Senate Transportation Committee

Department of Transportation & Public Facilities

Managing Alaska's Transportation Assets

Andy Mills, Legislative Liaison & Special Projects Coordinator
Commissioners Office

Christine Langley, Director, Data, Modernization, and Innovation

Andrew Schultz, Quality Assurance Engineer, Northern Region

Lauren Little, P.E. Chief Engineer, Project Delivery

March 24, 2026

KEEP ALASKA MOVING

Assets in Transportation

Assets and Asset Condition drive Alaska's transportation decisions

- What is asset management
- What types of assets does DOT&PF track
- Asset lifecycle
- How do we collect asset condition
- How do we ensure we are installing "good“ asphalt
- How do we monitor pavement condition over time
- How do we use data to maximize the lifespan of our assets
- What are some new methods we could use or have tried

Asset Management Drives DOT&PF

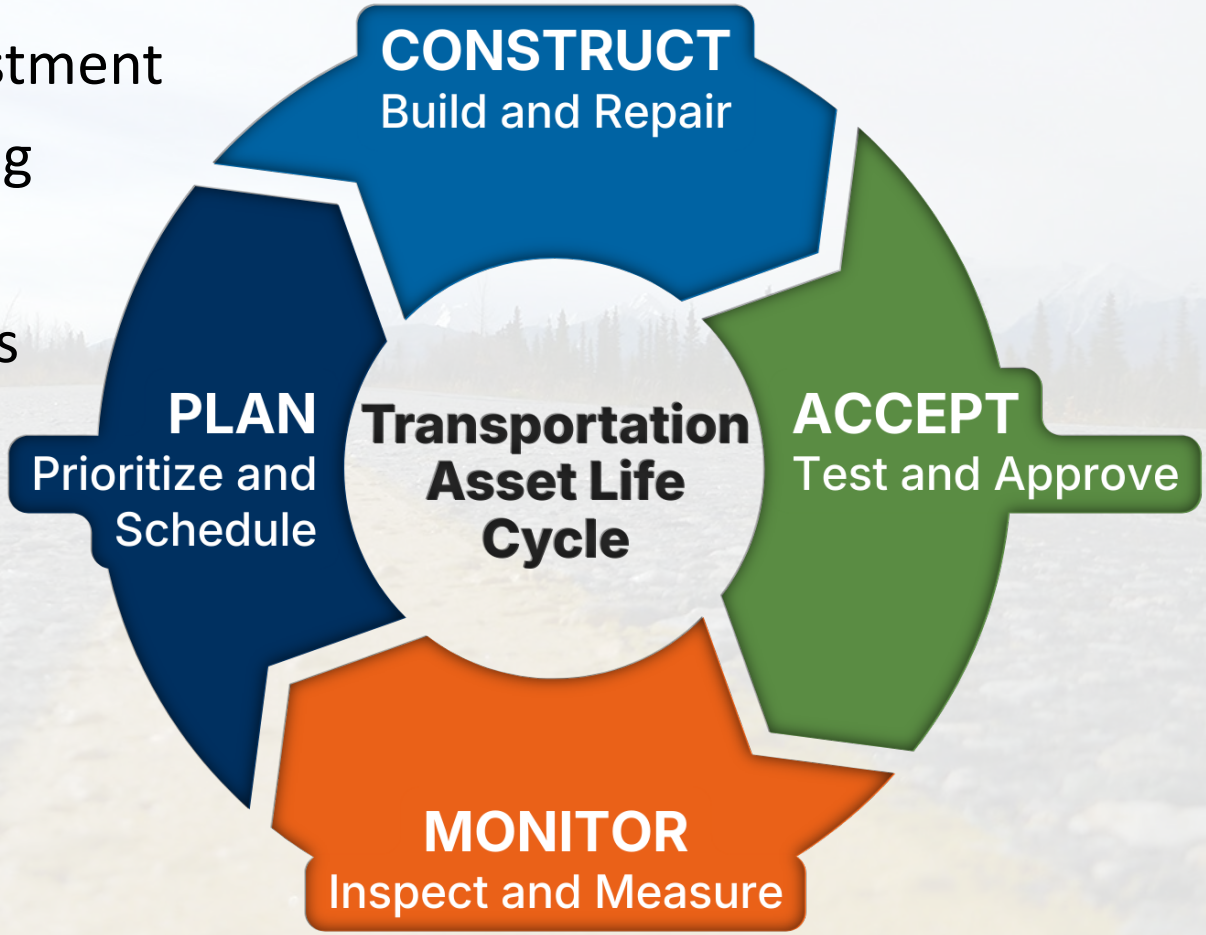
- 1,000 Bridges statewide
- 11,894 Lane miles
- 1,139 Signalized intersections
- 827 Buildings
- 235 Rural airports
- 16 Harbors
- Nine AMHS Vessels
- Nine Weigh stations
- Three Tunnels
- Two International airports

All come together to create the critical freight corridors that support energy, mining, tourism and communities.

