

# Alaska Department of Transportation & Public Facilities DOT&PF Winter Weather Operations

House Finance

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February 2, 2024

# October 10, 2023 – Snow Summit

***"Gathering of state and local stakeholders to discuss winter operations, challenges, and innovations."***

- Keeping Winter Roads Clear (M&O\*)
- Winter Maintenance Priorities for Sidewalks Paths (FAST Planning)
- Designing for Complete Streets in Northern Climates (Pedestrian and Bike Planning)
- 511 Innovations and RWIS\*\*\* (DMIO\*\*)
- Winter Snow Removal Operations (M&O\*)
- Extreme Events: How DOT&PF Prepares (Commissioner)
- Avalanche Program and Innovations (Avalanche/Drone Teams)
- Seasonal and Ice Roads (UAF Arctic Infrastructure Development Center)
- Snowtrails: Snowmachine Grants (DOT&PF Resiliency Coordinator)
- Innovations: Winter Operations Dashboard and Mobile RWIS\*\*\* (DMIO\*\*)



\* Maintenance and Operations (M&O)

\*\* Data Modernization and Innovation Office (DMIO)

\*\*\*Road Weather Information System (RWIS)

# Snow Summit Follow-Up: New Tools



## Alaska DOT&PF Winter Maintenance Priority by District

Includes number of lane miles and airports by maintenance district and winter maintenance priority.

This dashboard summarizes lane miles by maintenance district. Multiple data sources have been combined to produce the project information presented on this dashboard.

**Note:** Lane miles are based off of the [HPMS reporting definition of lane miles](#) which "is calculated by multiplying the number of through lanes on a given roadway section by its centerline length."

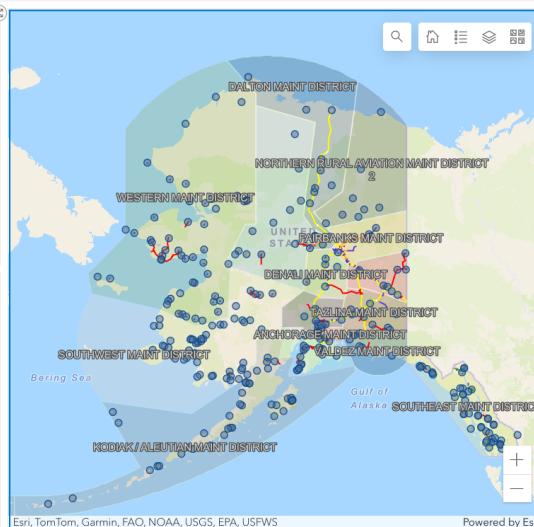
### Public Airports

| Maintenance Station    | Lane Miles |
|------------------------|------------|
| FAIRBANKS STATION      | 1,010.9    |
| ANCHORAGE STATION      | 781.9      |
| PALMER STATION         | 635.3      |
| NOME STATION           | 553.5      |
| DELTA JUNCTION STATION | 377.1      |
| TOK STATION            | 361.1      |

### Lane Miles

#### Winter Maintenance Priority

|   |        |
|---|--------|
| 1 | Green  |
| 2 | Yellow |
| 3 | Orange |
| 4 | Blue   |
| 5 | Red    |



### Total Lane Miles

12k

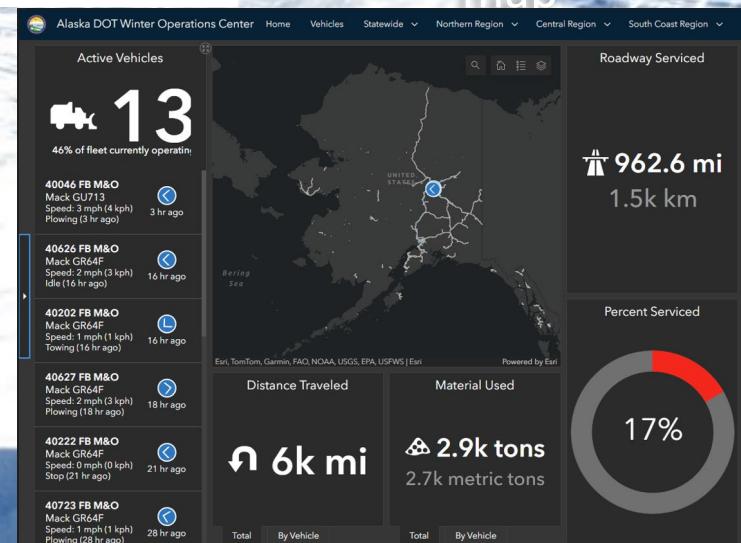
| Winter Maintenance Priority | Lane Miles   |
|-----------------------------|--------------|
| 1                           | 365.0281776  |
| 2                           | 1220.6614619 |
| 3                           | 4628.4678151 |
| 4                           | 2203.4006835 |
| 5                           | 1272.5085622 |

### Maintenance District

| Maintenance District | Airports |
|----------------------|----------|
| Anchorage            | 6        |
| Dalton               | 12       |
| Denali               | 6        |
| Fairbanks            | 4        |
| Kenai Peninsula      | 16       |



