



EXTENDING THE LIFE OF YOUR BRIDGES

STEVEN MYER, PE

9.24.2025

ABOUT IMEG



➤ Our Why

- Together we create positives outcomes for people, communities, and our planet

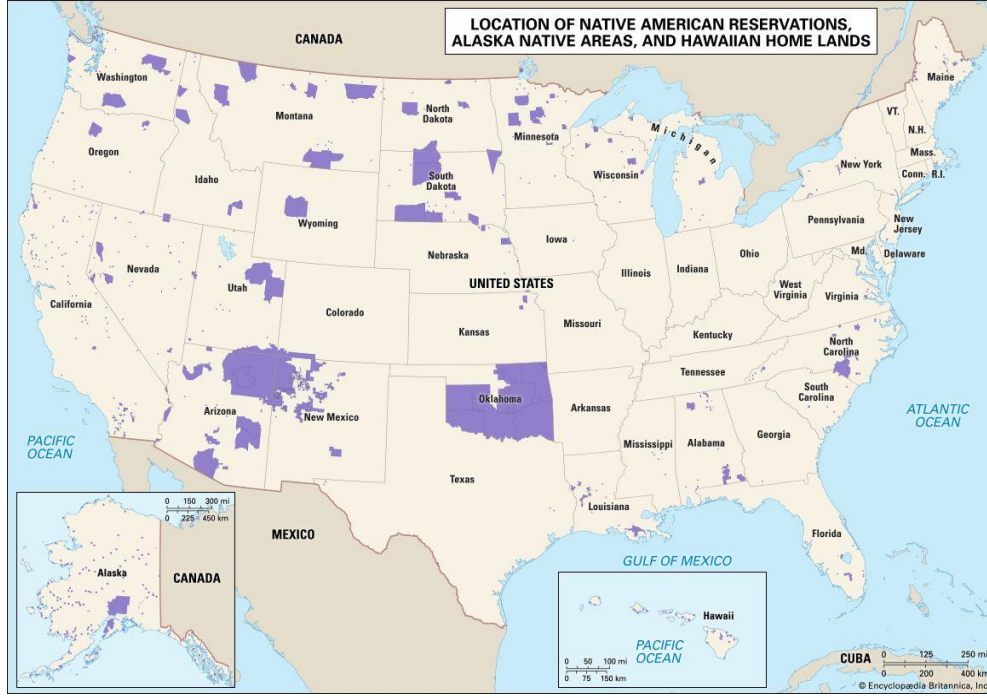
➤ 3,000+ Employees

➤ 90+ Office Locations

➤ 500+ Civil Employees

➤ Civil Services

- Bridge Design & Inspection
- Road Design
- Traffic Planning
- GIS Services
- Environmental Services
- Materials Testing & Inspection
- Reality Capture



IMEG Licensed Civil Engineers by State



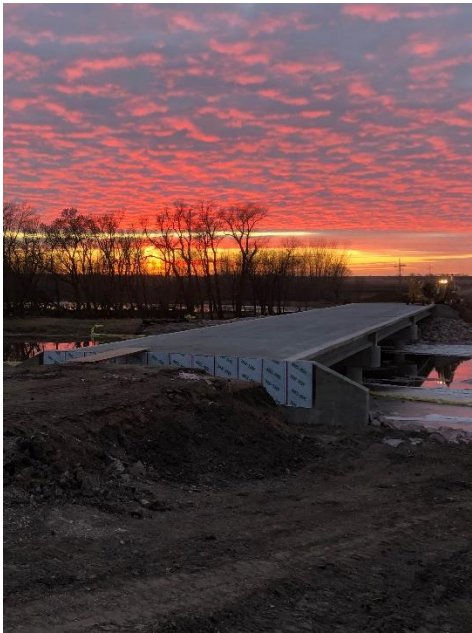


STEVEN MYER, PE



MARKET DIRECTOR – BRIDGES & TRANSPORTATION

ABOUT ME





› Bridge Replacement Costs

205' Prestr. Girder



\$1.7M in 2023

248' Prestr. Girder



\$2.3M in 2022

2-10'x5' RCBC

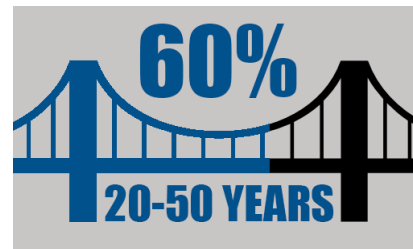


\$450k in 2023

› Why do we want to extend the life of bridges?



› When do we switch from extending life to bridge replacement





› Routine Maintenance (continuously)

- TTP Forces
- Preventative
- Cyclical
- Essential

› Preservation Projects (0 to ≈ 50 yrs)

- Actions or strategies that prevent, delay, or reduce deterioration
- Keep bridges in good condition
- Preventative or condition-driven
- Does not increase load capacity of bridges
- Likely work to be done by a contractor

› Rehabilitation Projects (≈ 50 to ≈ 75 yrs)

- Major repair work
- Restore the function of existing bridges
- Improve upon original design of bridges
- May increase the load capacity of bridges
- Likely work to be done by a contractor



› Bridge Inspections

- Every two years
- 20 feet or longer
- Look at the whole bridge, but the three elements used to classify the condition of the bridge are:



Deck



Superstructure

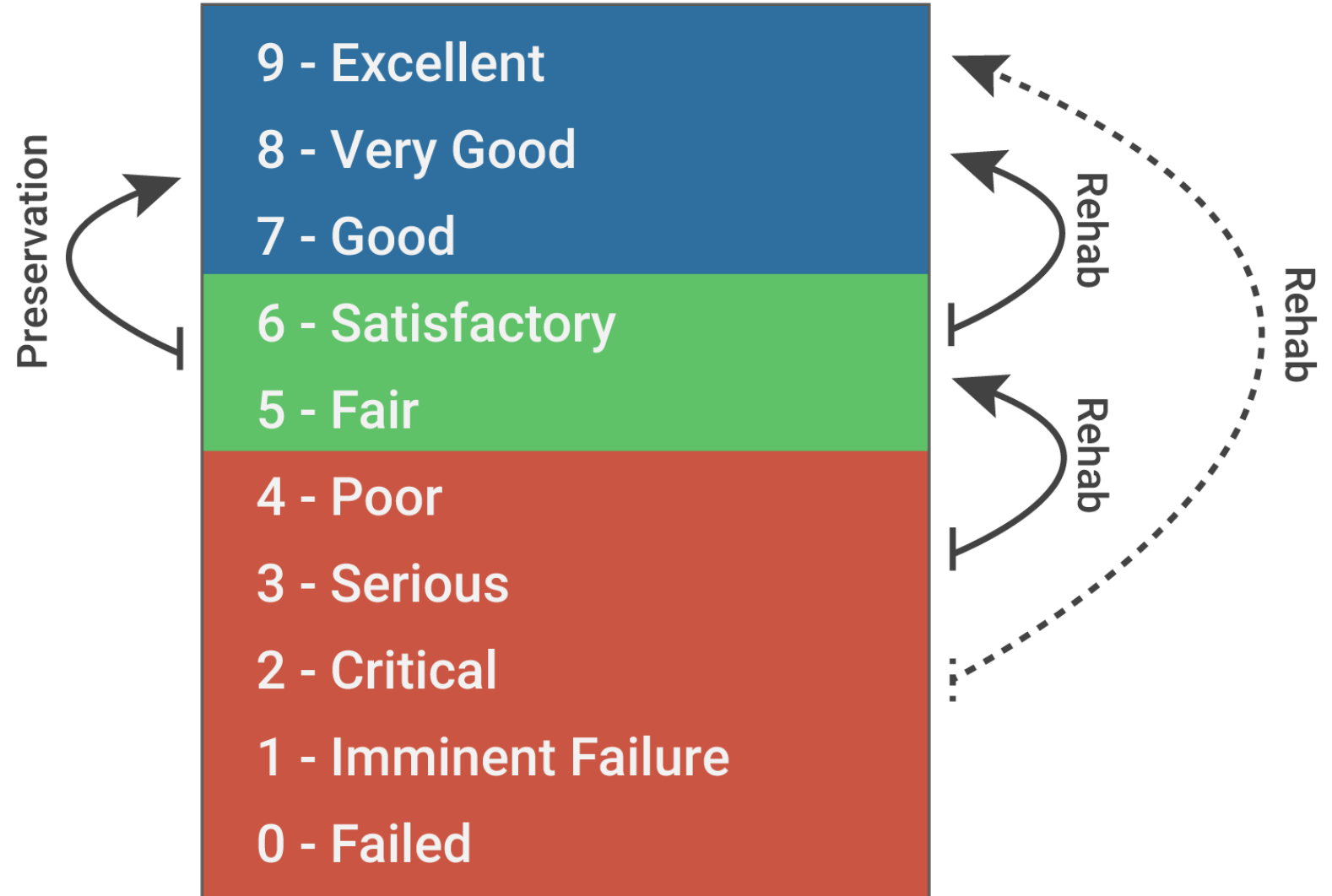


Substructure



› Elemental Rating

- Deck
- Superstructure
- Substructure



EXTENDING THE LIFE OF YOUR STRUCTURES



Lowest Condition Rating vs. Age

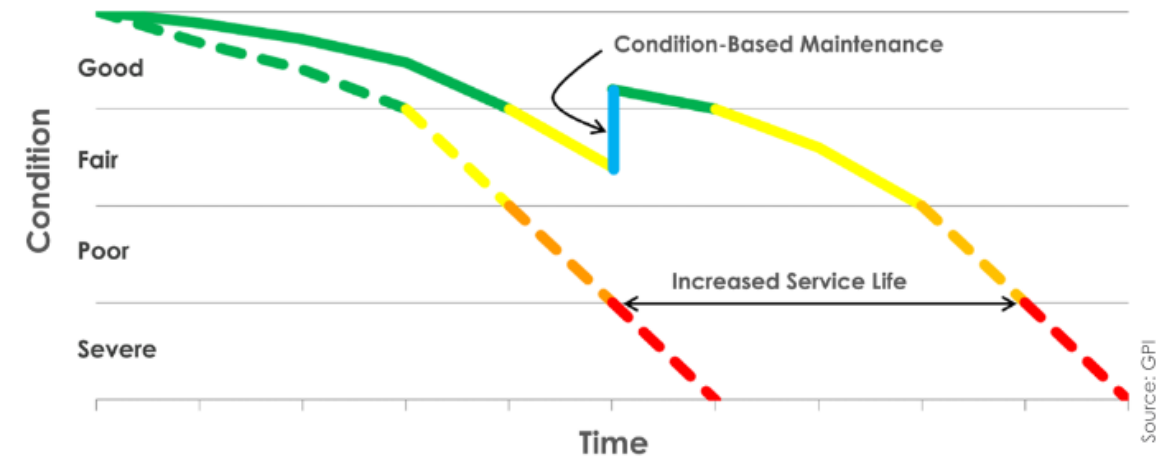
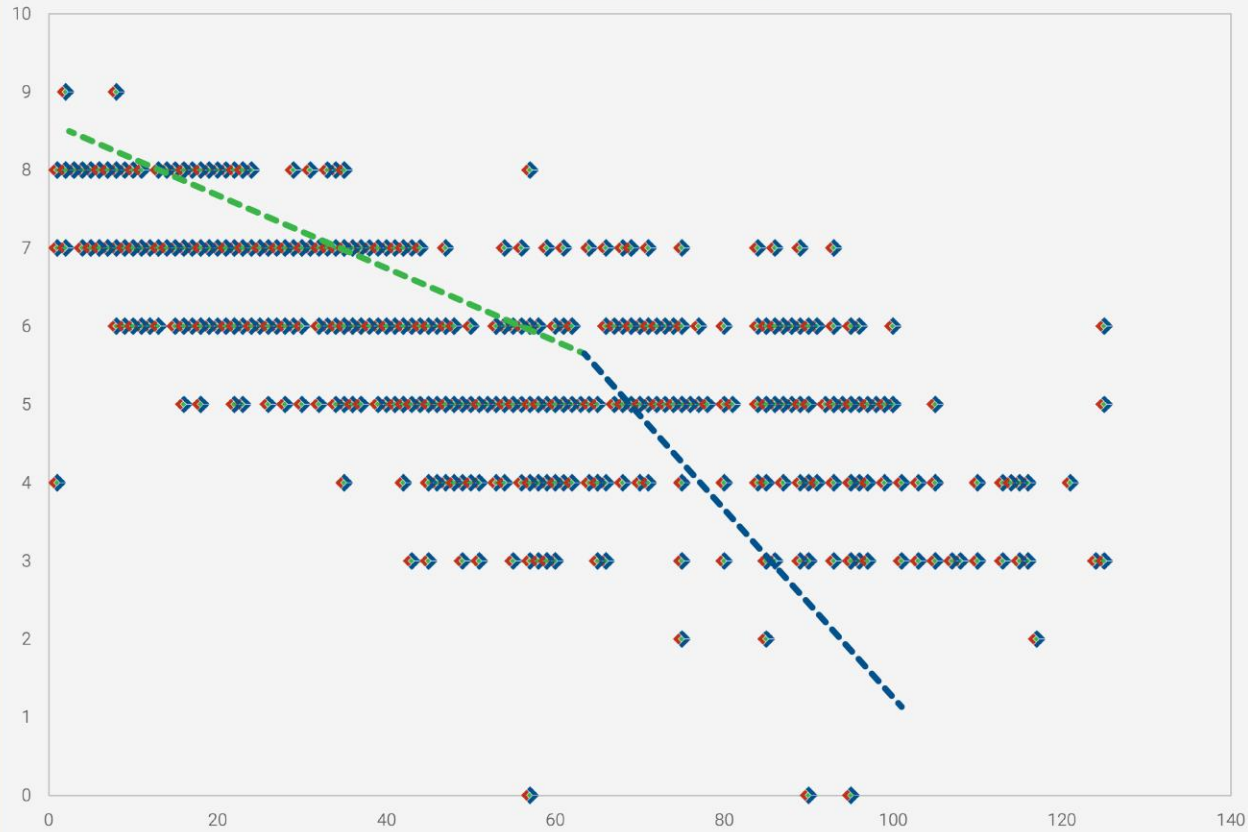


Figure 17. A comparison of bridge condition over time with and without bridge preservation.



➤ Questions?