Transportation Asset Life Cycle

Effective asset management

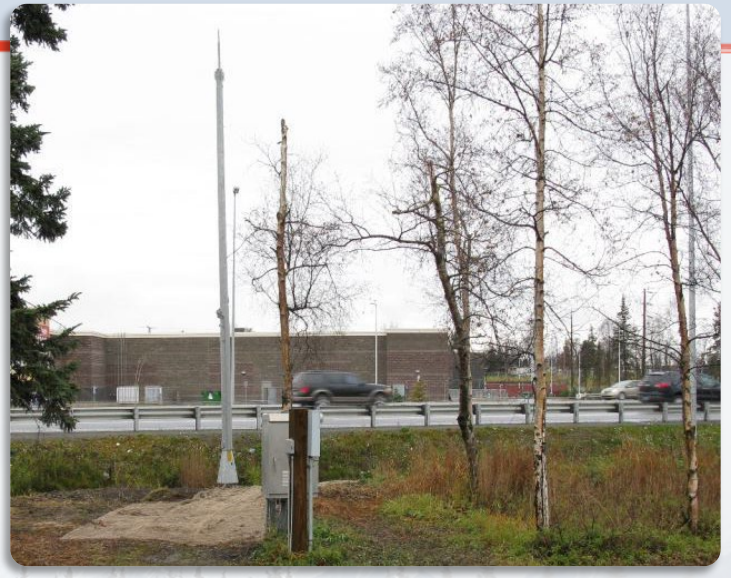
- Extends the life of infrastructure
- Protects Alaska's investment
- Helps prioritize funding
- Improves safety
- Supports Communities
- Promotes Industry



Collecting Data on Assets

DOT&PF collects asset condition in many ways

- Vehicle-mounted laser scanning
- Automated crack detection systems
- Roadway sensors for traffic collection
- Digital surveys on location and condition
- AI algorithms on crowd sourced imagery

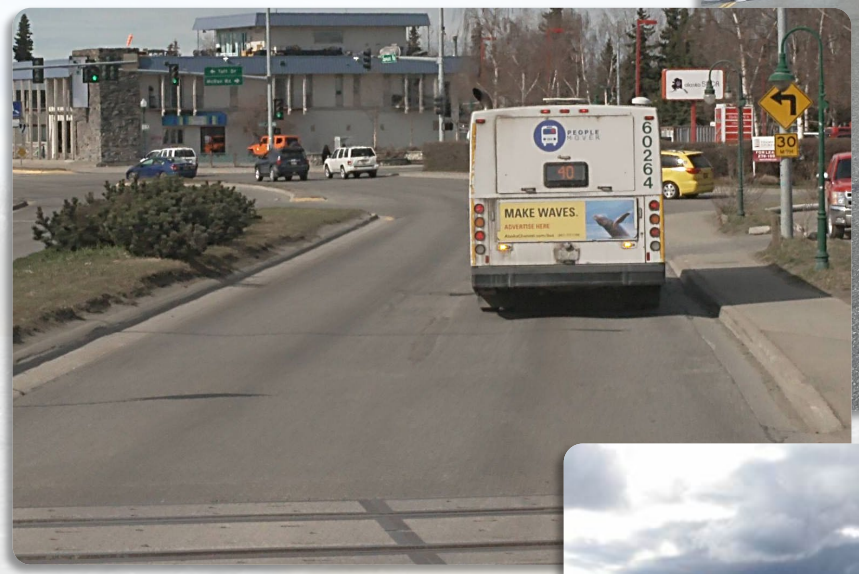


SUPPORT_MATERIAL	Steel
ROADSIDE_LOCATION	Median
CONDITION	Good
COMMENTS	
FILENAME	35218W7S
LATITUDE	61.206462
LONGITUDE	-149.733509
IMAGE	View
VEHICLEID	1782
COLLECTION_DATE	05/02/2023