Scan to explore the interactive priority map



Data-driven approach to improving safety and innovating investment in Alaska



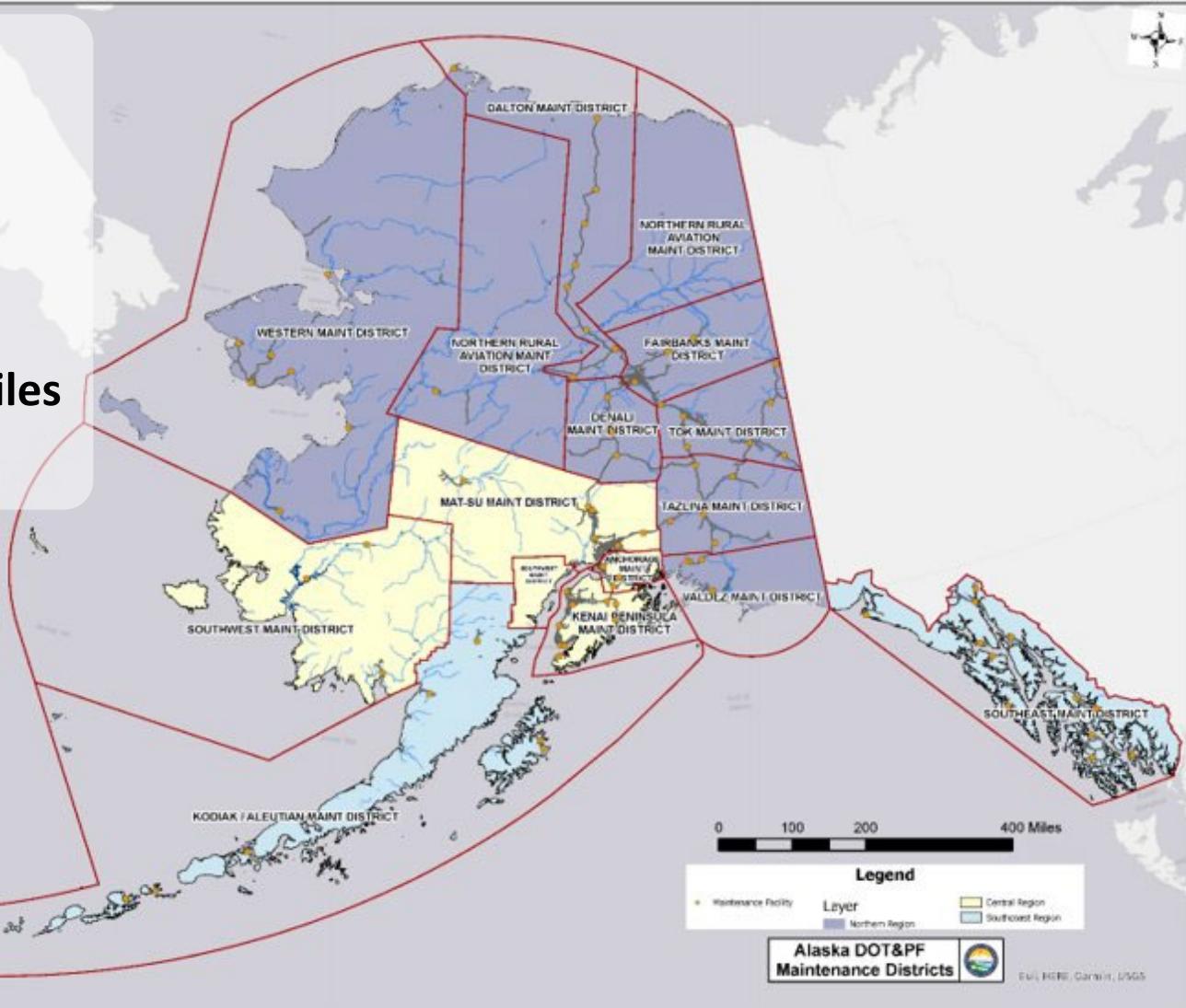
# Winter Operations and Budgets

## Examples

Western District:  
118,000 Sq. Miles

Southwest District:  
64,000 Sq. Miles

Florida is 53,600 Sq. Miles



# Winter Operations and Budgets

## Snow Removal Priority System

| Category | Condition   | Description   |
|----------|---|---|
| <b>A</b> | <b>Good Winter Driving Conditions</b>                 | Bare pavement, good visibility, snow removed from lanes and centerline, acceptable path widths.                 |
| <b>B</b> | <b>Fair to Good Winter Driving Conditions</b>         | Some lane blockage, icy patches, snow cleared from the traveled way, generally good traction.                   |
| <b>C</b> | <b>Fair to Difficult Winter Driving Conditions</b>    | Passable roads, standing water or loose snow, patches may cover some lane markings, slow traffic movement.      |
| <b>D</b> | <b>Difficult to Very Difficult Driving Conditions</b> | Challenging travel, moderate snow accumulation, substantial traffic delays.                                     |
| <b>E</b> | <b>Hazardous Winter Driving Conditions</b>            | Travel not advised, considerable snow accumulation, roads may be icy, poor traction, extremely poor conditions. |



# Winter Operations and Budgets

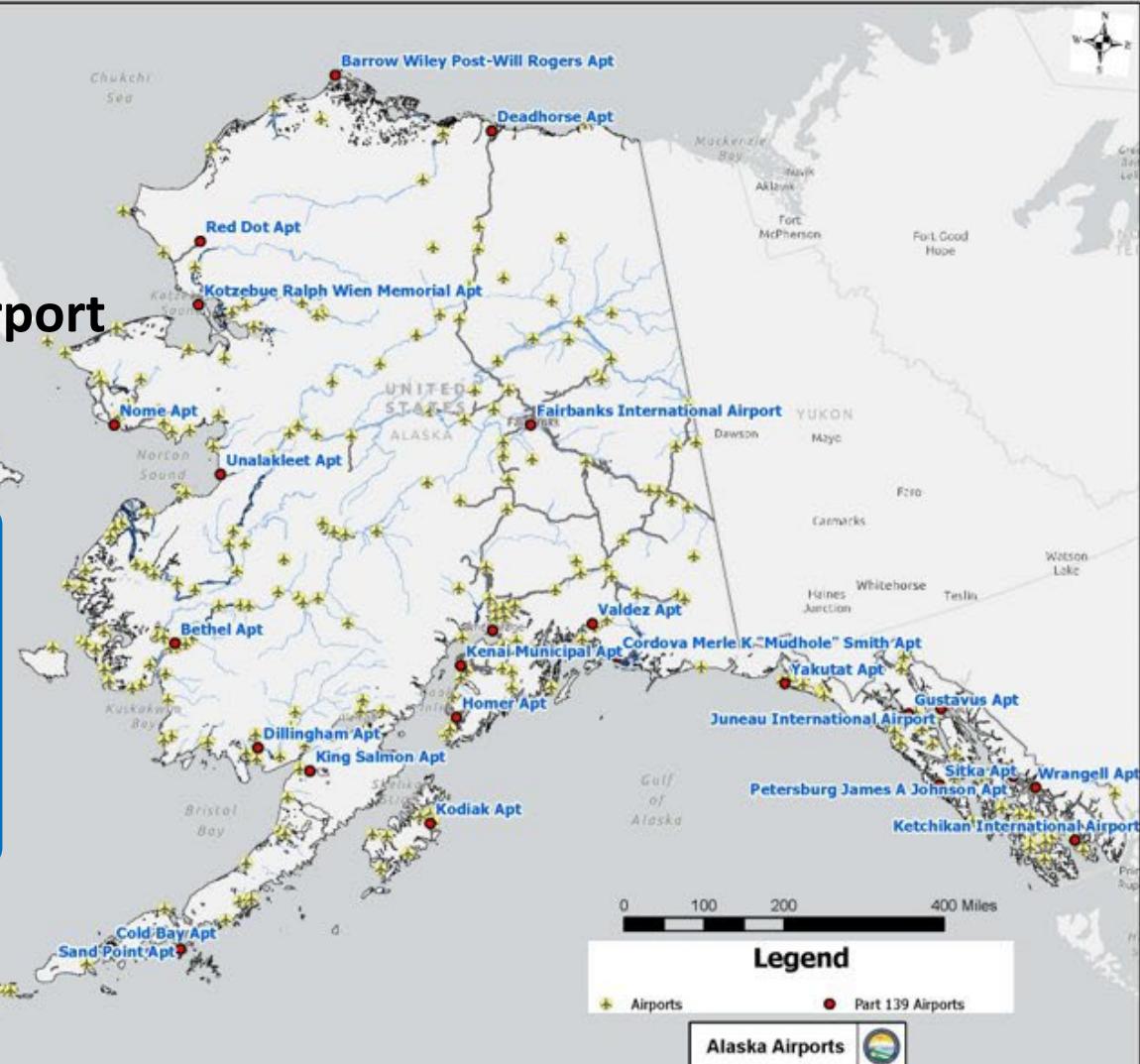
235 Rural Airports

26 are Part 139 Certified

Rural Airport Contracting

Average \$50K - \$100K per Airport

*~82% of communities  
in Alaska rely on  
aviation as their only  
means of access*



