Multimodal Freight Network, along with other information presented in this Freight Element, is intended to assist in developing those recommendations.

Evaluating Multimodal Freight Investments

The Freight Element is not a capital program. Capital programs are developed by DOT&PF at the state and modal level, by MPOs, and by facility owners and operators. Projects are additionally identified through local and regional planning studies addressing all modes. The question arises, however: if making freight investments improve the overall performance of Alaska's Multimodal Freight Network and achieve the kind of public benefits sought, which of the many possible investments in different regions or different modes should be given higher priority? The LRTP includes policy and actions to evaluate projects based on their effectiveness in meeting plan goals. The Freight Element provides a starting point for the future estimation of freight project benefits and project prioritization across modes and geographies based on emerging best practices.

Developing a freight project prioritization evaluation approach that is applicable at all levels of planning (state, regional, local) and geographies (urban, rural), and across all modes (road, rail, air, water, pipeline) will require the cooperative efforts of many stakeholders. The tools and methods must be highly customized to Alaska's specific needs. This Freight Plan cannot offer the final answer, but it can suggest a potential framework that has proven successful in other states.

Freight projects involve multiple modes, address both transportation and economic considerations, and can produce very different types of benefits depending on their location, type, and extent. Based on these considerations and on past experience in developing benefit-cost analyses (BCAs) for the USDOT's Transportation Investments Generating Economic Recovery (TIGER) grant program, the following approach is suggested as a basis for beginning discussions:

- Alaska would develop a freight prioritization tool, as a spreadsheet application, with standard input/output formats and built-in factors. The tool might consist of three modules: a Data Input Module, a Processor Module, and an Output Calculation Module.

- The Data Input Module would accept user inputs describing the type, location, and extent of the project, along with the key metrics necessary for the Processor Module. For example, if the user enters a rail improvement project, the module might ask for location; capital cost; operating and maintenance cost; incremental changes in volume (in tons, railcars, containers, etc.) each year that are directly associated with the project; associated reductions in truck vehicle miles of travel per year; associated increases in rail ton-miles of travel per year; etc. It would also ask for any additional data needed for economic analysis, along with the user's evaluation of the key Policy Analysis factors.

- The Processor Module could perform three distinct and mutually supporting types of evaluations:

    - Benefit Cost Analysis, following TIGER guidance: The module would estimate non-monetized effects (changes in VMT, congestion, fuel consumption, etc.) and translate these into monetized equivalents (representing benefits to state of good repair, economic competitiveness, livability, environmental sustainability, and safety). Benefits would be discounted to Net Present Value and divided by project cost to produce a Benefit Cost Ratio (BCR).

    - Economic Impact Analysis: TIGER BCAs are designed to capture transportation-related benefits and do not include measures of economic impact (e.g., jobs, wages, industry output and value-added, tax payments, and return on investment to the public sector). These are often important factors in making transportation investments and in developing support for planned investments across diverse stakeholder groups and geographic regions. Therefore, it is proposed that an economic impact calculation module be developed. The module would include per-unit factors for estimating the various direct impacts, along with appropriate multipliers for indirect and induced effects.

  - Policy Analysis: Successful prioritization cannot be a purely mathematical or mechanical exercise; it must also reflect qualitative evaluations of whether a state's policy goals are being advanced. The policy analysis function can include key questions: Is the project consistent with Alaska's freight vision? Is it consistent with Alaska's economic development and industry retention/attraction objectives? Is there an acceptable level of risk or is there some uncertainty whether the project will deliver the desired benefits? Is adequate funding available? Are the necessary stakeholder partnerships in place? Is it consistent with other state, regional, and local plans? Is it consistent with state economic development policy? Does it provide immediate benefit and value to Alaska industries, communities, and residents? Projects with very high BCAs and economic impacts that fail on one or more of these questions may be less desirable than projects with lower BCAs and economic impacts that do meet these criteria.

- The Output Module would perform two basic functions. The first is to report raw numbers: BCR scores, economic impact scores, and policy analysis scores. The second is to weight and sum those factors according to user-defined criteria. For example, if the user determines that the most important prioritization factor is the BCR, it could be assigned a weight twice as high as the economic impact or policy factors, etc. Weighting of sub-scores—safety benefits from the BCR or job creation from the economic impact analysis—is also possible.

RELATIONSHIP WITH OTHER PLANS AND FEDERAL GUIDANCE

The Freight Element is a valuable resource for modal plan development and area/local freight planning, and complies with federal guidance for state freight plans.

Modal Plans and Area/Local Freight Planning

Data and analysis developed in the Freight Element should be useful in a broad range of planning and analysis applications, at the area and local levels, and in the context of modal system planning. Many modal and regional plans address freight issues. The Alaska LRTP Freight Element aligns these different planning efforts under Alaska-specific goals, policies, and strategies.

