Infrastructure Week 2026 Webinar

How Steel Bridges Maximize Transportation Investment

How Steel Bridges Maximize Transportation Investment

Dan Snyder

Vice President, Construction at AISI

Director of the SSSBA

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ESTABLISHED 2007

Short Span Steel Bridge Alliance

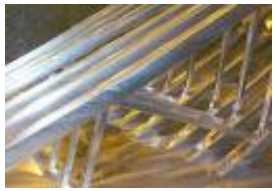
SHORT SPAN STEEL BRIDGE ALLIANCE™

A group of **bridge** and **buried soil structure** industry leaders who have joined together to provide **educational information** on the design and construction of short span steel bridges in installations up to **140 feet in length**.

SSSBA Membership – 115+ Members

Producers

Fasteners



Coaters

Service Centers

Fabricators

SHORT SPAN STEEL BRIDGE ALLIANCE™

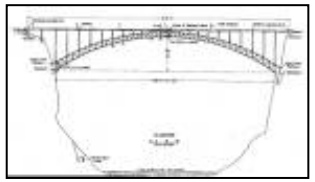
American Galvanizers Association

NCSPA

American Iron and Steel Institute

NSBA

Trade Organizations



Design Firms

Contractors

NACE International Association of Corrosion Engineers

Bridge Owners

Universities

Chair: Myrissa Welch, SSAB

Providing Economical Solutions (up to 140’)

Buried Bridges

Rolled Beam & Plate Girders

Press-Brake-Formed Tub Girders

Truss Bridges

What Do We Provide?

- Education
  - Workshops, Webinars, Newsletter
- Technical Resources
  - Standards, best practices, case studies
- Simple Design Tools (eSPAN140, eBEAM140)
- Project Assistance
- Find a Supplier
- Networking / SSSBA Semi-Annual Meeting

Today's Program

- Brett Smith, Senior Director of Government Relations at the American Iron and Steel Institute

- Michael Barker, Ph.D., Professor, Civil & Architectural Engineering at the University of Wyoming

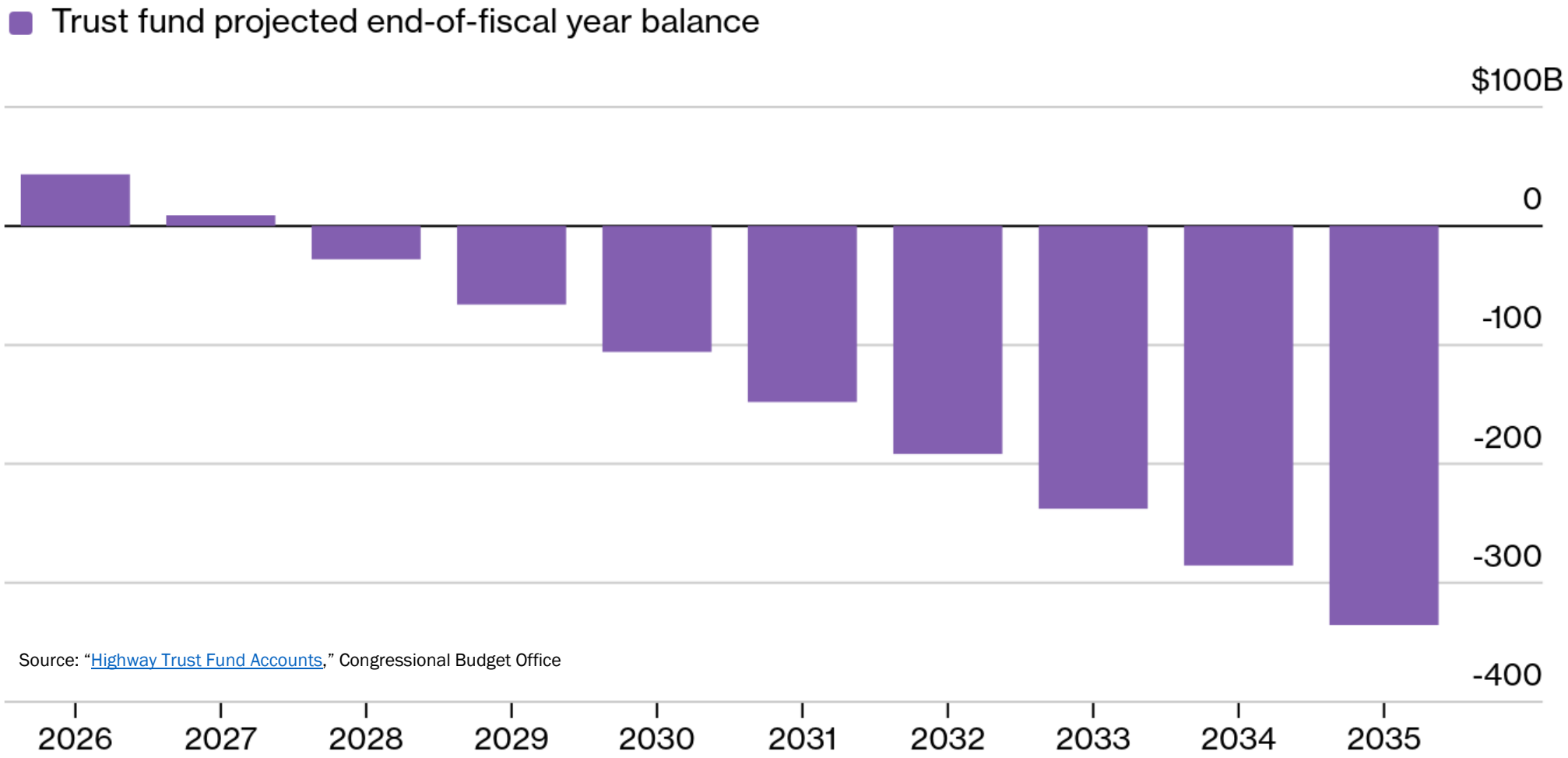
- John Krzywicki, Marketing Director at the American Galvanizers Association

Key Federal Infrastructure Policy Issues

Surface Transportation Reauthorization Legislation

- DOT highway/bridge/transit program authorities expire Oct 1, 2026
  - Need for significant additional funding to address expected insolvency of Highway Trust Fund
    - Funding options: general fund transfer, increase gas/diesel tax, usage fees, new fees for EVs, or increased tolling
  - Opportunity for permitting reform: streamline project delivery
- Maintain strong DOT Buy America requirements for federal procurement of iron and steel products is imperative
  - Existing Build America, Buy America (BABA) statutory programs
  - AISI working to maintain bipartisan support for Buy America

Insolvency of Highway Trust Fund (HTF)



Source: "Highway Trust Fund Accounts," Congressional Budget Office

House T/I Committee "BUILD America 250 Act"

- Bipartisan 5-year, $580 billion surface reauthorization bill
  - House Transportation and Infrastructure Committee Chairman Sam Graves (R-MO) and Ranking Member Rick Larsen (D-WA)
  - Committee consideration tomorrow, May 21st at 10am
- $45 billion in total bridge formula funds - 12% over existing law
  - 25% of funds required for local, off-system bridges
- Establishes annual fees on electric vehicles (EVs) and hybrids
- Permitting reforms to expedite delivery of key projects
- Maintain strong Buy America requirements for steel materials

Thank You / For More Information

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YouTube: www.youtube.com/aisisteel

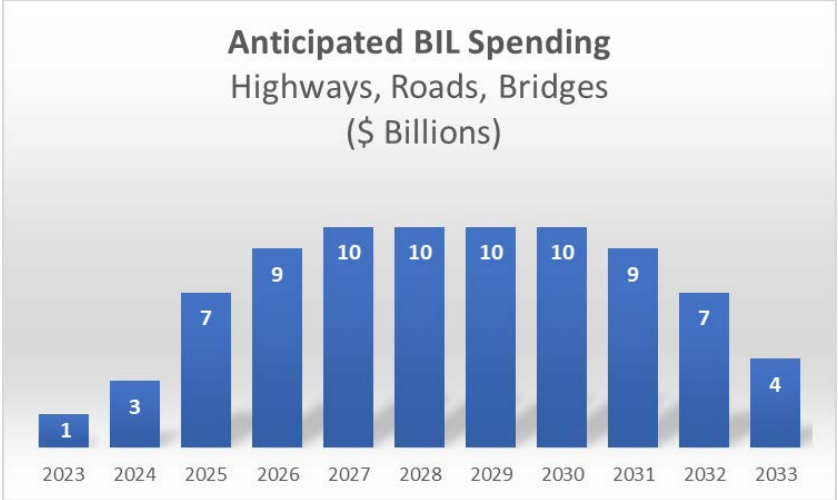
Steel Bridges & Resilience: Engineering the Future of Infrastructure

United For Infrastructure
How Steel Bridges Maximize Transportation Investment
May 20, 2026

Michael Barker, PE
University of Wyoming
Short Span Steel Bridge Alliance

Resiliency – Infrastructure

- Bipartisan Infrastructure Law
  - $39.5 billion over 5 years to repair or replace as many as 15,000 bridges
  - Minimum 15% must be used to build off-system bridges



* Source: McKinsey Insights

- PROTECT ($7.2 billion)
  - BIL establishes the Promoting Resilient Operations for Transformative, Efficient, and Cost-Saving Transportation (PROTECT) Formula Program
    - Make surface transportation more resilient to natural hazards (support of planning activities, resilience improvements, community resilience and evacuation routes, and at-risk coastal infrastructure).