# Winter Operations Staffing

| Maintenance District | Equipment Operator Positions | Vacancy Rate (as of Jan. 29, 2024) |
|----------------------|------------------------------|------------------------------------|
| Anchorage            | 48                           | 19%                                |
| Matanuska-Susitna    | 37                           | 14%                                |
| Kenai Peninsula      | 53                           | 25%                                |
| Southwest            | 19                           | 16%                                |
| Dalton               | 70                           | 26%                                |
| Denali               | 26                           | 27%                                |
| Fairbanks            | 57                           | 33%                                |
| Tazlina              | 42                           | 33%                                |
| Tok                  | 34                           | 32%                                |
| Valdez               | 24                           | 29%                                |
| Western              | 29                           | 21%                                |
| Kodiak               | 32                           | 4%                                 |
| Southeast            | 56                           | 11%                                |
| <b>Total/Average</b> | <b>524</b>                   | <b>22.3%</b>                       |

# Supporting Divisions: Statewide Equipment Fleet and Division of Facility Services

## 51 Maintenance Shops Statewide

Over 8,500 pieces of state equipment and vehicles for:

- Executive branch
- University of Alaska
- Other state agencies

827 public facilities

- 731 DOT&PF owned



Esri, USGS, National Land Survey of Finland, Esri, TomTom, Garmin, FAO, NOAA, USGS

### Legend

SEF Locations



0 37.5 75 150 225 300 Miles

STATE OF ALASKA  
Department of Transportation and Public Facilities  
2301 Peger Road Fairbanks, AK 99709