➤ Routine Maintenance (continuously)

- Preservation Projects (0 to ≈ 50 yrs)
- Rehabilitation Projects (≈ 50 to ≈ 75 yrs)
- Advice from a professional



- › Debris Removal
- › Culvert Cleanout
- › Guardrail Repair / Install
- › Scour Repair
- › Erosion Repair
- › Riprap Placement
- › Clean Bridge Decks
- › Spot Painting Steel Girders
- › Open / Fix Deck Drains
- › Patch Spalls (not on top of the deck)
- › Investigate Delaminations & Spalls (on the deck)
- › Joint Maintenance
- › Sign Inspection & Maintenance



› Debris Removal

- Possible defects / Concerns
 - Backs water up
 - Triggers scour
 - Corrodes ends of girders
 - Debris can damage structural components
- Repairs
 - Remove tree debris
 - Shovel debris from abutment seats





› Culvert Cleanout

- Possible defects / Concerns
 - Reduced or compromised culvert capacity
 - Road overtop
 - Culvert undermining
 - Likely will not correct itself
- Repairs
 - Remove tree debris
 - Excavate debris from inlet and culvert





› Guardrail (Guiderail) Repair / Install

- Possible defects / Concerns
 - Serious safety issue
 - Compromised approach rail function
 - Damaged guardrail left unchecked may lead to litigation
- Repairs
 - Repair damaged guardrail/approach rail
 - Install missing guardrail/approach rail
 - Upgrade any rail that is not up to crash-test standards





› Scour Repair

- Possible defects / Concerns
 - Can compromise structural capacity of substructure
 - #1 reason for Bridge Inspection Critical Findings
 - Exposed piles deteriorate more rapidly
 - Scour holes under bridge can be dangerous
- Repairs
 - Fill in scour holes with larger and smaller riprap
 - Allow sediment to fill in over time





› Erosion Repair

- Possible defects / Concerns
 - Safety concerns
 - Turn-down will not function as designed
 - Erosion could eat into roadway
 - Abutment is more vulnerable to scour
- Repairs
 - Reestablish berm and compact
 - Armor berm with riprap





› Riprap Placement

- Protects embankments against scour problems
- “Catches” sediment to fill in scour holes over time
- Riprap size
 - Large stones to handle large flows
 - Smaller stones to lock the larger stones into place





› Clean Bridge Decks

- Possible defects / Concerns
 - Water seeps through sediment and sits on the deck
 - Increases rate of deterioration of bridge deck
 - Particularly true with asphalt placed on concrete decks (kiss of death)
 - Causes concrete to begin to crumble
 - Delaminations can't be inspected through gravel or overlays
- Repairs
 - Use a broom to sweep the deck
 - Grind off asphalt placed on a concrete deck





› Spot Painting Steel Girders

- Possible defects / Concerns
 - Debris around girder ends accelerates corrosion
 - Leaking salts & chemicals accelerate girder corrosion
- Repair
 - Clean steel prior to painting
 - Paint the ends of the girder to arrest corrosion





› Open / Fix Deck Drains

- Possible defects / Concerns
 - Deck drain discharge should be below girder bottoms
 - Deck drain downspouts broken or missing
 - Deck drain downspouts not long enough
- Repairs
 - Extend downspouts that are not lower than the bottom of the girder
 - Replace / repair downspouts that have broken or gone missing





› Patch Spalls (not on top of the deck)

- Possible defects / Concerns
 - Aesthetics
 - Usually not a structural issue
- Repairs
 - Grout spalls
 - Does extend the life of the rebar





› Investigate Delaminations & Spalls (on the deck)

- Possible defects / Concerns
 - As decks age, they delaminate
 - Delamination amount guides remedial action to be taken
- What to do with the information
 - According to SDDOT
 - 0%-5% → Polymer Deck Seal
 - 5%-10% → Low Slump Dense Concrete Overlay
 - >10% → Further evaluation of total bridge life, life cycle cost, etc.





› Investigate Delaminations & Spalls (on the deck)





› Joint Maintenance

- Possible defects / Concerns
 - Defective joints allow more debris on the abutment seat
 - Rougher ride
 - Greater impact loading
 - Can be a safety issue
- Repairs
 - Clean debris and vegetation from joint
 - Replace joint material





› Sign Inspection & Maintenance

- Possible defects / Concerns
 - Traveling public cannot read sign
 - Incorrect loading information on the sign
 - The easiest maintenance to do and one of the hardest to defend in court if you don't do it
- Repairs
 - Ensure the current load posting is correct
 - Ensure the reflectivity is up to date
 - Ensure it is legible at the posted speed
 - Ensure sign is at the correct height and location





➤ Questions?

- › Routine Maintenance (continuously)
- › **Preservation Projects (0 to $\approx$ 50 yrs)**
- › Rehabilitation Projects ($\approx$ 50 to $\approx$ 75 yrs)
- › Advice from a professional