Sharing Asset Condition

DOT&PF publishes asset information on various websites for public use

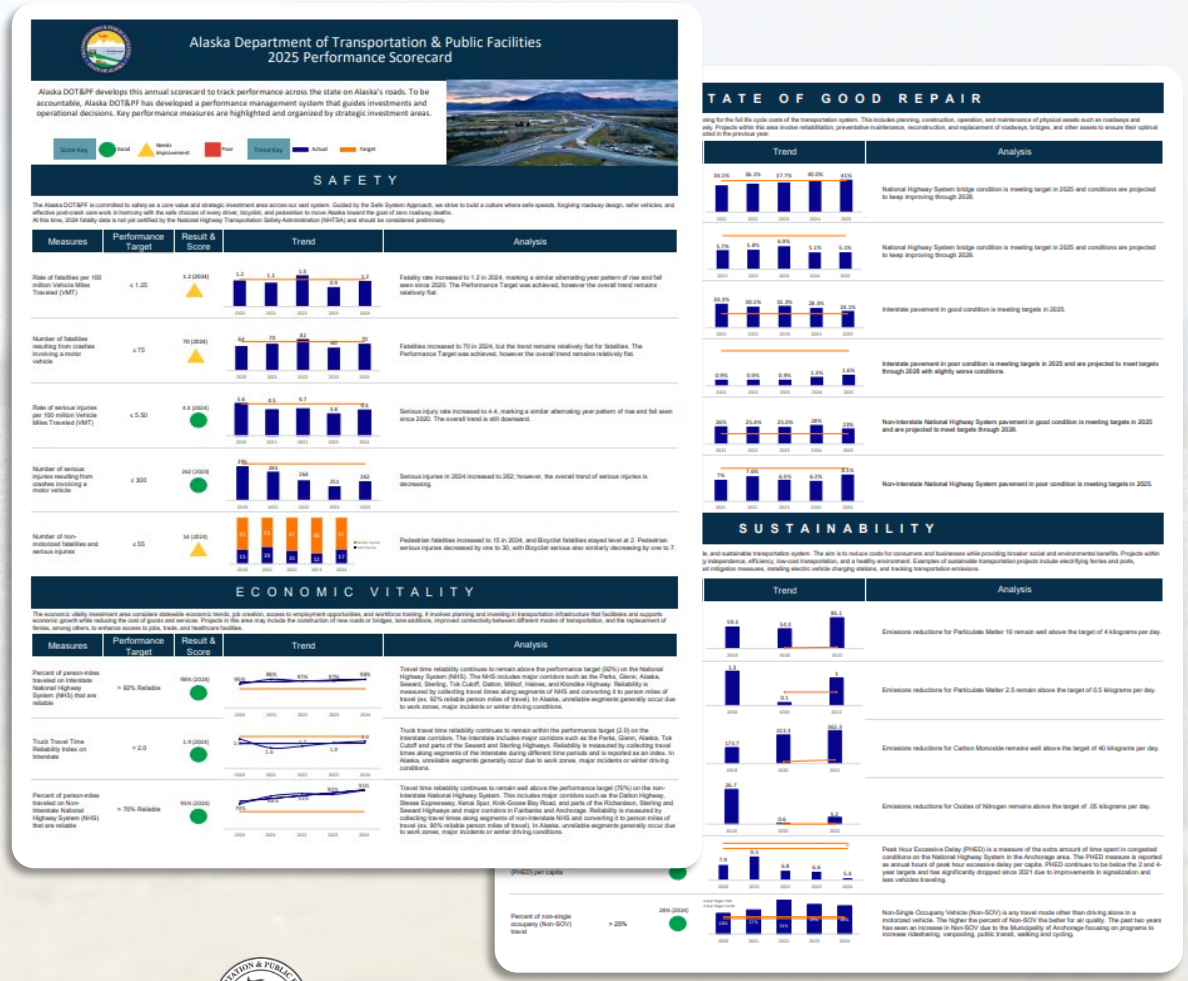
- Pavement
- Bridge
- Shoulders
- Guardrails
- Signs
- Lighting
- Curbs
- Material sites
- Intelligent Transportation Systems (ITS)
  - Examples: Traffic Stations, Road Weather Information Systems (RWIS)



Federal Performance Measures

Assets condition is used to calculate performance measures to plan and implement projects that address Alaska's infrastructure needs

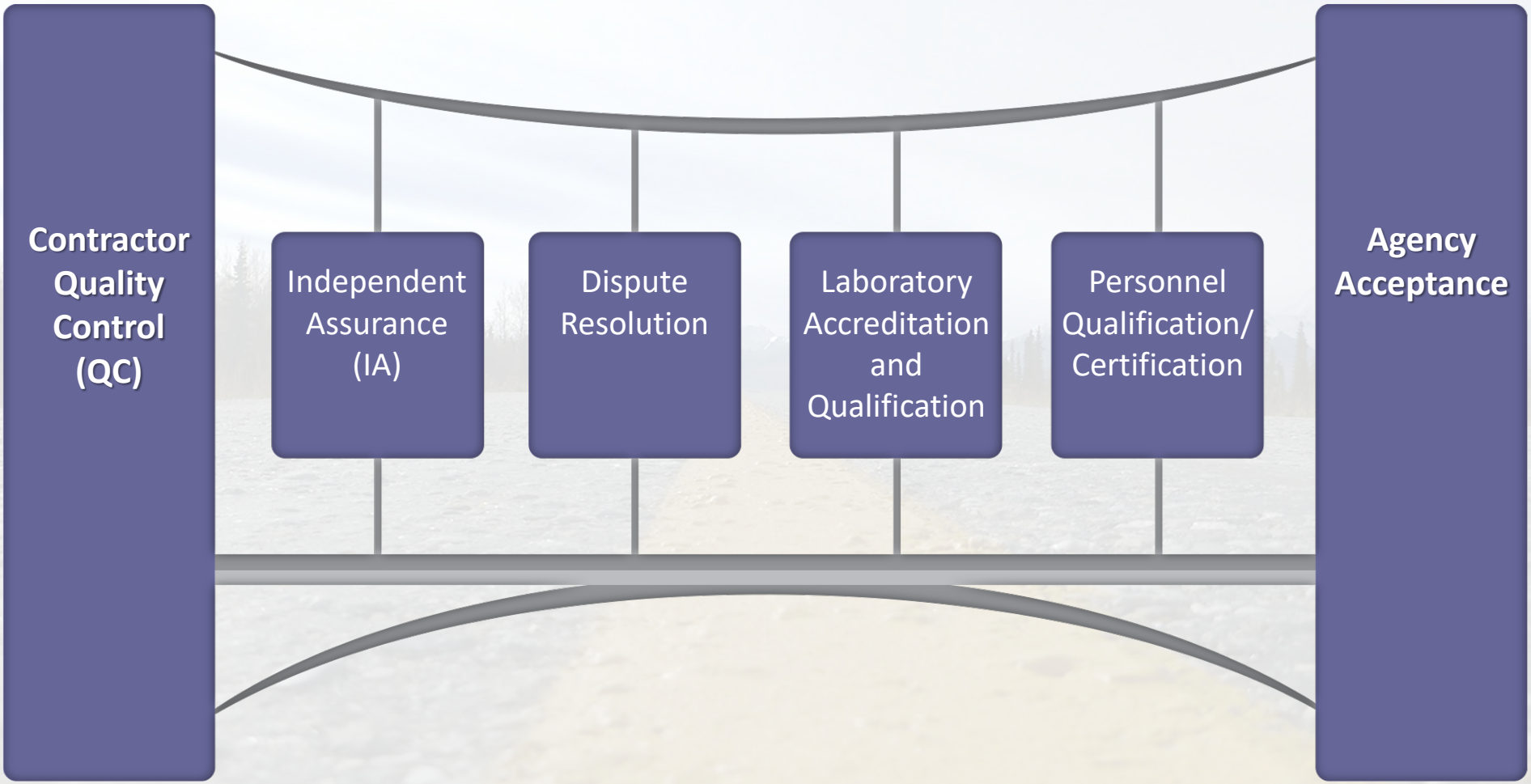
- Safety
- Economic Vitality
- State of Good Repair
- Sustainability



