NORTH
TO THE FUTURE

APRIL 15, 2025

Senate Transportation Committee

Department of Transportation & Public Facilities (DOT&PF)

State of Alaska's Bridges

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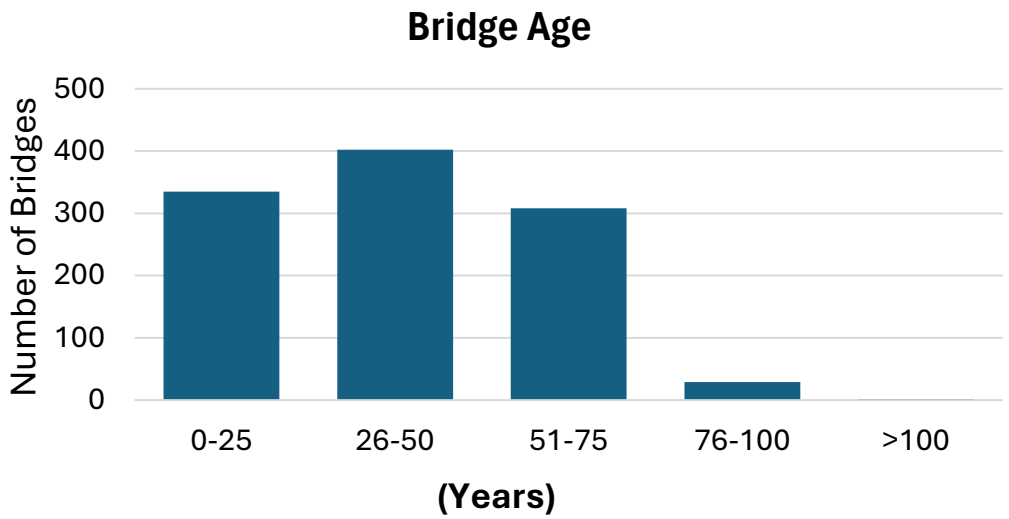
BRIDGES - INTRODUCTION

Alaska Bridges

- 1,077 bridges total
- 864 bridges owned by DOT&PF
  - 98 culverts (> 20’ long)
- 4 tunnels
- Average age is 39 years



Bridge Section

- Staff of 25 – Structural, Hydraulics, and Foundations
- Design
- Inspection

ASCE REPORT CARD

Bridge Grade B+

- *"Alaska has 1,685 bridges, the majority of which are less than 50 years old, making them newer than bridges in most other states. While less than 7% of Alaska's state and local bridges are rated in poor condition, the critical and economical time to maintain this key infrastructure is before problems arise.* ***Alaska is at the forefront of seismic bridge design research and implementation*** *and is a national leader when it comes to innovative bridge inspection techniques."*
- As context, 8.2% of bridges were in poor condition ("structurally deficient") in 2021 report card

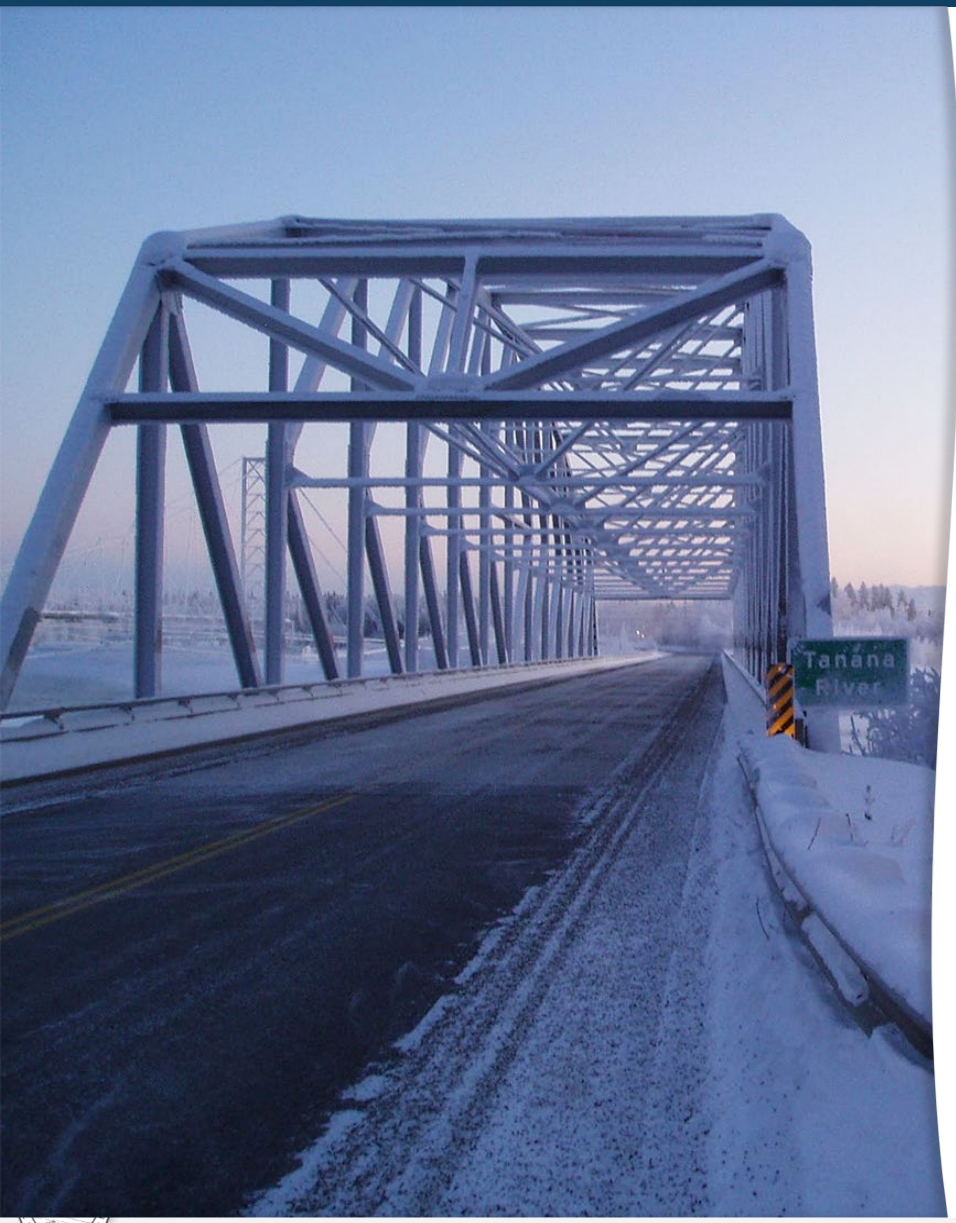
Consider:

- ASCE includes 600 federal bridges that aren't typical public roads
- ASCE relies on volunteers to gather data, write report

ASCE: American Society of Civil Engineers

Source: https://infrastructurereportcard.org/state-item/alaska/

SUCCESSES



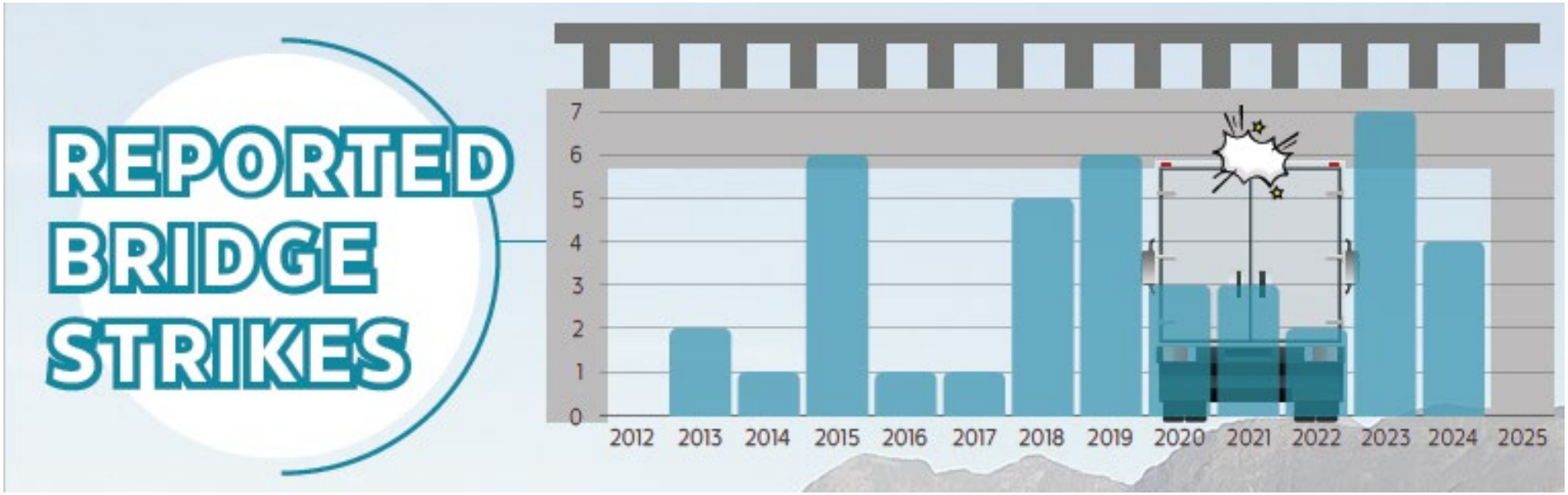
What Alaska does right

- Cradle to grave approach
- National leaders
  - American Association State Highway Transportation Officials (AASHTO)
  - National Academy of Science
- Research - $1.5 million annual for seismic and/or cold region bridge behavior
- Partnerships with national experts, universities
- Extreme event response
  - Drones (UAS) inspections
  - Starlink/TEAMS
- Innovation & Implementation
  - ABC (accelerated bridge construction)
  - Alternative procurement

CHALLENGES

Where we can improve

- Greater focus on preserving/maintaining
- Bridge emergency funds
- Discuss establishing a maximum GVW for legal loads
- Bridge strike elimination – replace trusses like Gerstle Bridge



GVW: Gross Vehicle Weight

HYDRAULICS

The job of DOT&PF Hydraulics staff is to know Alaska's rivers and creeks and how they interact with infrastructure.