Resiliency

U.S. Department of Transportation
Federal Highway Administration

Challenge

Because of deterioration, individual bridge components and systems such as bearings, decks, joints, columns, and girders require frequent and costly inspections, maintenance, and repairs that are often difficult to conduct. These activities cause lane closures that create congestion and impact safety for road workers and motorists. Bridge engineers need improved design options so they can deliver bridges that are operational for 100 years or more.

What is a Resilient Bridge?

Learn more - https://www.shortspansteelbridges.org/steel-bridges-beyond-100-years

- Service Life & Life Cycle Performance – New Target is 100 Years Life
- Robustness for Unexpected Demands: Seismic, Natural, Man-Made
- Inspectable & Repairable
- Rehabilitation & Strengthening
- Sustainable

Resilience - Service Life & Life Cycle Performance

1000's of Steel Bridges Over 100 Years Old

Steel Bridge Longevity

- **Practical and Effective Design**
- **Durable Materials**
- **Inspection, Maintenance & Repair**
- **Corrosion Protective Systems – Steel Chemistry and Protective Coatings**

Service Life & Life Cycle Performance

As an Example: 95 ft Simple Span, 5 Plate Girders

Weathering Steel with Painted Ends

Integral Abutments – No Joints

Bolted Diaphragms/Cross-Frames - Fatigue

How Long Will This Bridge Last?

Steel Bridge Longevity

- Practical and Effective Design
- Durable Materials
- Inspection, Maintenance & Repair
- Corrosion Protective Systems – Steel Chemistry and Protective Coatings

Resilience - Robustness for Unexpected Demands

Steel bridge robustness is a bridge's ability to withstand damage and maintain its structural integrity, especially in the face of unexpected events or local failures: **Seismic, Natural, Man-Made**

- **Ductility**

Steel can deform significantly without breaking

- **Redundancy**

Alternate load paths and ability for load redistribution

- **Lightweight Yet Strong**

Steel structures are lighter, reducing seismic forces

- **Bolted and Welded Connections**

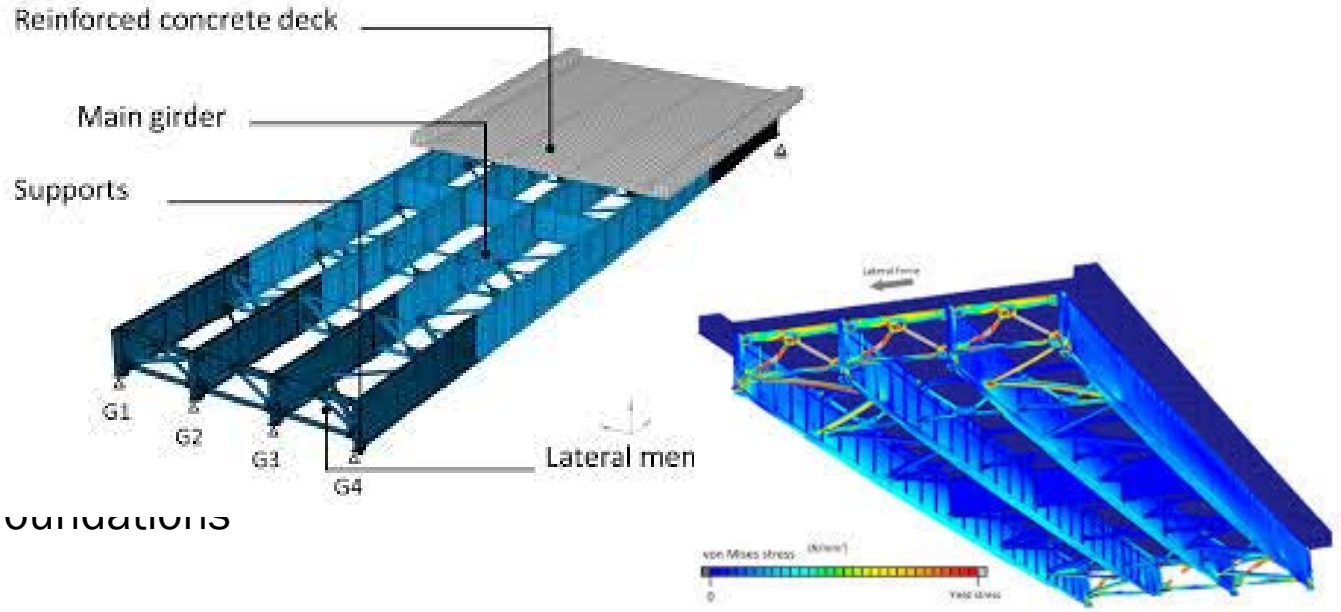
Steel bridges use high-strength bolted or welded joints

- **Ease of Retrofitting**

Steel bridges can be easily repaired, rehabilitated & retrofitted

Robustness for Unexpected Demands

Seismic: Survivability & Service



High Ductility
- Energy Absorption & Dissipation
- Prevents Brittle Fracture and Collapse

Lighter Self-Weight
- Smaller Inertial Forces
- Reduces Demand on Abutments, Piers & Foundations

Strong & Reliable Connections
- Bolted/Welded
- Designed for Seismic Distortions

Redundancy
- Alternate Load Paths
- Redistribution of Force Effects

Kobe, Japan (1995): Many modern steel bridges survived with repairable damage.

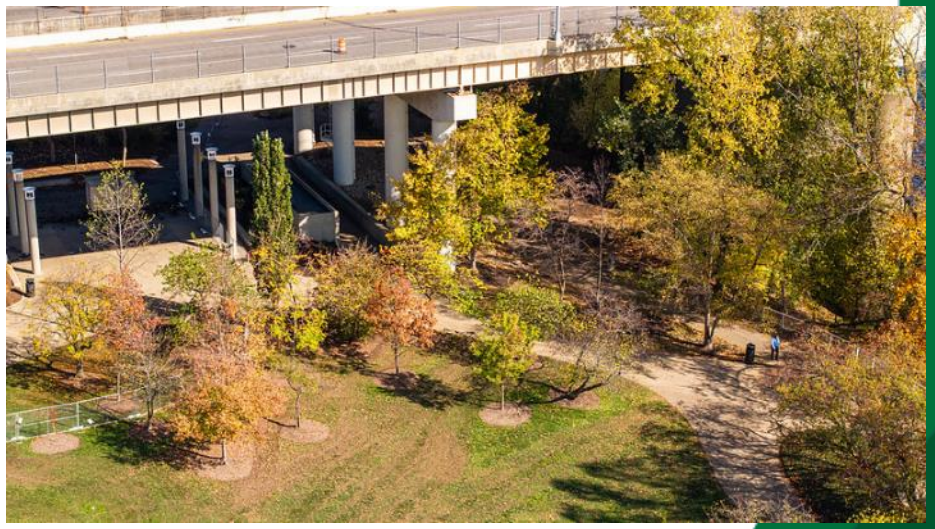
Northridge, USA (1994): Minor local damage, many bridges remained operational.

Chile (2010): Steel bridges demonstrated strong resilience and quick post-quake recovery.

Robustness for Unexpected Demands

Man-Made: Arson, Cincinnati, OH (https://www.aisc.org/modernsteel/news/2025/april/emergency-bridge-repair–daniel-carter-beard-big-mac-bridge-i-471/)

"Big Mac Bridge" Southbound Lanes Reopen After 100-Day Emergency Repair Effort



OVER A DOZEN COMPANIES COLLABORATED CLOSELY WITH THE OHIO DEPARTMENT OF TRANSPORTATION TO HELP RESTORE THE DAMAGED STRUCTURE AHEAD OF THE EXPEDITED SCHEDULE

Resilience - Inspectable & Repairable

Structural Steel Bridge Damage or Deterioration

- Overload
- High or wide vehicle collision
- Fire
- Structural vandalism
- Fatigue
- Corrosion

Accessibility - Exposed structural components

Ease of Nondestructive Testing (NDT)

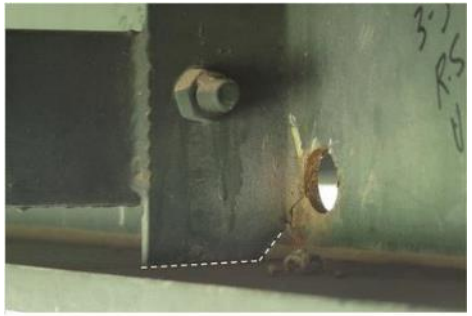
Steel is compatible with NDT techniques

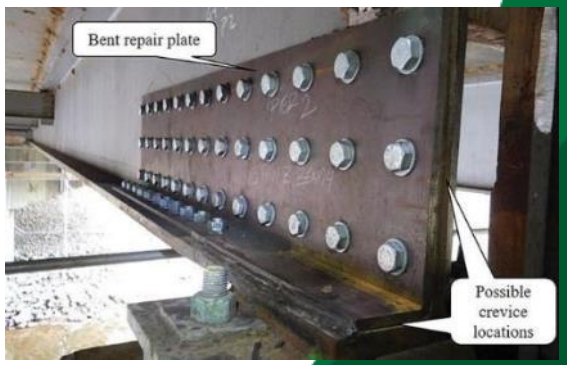
Repairable Characteristics of Steel Bridges