Freight Plans developed by Alaska's MPOs—in Anchorage, AMATS, and in Fairbanks, FMATS—will continue to play a key role in freight planning at the urban level. Both of these organizations are expected to undertake new freight planning in the coming year. Federal guidance encourages the involvement of MPOs in the state's effort to develop performance measures and set targets, especially relating to the movement of freight through urban areas. This Freight Element provides some suggestions for measures that could be used.

DOT&PF also prepares multimodal transportation plans for different regions in Alaska. In the last five years it developed plans for the Southwest, Southeast, and "Interior" regions. DOT&PF has also prepared modal plans for the State's Aviation System, Ports, and Rail. This Freight Element is intended to help in the preparation of these more specific plans because policies and strategies should be broadly consistent throughout the state. Most of the specificity will come in the way of more targeted actions.

Preparation of this Freight Element for Alaska has also highlighted opportunities where infrastructure can be improved to grow the economy and develop resources. Many of the economic opportunities in Alaska are limited by the availability of cost-effective methods of transportation that permit the commercialization of resources. The opportunities identified in this plan could be advanced through state economic development plans and priorities.

FAST Act Compliance

While the primary benefit and value of this Freight Element is to serve the needs of Alaska, it also satisfies federal guidance for statewide freight planning. Projects included within an approved statewide freight plan may be eligible for a new category of federal funding. The FAST Act establishes a new formula-based National Highway Freight Program (Title I, Section 1116), funded at $6.3 billion over five years. Up to 10% of funds may be used for rail or port projects. To be eligible for this funding, projects must be identified within an approved State Freight Plan. This Freight Element provides the basis from which projects eligible for current and future dedicated federal freight funding could be identified. This Freight Element satisfies federal guidance for statewide freight planning and supports other freight planning efforts in Alaska, which include modal and regional plans generated by DOT&PF and the local MPOs.

Exhibit 4 (in the *About this Document* section) presented a summary of the FAST Act requirements for state freight plans and identified which sections of the Freight Element address each requirement.

The FAST Act establishes broad national freight goals that should form the foundation for USDOT's efforts. Exhibit 92 lists some of the specific Policies and Actions of the Alaska Freight Plan Framework that address these seven broad national goals.

Exhibit 92: Correspondence of Alaska LRTP Freight Element and National Freight Goals

National Multimodal Freight Policy	Corresponding Alaska Freight Plan Policies
"…To identify infrastructure improvements, policies, and operational innovations that: - *strengthen the contribution of the National Multimodal Freight Network to the **economic competitiveness** of the United States"* - *reduce **congestion** and eliminate bottlenecks on the National Multimodal Freight Network* - ***increase productivity**, particularly for domestic industries and businesses that create high-value jobs"* - *"…To improve the **economic efficiency and productivity** of the National Multimodal Freight Network"* *"…To improve the short- and long-distance movement of goods that:* - *travel across rural areas between population centers;* - *travel between rural areas and population centers; and* - *travel from the Nation's ports, airports, and gateways to the National Multimodal Freight Network"*	**Policy 1A:** Develop the multimodal transportation system to provide safe, cost-effective, and reliable accessibility for people and freight. **Policy 1B:** Prioritize new construction projects by considering overall benefits and costs over time to the State as the key consideration. **Policy 1C:** Upgrade and modernize passenger and freight transportation systems to increase productivity and reliability, and to reduce safety risks. **Policy 3A:** Ensure the efficient management and operation of the passenger and freight transportation system. **Policy 4A**: Identify new construction and modernization needs that address travel demand growth, economic development, travel and tourism needs and funding strategies through area and metropolitan plans. **Policy 4B**: Preserve and operate Alaska's multimodal transportation system to provide efficient and reliable access to and from local, national, and international markets, to support economic development goals.
*"…To improve the **safety, security, efficiency, and resiliency** of multimodal freight transportation"*	**Policy 5A:** Improve transportation system safety in Alaska. **Policy 5B:** Work with federal, local, and state agencies to provide a safe, secure, and resilient transportation system and emergency preparedness for all modes.
*"…To achieve and maintain a **state of good repair** on the National Multimodal Freight Network"*	**Policy 2A**: Apply asset management best practices to preserve the existing transportation system. **Policy 2B**: Increase understanding of, and communicate DOT&PF's responsibilities for, system preservation as the owner of highways, airports, harbors, marine terminals, and vessels.
*"…To use **innovation and advanced technology** to improve the safety, efficiency, and reliability of the National Multimodal Freight Network*	**Policy 3B:** Use technology and Intelligent Transportation Systems where cost-effective.