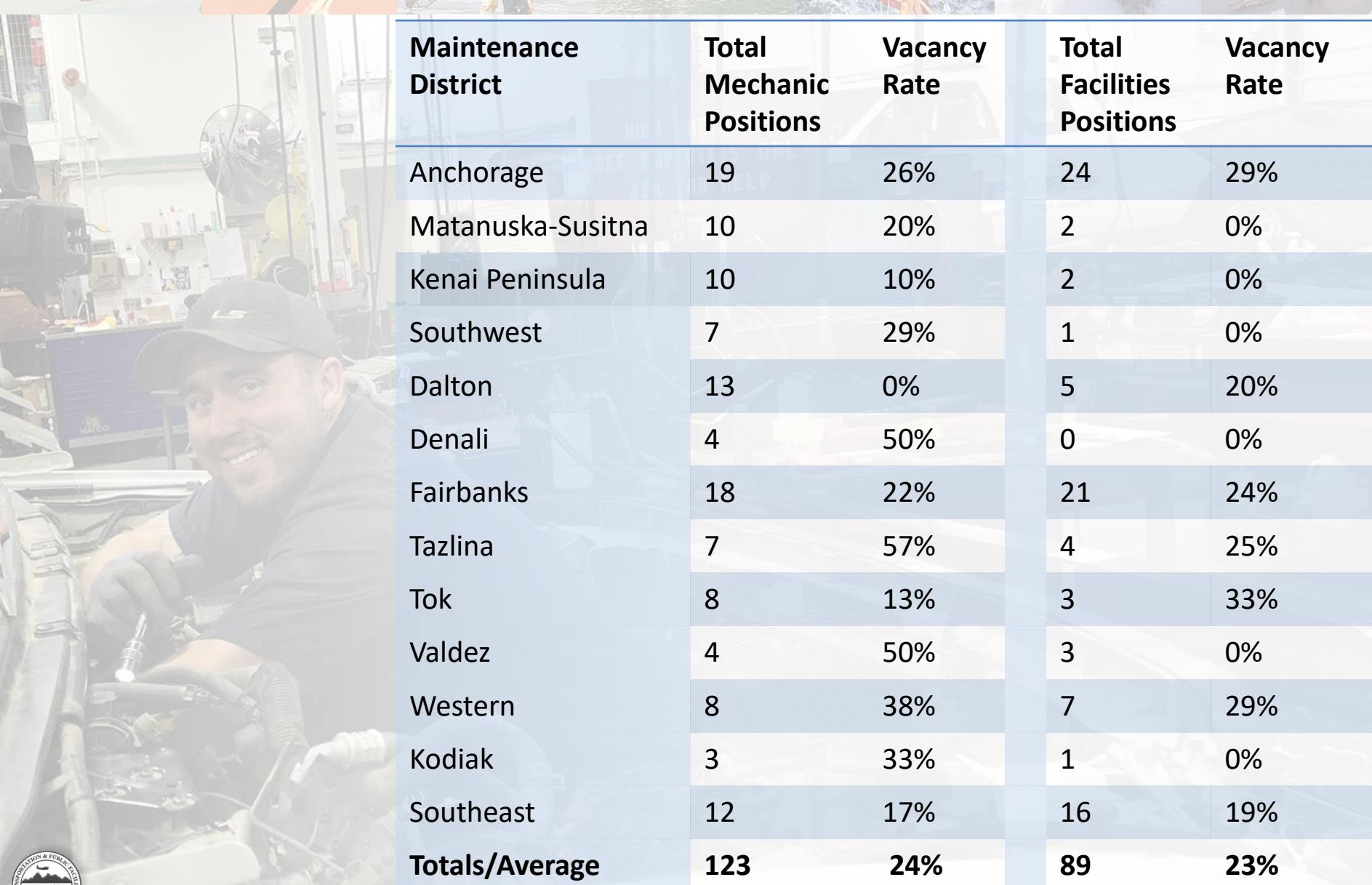
Date: January 2024

Figure 1

SEF Locations



# Statewide Equipment Fleet and Division of Facility Services Staffing

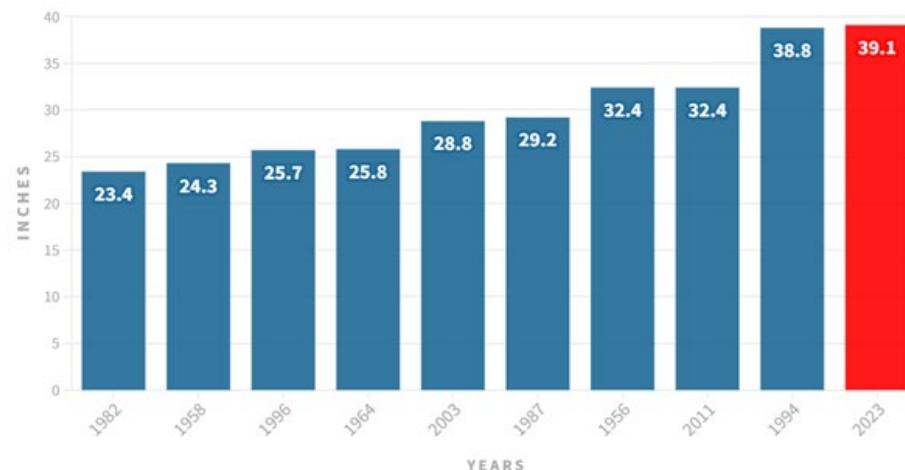


| Maintenance District  | Total Mechanic Positions | Vacancy Rate | Total Facilities Positions | Vacancy Rate |
|-----------------------|--------------------------|--------------|----------------------------|--------------|
| Anchorage             | 19                       | 26%          | 24                         | 29%          |
| Matanuska-Susitna     | 10                       | 20%          | 2                          | 0%           |
| Kenai Peninsula       | 10                       | 10%          | 2                          | 0%           |
| Southwest             | 7                        | 29%          | 1                          | 0%           |
| Dalton                | 13                       | 0%           | 5                          | 20%          |
| Denali                | 4                        | 50%          | 0                          | 0%           |
| Fairbanks             | 18                       | 22%          | 21                         | 24%          |
| Tazlina               | 7                        | 57%          | 4                          | 25%          |
| Tok                   | 8                        | 13%          | 3                          | 33%          |
| Valdez                | 4                        | 50%          | 3                          | 0%           |
| Western               | 8                        | 38%          | 7                          | 29%          |
| Kodiak                | 3                        | 33%          | 1                          | 0%           |
| Southeast             | 12                       | 17%          | 16                         | 19%          |
| <b>Totals/Average</b> | <b>123</b>               | <b>24%</b>   | <b>89</b>                  | <b>23%</b>   |

# Winter Event Response: Anchorage November 8-12, 2023

- **Nov. 8** Snowstorm starts. National Weather Service issues storm, high wind and flood warnings throughout Southcentral (Valdez, Thompson Pass, Anchorage, Turnagain Arm, Turnagain Pass, South & West Copper River Basin, Susitna and Matanuska Valleys, and Western Kenai Peninsula (over 50K sq. miles = New York). Temperatures around 30-31F.
- **Nov. 8** Breaks daily snow record with 9" of heavy wet snow
- **Nov. 9** Continues of up to 30" total snow fall, of high moisture content snow
- **Nov. 12** Another round of snow of over 7.5"

**Snowiest Novembers for Anchorage**  
Amounts shown in inches, 2023 total through Friday morning



Source: NOAA Data • KEVIN POWELL / Anchorage Daily News  
Note: Records for the Anchorage airport weather station date back to 1953



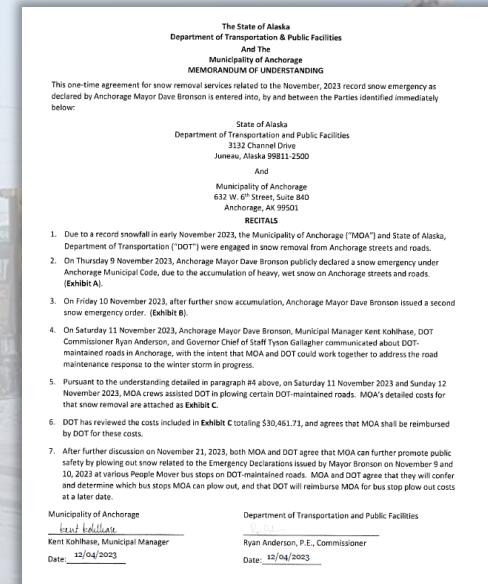
# Winter Event Response: Anchorage November 2023

## Anchorage District In-house Resources, Emergency Contracts, Memorandum of Agreement

### DOT&PF

- 48 equipment operators
- 13 plow trucks
- 9 graders
- 4 loaders
- 4 highway snowblowers
- 4 sidewalk snowblowers

\$1,175.6 FY2024 supplemental request pending for this event



### Event-only Emergency Contracts

- Executed 3 emergency contracts due to November event
  - Provide 2 winter-equipped graders
  - Priority 3 and 4 roadways
  - Sidewalks

\$ in thousands

# Winter Event Response: Moving Forward

TRANSFER OF RESPONSIBILITY (TORA) AGREEMENT  
Between the  
State of Alaska  
Department of Transportation and Public Facilities  
and the  
Municipality of Anchorage  
Maintenance & Operations Department  
for  
Winter Maintenance of Road Facilities

THIS AGREEMENT is entered into the 15<sup>th</sup> day of October, 2016, by and between the

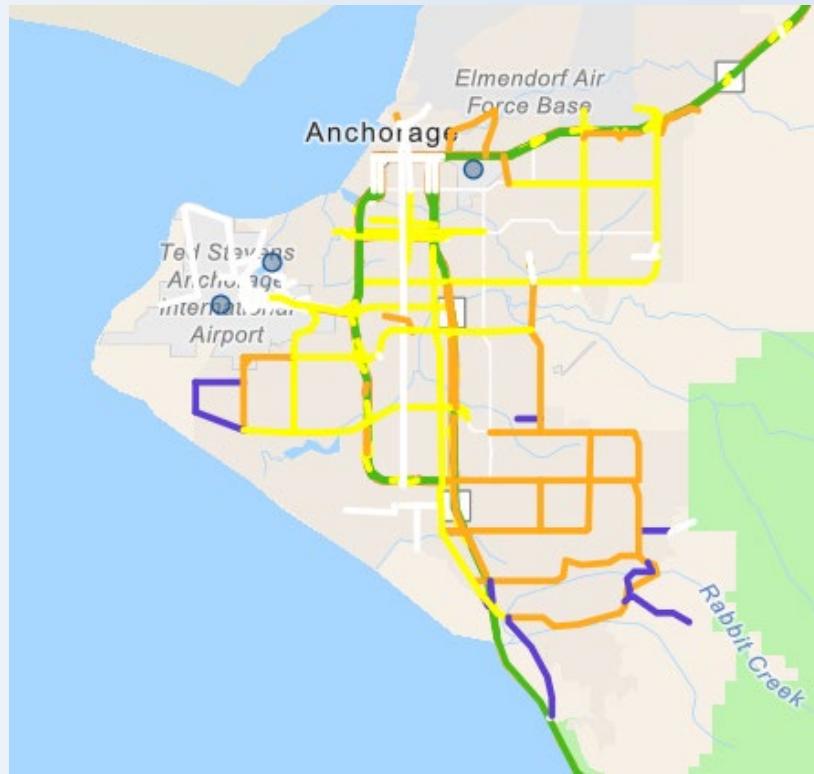
## Transfer of Responsibility Agreement (TORA) between DOT&PF and the Municipality of Anchorage

By this Agreement, the Department of Transportation and Public Facilities has been granted the authority by A.S. 19.10.030 and 19.20.010 to transfer responsibility for winter maintenance of certain road facilities to the Municipality and accept responsibility for winter maintenance of those municipal road facilities transferred in the exchange. The Commissioner has delegated this authority to the Regional Director of each Region as per the Department's Policy & Procedure 10-0017.