Modular Repairs of Damaged sections

Fatigue Management Fatigue cracks can be fixed

Corrosion Repair repainted or metalized





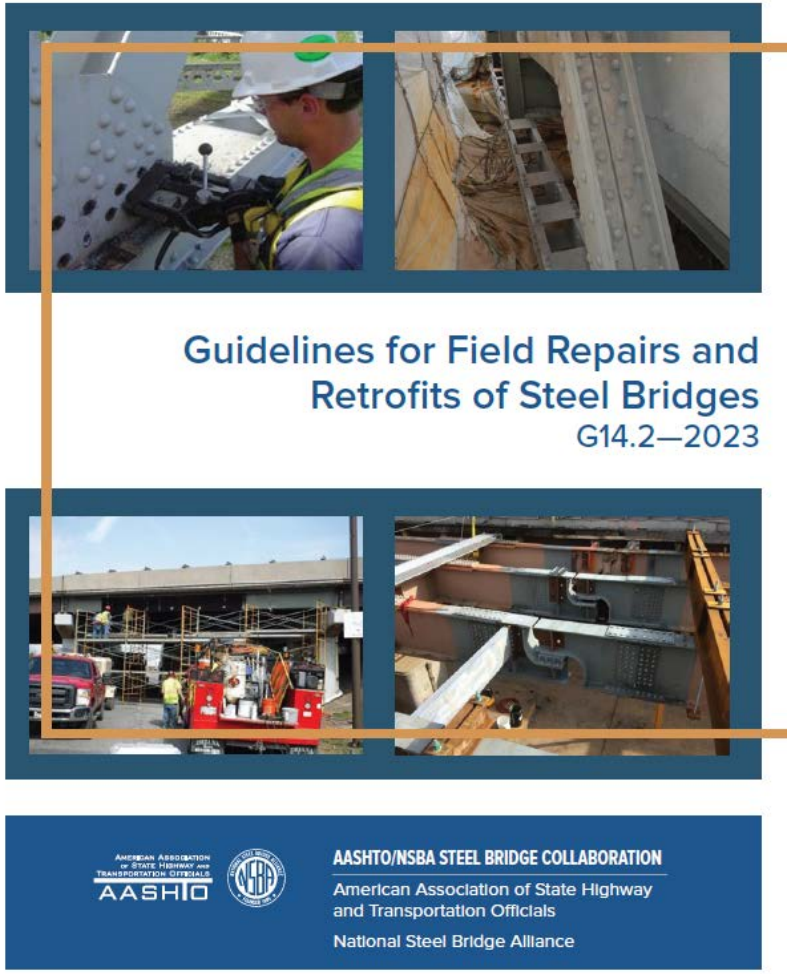
Inspectable & Repairable

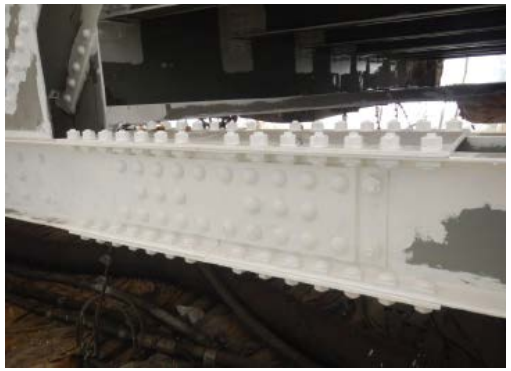
Inspectable

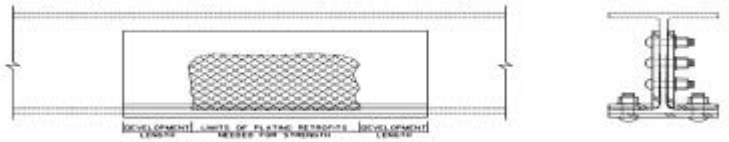
Inspectable & Repairable

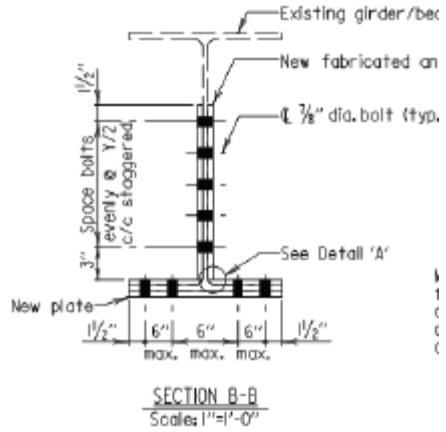
Repairable

https://www.aisc.org/globalassets/nsba/aashto-nsba-collab-docs/g14.2-2023-field-repairs-and-retrofits-of-steel-bridges.pdf









Inspectable & Repairable

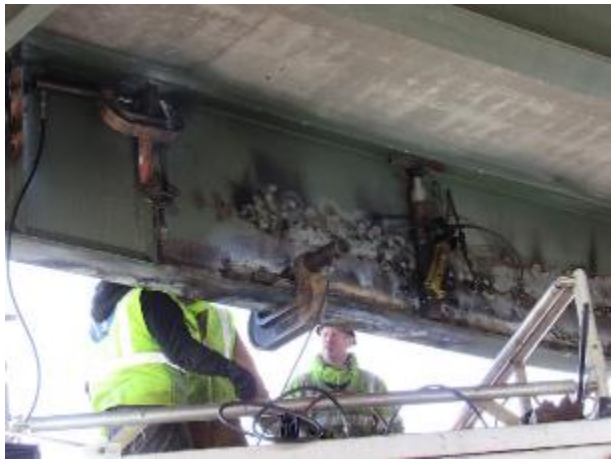
Overheight Bridge Strikes:
The National Highway Traffic Safety Administration reports an average of 15,000 such incidents a year

Repairable - Heat Straightening, Kansas 2018

Damaged steel bridge girders can be repaired

https://kansastransportation.blogspot.com/2019/02/hot-news-damaged-steel-bridge-girders.html

Distortions were deemed repairable
Heat straightening process to repair
Clamps and hydraulic jacks used to help influence the return of the steel to its former shape
Seven days of the heat straightening

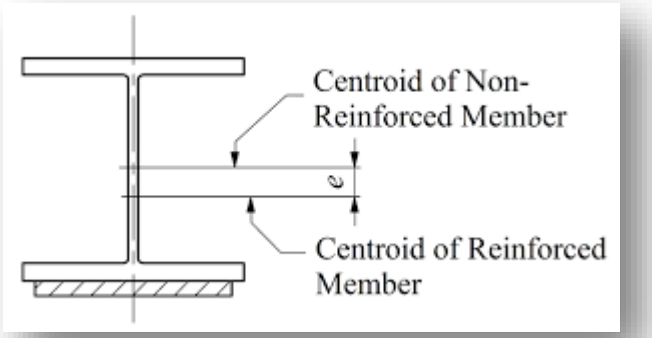


Cool Oklahoma State Video at https://www.aisc.org/nsba/design-and-estimation-resources/preservation-and-repairability

Resilience - Rehabilitation & Strengthening

Rehabilitation & Strengthening

- Extend service life
- Restore or increase load capacity
- Prevent or mitigate corrosion and fatigue
- Upgrade for seismic or traffic demands
- Improve safety and user experience

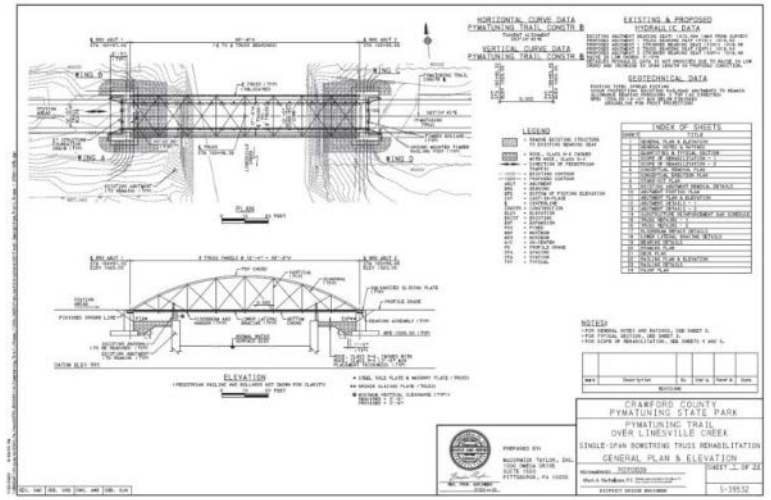


Rehabilitation & Strengthening

Rehabilitation of Bowstring Truss from 1876

https://www.shortspansteelbridges.org/historic-steel-truss-bridge-rehabilitated/

Relocation and Repurposing
- Removed
- Refurbished
- Reassembled, and
- Relocated



Original
- Pedestrians
- Horse Traffic
- Later Passenger Vehicles

Now
- Multipurpose
- Trail Bridge

Rehabilitation & Strengthening

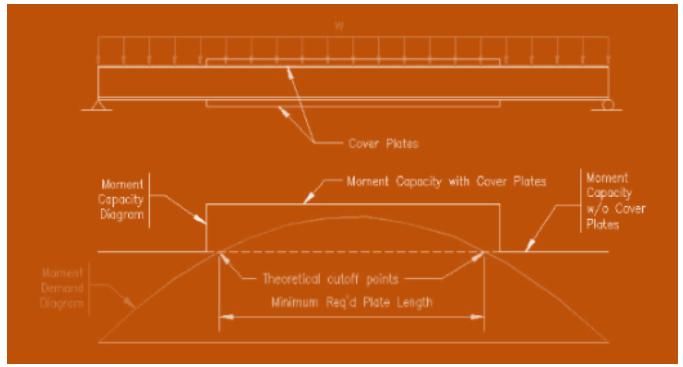
Strengthening

Why?