Exhibit 92: Correspondence of Alaska LRTP Freight Element and National Freight Goals (continued)

National Multimodal Freight Policy	Corresponding Alaska Freight Plan Policies
*"…To reduce the **adverse environmental impacts** of freight movement on the National Multimodal Freight Network"*	**Policy 6A**: Address quality-of-life, livability and community considerations in the Statewide Long-Range Transportation Plan, area and corridor plans, asset management, and other plans and project investment decisions. **Policy 6B**: Preserve the integrity of the ecosystems and the natural beauty of the State, limit the negative impacts, and enhance the positive attributes – environmental, social, economic, and human health – from the Alaska Transportation System. **Policy 6C**: Support energy conservation, specifically in our consumption of fossil fuels to address climate change. **Policy 6D**: Develop transportation plans in close coordination with local communities to ensure transportation investment decisions reflect Alaskans' quality of life values.
*"…To improve the flexibility of States to support multi-State **corridor planning and the creation of multi-State organizations** to increase the ability of States to address multimodal freight connectivity"*	**Policy 7A**: The statewide plan will provide the framework from which DOT&PF sets investment priorities.

Summary of Strengths, Weaknesses, Opportunities, and Threats Analysis

MAP-21 guidance recommended that state freight plans carefully consider a state's Strengths, Weaknesses, Opportunities, and Threats (SWOT) with respect to freight. Such consideration serves as a useful conclusion to the Freight Element.

SWOT analysis is a tool developed by the business community to help identify the negative and positive factors that prevent or facilitate the achievement of certain objectives. As shown in Exhibit 93, these factors are classified based on whether they are internal or external. In this case, internal is defined as anything that can be directly controlled or influenced by DOT&PF, including infrastructure, regulations, and investments. External factors are defined as the broader trends and constraints in the economy and society that affect freight transportation.

Exhibit 93: Freight Plan SWOT Analysis Framework

	Helpful to achieve plan objectives	**Harmful** to achieve plan objectives
Internal to DOT&PF	Strengths	Weaknesses
External to DOT&PF	Opportunities	Threats

This planning analysis framework explores the possibilities to solve problems by helping direct efforts. The distinction between external and internal factors is important because it underscores the range of control of the planning agency and shows the feasible steps that could be taken within this range. This methodology is particularly useful if applied frequently as part of a continuous strategic planning process where new threats and opportunities are included and considered as they are encountered. Having this framework at hand helps DOT&PF respond appropriately in uncertain times.

The factors in the SWOT analysis were identified based on stakeholder interviews and workshops, along with the modal analysis and trends discussion presented in this Freight Element.

Strengths

- **Multimodality of existing system:** Alaska is probably the one state in the U.S. that relies on the most variety of transportation modes. All of the conventional ones—road, air, water, rail—are critical in vast areas of the state, and even unconventional ones such as ATVs and snowmobiles are used frequently by certain communities. Few other states, if any, rely on water, pipeline, and air transportation to the extent that Alaska does.

- **System not choked with congestion:** In addition, unlike many parts of the U.S., Alaska's transportation infrastructure is generally not bogged down in congestion. Adequate planning and timely investments have built up an infrastructure system that has kept up with increases in demand and population growth. Congestion occurs at certain bottlenecks, especially in urban areas, but not at the system level.

- **Responsiveness of existing system:** Alaska's freight transportation system has a history of being responsive to the needs of the state. The public sector has embraced resource development as an importance objective, making transportation investments that spur wealth creation and economic growth.

Weaknesses

- **Underdeveloped networks:** The state's highway system reaches much of its population, but many communities are not served. The state's rail network is very limited in scope, although possibilities to expand its reach and utilization are being studied. Alaska therefore relies to an unusually high degree on water transportation (where available) and air (where necessary because no other means is available).

- **Specific bottlenecks:** While congestion is not a pressing system-wide issue, several facilities are operating at or near capacity and cause bottlenecks for the whole network. Logistics facilities in Anchorage, especially the airport and seaport, are expected to see significant increases in demand over the coming decades, combined with urbanization and population growth in the area. These facilities require investments in capacity and modernization to accommodate this growth and not allow congestion to degrade levels of service. Metropolitan area congestion, exacerbated by automobile traffic, is a growing problem in the Anchorage, Mat-Su, and Fairbanks areas. Anchorage, Fairbanks, and many other cities in between have a high proportion of at-grade crossings for the

Alaskan Railroad. This leads to congestion and delays many times throughout the day and sometimes causes traffic accidents (although these are infrequent in Alaska).

