

# ALASKA MOVES 2050

## Appendix E - Scenario Planning & Performance Measurement

June 2022

**L RTP**

ALASKA STATEWIDE LONG-RANGE  
TRANSPORTATION PLAN



ALASKA STATEWIDE LRTP  
FREIGHT PLAN



## SCENARIO PLANNING

In support of performance-based planning, exploratory scenario planning was used in development of the Long-Range Transportation Plan and Freight Plan. Like a defensive playbook in sports, scenario planning acknowledges that what may happen to Alaska with respect to certain driving forces is unknown, but by thinking through what could happen and how best to respond to those scenarios, Alaska can be better prepared.

Using a scenario-based planning approach has three primary goals: 1) informing community members and decision-makers on what the future could look like based on the need to address emerging trends, impacts of external forces, and concerns about future uncertainties; 2) prompting creative thinking and shared problem-solving to identify different strategies needed to plan for a desired and more resilient future; and 3) helping to build consensus for a decision or plan adoption based on shared knowledge exchange, tradeoff discussions, and consideration of multiple “What if” futures.

A scenario planning technical advisory committee (TAC) provided overall guidance for the scenario planning effort with significant input from the Statewide Transportation Advisory Committee (STAC) and the Freight Advisory Committee (FAC). The insights from scenario planning informed policies and strategic actions to the desired outcomes for the transportation system.

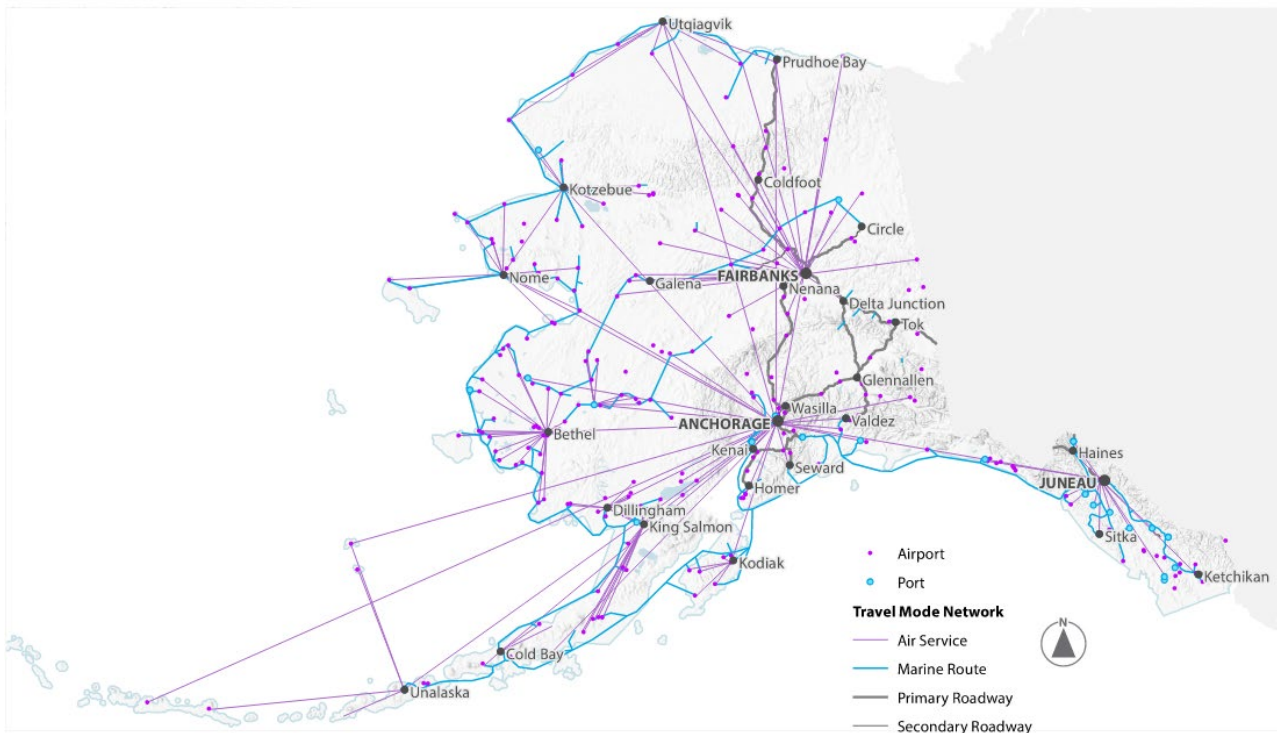
As defined by the Federal Highway Administration (FHWA), scenario planning is “a strategic planning approach to develop, compare, and test different scenarios or “stories” about what the future might look like. Scenario planning provides a framework for developing a shared vision for the future by analyzing various forces (e.g., technology, health, transportation, economy, environment, land use, etc.) that affect growth.”



