Western Bridge Engineers' Seminar

ITD's Mores Creek Bridge Asset Management Plan Case Study

Brian Leshko, PE

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Presentation Outline

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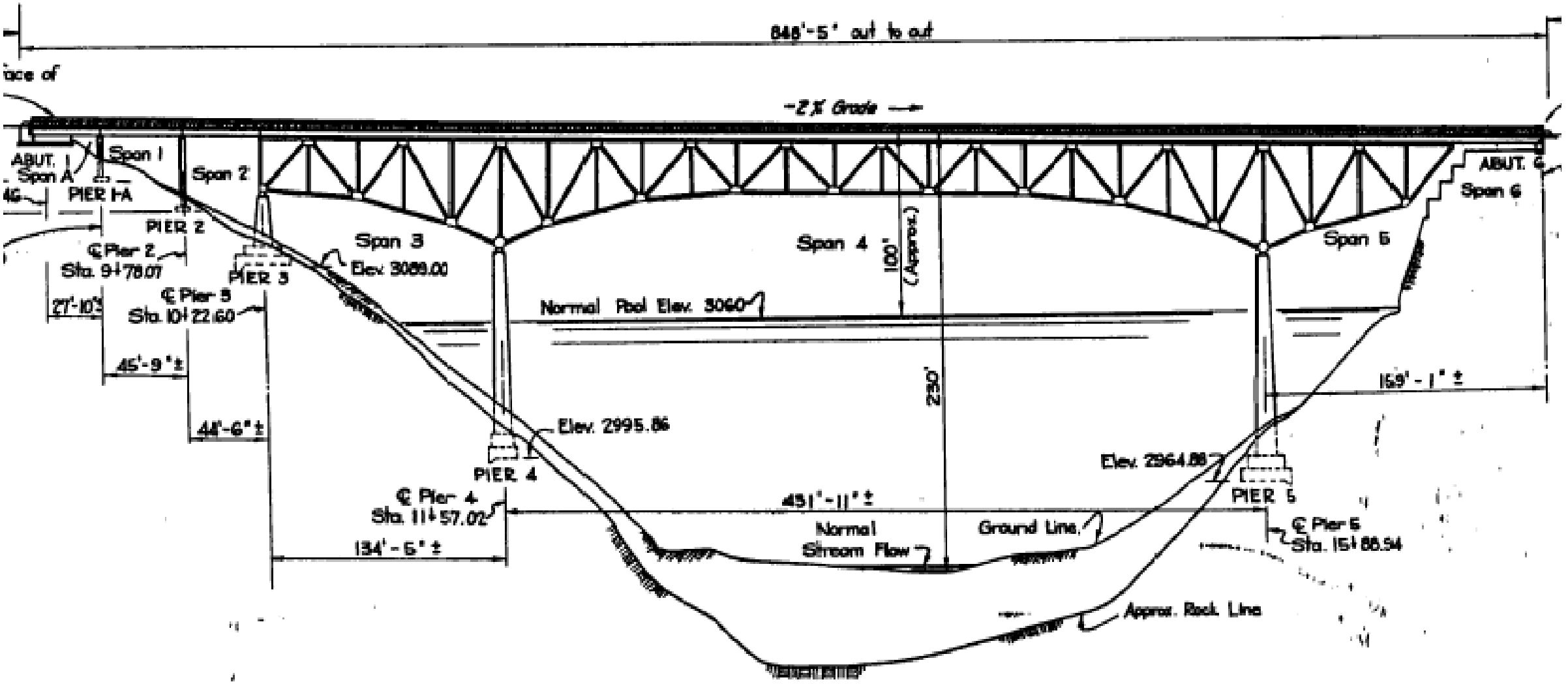
01 Background