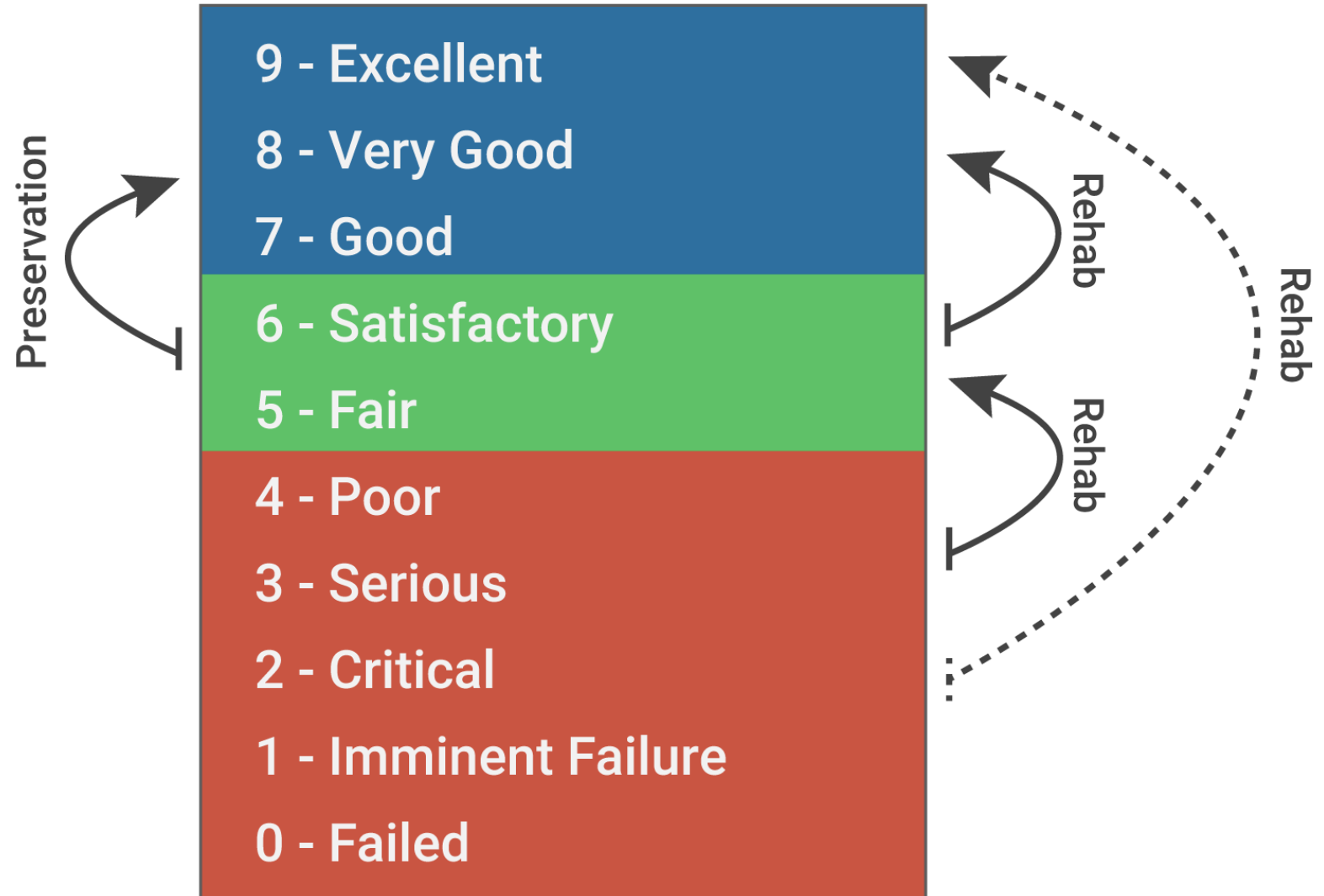


- › **Delamination / Spall Repair (on top of deck)**
(0% - 5%)
- › **Polymer Deck Seal**
(0% - 5%)
- › **Delamination / Spall Repair (on top of deck)**
(5% - 10%)
- › **Low Slump Dense Concrete Overlay**
(5% - 10%)
- › **Jacket Columns**
- › **Major Seal / Joint Repair**
- › **Painting**
- › **Total Deck Replacement**
- › **Approach Slabs**
- › **Heat Straightening**



› Elemental Rating

- Deck
- Superstructure
- Substructure





› Delamination / Spall Repair (0% - 5%)

- Grind the top ¼" minimum off the deck ensuring there is no asphalt overlay on the deck
- Conduct a thorough delamination survey of the deck
- Sawcut and chip away all delaminated and spalled concrete
- Sandblast existing reinforcing steel and concrete in spall repair areas





› Delamination / Spall Repair (0% - 5%)

- If the top mat of reinforcing steel is epoxy coated → clean and epoxy coat any exposed rebar
- Patch all delaminations and spalls
- Seal all patches and allow to cure according to manufacturer's recommendations
- Grind deck smooth prior to Polymer Chip Seal





› Delamination / Spall Repair (0% - 5%)





› Polymer Deck Seal (0% - 5%)

- Polymer protects the deck from chemicals & moisture; chips give friction for the cars
- Place coat of polymer and distribute at the manufacturer's recommended application rate
- Broadcast cover aggregate to point that there are no visible wet spots





› Polymer Deck Seal (0% - 5%)

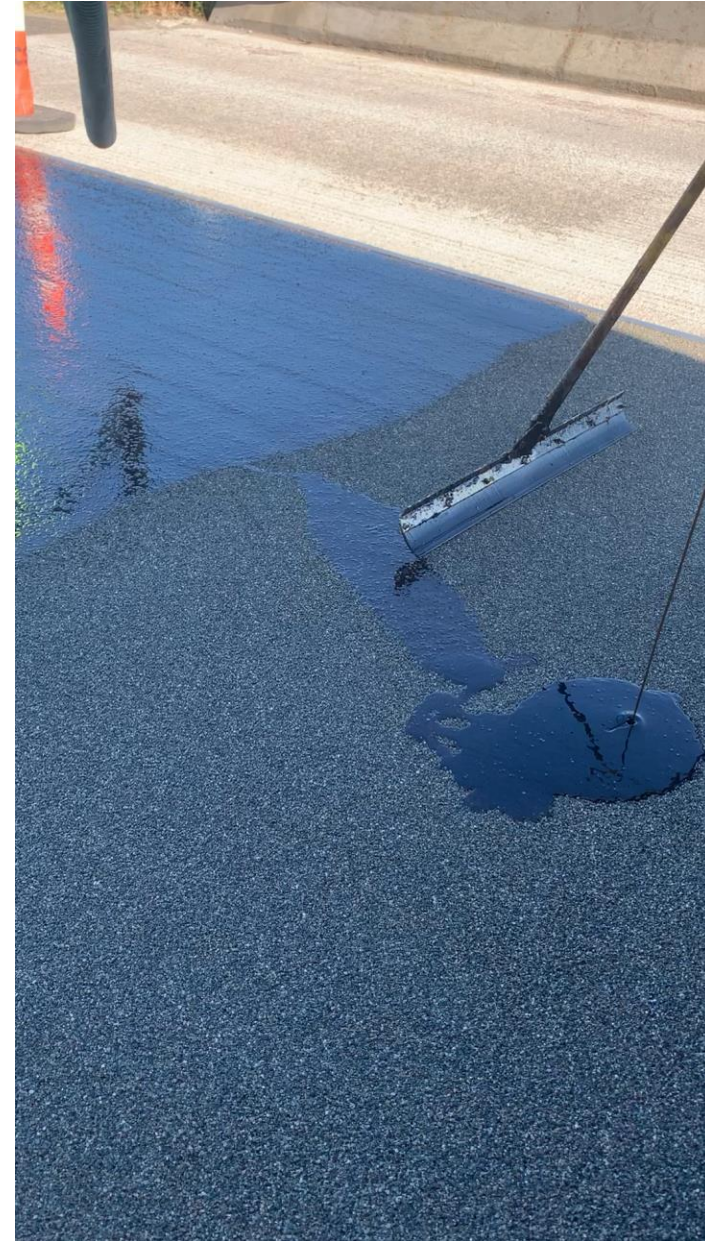
- Broom off excess cover aggregate





› Polymer Deck Seal (0% - 5%)

- Repeat process for 2nd coat





› Delamination / Spall Repair (5% - 10%)

- Grind the top ¼" minimum plus any previous overlay off the deck
- Conduct a thorough delamination survey of the deck
- Chip away all delaminated concrete





› Delamination / Spall Repair (5% - 10%)

- Sandblast existing reinforcing steel and concrete in spall repair areas
- If the reinforcing steel is epoxy coated → clean and epoxy coat any exposed rebar
- Install and level off standard deck concrete (4,500 psi)





› Low Slump Dense Concrete Overlay (5% - 10%)

- Added weight may affect removal of load restrictions
- Sandblast the whole bridge deck again
- Install rail system
- May wet deck for 24 hours (this is location dependent)
- Place grout mixture





› Low Slump Dense Concrete Overlay (5% - 10%)

- Use paving machine to place the low slump dense concrete overlay
- Broom & tine the concrete
- Cure as per specified method
- Saw cut to get a clean edge to place the other lane





› Jacket Columns

- Form up jacket (this can be either wood forms or as simple as a corrugated metal pipe (CMP)) set on end
- Place concrete (this MUST be done in the dry)