Opportunities

- **Resource development:** The development of natural resources, including continued operations in crude oil, mining, fishing, and timber, as well as new operations for LNG, crude oil, and minerals, creates transportation needs but also transportation finance opportunities. Increased use of Public-Private Partnerships has helped offset funding uncertainties related to oil taxes and federal transfers.
- **Opening of Northwest Passage and Arctic Port:** With the opening of the Northwest Passage over the following decades, Alaska will likely be at the center of new global shipping routes.
- **Value-added trade activities:** Air cargo transit flights will constitute most of the growth in tonnage passing through Alaska's airport system. This represents an opportunity to provide greater value-added services for operations, maximizing the benefit of stopping in Alaska from a logistics perspective.

Threats

- **Urbanization:** The movement of populations to larger cities such as Anchorage and Fairbanks will strain freight transportation systems in those locations.
- **Climate change and disruption:** Climate change and increasing disruptions will affect freight infrastructure in important ways. Considering these impacts in the context of network resilience, with proper caution toward the uncertainties involved, is fundamental to develop realistic plans.
- **Impending funding shortfalls:** Funding shortfalls will continue to strain infrastructure upkeep and development, potentially decreasing levels of service and reliability. This is seen in deferred expenditures for aviation, AMHS, and other system elements.

Appendix: Selected Truck Counts

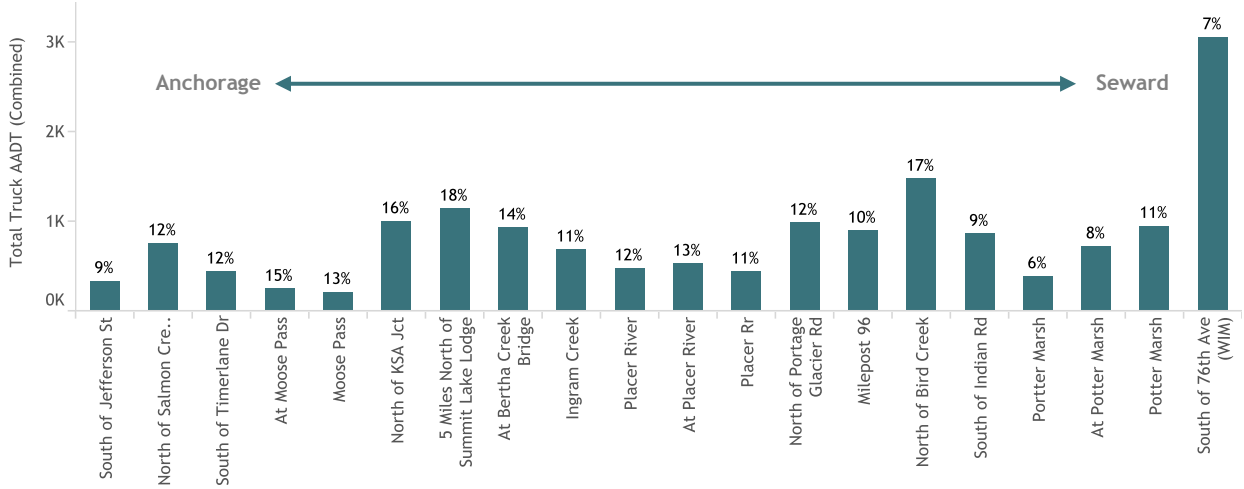
To identify the most critical roads for trucking operations truck counts were obtained from stations throughout the state.[30] 97 in the Southeast Region, 63 in the North Region and 103 in the Central Region. This data consists of Annual Average Daily Traffic (AADT) and truck traffic percentages. However, each Region used a different methodology to estimate the data and reported the results in a different way. To compile the results, several assumptions and approximations were needed to maximize the consistency of the data. Some of the issues include:

- Only the Central Region reported data on a monthly basis, which allows the study of seasonal trends. For the other two Regions none of this information was available—it is impossible to know to what periods of the year counts were recorded (given that stations often do not record continuously throughout the year).
- Only the Central Region reported data on truck percentages and truck AADT (and even differentiated by traffic direction). For the other two Regions it was necessary to combine estimates of truck percentages in particular locations with estimates of general traffic AADT. For the Southeast Region this AADT data came from the 2010 Traffic and Safety Report and for the North Region it came from the Annual Traffic Volume Report. For the majority of stations it was possible to match exactly the AADT estimates with truck percentages, but for others it was necessary to use nearby estimates.
- Both the Central and the North Regions had truck percentage data from 2010, 2011 and 2012, but only the Central one had AADT data for each of these years as well. For the Northern Region AADT estimates were selected from similar years. This was a reasonable approximation because the variation of trucking flows from one year to another is likely relatively small compared to other sources of error. Data availability was a greater challenge for the Southeast Region because it only had truck AADT estimates for some of the years between 1999 and 2011.