## Scenario Planning Process

1. Alaska was divided into place typologies, which are defined by levels of transportation connectivity or access. A network connectivity was developed to help define access by mode.

**Travel Mode Network**



### Place Typologies

## RURAL

Small communities located on the roadway network



## URBAN

Large communities located on the roadway network and with multiple modes of access



## ISOLATED URBAN/RURAL

Smaller communities not located on the roadway network but with multiple modes of access



## REMOTE

Small communities not located on the roadway network, with single primary access mode

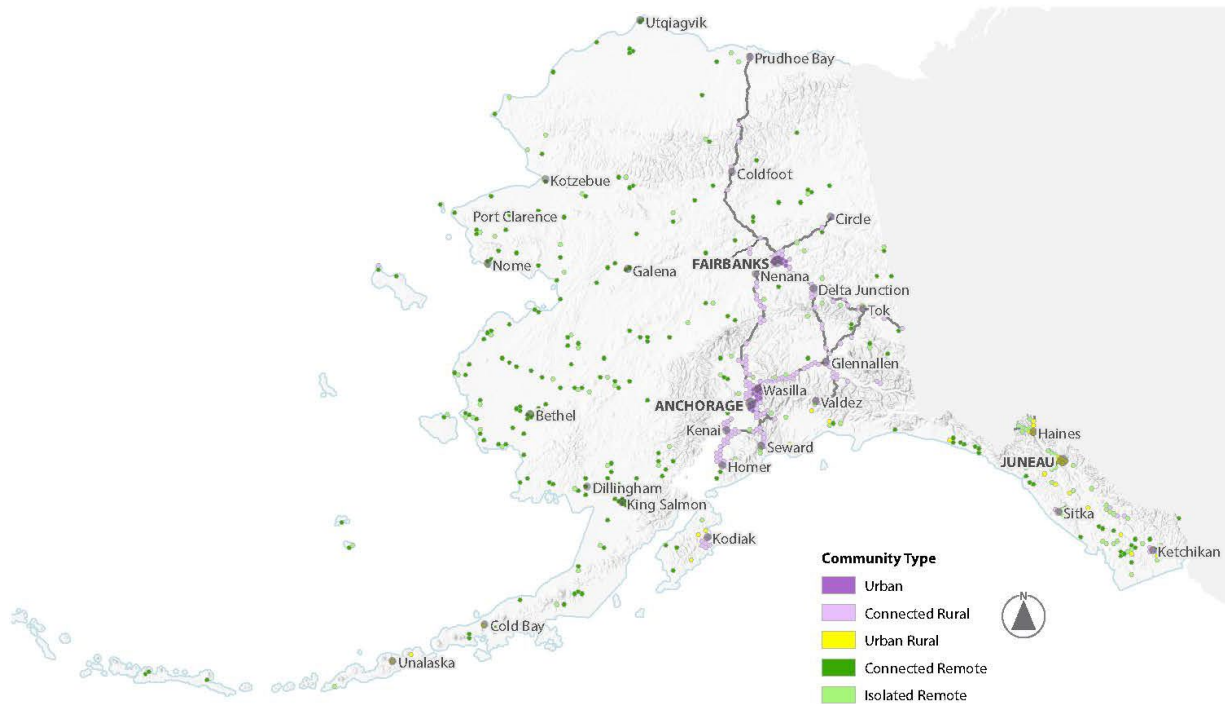


## ISOLATED REMOTE

Small communities located 30 miles or more from the roadway network, an airport, or port



### Communities by Place Typologies



2. The TAC, STAC and FAC identified the key drivers of change. The driving factors of change are high-level local, national and global trends that will likely influence the future transportation network. These external factors have the ability to impact all modes of the transportation network including but not limited to performance, demand, needs, funding, and life-cycle costs. The top three most influential drivers include:



Other drivers considered in the scenario planning included connectivity, emerging technology, climate change, and population.

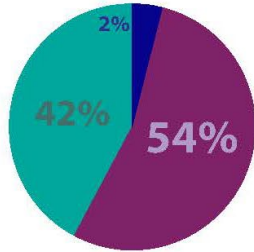
3. Considering the key drivers of change, **three distinct plausible future scenarios** were outlined, titled Full Speed Ahead, Cruising, and Powering Down.