(B) The Maintenance & Operations Department, Municipality of Anchorage, has been authorized to accept exclusive winter maintenance responsibility for the road facilities exchanged by the Department and to exchange exclusive winter maintenance responsibility for municipal road facilities to the Department.

### Section 3. EXCHANGE OF RESPONSIBILITY

(A) The Department hereby transfers to the Municipality all its right and obligation to perform routine winter maintenance work on the state road facilities listed in Attachment "A". The routine winter maintenance work hereby transferred to the Municipality means those regular winter activities necessary to keep such State road facilities and storm drains in operating condition. Those regular winter activities are identified in Attachment "B". They include those duties imposed upon the Department pursuant to 23 U.S.C. 116 relating to the winter maintenance of federally funded routes.



## Long-Term Contracts in Place

Non-Motorized Paths: Old Glenn; Eagle River Loop; North Birchwood; O'Malley; Jewel Lake

Roads: Potter; Sand Lake; International; West Dimond; Kincaid

Roads: O'Malley; Elmore; Abbot; Hillside; Rabbit Creek; DeArmoun; Huffman; Birch

Roads: Post; Old Glenn; Eagle River Road; Eklutna Lake; Birchwood Loop



# Winter Event Response: Moving Forward

## Priority System in Anchorage: Non-motorized

- Significant pedestrian facilities to clear
- Limited snow storage
- "Complete Streets" policy pending

| SIDEWALK/PATHWAY WINTER MAINTENANCE |                      |                       |                     |                        |  |
|-------------------------------------|----------------------|-----------------------|---------------------|------------------------|--|
|                                     |                      | DATE/TIME EVENT BEGAN | SNOW AMOUNT         | DATE/TIME EVENT ENDED  |  |
|                                     |                      | completed time/date   | completed time/date | completed time/date    |  |
| PRIORITY 1                          | PRIORITY 2           | PRIORITY 3            |                     |                        |  |
| Tudor Rd.                           | Boniface Parkway     |                       |                     | O'Malley Rd.           |  |
| Muldoon Rd.                         | Airport Heights Rd.  |                       |                     | International A.P. Rd. |  |
| Northern Lights                     | Abbott Rd.           |                       |                     | ML King Rd.            |  |
| Benson Blvd.                        | W. Dimond Blvd.      |                       |                     | Tudor Center Dr.       |  |
| 5th Avenue                          | Elmore Rd.           |                       |                     | Glenn Hwy. Pathway     |  |
| Old Seward Hwy.                     | Old Glenn Eagle Rvr. |                       |                     | Brayton Dr.            |  |
| Dowling Rd.                         | Eagle River Road     |                       |                     | Homer Dr.              |  |
| Debarr Rd.                          | Eagle River Loop     |                       |                     | I street 16- 15th      |  |
| Dimond                              |                      |                       |                     | Jewel Lake             |  |
| Seward NB 36-15th                   |                      |                       |                     | Boundary               |  |



## Sidewalk Priority

- 1) 66.1 miles
- 2) 35.3 miles
- 3) 46.7 miles

**Total 148.1 miles**

# Winter Event Response: New Technology in Avalanche Mitigation



**Pioneering Drone Dock Testing:** First in the nation to test drone docks for automated imagery collection.

**Purpose:** Enhances snow depth modeling and weather observation.

**Digital Transformation with GIS:** Leading in digitizing avalanche paths for improved asset management.

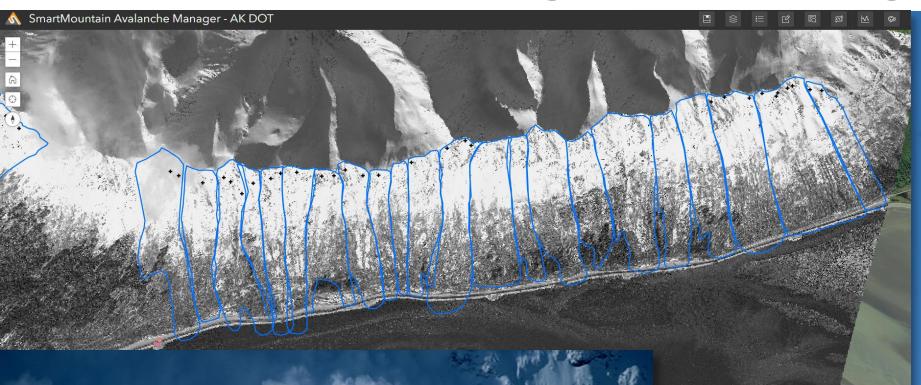
**Avalanche Hazard Reduction:** Nationwide first to receive approval for using explosives with drones for avalanche control.

**Bridging the Gap:** Utilizing UAS (Unmanned Aircraft Systems) as a step towards long-term hazard mitigation.

**Future Focus:** Implementing RACs (Remote Avalanche Control Systems) for enhanced safety.

# Winter Event Response: Avalanche and Highway Closures

# Avalanche Mitigation Program



| Color  | Rating    | AHI    | Mitigation Measures  |
|--------|-----------|--------|--|
| Red    | Very High | >150   | Full-time forecasting and mitigation with explosives, permanent structures, etc. |
| Orange | High      | 40-150 | Forecasting and closures, limited explosive mitigation                           |
| Yellow | Moderate  | 10-40  | Forecasting and closures, selected sites   |
| Blue   | Low       | 1-10   | Rare closures or no mitigation   |
| Green  | Very Low  | <1     | No mitigation  |

Table 1: AHI Hazard Levels and Typical Mitigation (after Schaefer, 1989)

| AMZ #    | Highway Name   | AHI | CBE |
|----------|----------------|-----|-----|
| 12 to 16 | Seward Highway | 212 | 309 |
| 5 to 7   | Thompson Pass  | 136 | 263 |
| 1        | Atigun Pass    | 98  | 131 |
| 21       | Klondike Hwy.  | 86  | 143 |
| 9        | Hatcher Pass   | 61  | 55  |
| 22       | Thane Road     | 29  | 37  |
| 20       | Pasagshak      | 16  | 16  |
| 8        | Copper River   | 11  | 13  |

Table 2: AHI and CBE Levels for Moderate and Higher AMZs

# Winter Event Response: Avalanche and Highway Closures

## Resourcing Responses: Highway closures and public notifications



Alaska Department of Transportation & Public Facilities  
Published by Sam Dapevich 1d · ...

**01/30, 12:00 pm UPDATE: Haines Highway Closure**  
The debris has been cleared at MP 20 and the Haines Hwy is now open to traffic. The Canadian side appears to be closed at this time. Check <https://511yukon.ca/> for more details on the Canadian portion of the highway.

**01/30, 10:30 am UPDATE: Haines Highway Closure**  
Debris cleanup is taking place this morning. We should have another update within the next few hours. Please stay tuned.