Construction: Quality Assurance (QA) Program

- The Department operates a Quality Assurance Program that provides oversight of material acceptance for infrastructure projects
  - Required by Federal funding partners
- Has several elements that work together to provide quality products
- Definition of **Quality** in Infrastructure = meeting the contract requirements
- 'Agency Acceptance' means the work the Department does to verify the contractor has met contract requirements

Core Elements of a QA Program



Quality Assurance Program

Alaska Test Methods Manual (ATMM) – collection of Alaska-specific test methods the Department's technician must follow.

Following these test methods produces consistent results that can be relied upon for contract enforcement.

There are over 60 test methods in this manual.

In addition to the manual 100+ nationally recognized test methods are utilized by the Department.

Since 1998 there have been 1,229 technicians qualified in Alaska to perform tests.

Three Regional laboratories and dozens of project-specific field laboratories with precision equipment are maintained by the Department to test materials.

Testing Hot Mix Asphalt on a Construction Project

Aggregate source is selected by contractor based on quality testing

- LA Wear, Nordic Abrasion, Micro Deval, Sodium Sulfate Soundness

Contractor sorts and crushes material to meet specifications

- QC testing of the Fractured Faces and gradation during production

Supplier produces asphalt binder

- QC testing of 12+ properties both during production and when loading tankers for projects

Laboratory combines aggregate and asphalt binder to make Hot Mix Asphalt

- QC testing of gradation, asphalt binder content, density

Department tests the Hot Mix Asphalt for acceptance for payment

- Acceptance testing of gradation, asphalt binder content, density, fracture, and asphalt binder material

Analyzing Pavement Throughout its Lifespan

Approximately 4,000 miles of pavement assessed annually covering 12,000 miles every 3 years

Data collected using specialized vehicle-mounted laser scanning equipment that operates at highway speeds.

Analyzing Pavement Throughout its Lifespan

Key Pavement Measures

- Rut Depth (inches)
- Roughness (inches/mile) measured as the International Roughness Index (IRI)
- Cracking Percent: precent of wheel path affected by cracking

Collection can be challenging with remote communities accessible by ferry and some that are only accessible by aircraft.

Separate collection systems are being tested in remote areas of Alaska the standard collection vehicle cannot access. **These include:**

- Camera/GPS system for visual assessment
- Camera system for AI ratings

Rating Pavement Condition

After the rut, roughness and cracking data is collected the overall condition is rated as **Good**, **Fair** or **Poor** based on federal condition measures.

	Good	Fair	Poor
IRI (inches/mile)	<95	95-170	>170
Rutting (inches)	<0.20	0.20-0.40	>0.40
Cracking (%)	<5	5-20 (asphalt) 5-15 (JCP) 5-10 (CRCP)	>20 (asphalt) >15 (JCP) >10 (CRCP)

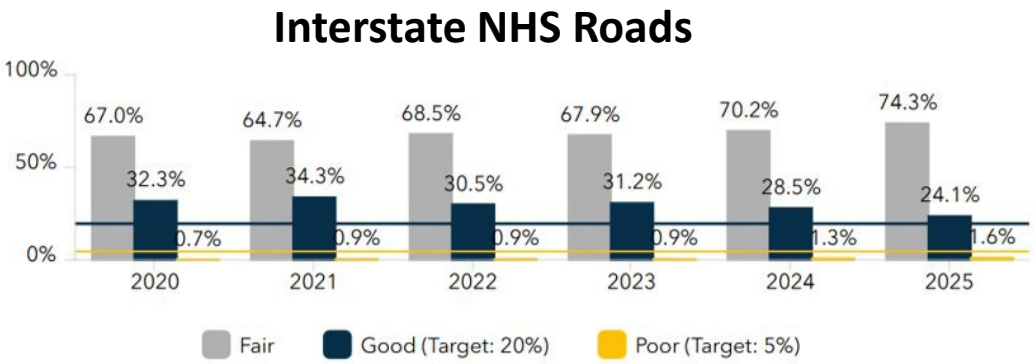
Examples:

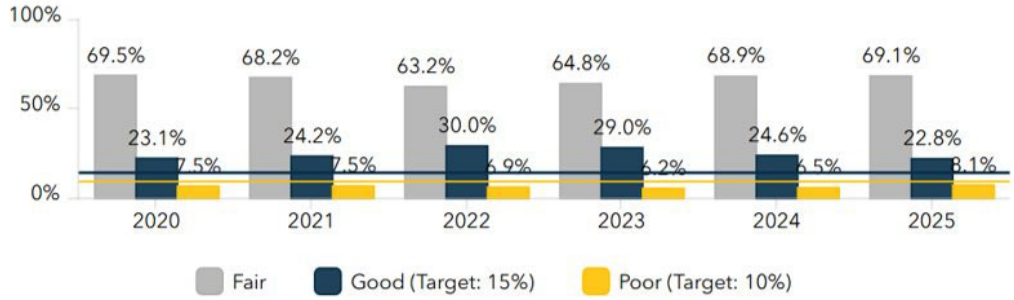
Good Pavement: IRI = 64 inches/mile, Rut Depth 0.1”, Cracking 1%

Poor Pavement: IRI = 212 inches/mile, Rut Depth 0.45”, Cracking 17%

DOT&PF Performance Measures: Pavement

DOT&PF publishes pavement condition on the National Highway System (NHS) for the past five years.





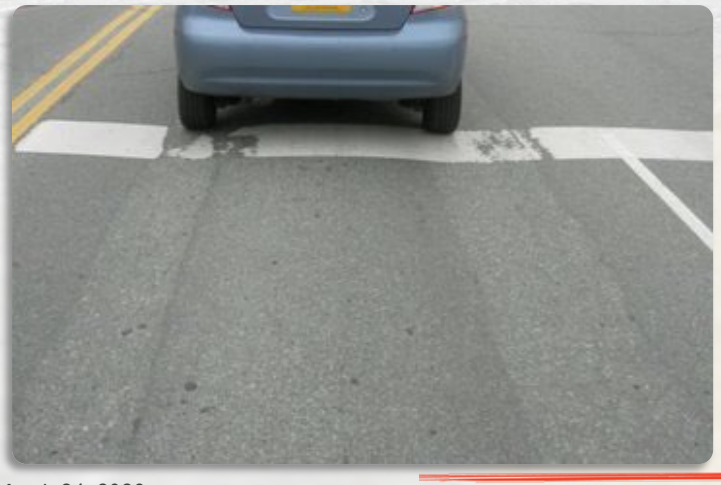
NHS network in Alaska

Asset Condition Drives Project Recommendations

Each year, pavement condition data is analyzed to identify work needs across the road system. This helps identify areas for preservation projects to extend pavement life and determine where more significant rehabilitation or reconstruction improvements are needed.

- **Preservation** – Seal coats or resurfacing that extend the pavements life
- **Rehabilitation** – More substantial repairs that address deeper layers
- **Reconstruction** – Most intensive option, involving a complete rebuild of the road

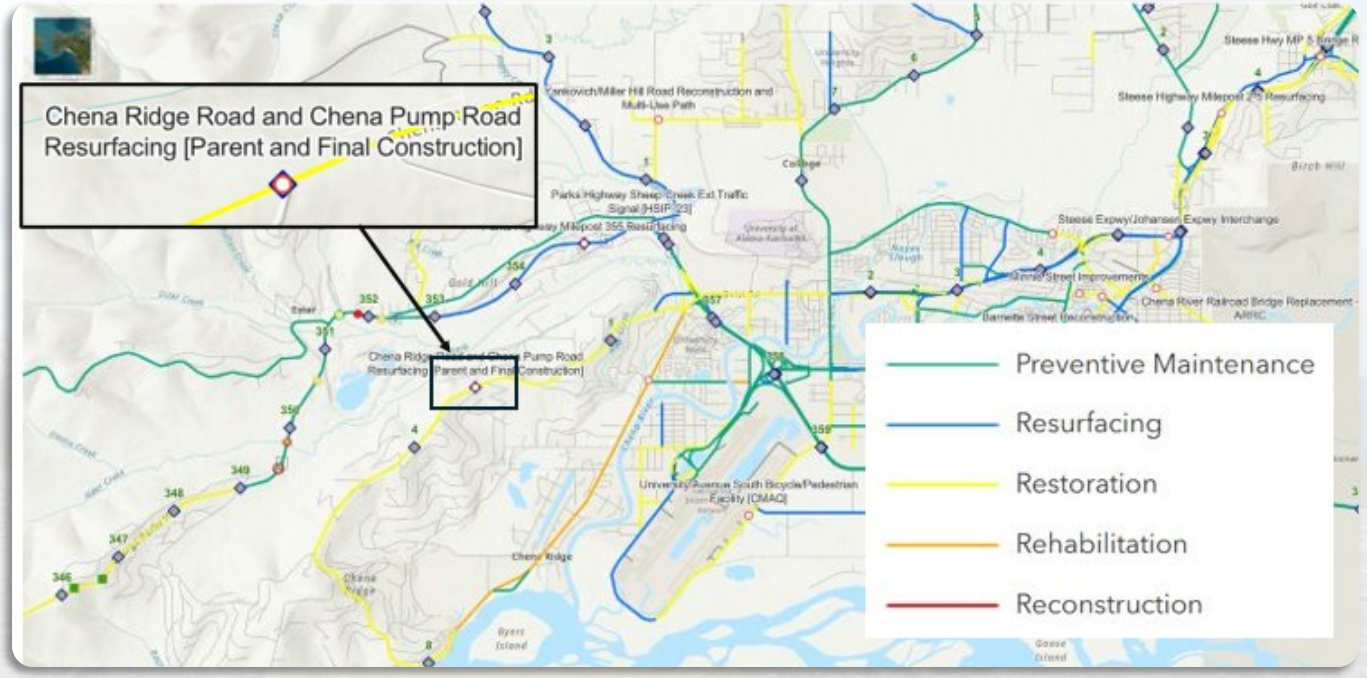
Preservation projects are prioritized because they can be completed quickly and help prevent roads from deteriorating into conditions that require more expensive rehabilitation or reconstruction treatments.