HYDROLOGY – How much water should we expect?

HYDRAULICS – How should we manage that water?

- Floods
- Bridge Scour
- Ice
- Navigation
- Environmental Regulations (e.g., fish passage)

HYDRAULICS

STATEWIDE HYDRAULICS

- Bridge Hydraulics
- Inspection Support
- Policy & Standards Recommendations

REGIONAL HYDRAULICS

- Culverts & Fish Passage
- Roadside Drainage
- Storm Sewer Systems
- Stormwater Management
- Revetments

HYDRAULICS

STATE-FEDERAL COLLABORATIONS

- State Transportation Improvement Plan (STIP) Need IDs 6450, 6455, & 12579
- Joint-Funding Agreements with the U.S. Geological Survey (USGS)
- https://www.usgs.gov/centers/alaska-science-center/science/streambed-scour-bridges-alaska

HYDRAULICS

CHALLENGES

- Wild rivers that move (up, down, and side-to-side)
- Travel logistics
- Limited data, sometimes
- Analytical tools cannot address every natural phenomenon

JUNEAU CREEK BRIDGE

Contract Amount: $151,327,688

Contractor: Traylor/QAP Joint Venture

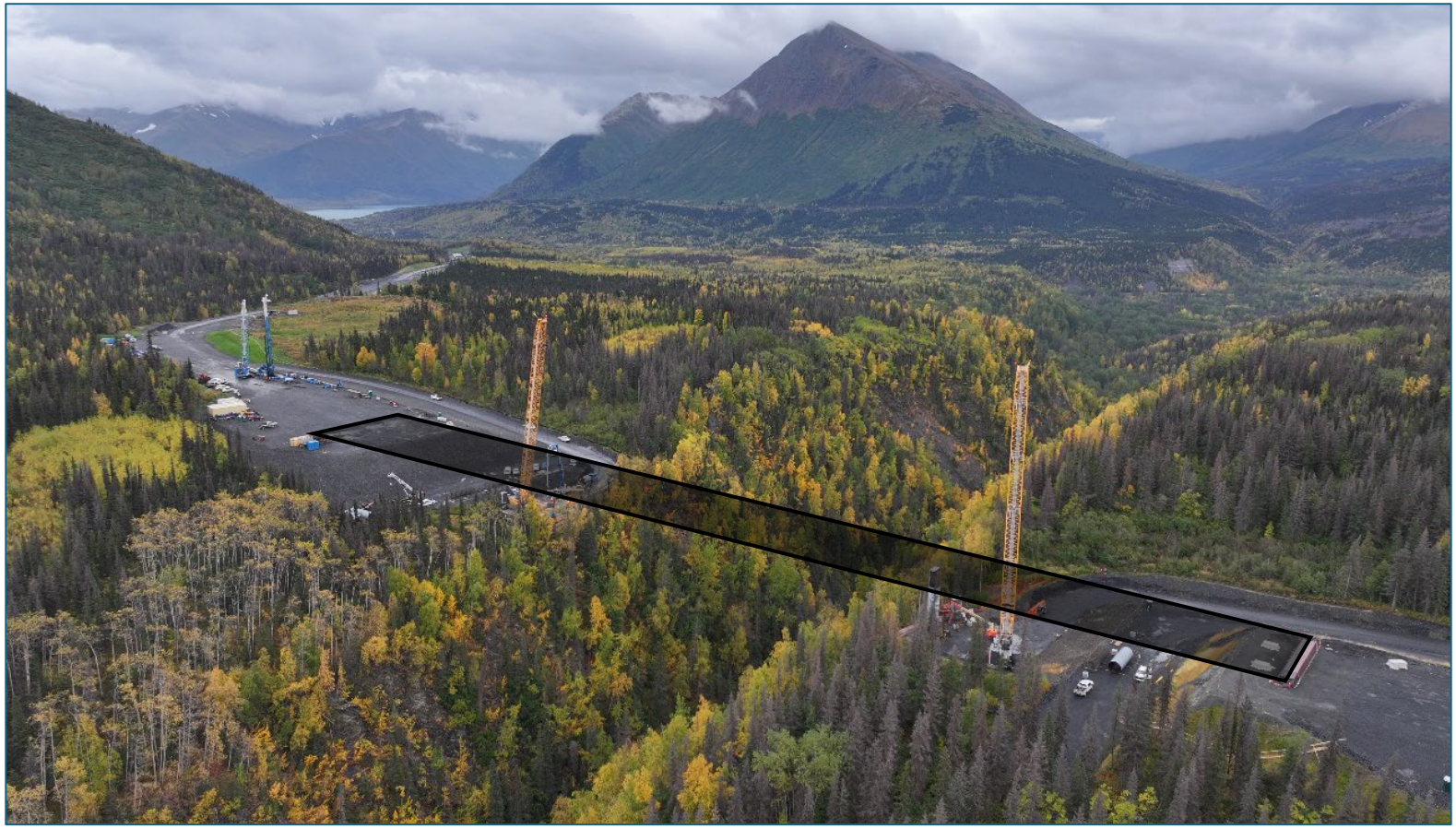
Contract Completion Date: June 30, 2028

Bridge Length: 928 ft