The following figures present estimates of truck volumes (annual average daily trucks, or AADT) and truck percentages (the share of total AADT for which trucks are responsible) for Alaska's leading truck corridors. The information is summed in both directions (north plus south, or east plus west).

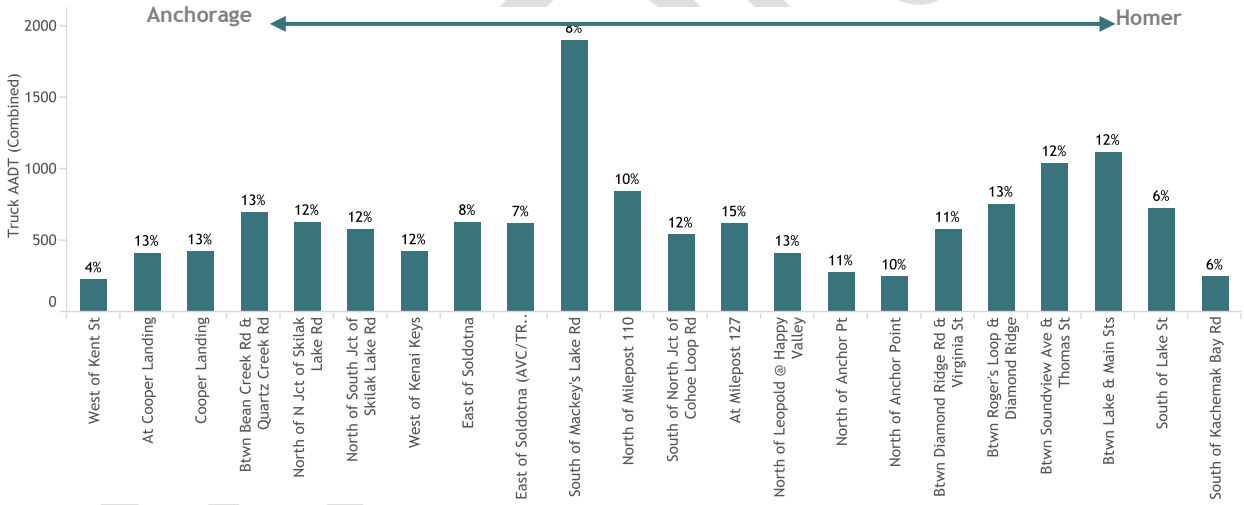
[30] From Alaska DOT&PF

Exhibit A-1: Truck AADT and Percentages (Both Directions), Seward Highway, 2010 – 2012



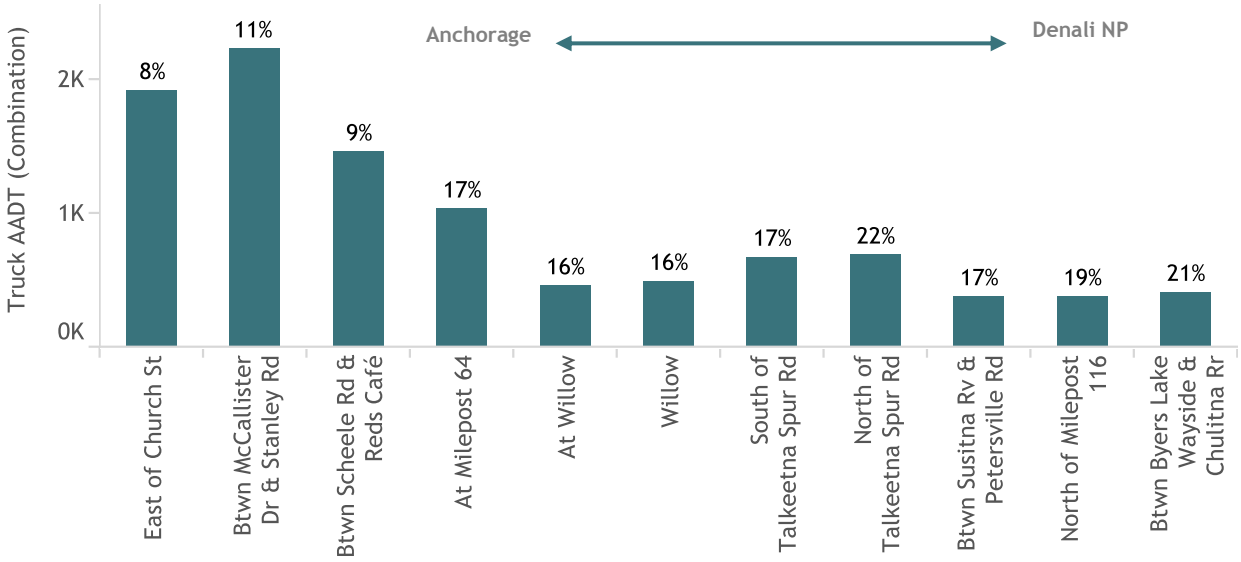
Sources: Annual Traffic Volume Reports, Alaska DOT&PF