	Full Speed Ahead	Cruising	Powering Down
Description	A future where growth in air to sea cargo, military presence, natural resource development, and tourism, combined with Alaska’s strategic connections and an efficient freight system positions Alaska for population, workforce and economic growth. New transportation infrastructure, as well as operation and maintenance funding sources, and skilled workforces, will be needed to meet increased and changing demands.	A future that looks much like Alaska today – business as usual. The economy and population will continue to grow at a low rate, with some periods of population loss. Demand for new transportation infrastructure will remain largely unchanged.	A future where the economy stagnates, funding is unstable and environmental, social and political threats results in a declining population and workforce. This results in a transportation system where travel declines, costs rise, deferred maintenance backlogs grow, and mobility becomes unreliable.
Key Assumptions	<ul style="list-style-type: none"> <li>• A significant number of major economic developments come online</li> <li>• Healthy National Economy</li> <li>• Strong Federal Funding</li> <li>• Minimal Climate Change Impacts</li> <li>• Robust Technology Advancements</li> </ul>	<ul style="list-style-type: none"> <li>• A few major economic developments come to fruition</li> <li>• Existing vehicular transportation system will likely be sufficient</li> <li>• Stable National Economy</li> <li>• Stable, then Declining Federal Funding</li> <li>• Public revenues to support transportation are not keeping up with rising maintenance and operations costs</li> <li>• Continued Climate Change impacts on infrastructure</li> <li>• Limited Technology Advancements</li> </ul>	<ul style="list-style-type: none"> <li>• Major economic developments are limited.</li> <li>• Loss of population means transportation network use decreases and some facilities may experience reduced services.</li> <li>• National Economy in Recession</li> <li>• Declining federal funding</li> <li>• No new state tax or user fee revenues to fund transportation infrastructure.</li> <li>• Significant Climate Change impacts</li> <li>• Very limited Technology Advancements</li> </ul>

Using GIS, available data was analyzed under each scenario to “visualize” potential changes to the transportation network. As the key data inputs increased or decreased in intensity, the impact on the transportation infrastructure also changed indicating either a need for investment to accommodate growth or a risk to the facility because of decreasing growth.

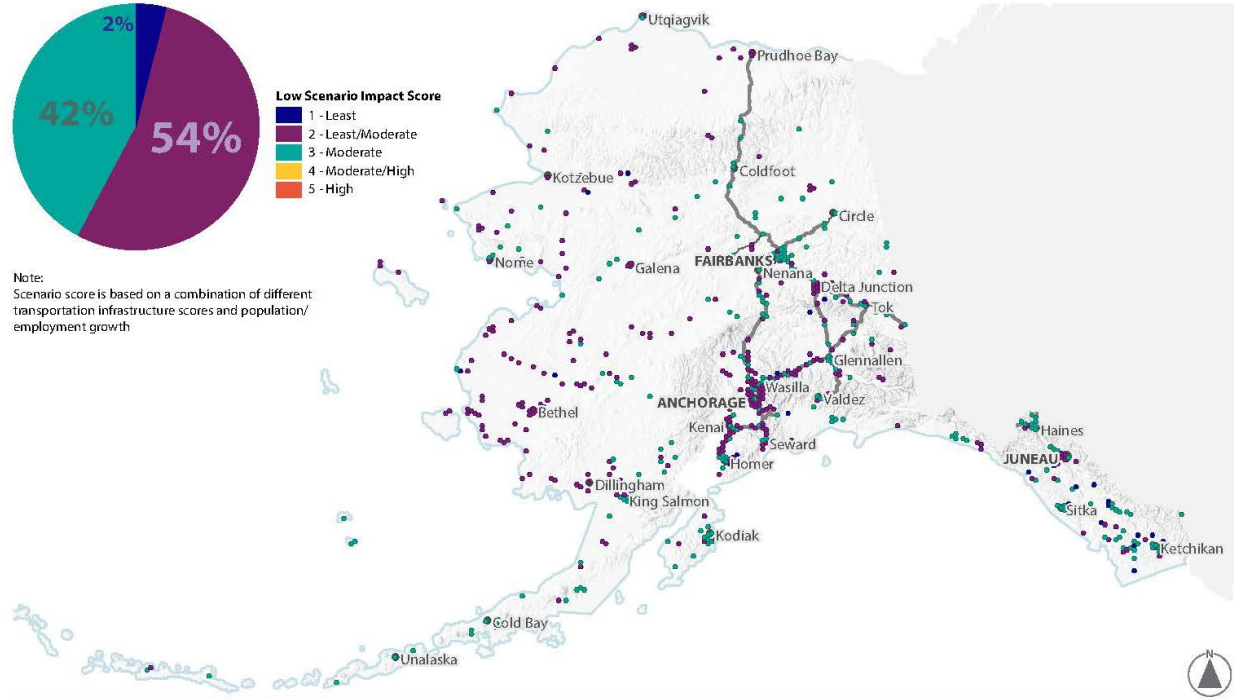
- 2050 Population Projections
- Employment Projections
- Transportation Network
- Road and Bridge Assets
- Areas of Potential Major Economic Development
- Climate Change Risk Areas

### Transportation Impacts of Powering Down Scenario

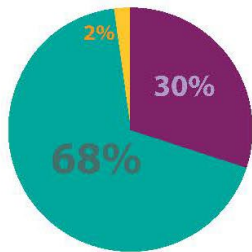


- Low Scenario Impact Score**
- 1 - Least
  - 2 - Least/Moderate
  - 3 - Moderate
  - 4 - Moderate/High
  - 5 - High