**01/29, 9:00 am UPDATE: Haines Highway...** See more

Summary Atmospheric Surface TDP Cameras Metadata Extremes

← Back to all camera views

Seward Hwy North 10/18/2023 13:20:00

**SEWARD HIGHWAY AVALANCHE CONDITIONS**  
Date issued: January 30, 2024 (valid until changed)

**ADOT&PF Employee Avalanche Hazard Rating for Seward Hwy Area**  
1 (One)

**Expected Avalanche Behavior**  
Avalanche Debris unlikely to reach the roadway.

**Recommended Action for ADOT&PF Employees**  
Normal highway maintenance operations.

**Comments**  
The storm has let up with potential flurries today and clear and cold back for the next several days. There is potential for North outflow winds that may increase the avalanche hazard but not expecting this to impact the highway. Storm total for Girdwood maintenance station was 16".

Alaska Department of Transportation and Public Facilities  
Road Weather Information System

Travel Business News and Social Projects About Us

You are here: DOT&PF > Roads & Highways Information > RWIS

**rWIS** iways

Home Sites Areas About AK Weather Links 511 - Traveler Info Login to RWIS

Move Map to Site or Area

**Layer Control**

**RWIS Layers**

- Summary
- DOT Sites
- Ext. Cameras
- TDP
- Cameras
- Wind

**DOT Layers**

- Mileposts
- Center Lines
- Facilities

**NWS Layers**

- NWS Radar

# Winter Event Response: Avalanche and Highway Closures



## Summary of Avalanches and Highway Closures 2023

| Type                   | SubType                     | Count of EventId | Start Month    |
|------------------------|-----------------------------|------------------|----------------|
| Incidents              | Avalanche Debris On Roadway | 1                | March 2023     |
| Incidents              | Avalanche Debris On Roadway | 5                | December 2023  |
| Incidents              | Avalanche Hazard Reduction  | 1                | January 2023   |
| Incidents              | Avalanche Hazard Reduction  | 2                | March 2023     |
| Incidents              | Avalanche Hazard Reduction  | 1                | November 2023  |
| Incidents              | Avalanche Hazard Reduction  | 2                | December 2023  |
| Incidents              | Closure                     | 2                | January 2023   |
| Incidents              | Closure                     | 3                | February 2023  |
| Incidents              | Closure                     | 1                | March 2023     |
| Incidents              | Closure                     | 1                | September 2023 |
| Incidents              | Closure                     | 3                | November 2023  |
| Incidents              | Closure                     | 4                | December 2023  |
| Incidents              | Falling Debris Risk         | 3                | September 2023 |
| Incidents              | Landslide                   | 1                | September 2023 |
| Incidents              | Landslide                   | 1                | October 2023   |
| Incidents              | Landslide                   | 2                | November 2023  |
| Roadwork / Maintenance | Avalanche mitigation        | 5                | January 2023   |
| Roadwork / Maintenance | Avalanche mitigation        | 3                | February 2023  |
| Roadwork / Maintenance | Avalanche mitigation        | 6                | March 2023     |
| Roadwork / Maintenance | Avalanche mitigation        | 1                | November 2023  |
| Roadwork / Maintenance | Avalanche mitigation        | 4                | December 2023  |
| Weather Conditions     | Snow advisory               | 1                | January 2023   |
| Weather Conditions     | Snow advisory               | 1                | February 2023  |
| Weather Conditions     | Snow advisory               | 9                | November 2023  |
| Weather Conditions     | Snow advisory               | 3                | December 2023  |



# Scalable Solutions: Contracting and Funding

## Successes in Contracting Models

- Northern Region
- Matanuska-Susitna
- Local Service Areas



Fairbanks Area Winter  
Maintenance Contract - LOT #1

| Road                                     | Road Miles  | Performance Target |
|--|-------------|--------------------|
| Yankovich                                | 1.7         | C                  |
| Dalton Trail                             | 1.1         | C                  |
| Lawlor                                   | 0.6         | C                  |
| Miller Hill                              | 0.7         | C                  |
| Auburn                                   | 0.9         | B/C                |
| Grenac                                   | 1.1         | C                  |
| Crossman                                 | 0.3         | C                  |
| Skyline                                  | 2.0         | B/C                |
| Skyrider                                 | 1.4         | B/C                |
| McGrath                                  | 2.9         | C                  |
| Farmers Loop Spur                        | 0.5         | C                  |
| <b>LOT #1 Total Road Miles Per Cycle</b> | <b>13.2</b> |                    |

## Strategy Ahead

- Develop new performance targets and priorities
- Priorities 3 and 4, Non-motorized
- FY2025 Operating Budget Request

# Scalable Solutions: Contracting and Funding

## Annual Supplemental Re-Appropriations

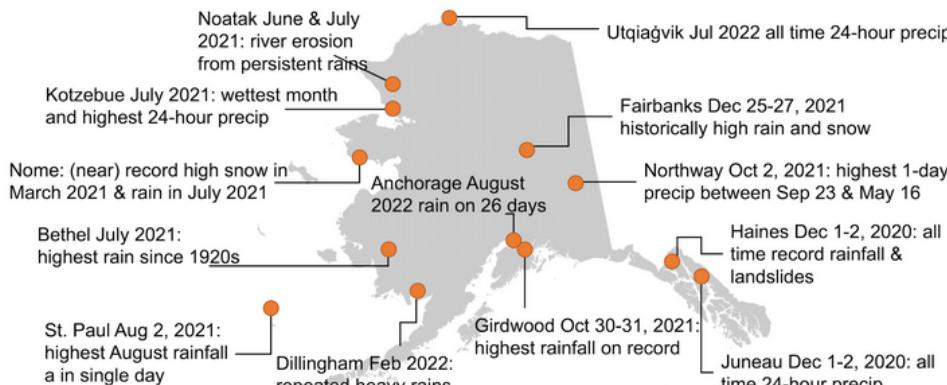
- FY2021 \$1,000.0
- FY2022 \$4,661.3
- FY2023 \$7,566.0
- **Balance: \$3,036.3**

FY2024 capital supplemental request, \$344.9 (Re-Appropriation)  
Emergency Weather, Catastrophic Events, and Unforeseen Critical Maintenance Needs

FY2024 operating supplemental request, \$350.0 (UGF)  
Fairbanks Area Winter Maintenance Contracts

FY2025 operating component, \$915.5 (UGF)  
Statewide Contracted Snow Removal

## Alaska's Extreme Precipitation December 2020-August 2022



Extreme precipitation events have occurred throughout Alaska with increasing frequency. Above are examples from December 2020-August 2022. Credit: Alaska Center for Climate Assessment and Policy.