› Jacket Columns

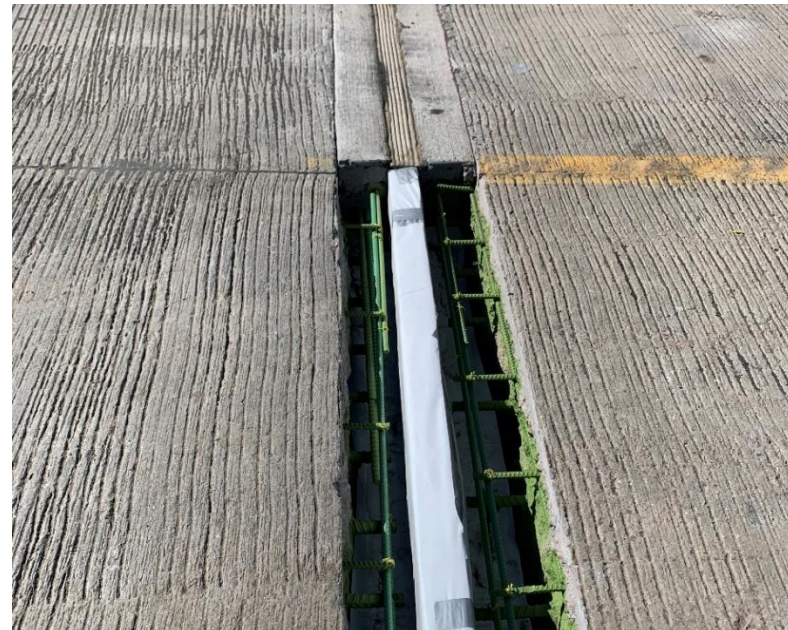
- Forms can be left in place (in the case of the CMP)





› Major Seal/Joint Repair

- Remove any bad concrete at the joint location
- Install dowel connections to sound concrete





› Major Seal/Joint Repair

- Place concrete
- Install joint material





› Painting

- Prepare the site (ensure stream is protected from any sandblasting material)
- Sandblast all surfaces to be painted down to bare metal





› Painting

- Apply primer coat as per manufacturer's recommendation to the specified thickness
- Apply paint as per manufacturer's recommendation to the specified thickness
- If specified, apply a 2nd coat





› Good Candidates for Painting

- Original steel essentially intact





› Bad Candidates for Painting

- Corrosion has set in to the point that there is noticeable section loss





› No Painting Required

- Weathered Steel
- Galvanized dipped steel
- Drawbacks
 - FHWA recommends weathered steel placed 10' above stagnate water and 8' above running water
 - Galvanizing baths are 40' - 60'



Photo: American Galvanizers Association



› Total Deck Replacement

- Remove existing deck
- Ensure stirrups are not damaged
- Form up new deck
- Place reinforcing steel





› Total Deck Replacement

- Pour concrete
- Cure concrete





➤ Approach Slabs

- Offers better movement of bridge & dynamic loading
- Place sub-base
- Pour sleeper slab
- Place base
- Place rebar





➤ Approach Slabs

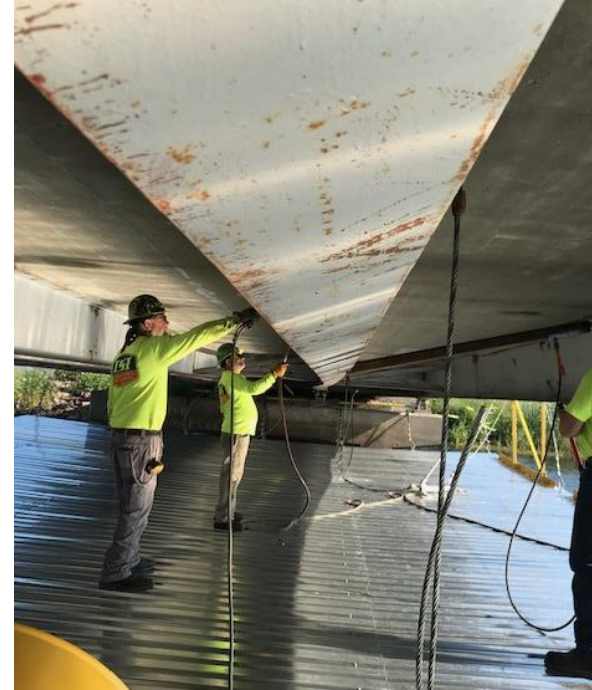
- Pour concrete
- Tine concrete
- Place asphalt or concrete





› Unique Bridge Preservation – Heat Straightening

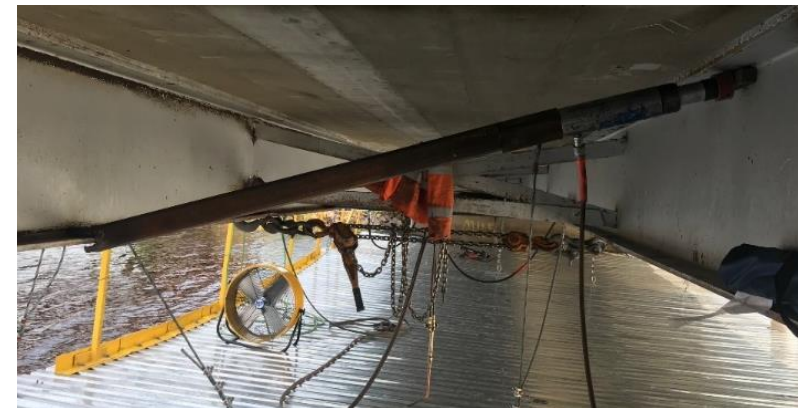
- Ice knocked 2' tall beam 13" out of plumb
- We inspected the bridge it and closed it until repairs could be made
- Heat straightening was deemed to be the best solution
- This can be done no more than twice per steel beam





› Unique Bridge Preservation – Heat Straightening

- Use soapstone pencil to mark the location you want to bend
- Use temperature gun & pressure gauge
- Heat steel up until the pencil mark changes color
- Using come-alongs, bend the steel back to the original shape





› Routine Maintenance (continuously)

› Preservation Projects (0 to $\approx$ 50 yrs)

› **Rehabilitation Projects ($\approx$ 50 to $\approx$ 75 yrs)**

› Advice from a professional

➤ Questions?