- Traffic Loads/Postings
- Corrosion Reduced Capacity

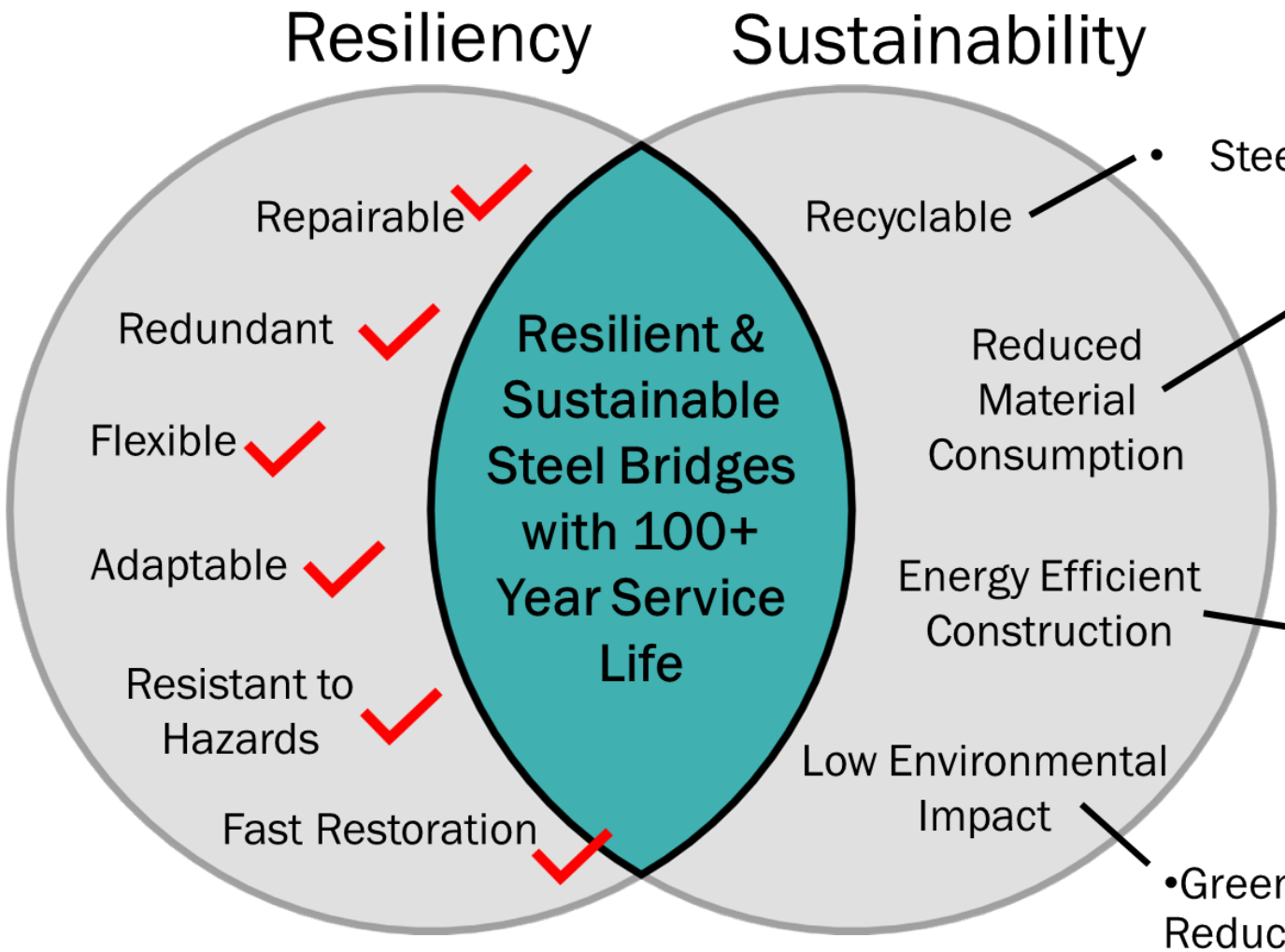
How?

- Adding Steel (Flanges/Webs)
- Replace Deteriorated Members
- Add Composite Action
- Reduce Dead Loads
- Post-Tensioning



Resilience - Sustainable

Crossover Between Resiliency & Sustainability



- Steel is North America's #1 Recycled Material
- High Strength to Weight Ratio
- Optimal Weight while Maintaining Strength, Durability & Safety
- Recycled Steel Conserves Energy, enough to power 18 million homes
- Steel's Energy Use Reduced 33% Since 1990
- Greenhouse Gas Emissions Reduced by 45% since 1975

Considering Sustainability for Rural Bridge Design

Michael Barker, PE, University of Wyoming, Director of Education Short Span Steel Bridge Alliance

Objectives of the Study

- ❑ Evaluate the Life Cycle Sustainability of Two Functionally Equivalent Short Span Steel and Concrete Bridges
- ❑ Develop Procedure to Consider Sustainability in Design Decisions

Bridges Analyzed

- Steel: Seltice-Warner
  - Oakesdale, Washington-Whitman County
  - 35'-8" long, 28' wide
- Concrete: Thornton Depot
  - Thornton, Washington-Whitman County
  - 34' long, 32' wide

Sustainability Criteria

- Equivalent Carbon Footprint
- Energy Consumption
- Waste Stream & Recyclability
- Life Cycle Costs

Life Cycle Analysis:

- Superstructure
- Construction
- Maintenance
- Demolition

Steel & Concrete Bridge Results

Bridge	Emissions (kg CO_2e)	Energy Consumed (MJ)	% Recycled	Life Cycle Cost
Steel	47,284	667,459	98.00%	$95,44.51
Concrete	59,726	725,780	80.19%	$117,650.24

Steel Bridge:

✓ Less Carbon ✓ Less Energy & Waste ✓ Lower Life Cycle Costs

Sustainable Design: Society Willing to Pay for Benefits

Suppose Society is Willing to Pay:

$0.20 per kg of CO_2e Reduced
$0.04 per MJ of Energy Reduced
$50 per ton of Landfill Reduced

Equivalent Cost

$=[Initial\ or\ Life\ Cycle\ Cost]$
$-[Reduced\ kg\ CO_2e\ ] \times (\$0.20/kg\ CO_2e)$
$-[Reduced\ MJ] \times \$0.04/MJ$
$-[Reduced\ Landfill\ tons] \times (\$50/ton)$

Alternative Designs

Bridge	Initial or Life Cycle Cost	Initial or Life Cycle Total			Reduction			Cost Benefit			Total Cost Benefit	**Equivalent Cost**
		kg CO_2e	MJ Consumed	Landfill (tons)	kg CO_2e	MJ Consumed	Landfill (tons)	kg CO_2e	MJ Consumed	Landfill (tons)		
Alt 1	$100,000	59,726	725,780	21	0	0	0	$0	$0	$0	$0	**$100,000**
Alt 2	$105,000	70,000	720,000	10	-10,274	5,780	11	-$2,055	$231	$540	-$1,284	**$106,284**
Alt 3	$105,000	47,284	667,459	1	12,442	58,321	20	$2,488	$2,333	$1,000	$5,821	**$99,179**
Alt 4	$107,000	45,000	664000	10	14,726	61,780	11	$2,945	$2,471	$540	$5,956	**$101,044**
Alt 5	$107,000	44,000	750,000	1	15,726	-24,220	20	$3,145	-$969	$1,000	$3,176	**$103,824**

1. Alternative 1 has Lowest Initial or Life Cycle Cost
2. Alt 3 has lowest Equivalent Cost at $99,179 (Initial Cost – Total Cost Benefit)
3. Alt 3 costs $5,000 more, but has a Societal Accepted Rate of Return of $5,821
4. This is Incremental Benefit Cost Analysis with Monetized Sustainability Benefits
5. Owner or Society Determines the Acceptable Cost for Sustainability Benefits
6. Owners Understand Equivalent Cost: Compare Similar to Initial Costs or Life Cycle Costs

Report on ShortSpanSteelBridges.org

Take-Aways

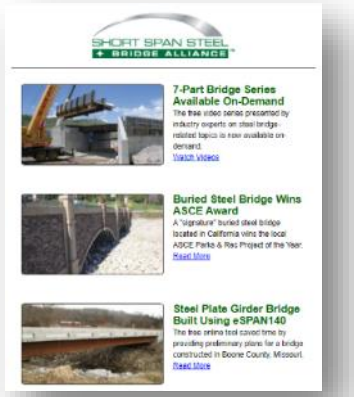
Rural Steel Bridges can have Cost & Sustainability Benefits
Sustainable Design can Consider Societal Monetized Sustainability Benefits

Steel Advantages for Resiliency

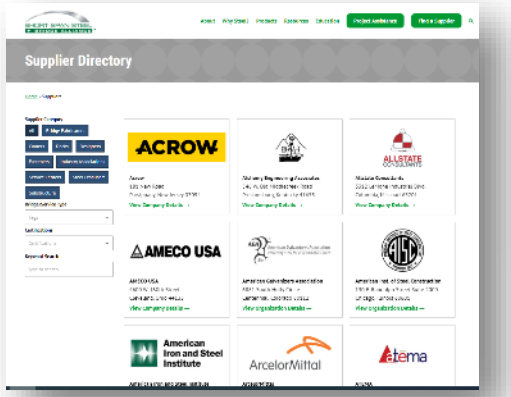
- **Long Service Life**
  - Thousands of 100-year-old steel bridges still in service.
  - Innovative new systems have life expectancy of 100+ years.
- **Robustness, Strength and Durability**
  - High strength-to-weight ratios, which allows steel bridges to resist structural damage.
  - Ductile, Redundant and Robust Structure
- **Ease of Inspection/Repair**
  - Signs of problems are clearly apparent at an early stage, making steel bridges easier to inspect and repair.
- **Rehabilitation & Strengthening for Increased Loads**
  - Quickly rehabilitate & strengthen a steel bridge, while keeping the bridge in service with minimal traffic disruption.
- **Sustainability**