Objective

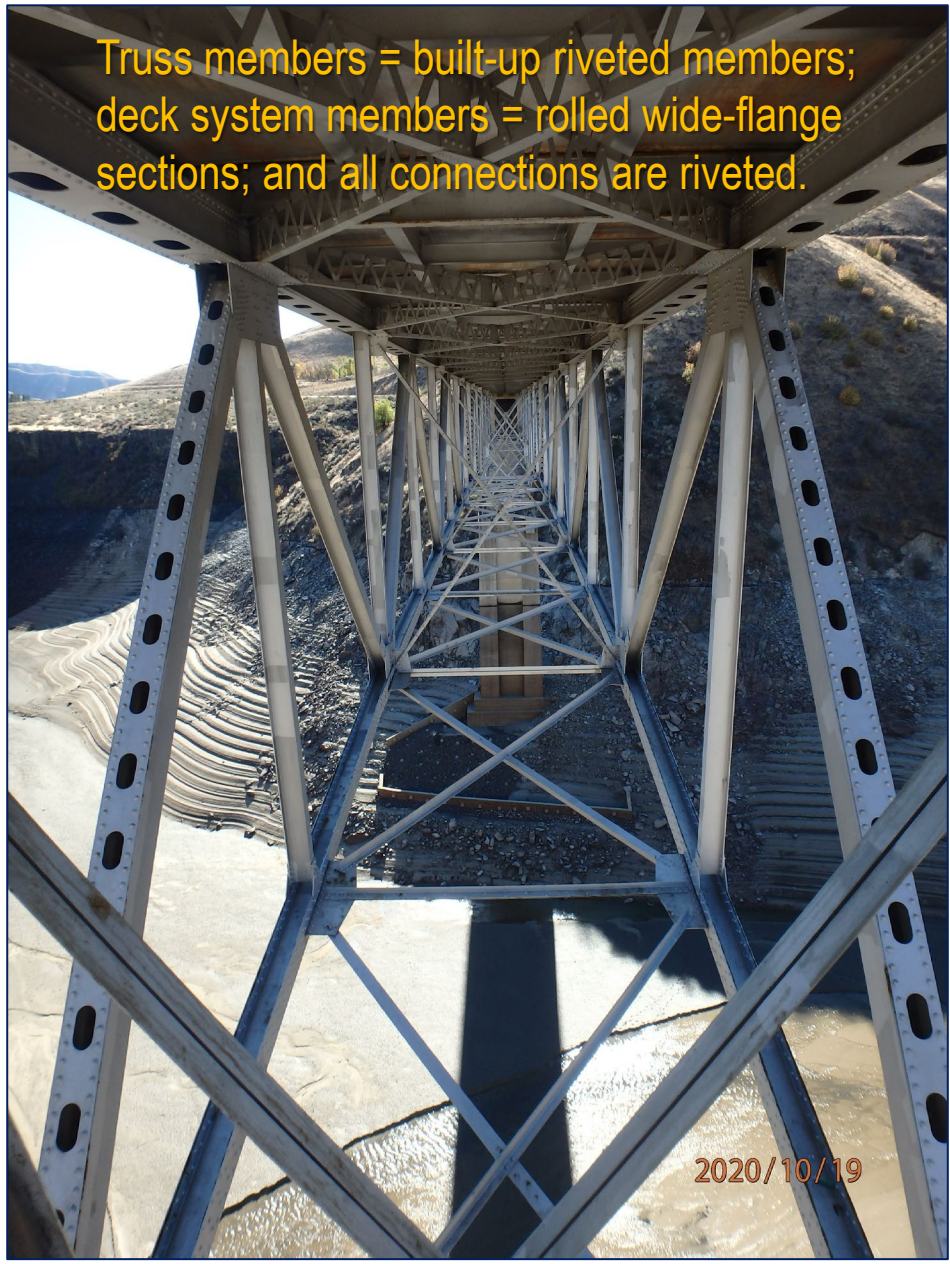
To assess one of Idaho Transportation Department's (ITD) major bridge structures to determine the best option to extend its service life to 100 yrs.

Objective (Continued)

The comprehensive study followed a prescriptive asset management process, with transparent methodology to ensure an unbiased outcome.

Bridge Identification

- Mores Creek Bridge (Bridge Key: 12815)
- 848 feet long x 32 feet wide
- Carries 1 lane NB & 1 lane SB of SH 21 over Mores Creek and Lucky Peak Reservoir
- 95 feet above normal pool elevation
- Designed for 2 lanes of AASHTO HS15 traffic
- Located 17 miles NE of Boise, Idaho (USA)
- 3-span deck truss bridge with 4 steel girder approach spans
- Built in 1953; Concrete deck overlay in 2010; Latex epoxy overlay in 2017
- Annual Average Daily Traffic = 3,200 (2018) with 7% truck traffic
- Detour route is 75 miles