› **Deck Unit Replacement**

› **Bearing Replacement**

› **Steel Girder Splice
Repair**

› **Abutment Replacement**



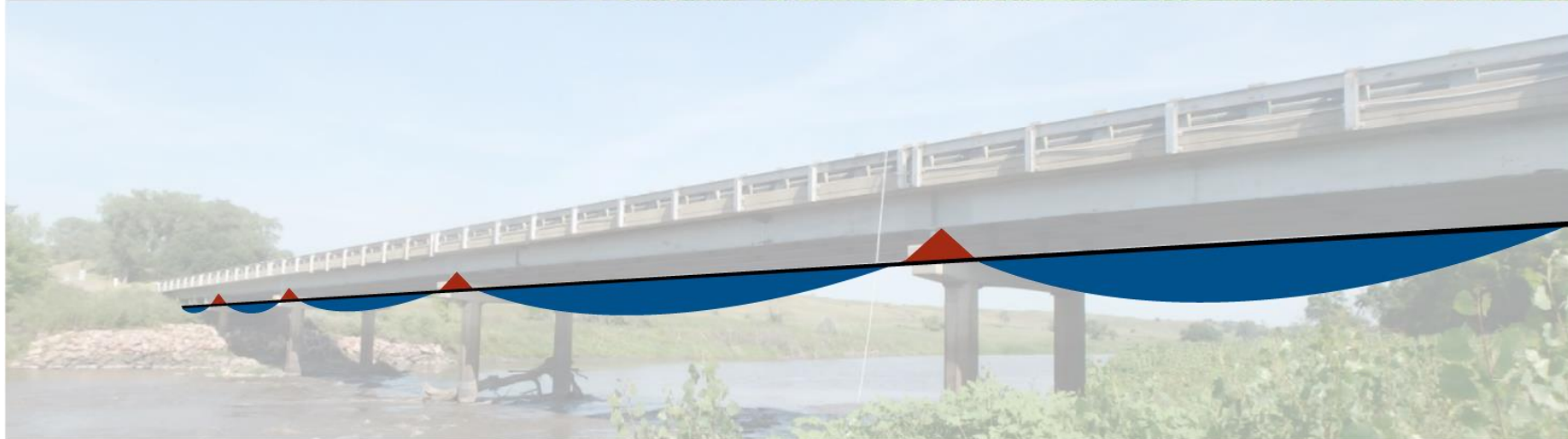
› Deck Unit Replacement

- Deck units are precast concrete
- Can be prestressed or not
- Need to replace can be from:
 - Deterioration
 - Damage





› Steel Girder Splice Repair





› Steel Girder Splice Repair

- Crack discovered at inflection point
- Determine the end of the crack
 - If crack doesn't propagate into the flange, drill hole to ensure you capture the end
 - If crack does propagate into the flange, you must splice the flanges as well





› Steel Girder Splice Repair

- Remove the deck at the splice location
- Bolt splice repair plate on the girders





› Bearing Replacement

- 2nd biggest critical finding for bridge inspection
- Shore up girder ends
- Ensure the girders can bear where you shore them up





› Bearing Replacement

- Replace the bearing
- Ensure the bridge is pinned on one end and allowed to move on the other end





› Abutment Replacement

- Causes
 - Pile movement
 - Bridge movement
 - Earth pressures
 - Under designed abutment
- Remove existing abutment
- Ensure any steel for the existing girder is not damaged





› Abutment Replacement

- Place reinforcing steel for the abutment
- Pour concrete for abutment
- Place reinforcing steel for deck matching steel that was originally used for the existing deck
- Pour concrete for deck





- › Routine Maintenance (continuously)
- › Preservation Projects (0 to ≈ 50 yrs)
- › Rehabilitation Projects (≈ 50 to ≈ 75 yrs)

➤ Questions?

› **Advice from a professional**



➤Don't

put an asphalt
overlay on the
bridge deck ...
unless

- Kiss of death





➤ **Don't**
overlook signage





➤ **Do**
raise the
plow over
bridge
joints





➤Don't

use salts and
chemicals on
your roads if
you don't
have to





➤Don't

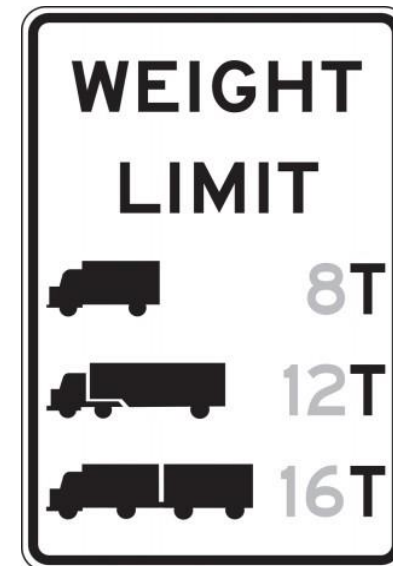
**underestimate
the importance
of routine
maintenance**

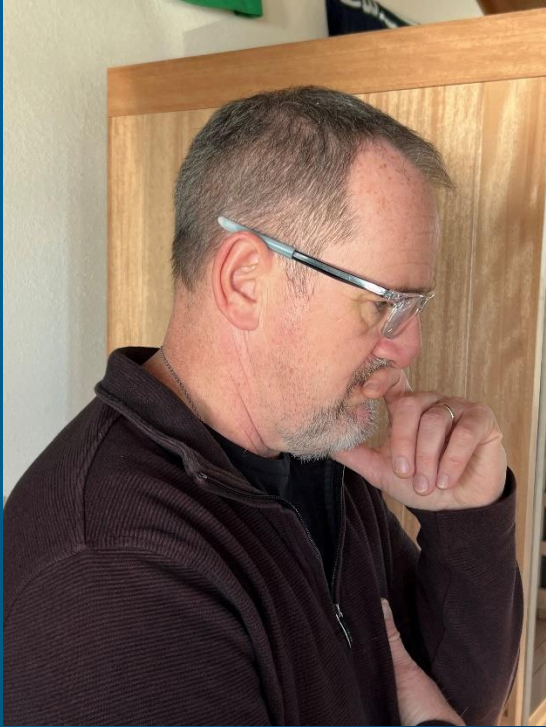




› Bridges are not posted for safety reasons (verbatim); they are posted to extend the life of the structure.

- A 6-ton truck will not fail this bridge, but a 10-ton truck will shorten the life of this structure
- Load capacity can be reduced due to deterioration, damage, and load rating analysis





- Thank you for your time!

- Don't underestimate the importance of routine maintenance
- Signage is the easiest maintenance to do and the hardest to defend in court if you haven't done it and something goes awry
- Bridges are expensive, and whatever we can do to extend the life of them is money well spent
- Questions?