Note: Scenario score is based on a combination of different transportation infrastructure scores and population/employment growth

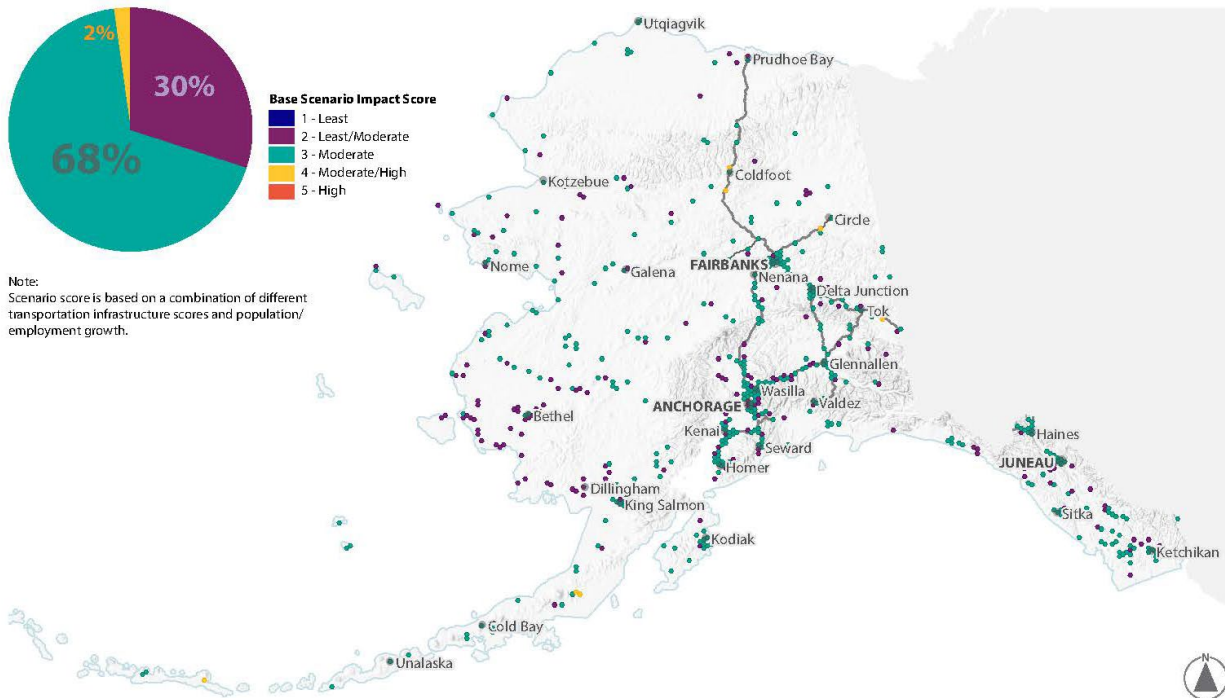


### Transportation Impacts of Cruising Scenario

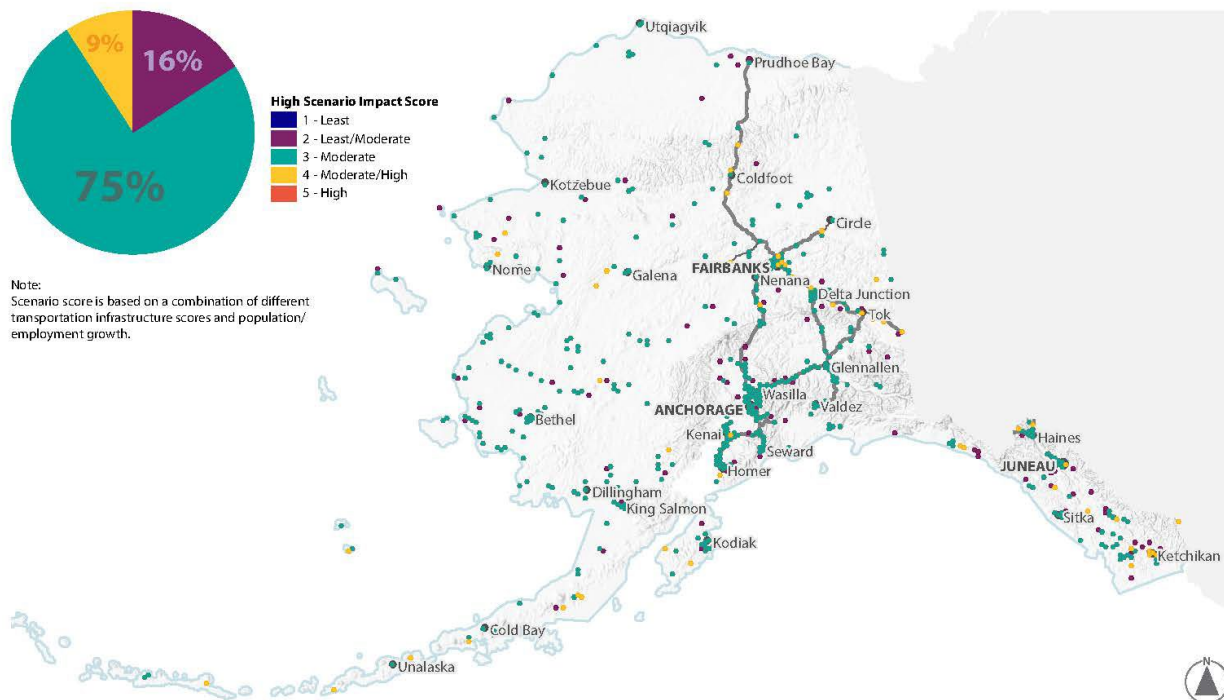


- Base Scenario Impact Score**
- 1 - Least
  - 2 - Least/Moderate
  - 3 - Moderate
  - 4 - Moderate/High
  - 5 - High

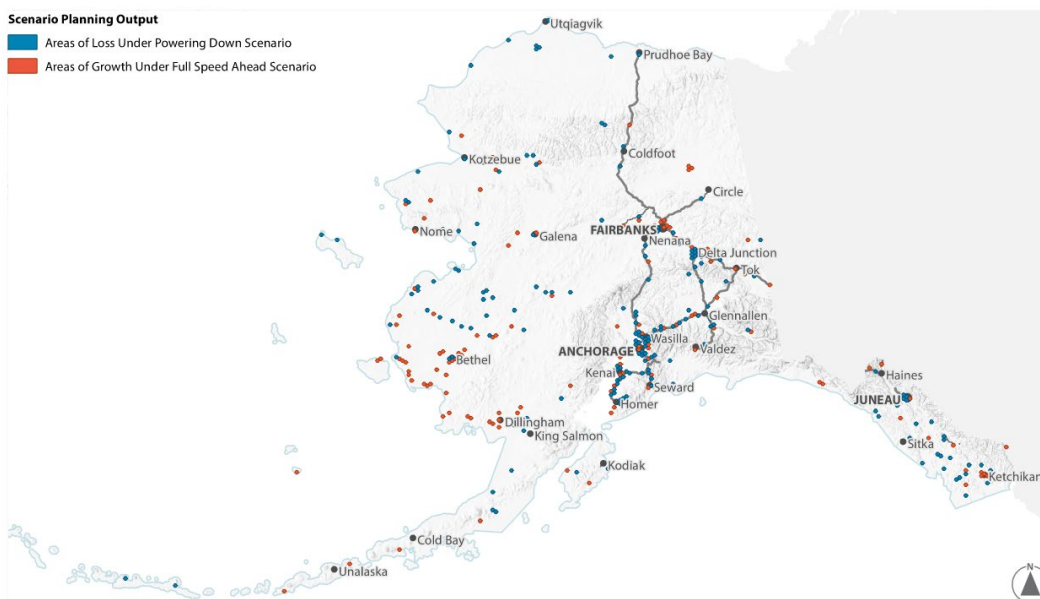
Note: Scenario score is based on a combination of different transportation infrastructure scores and population/employment growth.



### Full Speed Ahead Scenario



### Comparison of Powering Down Scenario and Full Speed Ahead Scenario





## STAKEHOLDER DISCUSSIONS ON EACH SCENARIO

Throughout the scenario planning process, the STAC and the TAC were engaged to provide their perspective on the scenarios and their possible impacts. Guiding questions included:

<p>What does transportation look like in 2050 under each scenario?</p> <p>How might major economic activities change transportation needs?</p>	<p>How does low growth, no growth and high growth influence:</p> <ul style="list-style-type: none"><li>• Where people are living</li><li>• How they move around the state/travel patterns and modes</li><li>• How goods move around the state</li><li>• Ability to plan for and respond to climate change/disasters</li><li>• Connectivity between communities</li><li>• Implementation of new technologies</li><li>• The financial stability of each transportation mode</li></ul>	<p>What and where are the investment priorities for each scenario?</p> <ul style="list-style-type: none"><li>• Capital Improvements</li><li>• Expansion</li><li>• Safety</li><li>• Operations</li><li>• Maintenance</li></ul>
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## Opportunities and Risks by Scenario

The identified opportunities and risks from the discussions informed the overall LRTP strategic actions, so that Alaska can be better prepared to manage risk and maximize opportunities regardless of which future becomes reality.