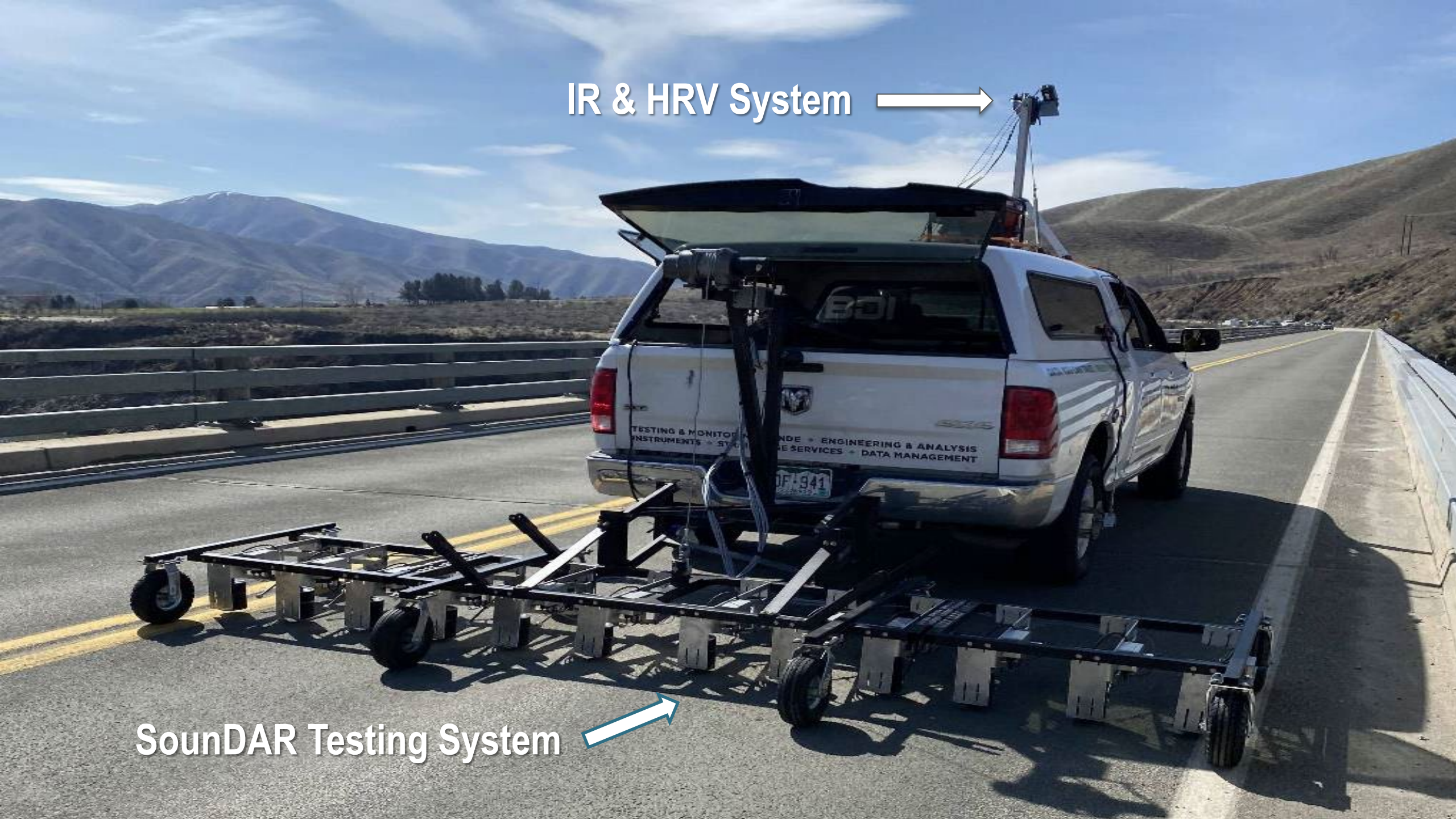
Bridge Components

- Deck Elements:
  - Reinforced Concrete Deck
  - Wearing Surface
- Superstructure Elements:
  - Steel Open Girder/Beam
  - Steel Stringer
  - Steel Truss
  - Steel Floor Beam
  - Steel Pin and Pin & Hanger Assembly or both
  - Steel Gusset Plate

Bridge Components (Continued)

- Substructure Elements:
  - Reinforced Concrete Column
  - Reinforced Concrete Pier Wall
  - Reinforced Concrete Abutment
  - Reinforced Concrete Pile Cap/Footing
  - Reinforced Concrete Pier Cap
- Joint, Bearing and Railing Elements:
  - Compression Joint Seal
  - Assembly Joint with Seal
  - Movable Bearing
  - Fixed Bearing
  - Metal Bridge Railing

02 Data Collection Methods


IR & HRV System
SounDAR Testing System

Inspection / Evaluation

- Visual Inspection of Bridge
- Automated Deck Sounding
- Deck Chloride Testing
- Infrared Thermography and High-Resolution Video
- Corrosion Inspection and Coating Condition Assessment

03 Key Findings

Key Finding 1:

The worst-case corrosion is located along the floor beams at the deck joints.