Exhibit A-2: Truck AADT and Percentages (Both Directions), Sterling Highway, 2010 – 2012



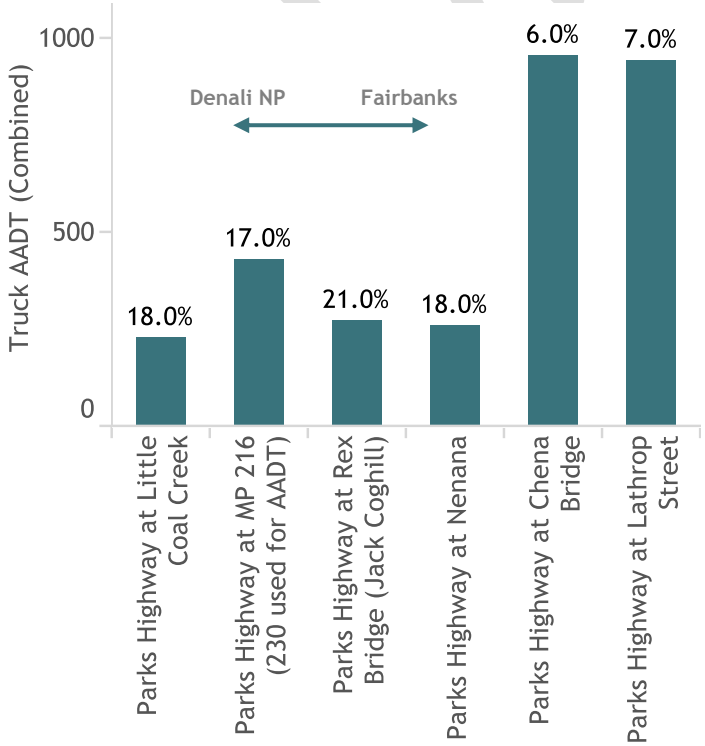
Source: Annual Traffic Volume Reports, Alaska DOT&PF

Exhibit A-3: Truck AADT and Percentages (Both Directions), Parks Below Denali, 2010 - 2012



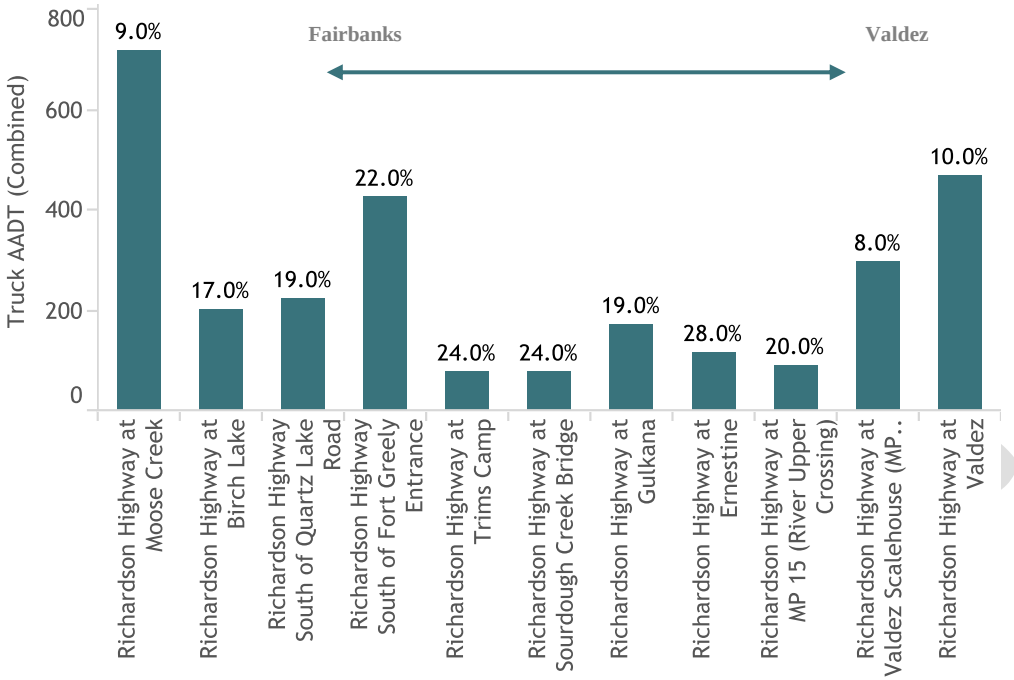
Source: Annual Traffic Volume Reports, Alaska DOT&PF