Main Span Length: 440 ft

Bridge Width: 63.5 ft

Designed in-house by DOT&PF Engineers



JUNEAU CREEK BRIDGE

Structural steel fabricated outside of Phoenix, Arizona

-Trucked from Arizona to the Port of Long Beach, CA

-Barged from Long Beach, CA to Seward, AK (ETA June 2025)

45 individual segments, each 100 ft±

6.75 million lbs of structural steel

1.12 million lbs of reinforcing steel (rebar)

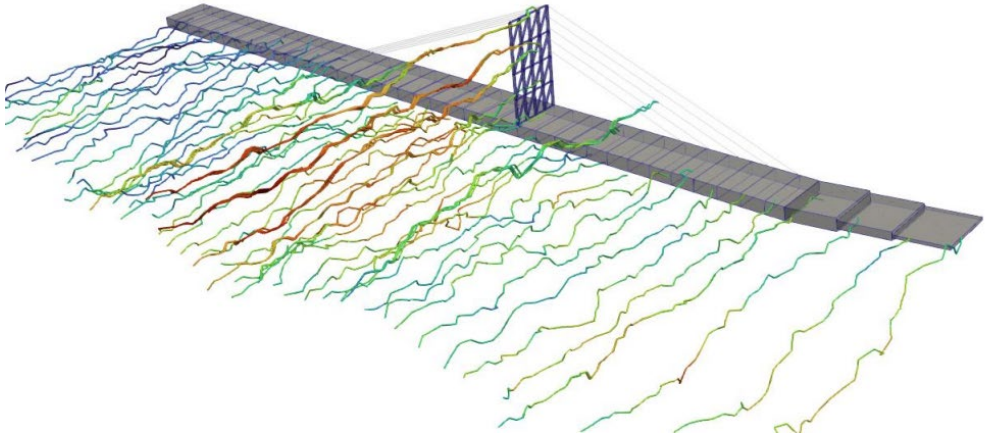
16.7 million lbs of concrete

30,000 bolts

Less than ½ the bridge assembled in AZ→

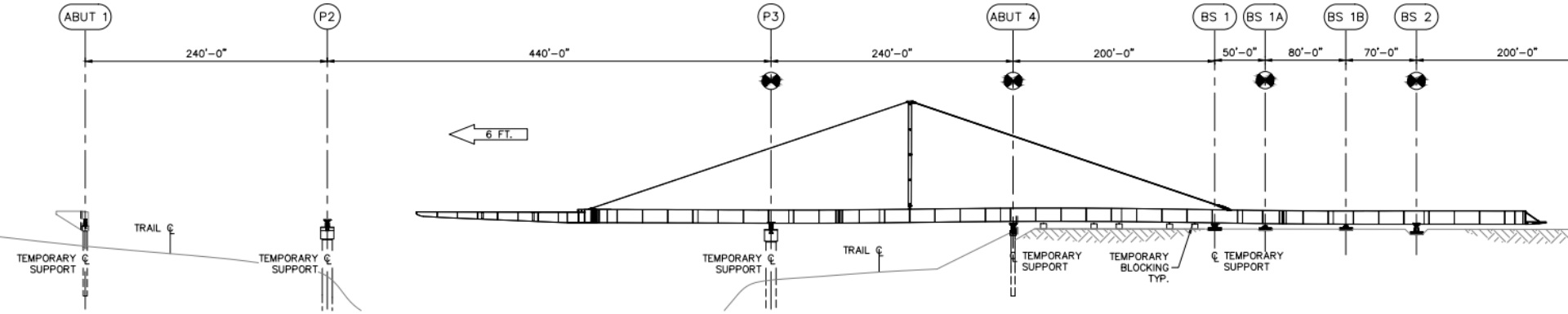
JUNEAU CREEK BRIDGE

Steel will be completely assembled at one end of the bridge and slowly pushed (launched) across the canyon



Will be the longest launched bridge in North America

Launching expected in August 2026



YUKON RIVER BRIDGE

Constructed in 1975 as part of TAPS

Timber decking was used as an interim wearing surface

- Multiple replacements have been tested but nothing so far has stood to heavy truck traffic

- The bridge was not designed for any additional load (concrete, asphalt, etc)