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BRIDGE REHABILITATION: REPLACEMENT FUNDING PROCESS

FHWA-AGREEMENT & BUREAU TRIBAL TRANSPORTATION PROGRAMS

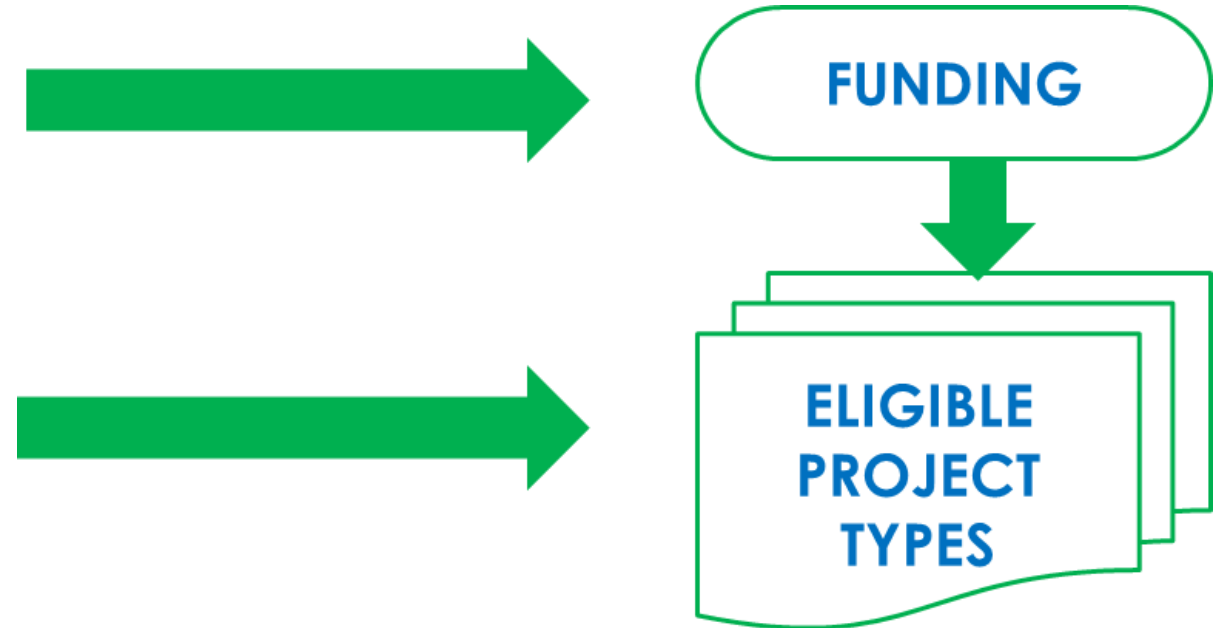


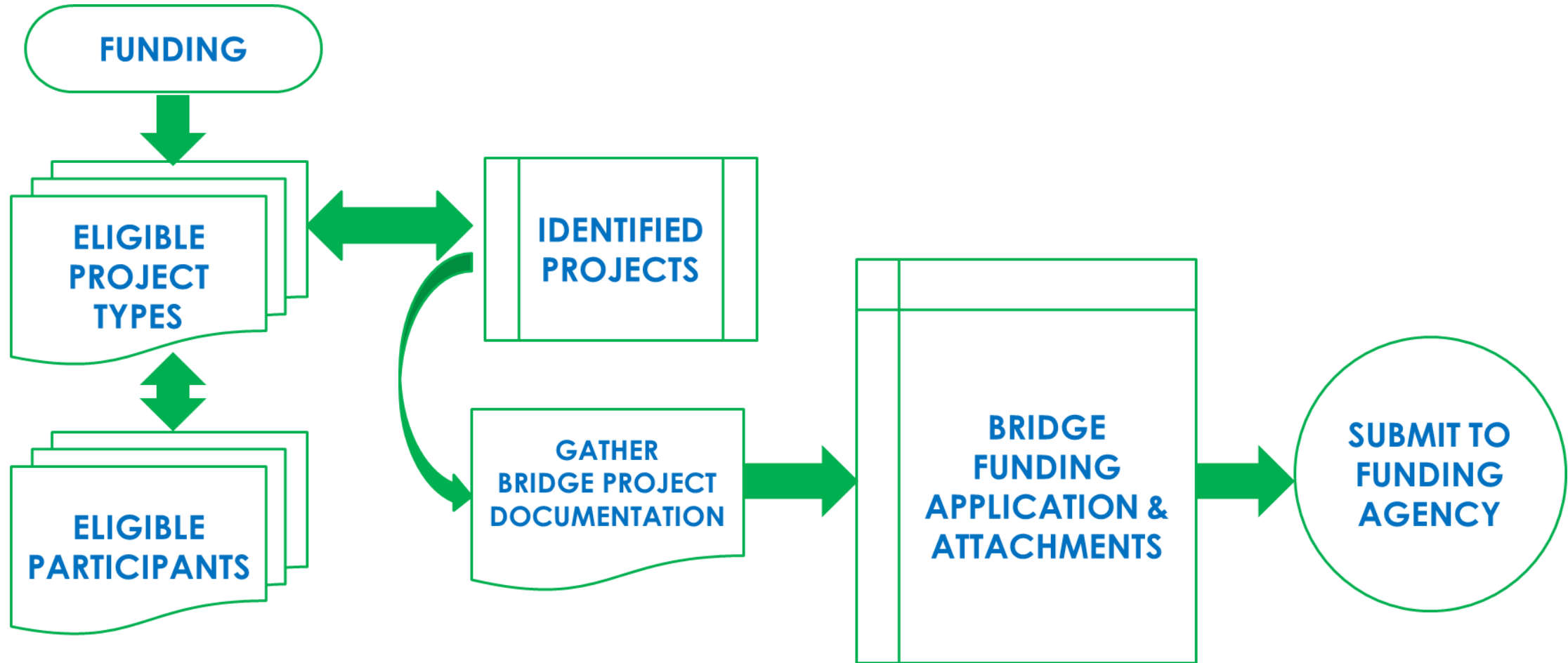
› As a BPM, I saw:

- Cracks
- Corrosion
- Spalling of concrete
- Scour
- Erosion
- Settlement
- Fatigue
- Deck deterioration
- Joint deterioration
- Bearing wear & deterioration



PROCESS ROADMAP – REHABILITATION OR REPLACEMENT







› Infrastructure Investment and Jobs Act

- Known as Bipartisan Infrastructure Law (BIL)
- Included more than \$1 billion from 2022-26 for the Tribal Transportation Bridge Program through dedicated set-asides from the Bridge Investment Program and Bridge Formula Program
- Provides resources to help tribes advance projects that consider the unique circumstances affecting community members' mobility needs
- **Expires September 2026**



› Other BIL funding

- Tribes are eligible to access other transportation programs focused on resilience, alternative fuel vehicle infrastructure, and repairing and replacing culverts.





› The Federal Highway Administration's (FHWA) Office of Federal Lands Highway, and the Bureau of Indian Affairs (BIA)

- Provides funding and support for addressing the transportation needs of 574 federally recognized Tribes



U.S. Department of Transportation
**Federal Highway
Administration**

Bureau of Indian Affairs



› Funds shall be used:

- **to carry out any planning, design, engineering, preconstruction, construction, and inspection** of new or replacement tribal transportation facility bridges;
- **to replace, rehabilitate, seismically retrofit, paint,** apply calcium magnesium acetate, sodium acetate/formate, or other environmentally acceptable, minimally corrosive anti-icing and deicing composition; or
- **to implement any countermeasure** for tribal transportation facility bridges classified as in **poor condition**, having a **low load capacity**, or needing **geometric improvements**, including multiple-pipe culverts



› What bridges are eligible?

- For **bridge replacement or rehabilitation**:
 - Have an opening of 20 feet or more;
 - be classified as a Tribal transportation facility (**NTTFI**);
 - be classified as in **poor condition**, have **low load capacity**, or need **geometric improvements**; and
 - be recorded in the National Bridge Inventory (**NBI**) maintained by the FHWA