How Asset Management Supports Planning

Asset condition data feeds directly into planning decisions:

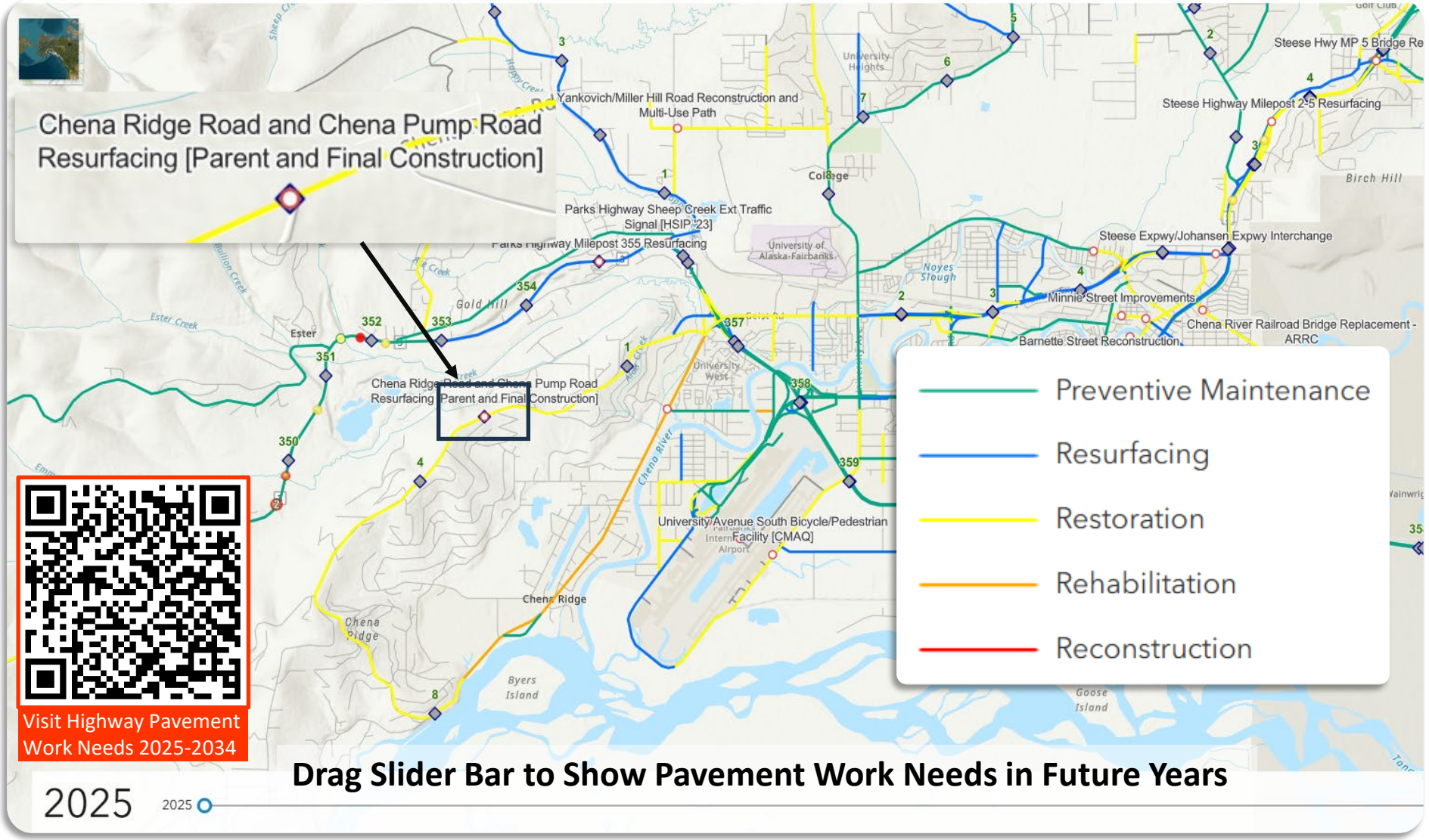
- Condition data is collected annually
- Infrastructure needs are identified
- Preservation projects are prioritized



This application assists with locating project needs in the 10-Year Plan

- Larger rehabilitation or reconstruction projects are considered for STIP and 10-Year Plan