5 Ways to Keep Learning About Steel Bridges

1. Subscribe to the Weekly Newsletter



2. Find a Supplier



3. Design a Bridge in 5-Minutes

eSPAN140™

eBEAM140

4. Receive Free Project Assistance

5. Schedule a Workshop/Webinar

www.ShortSpanSteelBridges.org

Questions? Dan Snyder, Director, SSSBA, dsnyder@steel.org, (301) 367-6179

Website: ShortSpanSteelBridges.org

Twitter: @ShortSpanSteel

Facebook: Short Span Steel Bridge Alliance

Extending the Life of Steel Bridges with Durability Solutions

United For Infrastructure

How Steel Bridges Maximize Transportation Investment

May 20, 2026

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American Galvanizers Association
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www.shortspansteelbridges.org
galvanizeit.org

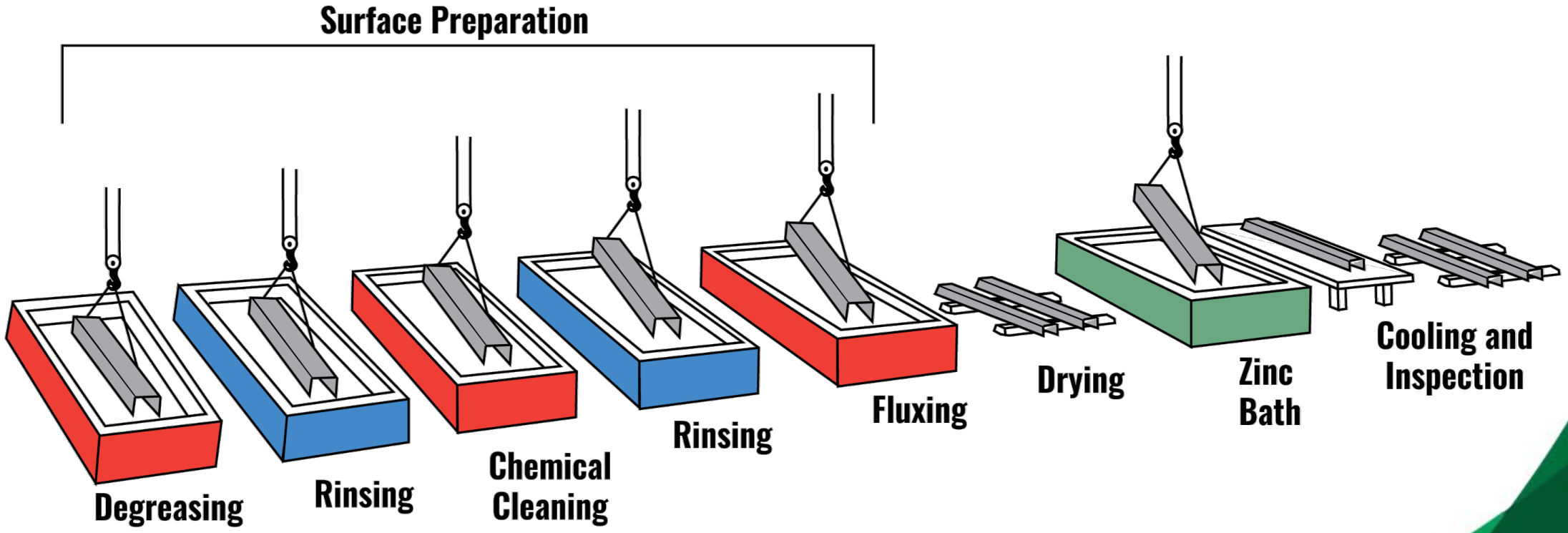
Steel Bridge Durability Systems

- Hot-Dip Galvanized (HDG) Steel
- Uncoated Weathering Steel (UWS)
- Protective Coating Systems (Paint)
- Metallizing - Thermal Spray Zinc (TSZ)
- Duplex Systems
  - HDG/TSZ + Protective Coating

Tait Road Bridge Over Otter Creek
Coolspring Township, PA | 2024
62 tons – Beams, channel and grid deck

Hot-Dip Galvanizing (HDG) Overview - Process

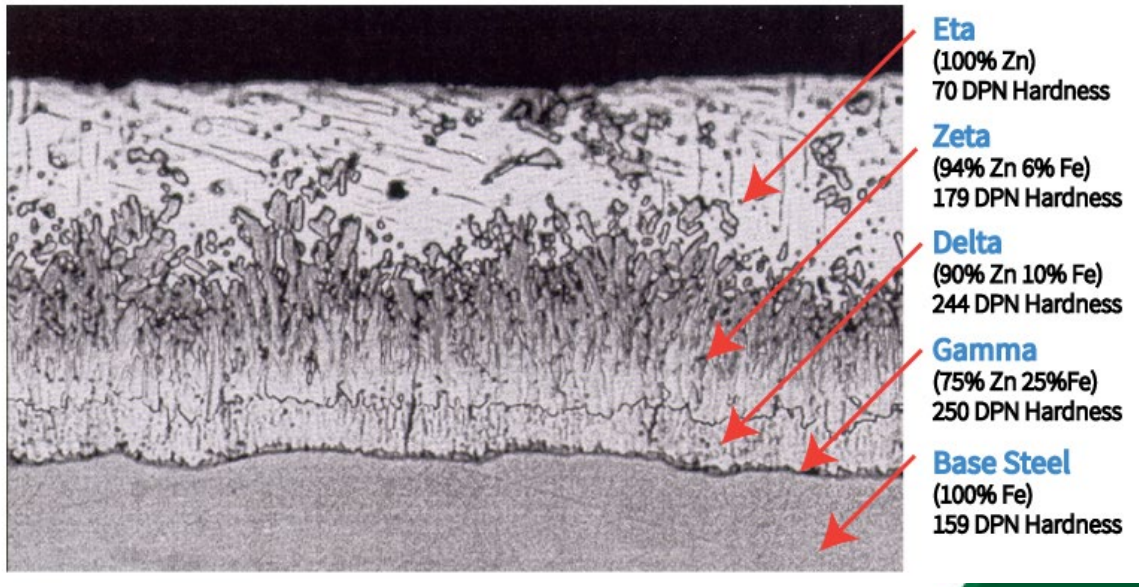
- Zinc coating used to protect steel for over 170 years
- Steel is immersed in a series of tanks to clean and then galvanize in a molten zinc bath (830 – 850 ^{0}F)



Galvanizing Advantages: Longevity & Durability

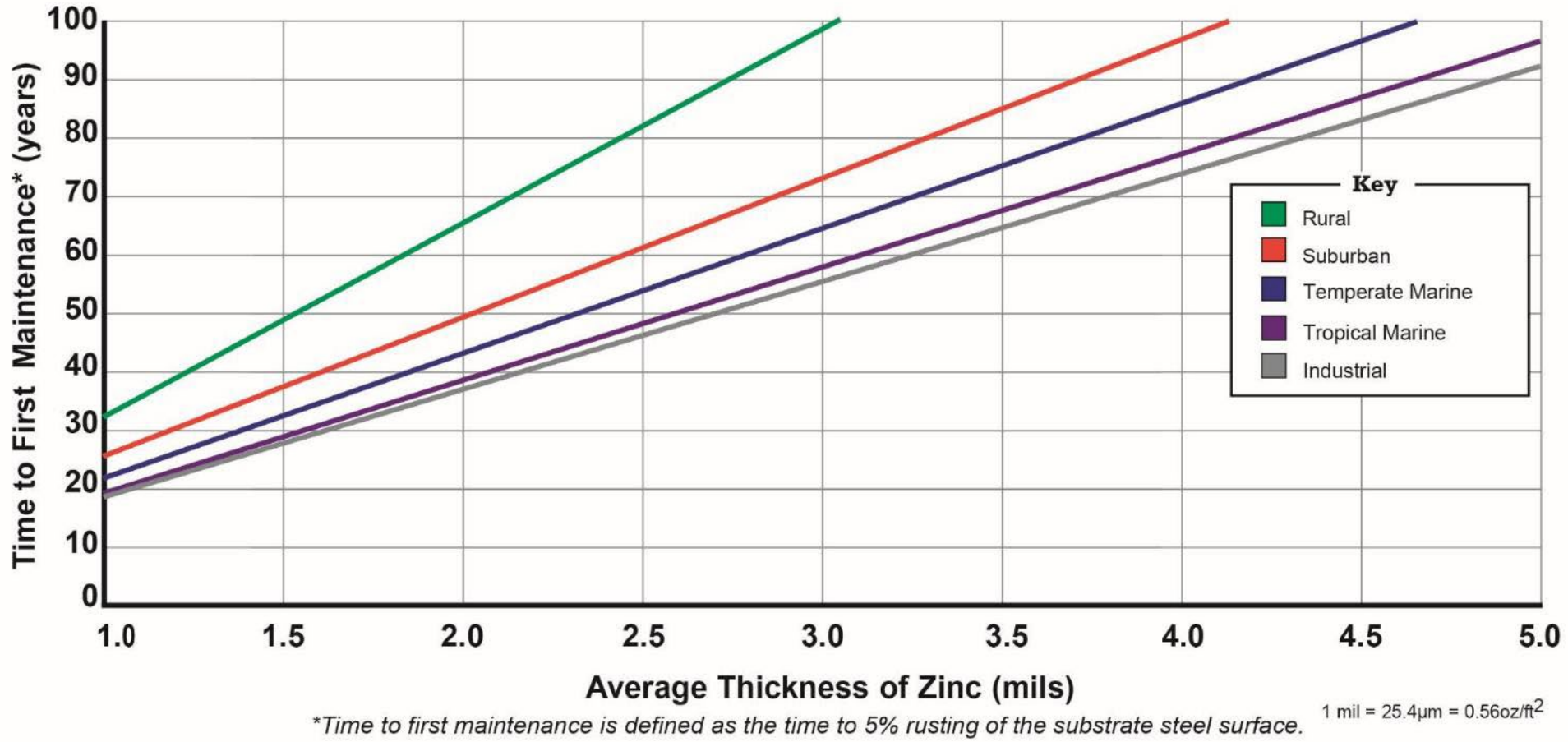
- Zinc coating provides three types of corrosion protection:
  1. Barrier
     - Isolates steel from environment / atmosphere
  2. Cathodic
     - Zinc will sacrificially corrode to protect underlying steel
  3. Zinc Patina
     - Protective layer of corrosion products
     - Develops naturally as HDG steel weathers