Sees lots of heavy traffic - 60% trucks

Bridge is on steep 6% grade

YUKON RIVER BRIDGE

Wearing surface was last replaced in 2011 and has significant deterioration and wear causing less than ideal conditions for heavy truck traffic

~4,500 16-ft long pieces of timber required for redecking

Material will be state-furnished to expedite construction and ensure decking can be replaced in 2025

Anticipated advertisement by Mid May 2025

Estimated construction cost ~$3-4 million

POLYESTER CONCRETE OVERLAYS

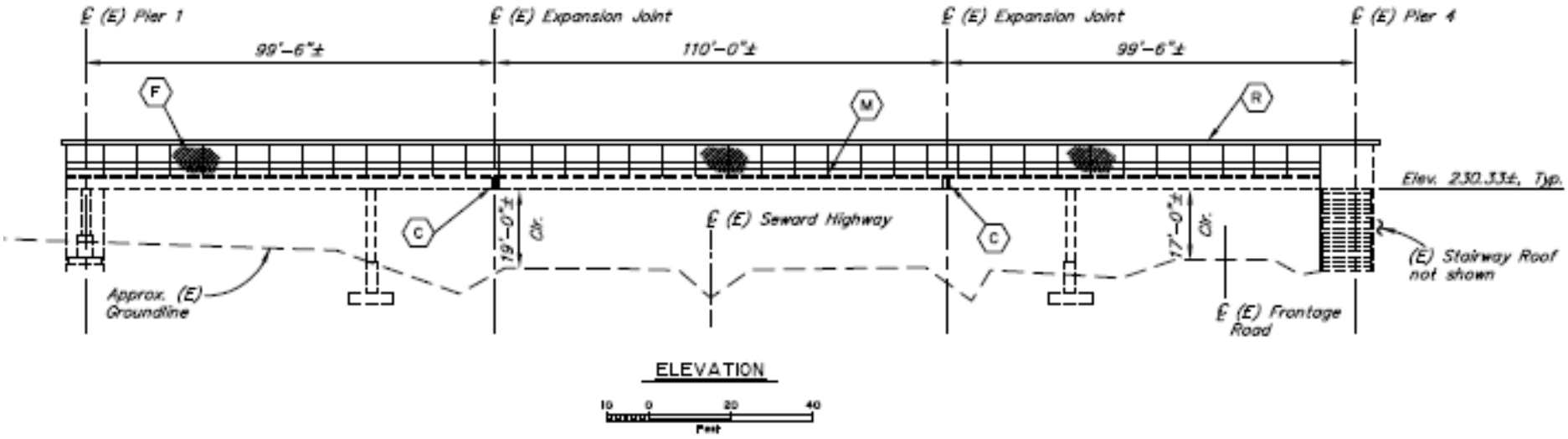
Bridge Projects include Knik River Bridges, Copper River Bridges/Sterling Highway, Cripple Creek in Fairbanks

- First Alaska project in 2008
- 30+ year life
- Fully waterproof

RABBIT CREEK POC (ANCHORAGE)

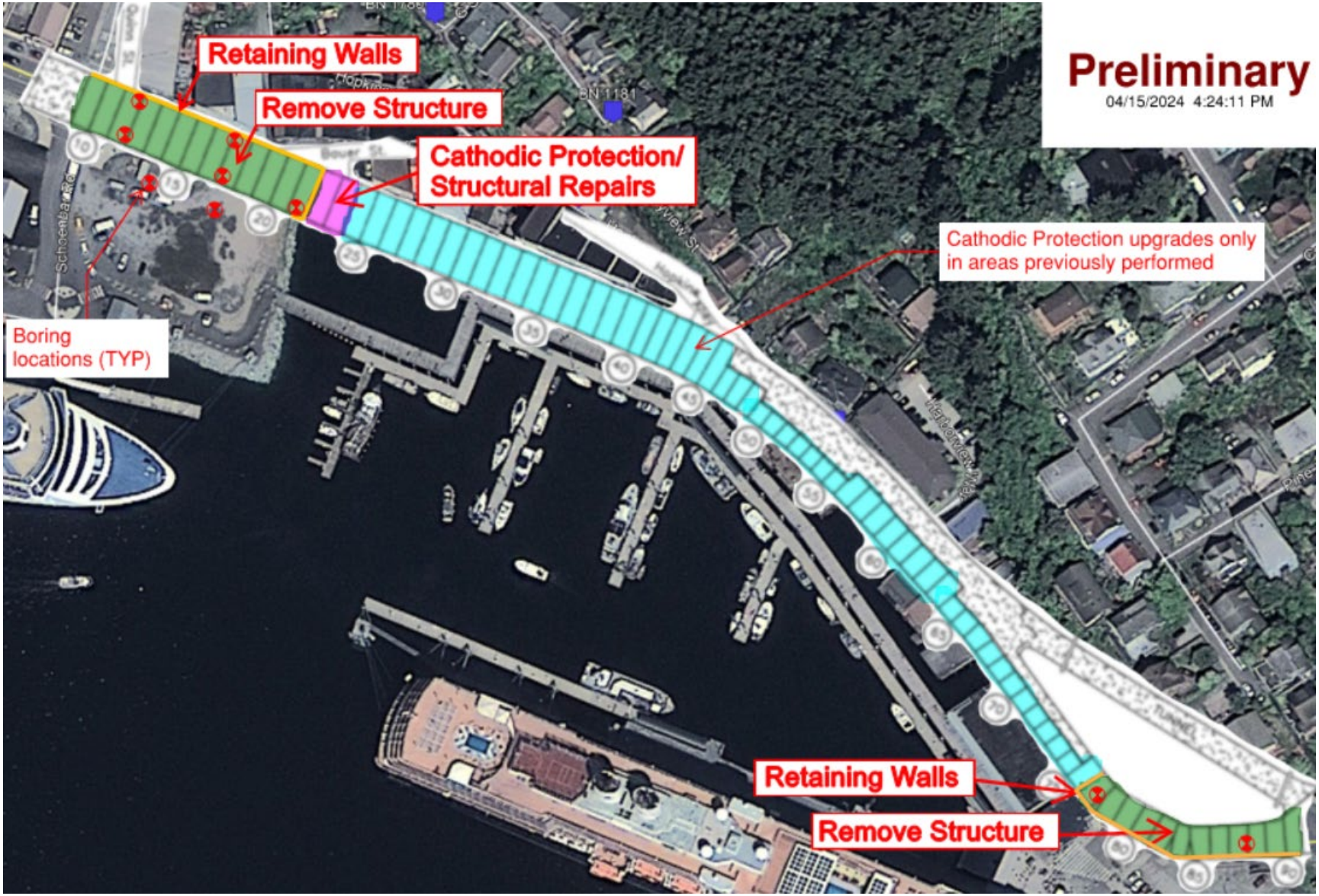
Replacement of roof slated for end of summer 2025