Key Finding 2:

Pack rust formed between many riveted built-up FCM/NSTM members.

Key Finding 3:

More than 20 deck joints exhibit leakage over the floor beams.

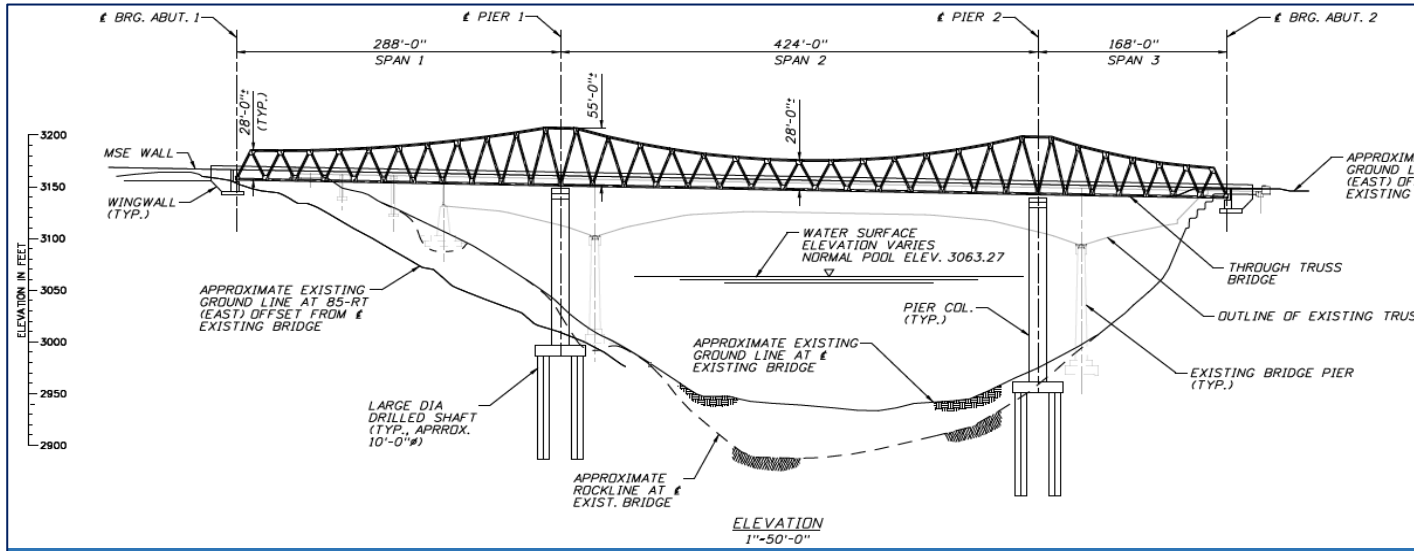
Key Finding 4:

Install the missing neoprene trough below the finger joint assembly at Abutment 2.