- Zinc metallurgically-bonded to steel
  - Bond strength: 3,600 psi
  - Intermetallic (Zn-Fe) layers harder than the base steel
  - Good abrasion & impact resistance



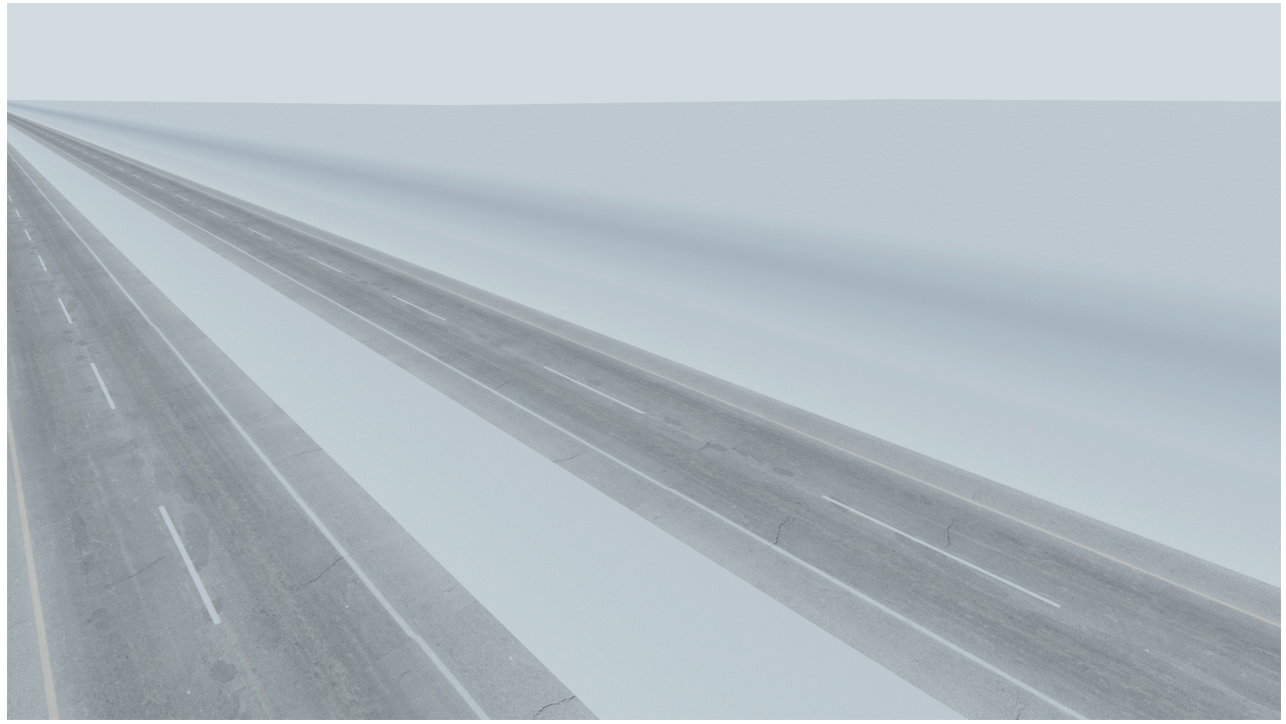
Galvanizing Advantages: Low Maintenance

- Time to First Maintenance Chart: Derived from the Zinc Coating Life Predictor



Galvanizing Advantages: Availability & Versatility

- Galvanizers located throughout North America
  - 150 Plants in the United States
  - Avg kettle size: 40’ L x 5.5’ W x 8’ D
  - Many 50-60’ L
  - Progressive dipping for pieces larger than kettle
  - Galvanizer Locations & Kettle Sizes
- Factory-controlled, quick turnaround
  - No humidity requirements or curing
- Variety of products
  - Intricate pieces, large structural, fasteners and small parts



https://markets.galvanizeit.org/bridges-highways

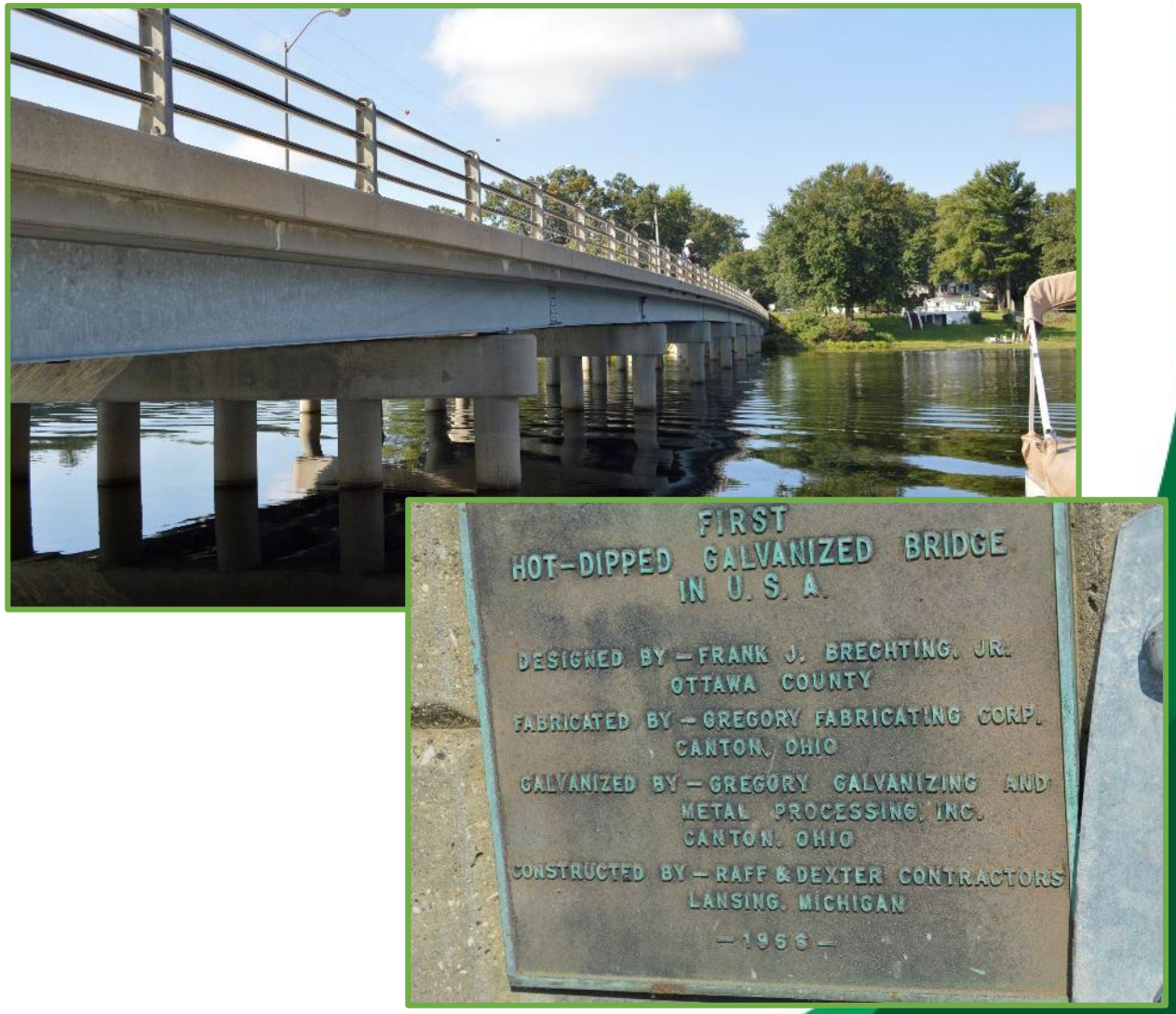
Galvanizing Challenges: Size & Shape Limitations

- Modular Design to Fit the Kettle
  - Connect after galvanizing
- Progressive Dipping
  - Increases kettle L or D constraints
- Zinc Metallizing + HDG
  - Progressive dip + metallize mid area
  - Metallize oversized parts, galvanize anything that will fit in the kettle
  - Similar appearance
  - No dissimilar metals
- Potential for warpage/distortion of non-symmetrical and/or cambered designs
  - Can be mitigated with design practices (i.e. single-dip, stiffners, etc.)