- Draft plan review in progress
- Tentative advertising date anticipated within a week



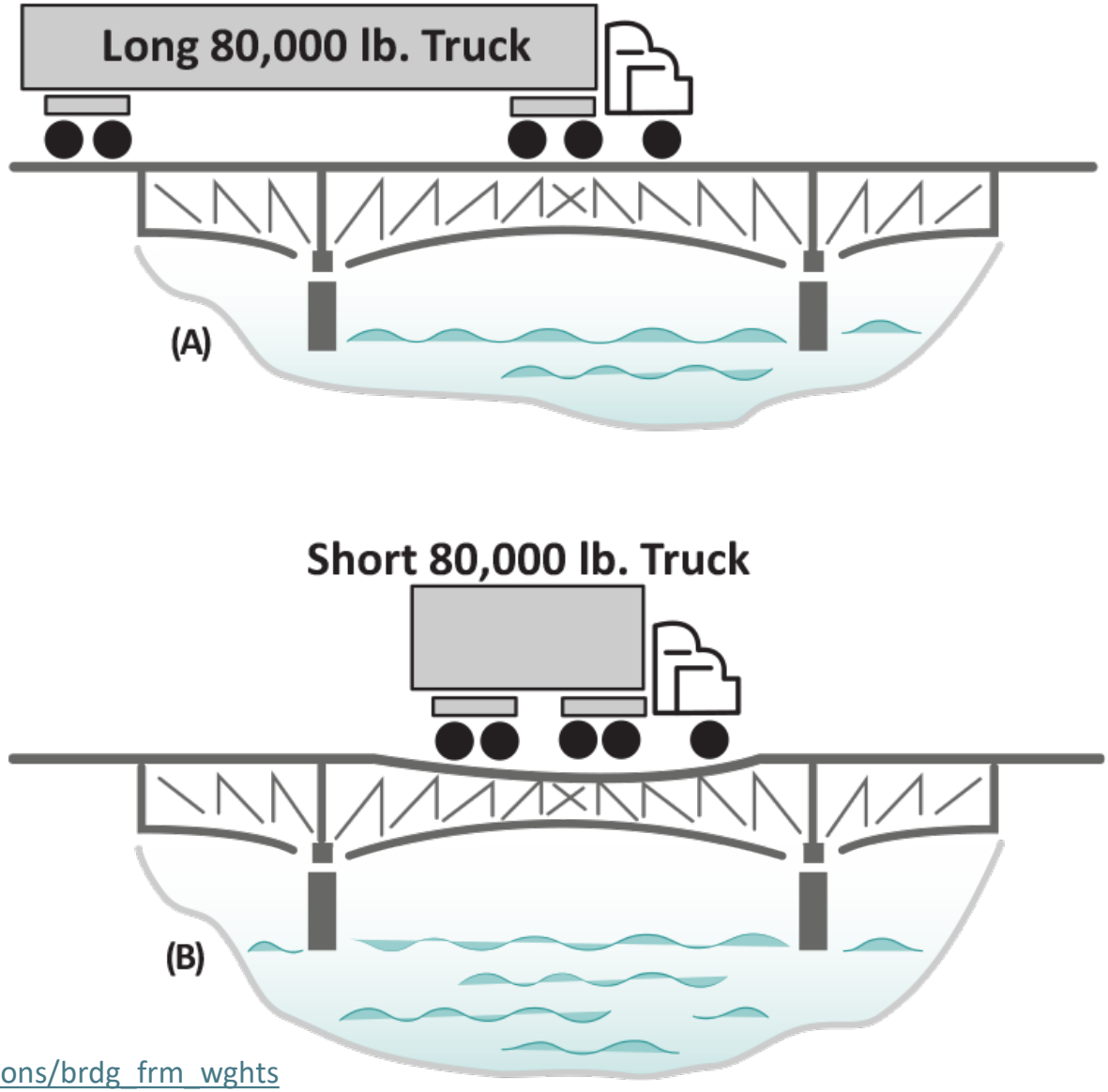
POC: Pedestrian Over Crossing

KETCHIKAN VIADUCTS



BRIDGE AXLE LOADING

- Bridge Loading is related to axle weights and spacings, not Gross Vehicle Weight (GVW)
- Bridges are not designed or analyzed for GVW
- Short bridges may not see all of truck load if it is spread out
- Long span bridges see more of truck weight



Source: ops.fhwa.dot.gov/freight/publications/brdg_frm_wghts

BRIDGE LOADING EXAMPLE

Bridge Loading is comparable to airplane loading where distribution of loads is what keeps airplanes stable.

