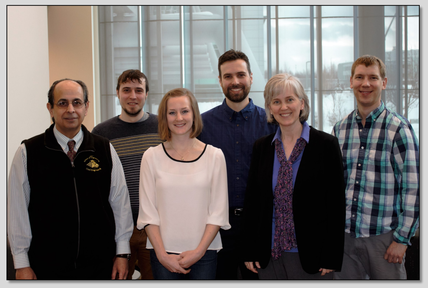
TWENTY MILE BRIDGE

Civil Engineering Program
University of Alaska Anchorage

Alaska Department of Transportation & Public Facilities

PROJECT TEAM

- Terry Gryting, EIT, Project Manager
- Kelinda Larson, EIT, Structural Team Lead
- Steven Lemmel, Transportation Team Lead
- Gabriel Pierce, Geotechnical Team Lead



Left to right: Professor Osama Abaza (UAA), Steven Lemmel, Kelinda Larson, Gabriel Pierce, Terry Gryting, Sean Baski (Alaska DOT & PF)

PROBLEM SCOPE

Twenty Mile Bridge No. 634 is classified as structurally deficient. The bridge deck is in poor condition and the load rating is less than the original design load. Pier walls are cracked and vertical rebar is exposed.

PROJECT LOCATION

The project is located between mile 80 and 81 of the Seward Highway, approximately 46 miles from Anchorage.

GOALS

Five Primary Goals:

- Design a replacement bridge
- Realign the existing roadway
- Improve safety
- Minimize environmental impacts
- Estimate costs

EXISTING SEVEN-SPAN BRIDGE

Features

- Constructed in 1967
  - Previous bridge destroyed in 1964
- Steel girders and concrete pier walls
- 568 feet long and 34 feet wide

Current Condition

- Classified as structurally deficient
- Exposed steel reinforcement
- Cracked pier walls
- Decking in poor condition

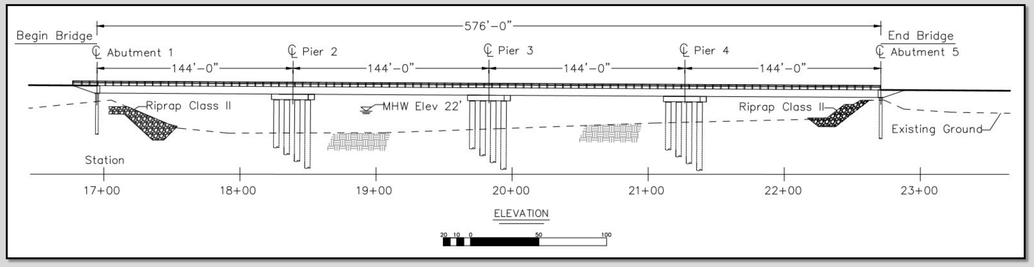
PROPOSED FOUR-SPAN BRIDGE

Bridge Features

- Precast concrete decked bulb-tee girders
- Steel pipe pile extensions
- 576 feet long
- 54 feet wide
- Pedestrian pathway accommodation

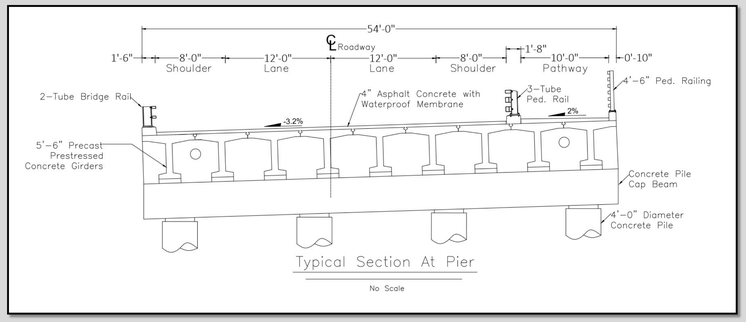
Alignment Features

- Single horizontal curve
  - Radius of 4900 feet
  - 3.2% superelevation
- Vertical crest curve north of bridge
  - Provides 0.5% grade for bridge drainage



Above: The four-span bridge will have three piers and a 0.5 percent longitudinal grade for drainage. On the southern end, the minimum low chord elevation is 33 feet, based on the high tide line elevation. On the northern end, the minimum low chord elevation is 35 feet, in order to accommodate a pedestrian pathway passing beneath the bridge.

Right: A typical cross-section of the bridge at a pier. An asphalt layer sits atop nine decked bulb-tee girders, which are in turn supported by a cap beam on four pile extensions. A pedestrian path is separated from vehicle lanes by a three-tube pedestrian rail.



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DESIGN BENEFITS

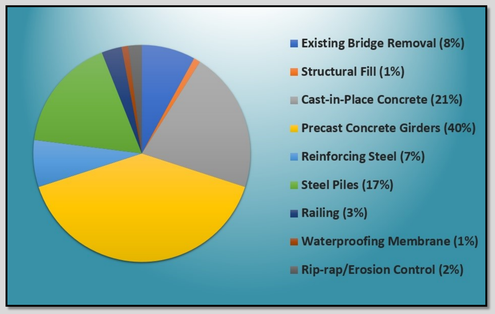
- Single horizontal curve replaces broken-back curve
- Improves pedestrian safety
  - Pathway crossing under highway
  - Pathway accommodation on bridge
  - Expanded parking facilities
- Cost effective
- Reduces scour at piers
- Minimizes environmental impacts

COSTS

The project cost estimate is as follows:

Bridge	$9,100,000
Roadway	$1,900,000
Non-Material	$7,400,000
Total	**$18,400,000**

Bridge Material Cost Breakdown



ACKNOWLEDGEMENTS

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- Nick Murray, P.E., S.E., Bridge Design Engineer
- David A. Hemstreet, P.E., G.E., State Foundation Engineer

HDR

- Matt Stone, P.E., Roadway Lead / Senior Project Manager
- Trent Parks, Transportation EIT

UAA

- Osama Abaza, Ph.D., Professor of Civil Engineering
- Joey Yang, Ph.D., Professor of Civil Engineering