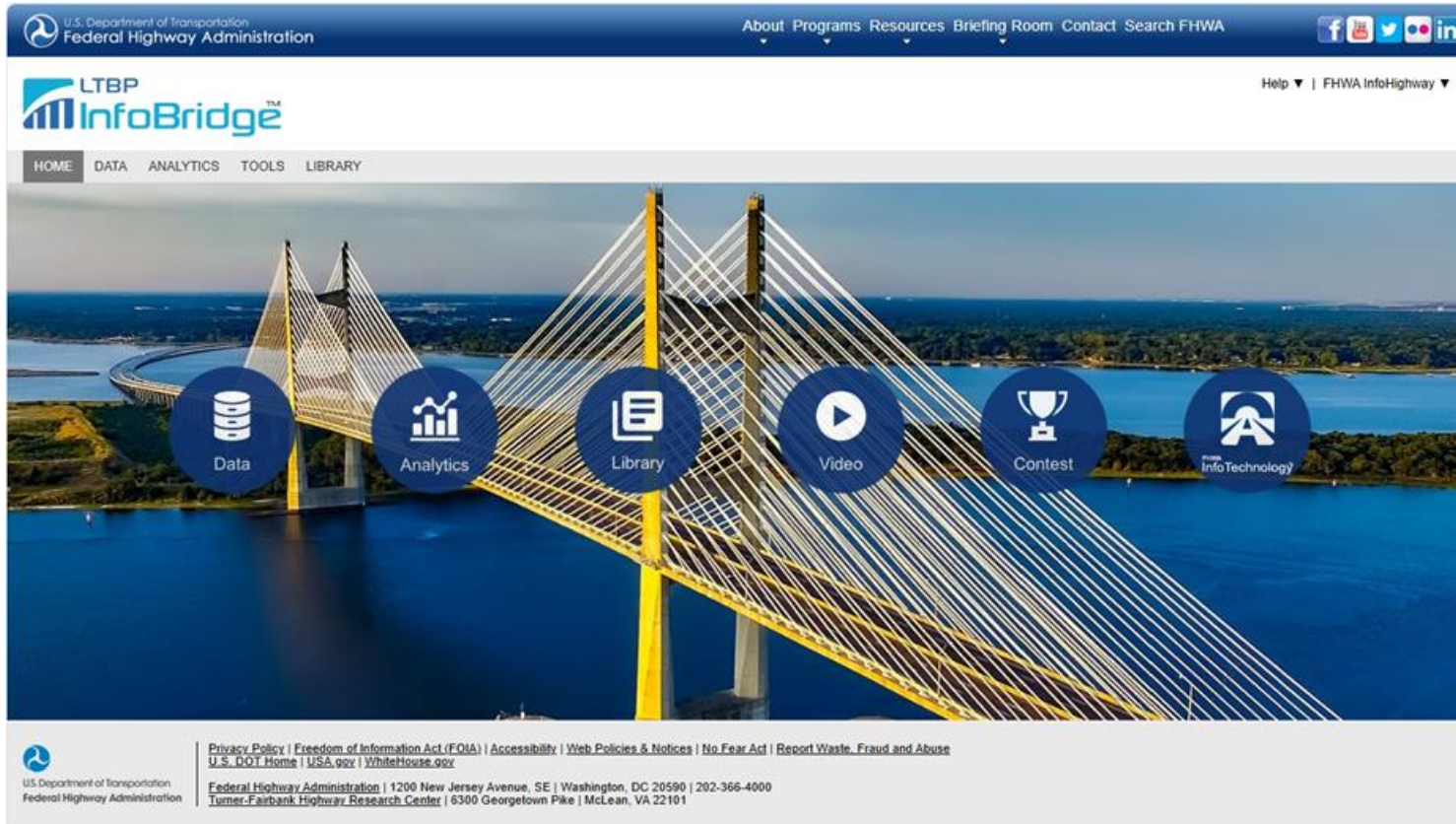


› What bridges are eligible?

- For **new bridge** construction:
 - Classified as a Tribal transportation facility (NTTFI);
 - a **public** bridge with opening of **20 feet or more**; and
 - recorded in the **NBI** after project completion



PROCESS ROADMAP – ELIGIBLE BRIDGES



› Is your bridge eligible?

- **Locate** eligible bridge projects for tribal transportation programs at **InfoBridge** (the National Bridge Inventory (**NBI**))
- <https://infobridge.fhwa.dot.gov/Data/SelectedBridges>

PROCESS ROADMAP – IDENTIFY BRIDGES



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Federal Highway Administration

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InfoBridge™: Data

Help

FHWA InfoHighway

HOME

DATA

ANALYTICS

TOOLS

LIBRARY

Select Data

2024 NBI Data

2020 NBI Data

All Data

Find Bridges

NBI

State Name (1)

Structure Number (8)

Features Intersected/Facility Carried (6A/7)

Owner Agency (22)

NHS (104)

Bridge Condition

Bridge Age

Main Span Material (43A)

Main Span Design (43B)

Scour Critical Bridges (113)

NBE

National Bridge Element Data

Additional Filters

Advanced Find

Map Find

Chart Find

LTBP

Map Description Evaluation

Bridge Selection and Data Presentation

About

Show Bridges

623,218 of 623,218 bridges

Advanced Find

Map Find

Chart Find

Clear

Find Options

Map Find

This feature displays the selected bridges on a map. Please use Google Chrome or Microsoft Edge for better user experience.

Map

Satellite

White

Search Location

Search

Close

Clear Map Find

Select

Map Controls

View 1 - 15 of 623,218

Page 1 of 41,548

85



› **What's in a complete bridge funding application?**

- The TTP Bridge Program certification checklist
- An FHWA-approved TTP Tribal Transportation Improvement Plan
- A description of the project scope of work
- A detailed cost estimate for PE
- The NBI data sheet (n/a for new bridge)
- An acknowledgment by the Tribe of the project specific funding requirements and that any excess funds will be returned to FHWA for further distribution



› For non-Bureau-owned and non-Tribal government-owned structures:

- The TTP Bridge Program certification checklist
- An FHWA approved TTP Tribal Transportation Improvement Program
- A description of the project scope of work
- A detailed cost estimate for PE
- The NBI data sheet (n/a for new bridge); and
- An acknowledgment by the Tribe of the project specific funding requirements and that any excess funds will be returned to FHWA for further distribution
- **A tribal resolution supporting the project**



› Review and Approval Process (FHWA-OTT & BIA)

- Applications are initially reviewed by either the FHWA Tribal Coordinator or the BIA Region, depending on the Tribe's program agreement.
- Applications **deemed complete** are added to a queue, and funding is provided through FHWA/Tribal Agreements or the Secretary of the Interior, subject to available funds.





› The Program Delivery Guide

- Either Bureau tribes or FHWA-Agreement tribes may refer to the Program Delivery Guide for more information on bridge rehab/replace funding & forms:
 - **Section XII** of the Guide provides an overview of the **TTP Bridge Program**.
 - The **Bridge Program Certification Checklist** can be found in the Delivery Guide.

Tribal Transportation Program Delivery Guide

Revised 03-17-2023

A Guide for Tribes

Tribal Transportation Program Delivery Guide

A Guide for Tribes with an FHWA
Tribal Transportation Program Agreement



March 17, 2023



› Application checklist

- Need assistance with the other required funding documents?
- Does the tribe utilize the services provided by the Bureau of Indian Affairs Division of Transportation (BIADOT)? There may be a different funding application checklist.
- **Contact me** if you need help!

Exhibit 12.3 – TTP Bridge Program Application Checklist

TTP Bridge Program Application Checklist

Bipartisan Infrastructure Law (BIL)

I. General Information:

Project Name: _____

Structure No. (from certification checklist): _____

Project scope of work:

II. Eligibility requirements (please checkmark boxes):

- ☐ Meets eligible activities as identified in 23 CFR Part 661.15?

For bridge replacement or rehabilitation:

- ☐ Has an opening of 20 feet or more?
- ☐ Classified as a Tribal transportation facility?
- ☐ Bridge in poor condition, have low load capacity, or need geometric improvements?
- ☐ Bridge recorded in the NBI maintained by the FHWA?

For new bridge construction:

- ☐ Classified as a Tribal transportation facility?
- ☐ Is a public bridge with opening of 20 feet or more?
- ☐ Is the bridge to be recorded in the NBI after project completion?



QUESTIONS?





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