Exhibit A-4: Truck AADT and Percentages (Both Directions), Parks Hwy Above Denali, 2012



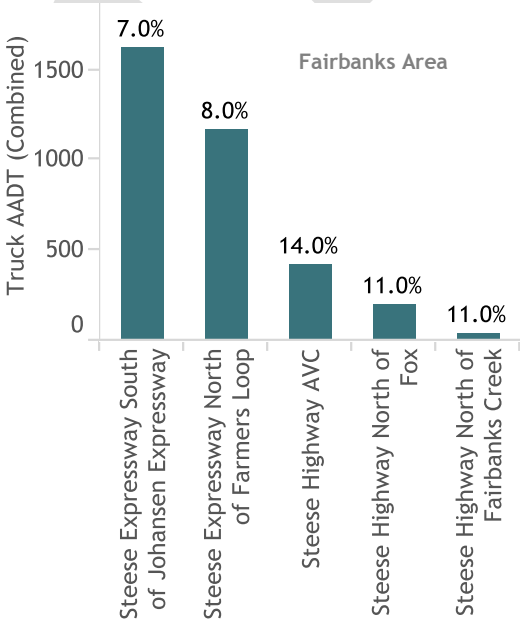
Source: Annual Traffic Volume Reports, Alaska DOT&PF

Exhibit A-5: Truck AADT and Percentages (Both Directions), Richardson Hwy, 2012



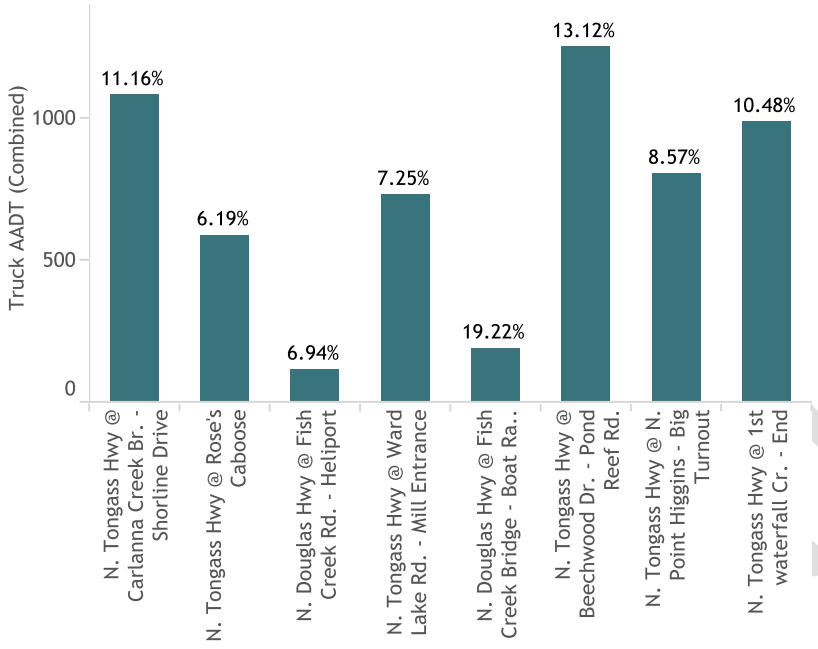
Source: Annual Traffic Volume Reports, Alaska DOT&PF

Exhibit A-6: Truck AADT and Percentages (Both Directions), Steese Expressway, 2012



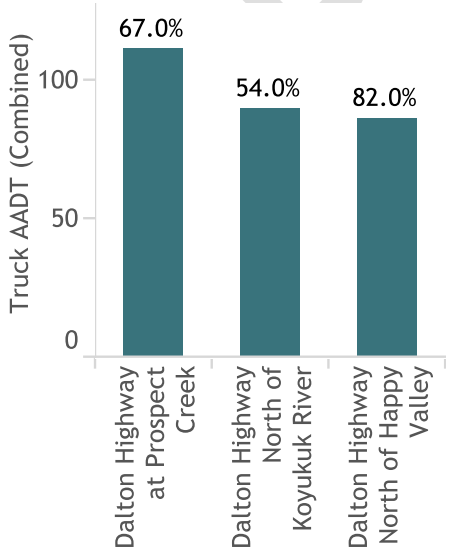
Source: Annual Traffic Volume Reports, Alaska DOT&PF

Exhibit A-7: Truck AADT Percentages (Both Directions), Tongass Highway 2004 - 2010