**Opportunities and Risks by Scenario**

	<b>Opportunities</b>	<b>Risks</b>
<b>Scenario 1: Full Speed Ahead</b>	New federal funding provides opportunities to advance important transportation improvements to meet future needs	New federal funding is a term solution (5 years) and additional sources of state and local revenue will be needed to operate and maintain any investments
	Significant economic growth enables the state to address revenue concerns and fund transportation for long term budget sustainability	High use development-related overweight freight loads reduce service life on some NHS routes/critical infrastructure
	Population increases could result in a deeper pool of skilled workforces	Workforce could be imported and not result in significant increase in population or employment
	Capital investments could fundamentally change the system, improving connectivity, mobility, safety and resiliency across all modes	With most growth happening in larger population centers and regional hubs, rural and remote areas may not equally benefit from funding opportunities
	Technology advancements include expanded data collection and facilitate the implementation of new transportation technology applications	Data breeches could be detrimental to the department as services and infrastructure become more connected
	Public-private partnerships are necessary to fully leverage all available funding sources and development opportunities	
	Increased funding allows for creation of a state funded transportation program	Inability to meet workforce demands results in stymied economic growth, including tourism
	Existing system can be maintained in a state of good repair with continuing or improved service levels across all modes	Service levels increase but not necessarily demand/ridership/use – inefficient use of resources
	Opportunities for modernization and expansion of system	Additional lanes constructed result in higher traffic levels and air quality decline
	Remote access technology, e.g., teleworking, drone pilots, etc. increase opportunities for marginalized populations to access education and jobs while staying where they live	Workforce needs change – need for more data operations and IT focus
<b>Scenario 2: Cruising</b>		Increased need for coordination with other agencies as they also ramp up/update their systems (such as DMV updates, data capture protections)
	Significant buildout of active transportation infrastructure and interconnected network	Added infrastructure increases M&O burden
	Financial constraints increase the need to focus on cost-efficiencies between divisions, departments and transportation owners	Inaction and lack of strategic planning results in a lack of preparedness to handle uncertainties
	Focus on maintenance and rehabilitation of existing facilities	
	Implementation of performance-based planning and programming supports maintenance and operations	Insufficient state funding available to leverage Federal funding
	Investment in technology could result in efficiencies minimizing needs for modernization/expansion	Continued workforce challenges – finding operators, inability to invest in data scientists, and other specialized and needed positions
<b>Scenario 2: Cruising</b>	Ability to future-proof the transportation system for new modes, climate change, and other uncertainties	Competition for limited resources is high – creates tension internally and externally
	Define minimum service levels so funding can be better prioritized to achieve service levels	Unable to move forward with system modernization or expansion projects

	Opportunities	Risks
	Focus on asset management and state of good repair	Maintenance and Operations unable to keep up with large storm/snow events
	Align assets with state mission – transfer infrastructure responsibility to local jurisdictions where not aligned state mission	Institutionalized education patterns resist redesign around workforce needs, staff outmigration continues
	Connectivity infrastructure is installed; however, it is insufficient to support most remotely-located Alaskans	Electric Vehicle (EV) fleet changeover impacts infrastructure needs
	Opportunities	Risks
<b>Scenario 3: Powering Down</b>	Strategic investments of short-term federal funds spur returning benefits by addressing most critical needs	Reduced federal and state dollars causes funding crisis, triggering a system-wide service triage. Current needs are not met and deferred maintenance backlog grows. Priorities and tradeoffs are reassessed, such as service cuts, lack of regular maintenance, etc., increasing future costs
	Necessity to advance cross-agency funding coordination partnerships	Political pressure to privatize some DOT&PF functions, such as contracting
	Form innovative public-private partnerships to mitigate risks	Inability to adequately fund safety projects
	Strategic workforce outreach, training and retention policies encourage forward-thinking labor management	Severe workforce shortage leaves critical needs unfulfilled, impacting transportation reliability and resiliency
	Investment in technology could result in efficiencies minimizing needs for modernization/expansion	Loss/shrinking of various industries as mobility uncertainties and operating costs grow
	Use capital investment to convert unused spaces to new purposes	Inability to meet minimum service levels
	Out of necessity, emphasize training and workforce development, home-grown educators	Loss of institutional (staff) competency to adequately administer federal aid program
	Increase community transition to renewable energy	Transportation technology wise, Alaska falls decades behind the rest of the country
		Rural to urban migration increases as rural community needs are not met
		Due to inability to modernize facilities and adequately maintain them, there is a risk that network safety will worsen



## Performance Measurement

As part of the performance-based planning framework, DOT&PF is required to report on established federal performance measures so that the United States Department of Transportation can compare performances across all the states in order to prioritize funding. One of the challenges that Alaska and other states face when monitoring these performance measures is tracking and reporting the required data on a statewide level. Another challenge, particular to Alaska, is that these federally required performance measures do not adequately capture the rural nature of the majority of the state and the limited roadway system network.