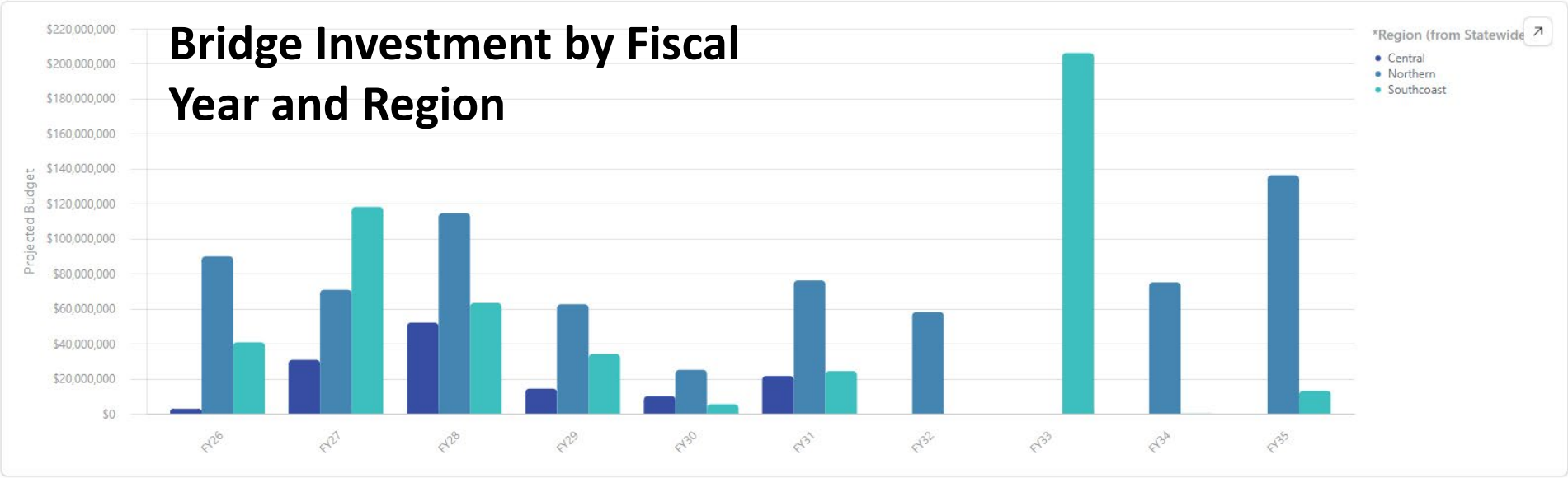
Long Term Pavement Planning



10-Year Plan

Program Investment by Fiscal Year

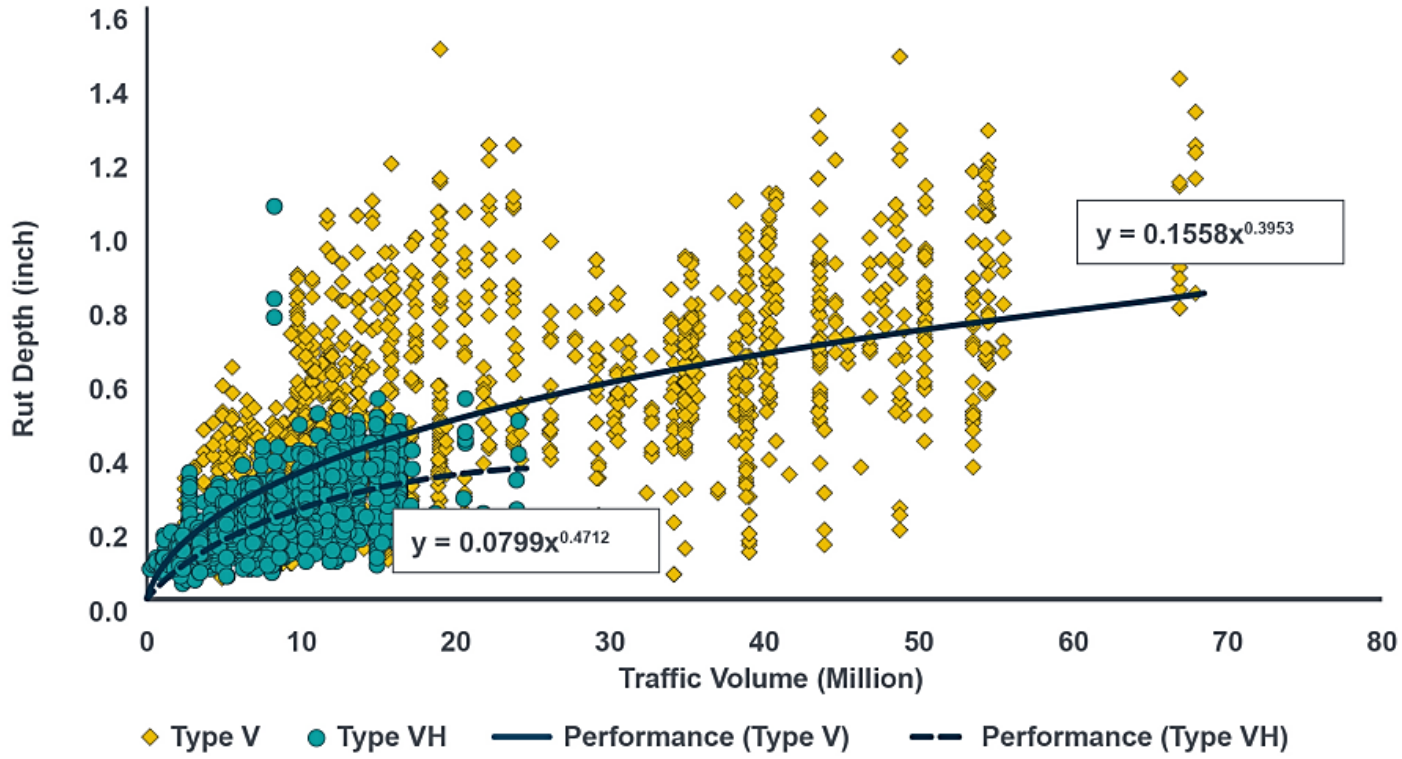
Bridge Investment by Fiscal Year and Region