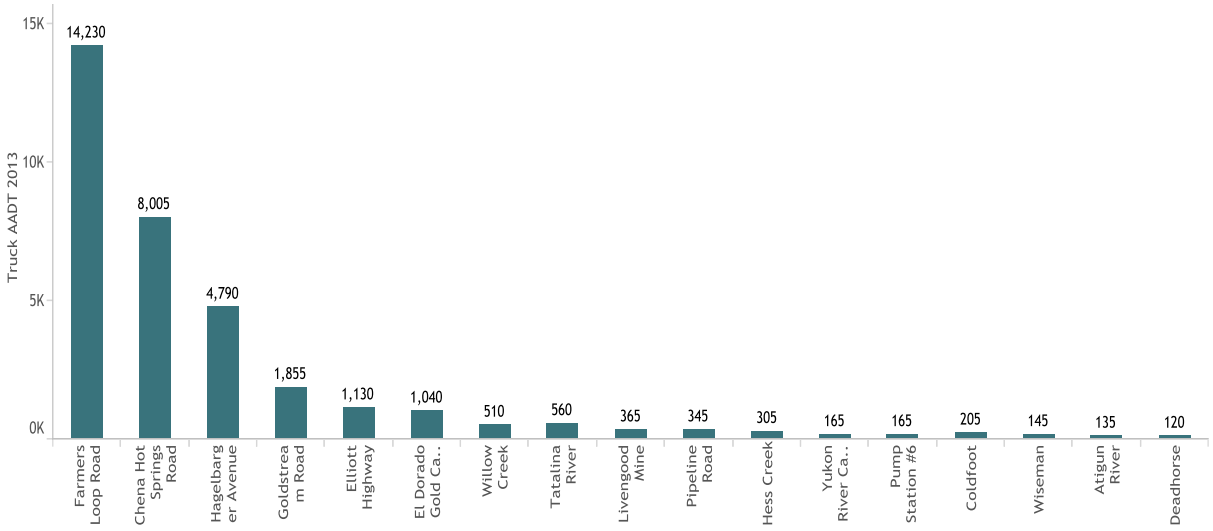
Source: Annual Traffic Volume Reports, Alaska DOT&PF

Exhibit A-8: Truck AADT and Percentages (Both Directions), Dalton Highway, 2012



Source: Annual Traffic Volume Reports, Alaska DOT&PF

Exhibit A-9: AADT (All Vehicles), Dalton Highway, 2013



Source: Dalton Highway Traffic Forecast Study, Kittelson and Associates, September 2014

Exhibit A-10: Other Highways Important to Trucking

Region	Count Station	Avg. Truck %	Truck AADT
C	Minnesota Drive, Anchorage - North of Dimond Boulevard (WIM)	6.0%	2,294
C	Glenn Highway - At Eklutna Flats	6.0%	1,797
SE	Egan Drive @ Sunny Pt. – Yandukin	5.7%	1,773
C	Minnesota Drive, Anchorage - At Chester Creek	4.0%	1,366
SE	Halibut Pt. Road @ Harbor Mt. Rd - Cascade Cr. Rd.	13.3%	1,325
SE	Zimovia Hwy. @ Pat Creek – End	57.8%	1,156
SE	Egan Drive @ McNugget – Yandukin	3.7%	1,093
SE	Sawmill Ck. Road @ Lake - Jeff Davis	11.8%	1,060
SE	Nordic Dr. @ Sing Lee Alley - Ferry Term	15.1%	1,051
C	Tudor Road, Anchorage - West of Patterson Street	4.0%	1,049
C	Ocean Dock Road, Anchorage - Port of Anchorage (WIM)	48.0%	942
SE	S. Tongass Hwy @ Shoenbar - Water St.	5.1%	929
SE	Halibut Pt. Road @ Granite Creek. - Harbor Mountain Rd.	8.0%	876
SE	S. Tongass Hwy @ Grant St. - Mission St.	6.6%	852
SE	Sawmill Ck. Road @ Thimbleberry Creek – Mill	9.3%	834
C	Knik Goose Bay Road, Wasilla - Between Hollywood/Vine & Settlers Bay Dr.	7.0%	797
C	Old Seward Highway, Anchorage - Between Hamilton Dr. & Brandon St	8.0%	790
C	Dimond Boulevard, Anchorage - West of Arctic Blvd	3.0%	788
C	Int'l Airport Road, Anchorage - West of Fairbanks St	5.0%	779
N	Airport Way between Lathrop Street and Wilbur Street	4.0%	760
C	Kenai Spur Road - West of Beaver Loop Rd	8.0%	740
N	Airport Way between Steese Expressway and Noble Street	4.0%	720