To more accurately track performance at a state level, statewide system performance measures are being proposed that are tailored towards the specific characteristics of Alaska's transportation system, which helps guide decision makers in how they invest in and operate the system and to determine if the system is function as desired.

## Federally Required Performance Measures & Targets

The Fixing America's Surface Transportation Act, which continues the National Highway Performance Program established under the Moving Ahead for Progress in the 21<sup>st</sup> Century Act (MAP-21), require performance measures and targets to be established and monitored that relate to safety, bridge and pavement conditions, air quality, freight movement, and the performance of the National Highway System (NHS) in order to be eligible for federal funding. DOT&PF must report to the Federal Highway Administration and the Federal Transit Administration on the performance measures, based on the most recently available data. The Infrastructure Investment and Jobs Act (IIJA), passed in 2021, did not create any new performance measures; however, it continued the reporting requirements already in place and indicated that new guidance may add new measures.

### Safety

Safety Federal Safety Performance Measures & Targets			
Performance Area	Performance Measure	2020 Targets	2022 Targets
Highways	Fatalities	80	70
	Fatality Rate (per 100 million vehicle miles travelled)	1.5	1.3
	Serious Injuries	400	325
	Injury Rate (per 100 million vehicle miles travelled)	7.5	5.9
	Non-Motorized Fatalities & Serious Injuries	70	58
Transit	Fatalities	<i>Not Yet Established By State of Alaska</i>	
	Fatality Rate (per Total Vehicle Revenue Miles by Mode)		
	Injuries		
	Injury Rate (per Total Vehicle Revenue Miles by Mode)		
	Safety Events (per Total Vehicle Revenue Miles by Mode)		
	System Reliability (Mean Distance between Major Mechanical Failures by Mode)		

## Transit

Transit Federal Transit Asset Performance Measures & Targets		
Performance Measure	2020 Targets	2022 Targets
Percent of Rolling Stock Revenue Vehicles Exceeding the Useful Life Benchmark (ULB)		
Percent of Non-Revenue Service Vehicles Exceeding the ULB		
Percent of Facilities Rate under 3.0 on the Transit Economic Requirements Model (TERM) Scale	<i>Not Yet Established By State of Alaska</i>	
Percent of Track Segments under Performance Restriction		

## Air Quality

Air Quality Federal Air Quality Performance Measures & Targets		
Performance Measure	2020 Targets	2022 Targets
Total Emissions Reduction for CMQA Criteria Pollutants (PM2.5)	0.05 Emissions (kg/day) Reduced	0.05 Emissions (kg/day) Reduced
Total Emissions Reduction for CMQA Criteria Pollutants (PM10)	2.0 Emissions (kg/day) Reduced	4.0 Emissions (kg/day) Reduced
Total Emissions Reduction for CMQA Criteria Pollutants (NOx)	0.05 Emissions (kg/day) Reduced	0.05 Emissions (kg/day) Reduced
Total Emissions Reduction for CMQA Criteria Pollutants (CO)	40.0 Emissions (kg/day) Reduced	40.0 Emissions (kg/day) Reduced
Total Emissions Reduction for CMAQ Criteria Pollutants (VOC)	<i>Not Available</i>	<i>Not Available</i>

## Highways

Highways Federal Highway Performance Measures & Targets			
Performance Area	Performance Measure	2020 Targets	2022 Targets
Travel Time Reliability	% of Person-Miles Traveled on the Interstate that are Reliable	92%	92%
	% of Person-Miles Traveled on Non-Interstate NHS that are Reliable	<i>Not Available</i>	70%
Freight Travel Reliability	Truck Time Reliability (TTTR) Index (Ratio of 95th %-tile Travel Times to 50 %-tile Travel Times)	2.0	2.0
Traffic Congestion	Annual House of Peak Hour Excessive Delay Per Capita	<i>Not Applicable</i>	<i>Not Applicable</i>
	% of Non-SOV Travel	<i>Not Applicable</i>	<i>Not Applicable</i>

## Pavement & Bridges

Pavement Federal Pavement Condition Performance Measures & Targets			
Performance Area	Performance Measure	2020 Targets	2022 Targets
Interstate System	% of Pavement of Interstate System in Good Condition	20% of Lane Miles	20% of Lane Miles
	% of Pavement of Interstate System in Poor Condition	10% of Lane Miles	10% of Lane Miles
Non-Interstate	% of Pavement of Non-Interstate System in Good Condition	15% of Lane Miles	15% of Lane Miles
	% of Pavement of Non-Interstate System in Poor Condition	15% of Lane Miles	15% of Lane Miles