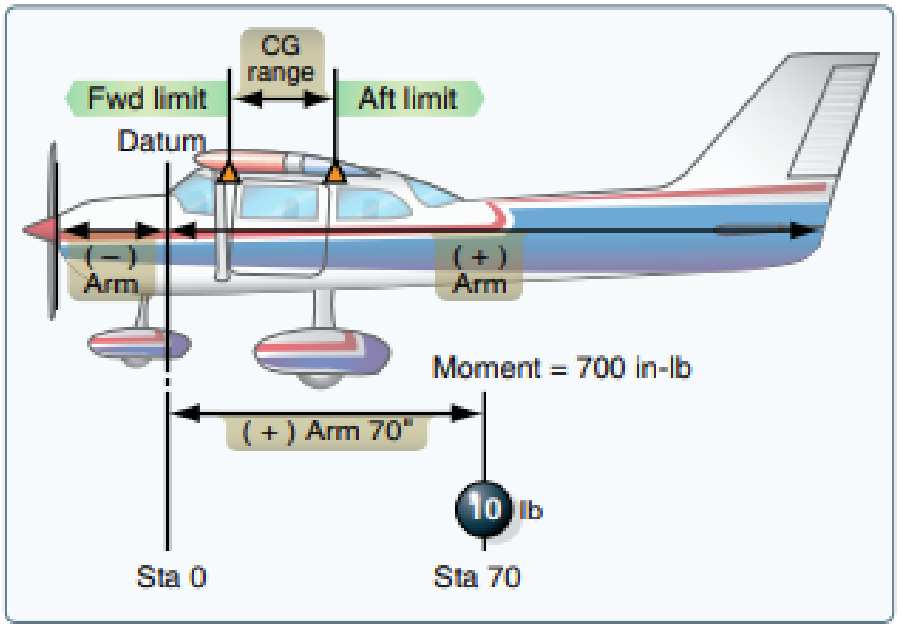


Figure 10-2. *Weight and balance.*

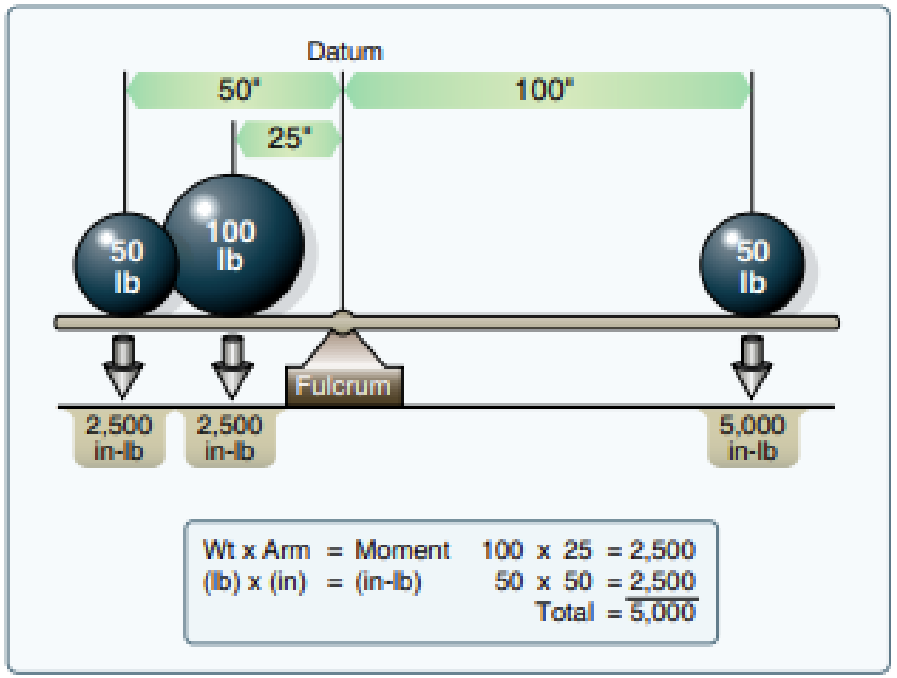


Figure 10-4. *Establishing a balance.*

Source: www.faa.gov/sites/faa.gov/files/12_phak_ch10.pdf

LOAD DISTRIBUTION

- Legal loads are route and configuration dependent
- Historically, permitted loads have exceeded 400,000 lbs. GVW

- Based on axle weight and spacing, by federal law, we must restrict any loads over "operating limit" - maximum safe load (23 CFR 650.305)
- Permits are granted based on operating limit because loads are known and analyzed; more enforcement available

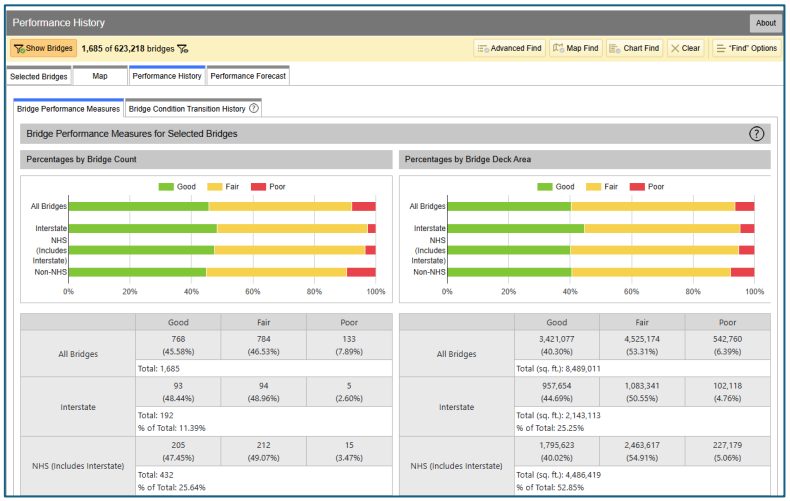
GVW: Gross Vehicle Weight

ORE HAULS

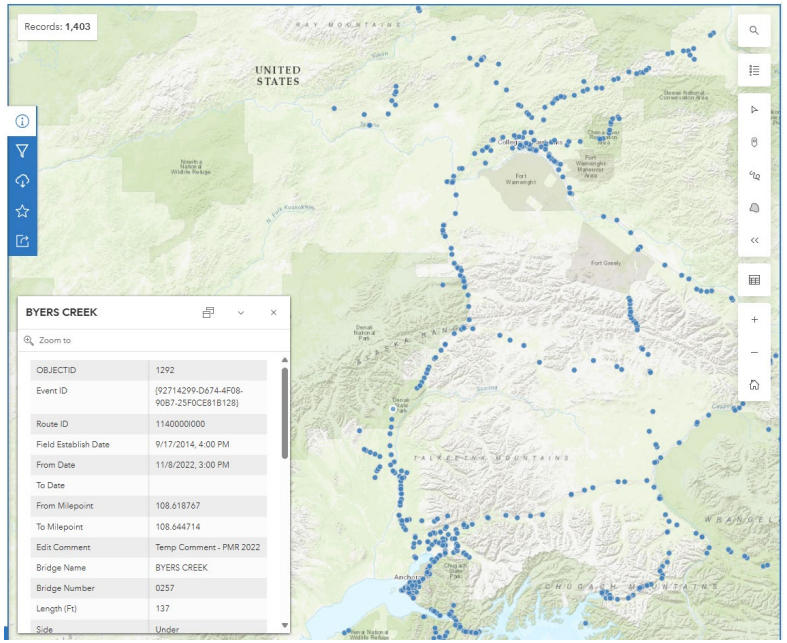
- FHWA requiring a new method of load rating and posting for Long Combination Vehicles (LCV), study expected 2025
- About 65% of Alaska's bridges predate federal exemption from 80,000 lb. maximum GVW (23 CFR 658 App C)
- Given old/aging infrastructure, DOT&PF is likely to load post more bridges
- Non-divisible loads above legal can still get a permit if the bridges can handle the loads
- Bridge inspections have increased to ensure safety due to ore haul and other locations due to new federal regulations

BRIDGE RESOURCES

- National Bridge Inspection Data including performance history and forecasts: https://infobridge.fhwa.dot.gov/Data



- Alaska's bridges with condition ratings: https://gis.data.alaska.gov/datasets/AKDOT::bridges-akdot-1/explore



THANK YOU

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