### September 2022

- Typhoon Merbok Emergency Repairs

### January 2023

- Seward Highway: Ice Fall diversion
- Tok Cutoff Road closed: avalanche

### May 2023

- Funny River Road MP 8 washout
- Taylor Highway Emergency Flooding Repairs
- Eagle Mission Road Emergency Flooding Repairs
- Richardson Hwy MP 330 Emergency Flooding Repairs
- Nome Kougarok Road Emergency Flooding Repairs
- Russian Mission Airport Emergency Flooding Repairs
- Stevens Village Apt Rd Emergency Flooding Repairs
- Glenn Hwy MP 186-188 Emergency Flooding
- Dalton Highway MP 404 Emergency Repairs

### June 2023

- Dalton Highway MP 404 Emergency Repairs continue
- Chitina O'Brien Creek Emergency Flooding Repairs
- Dalton Highway Koyukuk River #1 Bridge Emergency Repairs
- Elliott Highway MP 85.9 closure: failed culvert & erosion repair

### July 2023

- Seward Hwy: partnered w/agencies to free sheep caught in rockfall mesh

### August 2023

- Mendenhall River Emergency Flooding Repairs

### September 2023

- Glacier Highway Rockfall

### November 2023

- Wrangell: Zimovia Highway Landslide
- Southcentral widespread snowstorm/rain/wind

### December 2023

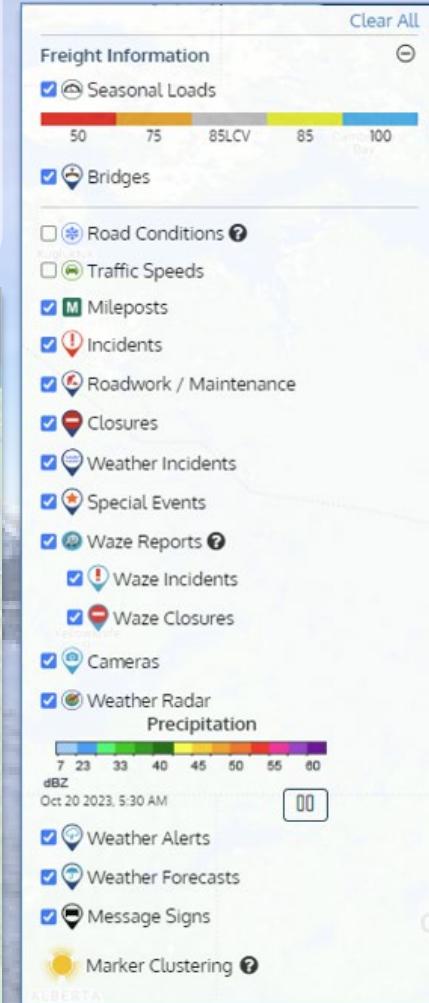
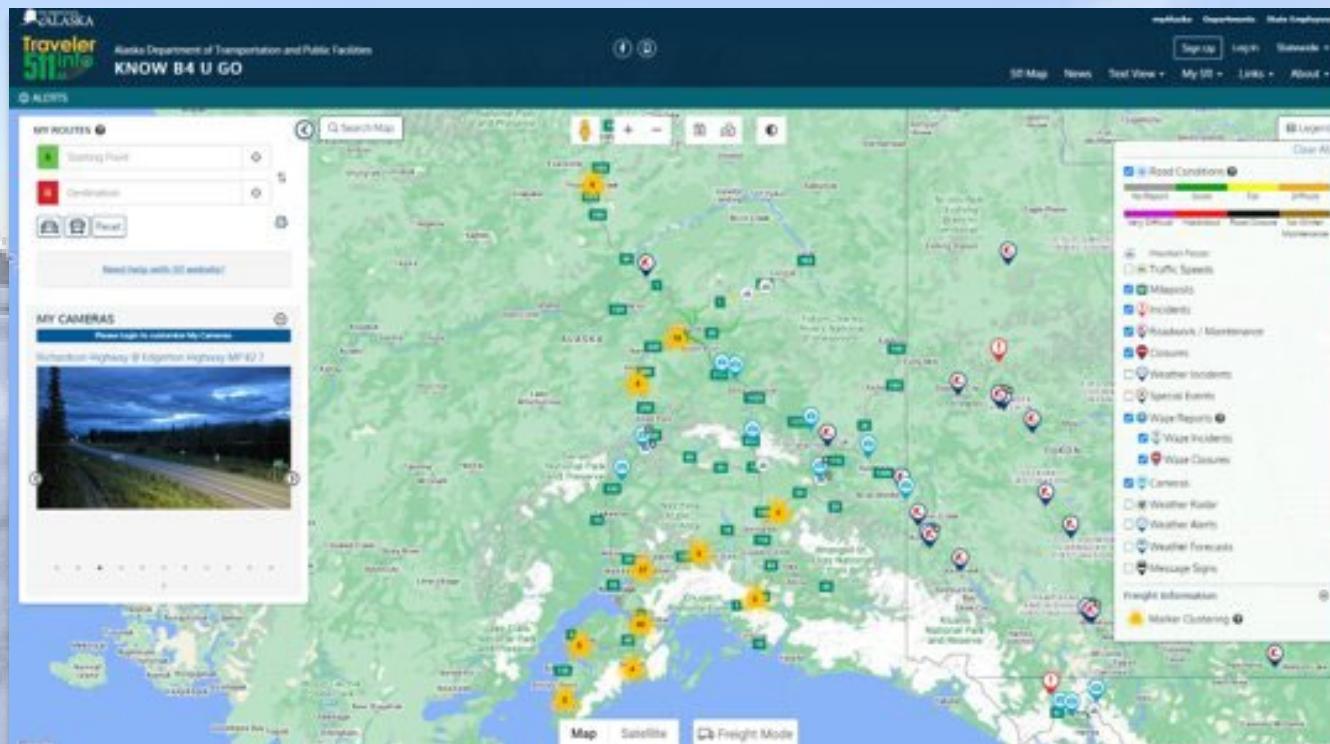
- Richardson Highway at Thompson Pass and MP 182-200 closed: avalanche
- Valdez/Glenallen: Richardson Hwy closed from milepost 12 to 65: numerous avalanches
- Klondike Hwy closed: heavy snowfall, inoperable plows
- Seward Highway Mileposts MP 36-40 closed: Avalanche
- Haines Highway closed: Rockfall

# Technology: Improving Operations

“...expressing how invaluable the Turnagain Pass RWIS\* cameras are. One of the camera images captured two large avalanches in a very popular area for snowmachining.