Bridge Condition Performance Measures & Targets			
Performance Area	Performance Measure	2020 Targets	2022 Targets
National Highway System	% of NHS Bridges Classified as Good Condition	40% of Deck Area	40% of Deck Area
	% of NHS Bridges Classified as Fair Condition	<i>Not Available</i>	<i>Not Available</i>
	% of NHS Bridges Classified as Poor Condition	10% of Deck Area	10% of Deck Area

# Existing and Proposed State Performance Measures

## Existing Performance Measures

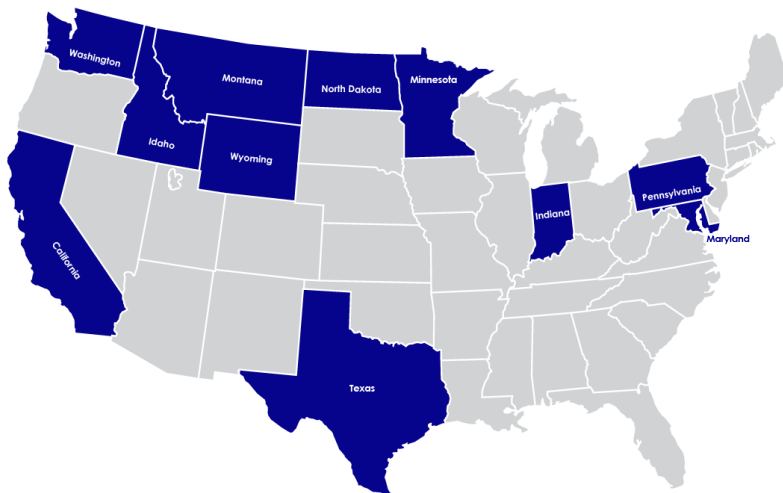
In addition to the federally required performance measures and targets which are already tracked by DOT&PF, the state has identified performance measures in the Alaska Statewide Active Transportation Plan to monitor implementation progress.

Alaska Statewide Active Transportation Performance Measures	
Performance Area	Performance Measure
Safety	Reduction in No. of Non-Motorized Fatal/Serious Injury Collisions (Rolling Average & % of Total Collisions)
Health	% Change in Avg. Minutes of Physical Activity per Day per Capita
Total Emissions Reduction for CMQA Criteria Pollutants (NOx)	% of Health Regions Meeting Healthy Alaska Benchmarks
Maintenance/System Preservation	Miles of Roadway Adopted through Adopt-A-Road & Adopt-A-Highway Initiatives
Connectivity	Miles of State-Owned Active Transportation Facilities (Trails, Sidewalks, Designated Bicycle Facilities, Road Shoulders)

## Proposed Performance Measures

A best practice review of performance measures used in other multi-modal Statewide Long Range Transportation Plans was completed to help inform proposed measures for Alaska.

States Reviewed for Best Practices of Performance Measures



Alaska has unique geographic, environmental, cultural, and economic conditions that affect its transportation system. It's important to capture what affects the transportation system and how it affects it. Much of Alaska's landscape is rural in nature and performance measures were reviewed for states with similar environments such as Washington, Idaho, Montana, and North Dakota. Additionally, Alaska's transportation system involves many different modes including the road system, active

transportation such as walking and biking, transit, aviation, and marine and waterway systems. Washington’s Long Range Transportation Plan for ferries was reviewed to identify performance measures specifically related to the marine and waterway systems. Other states such as Texas, Pennsylvania, Maryland, Indiana, California, and Minnesota were also reviewed to identify any other performance measures that may relate to other modes of transportation, climate and the environment, urban vs. rural environments, and use of emerging technology.

The performance measures that are recommended to best capture the performance of Alaska's transportation system are presented below. The performance measures are kept a high, system-wide level for state-wide multi-modal comparison and monitoring. Additional data collection will be necessary to monitor and report on progress; therefore, a phase implementation of the performance measures is recommended based on available data and resources.

Proposed Future State Transportation Performance Measures	
Performance Area	Performance Measure
Operations and Maintenance of the System	<ul style="list-style-type: none"> <li>Average Annual Delay (vs. Scheduled Departure Time -Transit &amp; Intercity Rail, Ferries, Aviation, etc.)</li> </ul>
Resiliency	<ul style="list-style-type: none"> <li>No. of System Improvements Addressing Climate Vulnerability</li> <li>Avg. Time to Restore Normal Operations After Weather Event</li> </ul>
Safety and Mobility for All Alaskans	<ul style="list-style-type: none"> <li>Access to Destinations by Mode and Travel Costs (by Income Quintile &amp; Race)</li> <li>No. of Communities &amp; Community-Based Organizations (CBO) Meaningfully Engaged in Development of Plans &amp; Projects</li> </ul>
Performance-Based Management	<ul style="list-style-type: none"> <li>% of Projects Delivered on Time/Budget (by Original Contract Date) (for all modes)</li> <li>% of Maintenance Work Completed vs. Work Planned</li> <li>Annual savings through Modernization</li> </ul>