Progressive Dipping: 63 ft Bridge Girder
Jesup South Bridge
Buchanan County, Iowa | 2013

Galvanizing Case Studies: Stearns Bayou Bridge

- Built in 1966, Stearns Bayou Bridge in Michigan is the first hot-dip galvanized bridge in the U.S.
- Based on an inspection in 2017, the galvanized steel components on the bridge are not expected to require any maintenance for at least another 70 years - easily surpassing the 100-year bridge life desired today



Galvanizing / AGA Resources

- Technical Assistance/Expertise
  - galvanizeit.org
  - aga@galvanizeit.org; 720.554.0900
- Dr. Galv KnowledgeBase
  - galvanizeit.org/knowledgebase
- AGA Project Gallery
  - galvanizeit.org/project-gallery
- GI News - Monthly Newsletter
  - galvanizeit.org/newsletter
- Galvanized Steel Studies Videos
  - www.youtube.com/c/AGAGalvanizeIt

USACE Fort Wingate Bridge Replacement
Gallup, NM | 2022
52 tons – Press-brake-formed steel tub girder: 8 beams weighing 12,600 lbs. each

Uncoated Weathering Steel (UWS) - Overview

- A corrosion resistant steel that initially corrodes to form a protective patina
  - Originally developed as a high-strength steel
  - Later realized benefits of copper additive to weathering
- Corrosion products form a stable layer adhered to the steel
  - Known as the rust patina
  - Limits further oxidation
- Also known as COR-TEN Steel

From ASTM A709 - 2018

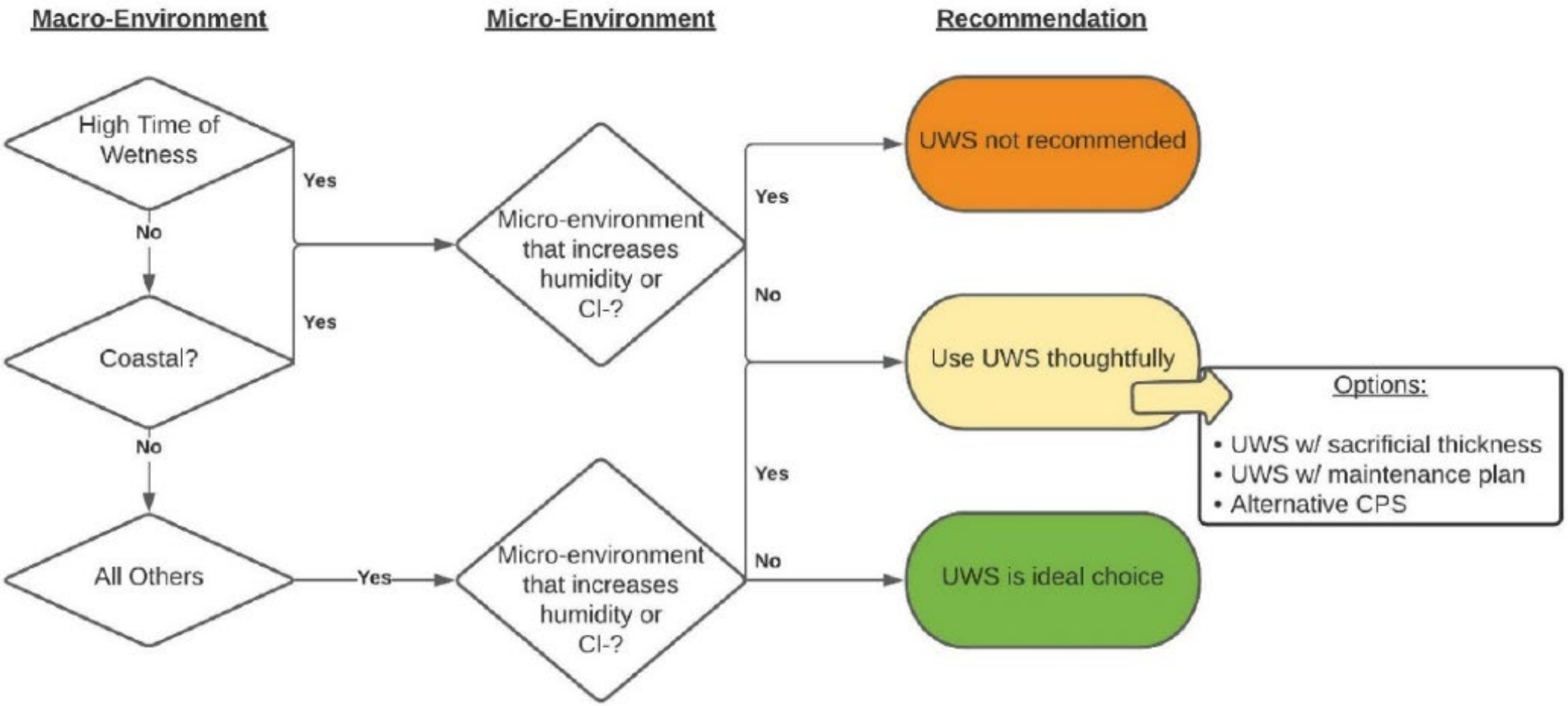
Grade	Yield Strength (ksi)
36	36
50	50
50S	50
50W	50
HPS 50W	50
HPS 70W	70
HPS 100W	100
50CR	50
QST 50	50
QST 50S	50
QST 65	65
QST 70	70

Grade designations ending in "W" are weathering grades

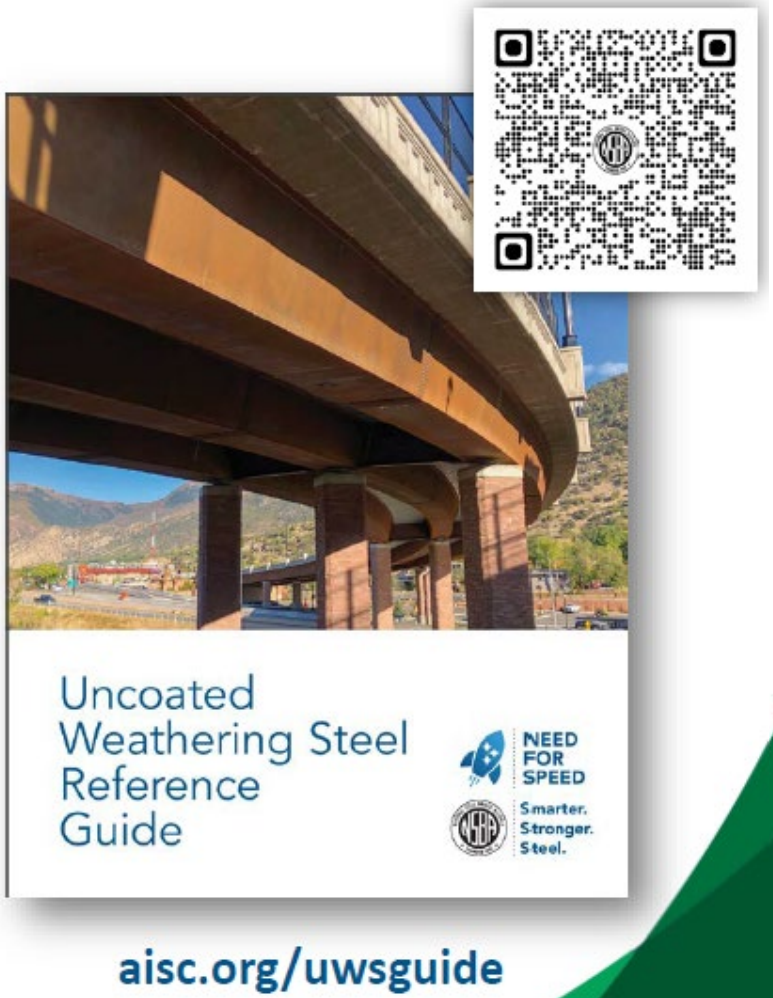
Uncoated Weathering Steel (UWS) Advantages

- Cost-effective solution for initial construction
  - No coatings applied in the fabrication shop
- Reduced future maintenance costs
  - No re-application of coatings in the field
- Aesthetics
  - Natural appearance
- Needs to be used in appropriate environment

UWS Challenges: When to Use



Uncoated Weathering Steel (UWS) Reference Guide



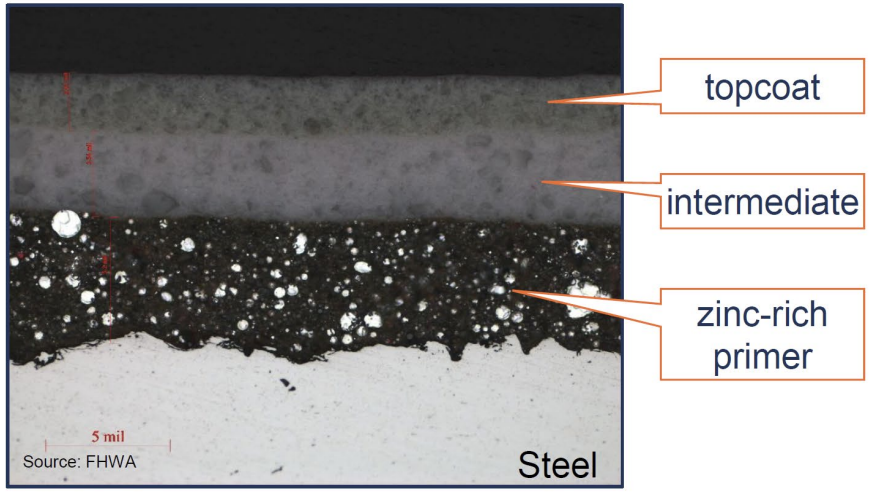
aisc.org/uwsguide

Liquid Coatings (Paint) - Overview

- Multi-Coat paint layer systems with primary purpose of corrosion protection
- Secondary purpose of aesthetic color selection
- Common Coating Systems:
  - Traditional 3-Coat Systems
    - Inorganic zinc rich paint top coated with epoxy/polyurethane paint
  - High Performance 2-Coat System
    - Multi-Coat Epoxy Paint or Polyurethane
  - Single Coat Inorganic Zinc Rich System
- Chapter 19 of the NSBA Steel Bridge Design Handbook
  - https://www.aisc.org/nsba/design-and-estimation-resources/steel-bridge-design-handbook/