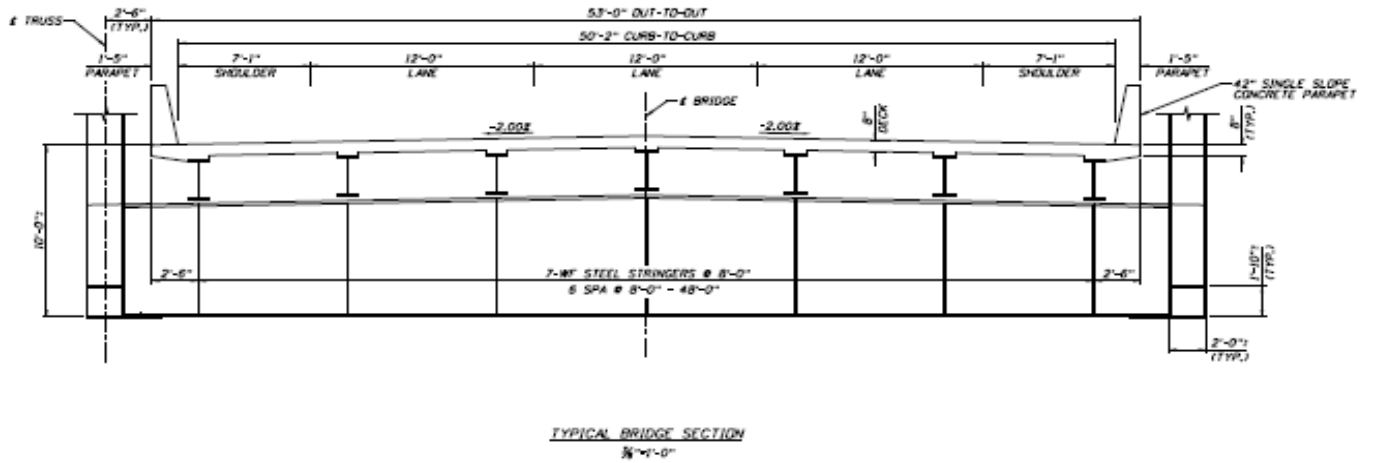
04 Asset Management Plan

Replacement Options

- Through Network Steel Tied Arch
  - Single 880-foot span crossing of the canyon with a network steel tied arch rise of approximately 160-feet
  - Estimated Cost = $77,500,000
- CIP Segmental Concrete Box Girder
  - 3-span (288’-424’-168’ span arrangement), depth varies from approx. 11-feet to 25-feet
  - Estimated Cost = $79,100,000
- Through Steel Truss
  - 3 span (288’-424’-168’ span arrangement), depth varies from approx. 28-feet to 55-feet
  - Estimated Cost = **$65,900,000**



Through Steel Truss Option



Rehabilitation Recommendations

- **Null Option**
  - Assumes that the structure is allowed to deteriorate until such time as repairs need to be made to maintain the structure in safe condition for roadway traffic.
  - NPV is over $11.57 MM in current dollars
- **Implement Staged Repairs**
  - Repair/replacement of the joints; Floor beam top flange corrosion mitigation; Extension of the scuppers; Miscellaneous concrete repairs to the substructure and underside of deck near joints; and Replace broken bolts on Pier 5 bearing assembly
- **Steel Coating Repairs**

Option	Year Performed	Construction Cost (Current Dollars)	LCC - NPV	Paint Condition 2053
Spot Painting	2023, 2040	$ 1,982,448, $ 3,196,021	$ 4,893,579	69%
Spot Painting	2030, 2047	$ 3,196,021, $ 3,196,021	$ 5,913,676	85%
Bridge Painting	2023	$ 7,856,144	$ 7,756,852	62%

Preservation Recommendations

- **Deck**

Annual spring washing of the bridge to remove ice melting chemicals; Repair joints (staged repairs); Extend scupper length (staged repairs); Perform SounDAR inspections of deck condition at 10-year intervals; and Monitor epoxy overlay condition and chloride ingress

- **Superstructure**

Perform spot painting in 2023 & 2040; Perform staged repairs in 2023; Evaluate the pins and hangers for capacity – monitor condition with visual inspection and non-destructive testing; and During biennial inspections, measure cracked spot weld in the upper chord plate connection at U17, LT, EXT, south end, measure crack in tack weld at L14, LT, EXT, and monitor interior gusset plate on the right truss at L4

- **Substructure**

Perform a detailed bearing inspection at Pier 5; Implement staged repairs; and Locate inspection points on substructure units for GPS location monitoring (detect movement)

05 Wrap Up


MORE'S CREEK
IS NAMED FOR J. MARION MORE,
LEADER OF THE PARTY OF MINERS
WHO FOUNDED IDAHO CITY,
OCTOBER 7, 1862.
Like most of Idaho's early miners, he came originally from the South. Unlike most of them, he struck it rich. During the Idaho gold rush, he had profitable investments in many important mining camps. Hardly anyone else did as much to build Idaho during the early days.
Stanley
Lowman
Idaho City
Boise
Bellevue
MORE'S CREEK
Mountain Home
84
21
IDAHO
318

Alternatives Comparison

Option	Remaining Service Life (yrs)	Construction		Net Present Value (NPV)
		Total Expenditure	Year	
Null Option	32	$26,058,487	2041	$11,569,803
Replace the bridge (Through truss)	100	$81,290,101	2026	$65,255,365
Spot painting	32	$8,635,347	2023/2040	$7,992,066
Implement staged repairs		$3,546,960	2023/2038	
Bridge preservation costs		$2,150,468	ongoing	

Conclusion

Based upon the assumptions made for this analysis, performing limited repairs, including spot painting and implementing preservation measures, has the lowest life cycle costs and represents the best value to the Idaho Transportation Department.

- (NPV $7.99 MM vs $11.57 MM)
- As a result, this is the recommended alternative.

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Questions?
Thank you for your time