***We were able to better alert backcountry recreationalists.***

Chugach National Forest Avalanche Center: January 25, 2024



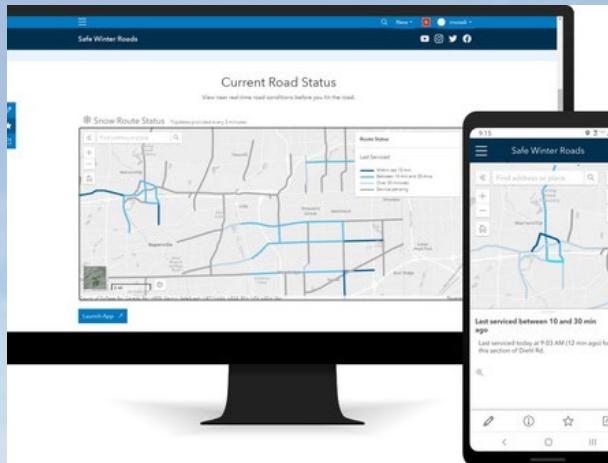
# Technology: Improving Operations

## Condition Reporting

real time plowing and condition reporting

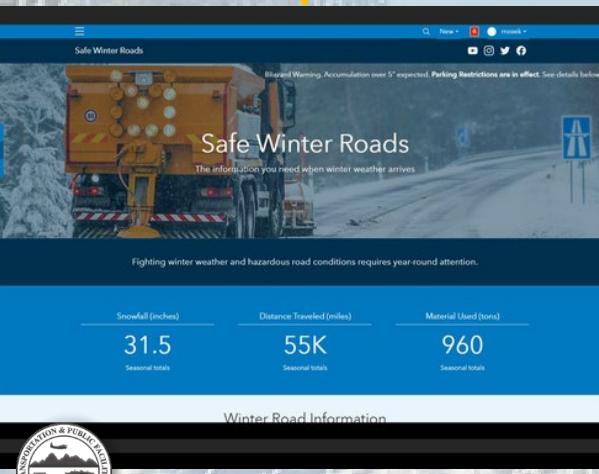
### 01 Today

Manual entry system  
that we are testing in a  
few vehicles across  
Alaska



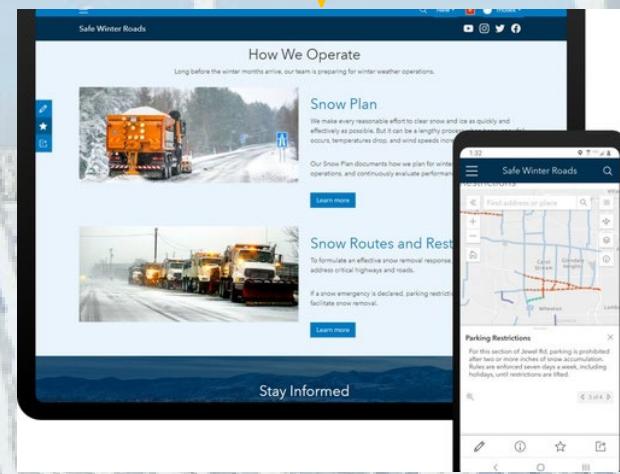
### 02 Continued Research

Exploring Automatic Vehicle  
Location systems for auto  
reporting to the system



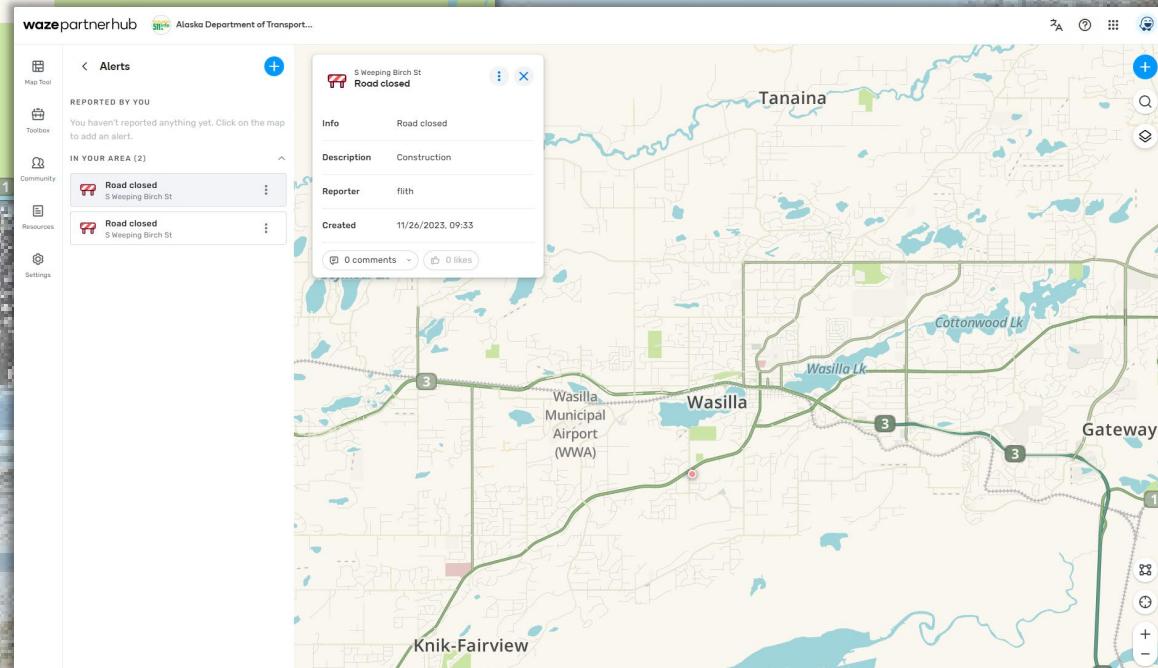
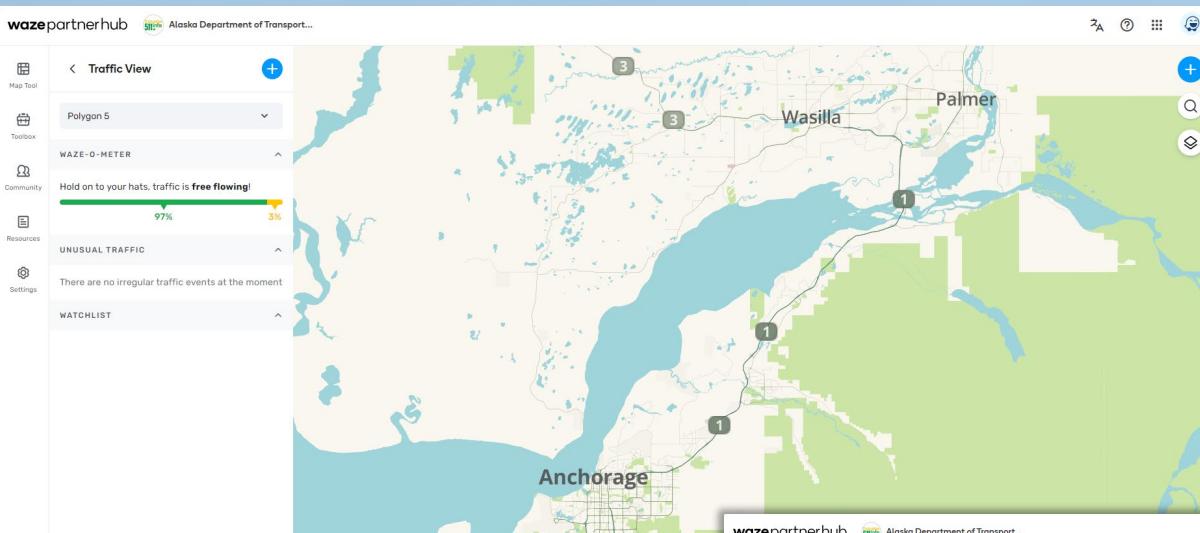
### 03 Vision in Action

Share public-facing  
aspects of technology on  
511 and the winter  
outreach website



# Technology: Improving Operations

Waze is a community-focused traffic and navigation app that uses data supplied by drivers to help improve the travel experience



# Thank you. Questions?

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