($ in whole dollars)

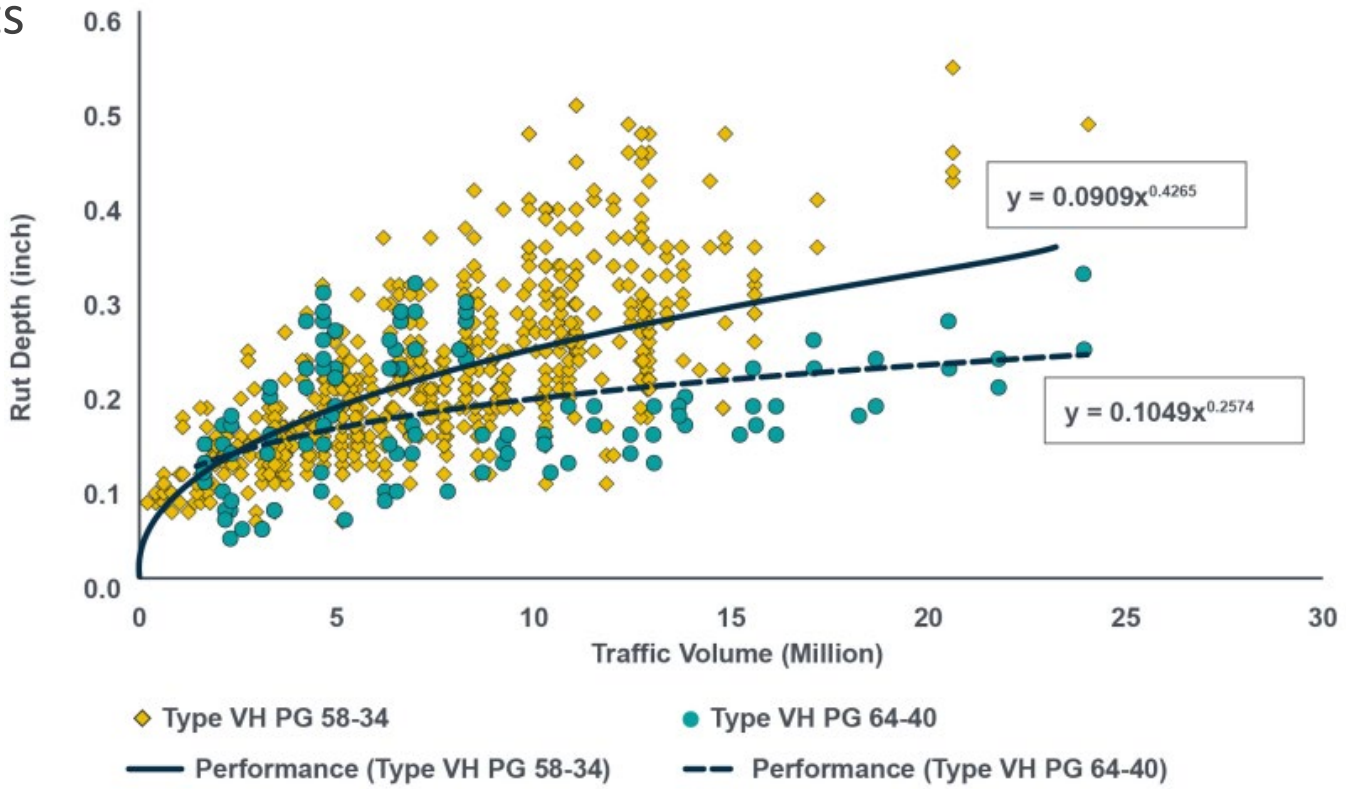
Improvements to Aggregate Hardness

Harder aggregates are required on roadways with high traffic volumes to improve performance. The graph below shows that pavements incorporating hard aggregate (**type VH in green**) exhibit lower rutting rates compared to similar roadways without hard aggregate (**type V in gold**).



Improvements to Asphalt Binders

DOT&PF has used polymer-modified binders since the late 1990s to improve resistance to rutting, with earlier applications incorporating approximately 3% polymer. Beginning in 2015, we transitioned to more highly modified binders on our highest-traffic roadways, using more than double the polymer content of Standard pavements to further enhance rutting resistance. These high-performance pavements are designed to contain approximately 7% polymer.



Modernizing Transportation Asset Data

DOT&PF is working to expand and modernize asset data collection across Alaska.

Key efforts include:

- Expanding inventories to include assets such as culverts and roadside infrastructure
- Integrating new technologies such as LiDAR, AI and mobile data collection
- Improving data integration through GIS

The goal is to provide reliable, accessible infrastructure data that improves decision-making about maintenance, investments and long-term planning across the Department.

Thank You.

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Alaska Department of Transportation & Public Facilities

DOT.Commissioner@alaska.gov

Alaska 511: 511.alaska.gov

Cover photo: *The Alaska Range, Richardson Highway.*
By Dennis Bishop, Alaska DOT&PF

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