Liquid Coatings Advantages

- Versatile
  - Shop or field application
  - Single coat or multi-coat systems designed for service environment
- Complimentary
  - Compatible with each technology
  - Used to extend service life and improve aesthetics
- Tested
  - Highly specified product and performance criteria
  - Rigorous test methodologies
  - Required re-testing
  - Project level acceptance testing



Liquid Coatings Advantages

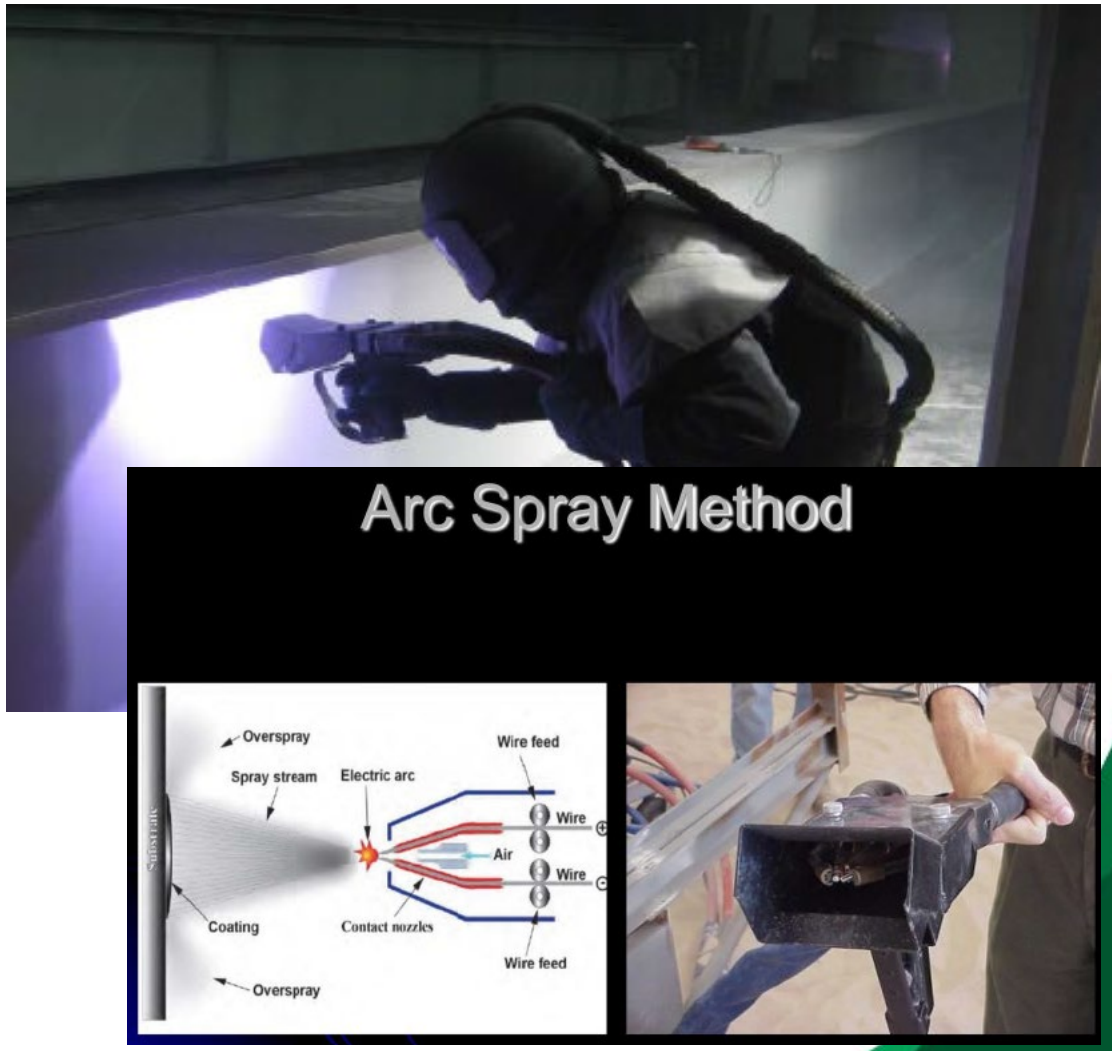
- Cost effective
  - Single coat, two-coat and three-coat systems
  - Fast cure times promote production throughput
  - Shop or field application
- Aesthetics
  - Wide range of colors and finishes
- Availability

Liquid Coatings Challenges

- Limited painting season
  - Atmospheric conditions
- One size fits all
  - Products
  - Surface preparation
  - Life cycle expectations
- Updating painting specifications
- Maintenance
  - Spot painting
  - Zone painting
  - Full removal and replace

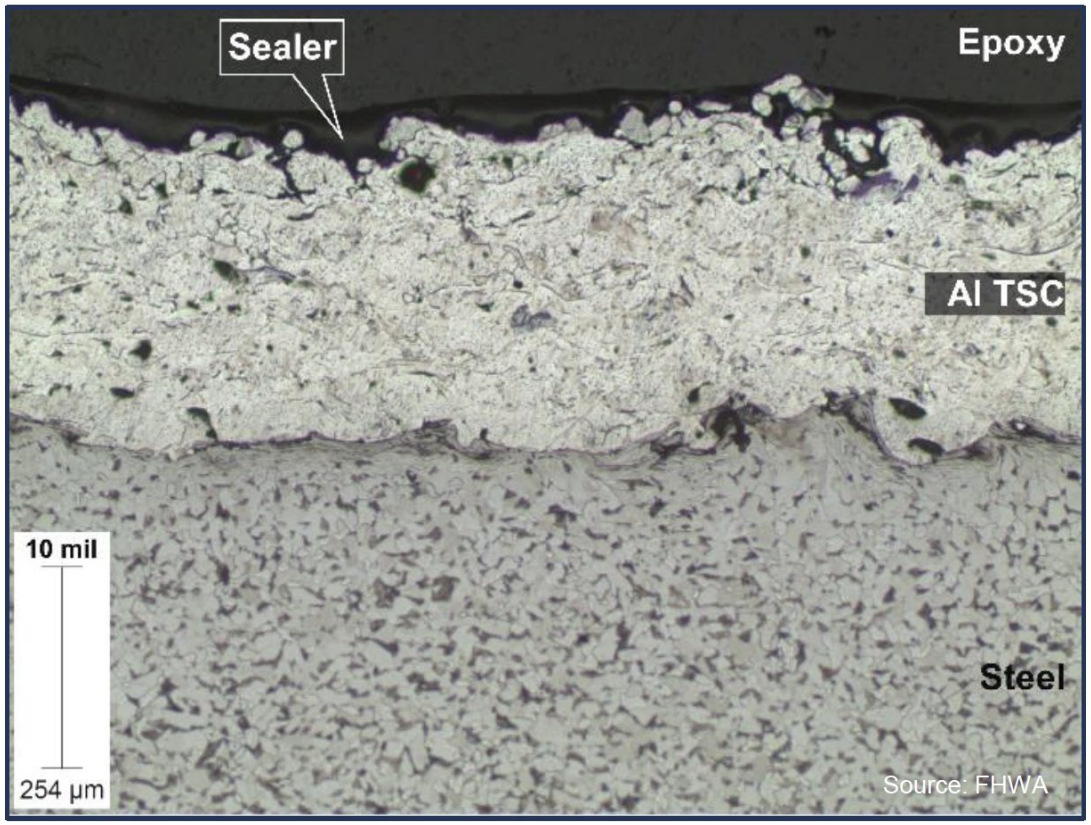
Metallizing / Thermal Spray Zinc (TSZ) - Overview

- Feeds two electrically energized wire(s) to a common gun assembly.
- The wires intersect and generate heat which in turn melts the wire.
- The molten metal is atomized by compressed air and propelled to the surface as a high velocity metal spray.



Metallizing Advantages

- No VOCs produced
- Lower life-cycle-cost
- Less rework for defects
- Lower maintenance cost
- No size limitations
- Portable Equipment adapted for field applications
- Cost per Square Foot



Metallizing Challenges

- Requires deep angular blast profile
- Equipment requires frequent Preventative Maintenance
- Requires Specific P.P.E. for Operators
- Climate Controlled large area required to perform the Metalizing Process
- Metalizing Operators must be certified

Duplex Coatings (Paint over HDG/TSZ) - Overview

- Aesthetics
  - Branding/Architect preference
- Identification
  - Safety
- Hostile Environment
- Repair/Extend life of existing HDG
- Synergistic Effect
- Economic benefit

Duplex Coatings - Advantages

- Paint/Powder provides barrier protection to HDG/TSZ coating
- HDG “primer” eliminates underfilm corrosion and paint peeling
- Paint/powder + galvanizing provide 1.5x-2.0x sum of systems alone
  - 70 years (HDG life) + 12 years (paint life) = ~123-164 years (duplex life)
- Extends maintenance cycle 1.5x-2.0x of black steel

Steel Bridge Corrosion Protection Systems Study

- Durability of Steel Bridge Corrosion Protection Systems Using Environment-Based Accelerated Corrosion Testing
  - Jennifer McConnell, Ph.D. (University of Delaware)
  - Link to full report
- Two Evaluation Methods
  - Statistical Analysis of Existing Long-Term Performance Data of Corrosion Protection Systems - National Bridge Inventory (NBI)
  - Accelerated Corrosion Testing
- Results
  - Galvanized Bridges - Highest Average SCR in Existing LTPD