Building for the Future: Corrosion Protection Systems for Steel Bridges

National Association of County Engineers Annual Meeting

April 15, 2025

Schaumburg, Illinois

www.shortspansteelbridges.org

Session Overview

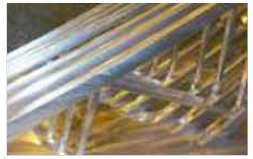
Michael Barker
Professor, University of Wyoming
Director of Education, Short Span Steel Bridge Alliance
Barker@uwyo.edu

Short Span Steel Bridge Alliance – Who We Are

*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**.*

Producers

Fasteners



Coaters

Service Centers

Fabricators

SHORT SPAN STEEL BRIDGE ALLIANCE™

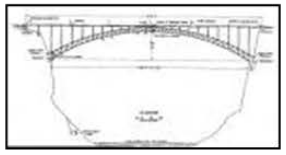
American Galvanizers Association

NCSPA

American Iron and Steel Institute

NSBA

Trade Organizations



Design Firms

Contractors

NACE

Bridge Owners

Universities

David Stoddard, SSAB, Chair SSSBA

Short Span Steel Bridge Alliance – Why We Are

Remove Design Obstacles for Short Span Steel Bridges

- eSPAN140 Standard Designs, Design Software

Overcome Preconception that Concrete is Always Less Expensive in Short Span

- Initial and Life Cycle Cost Studies

Prefabricated Steel Bridge Systems and Accelerated Bridge Construction

- Case Studies and Alliance Members

Develop and Implement Innovative Steel Bridge Systems

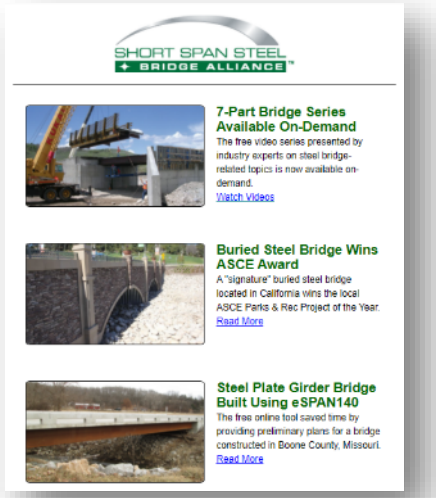
- Press-Brake Tub Girder Bridges & SDCL Construction

Educate Owners, Engineers & Students in Steel Bridges

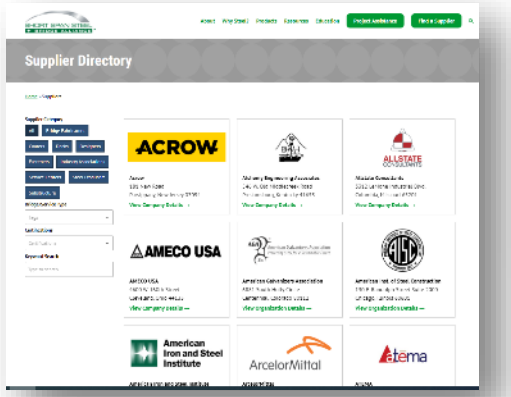
- Webinars, Presentations, Workshops and On-Line Certificate Programs

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™

4. Receive Free Project Assistance

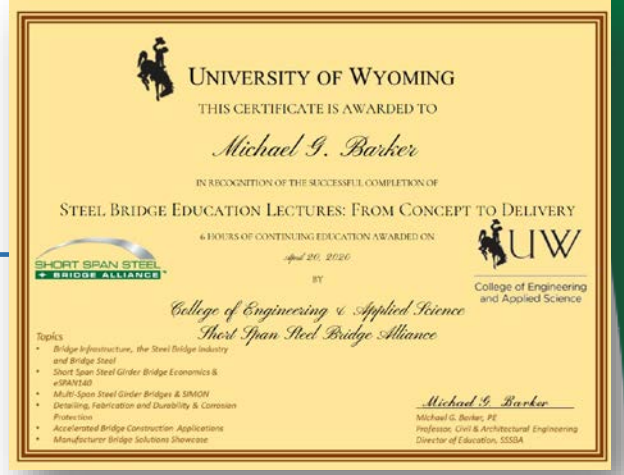
5. Schedule a Workshop/Webinar

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

Online University Lecture Part I: Steel Bridges From Concept to Delivery

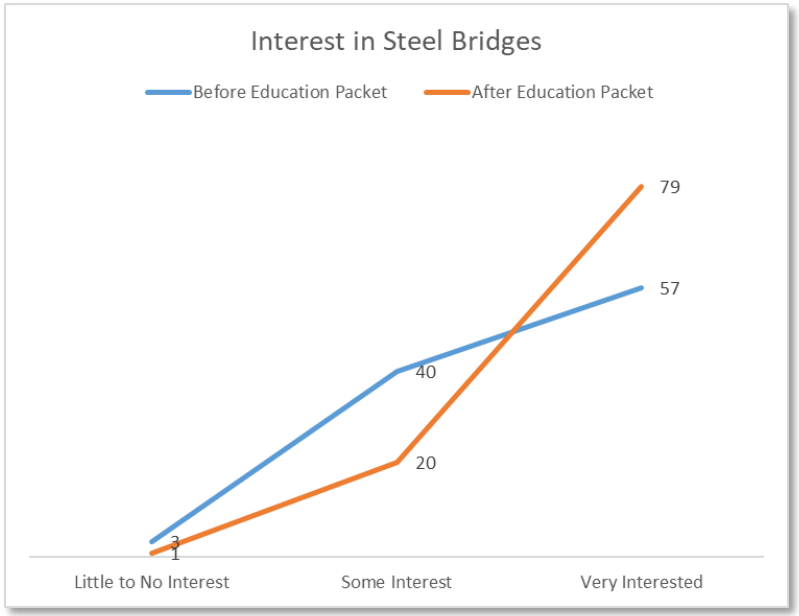


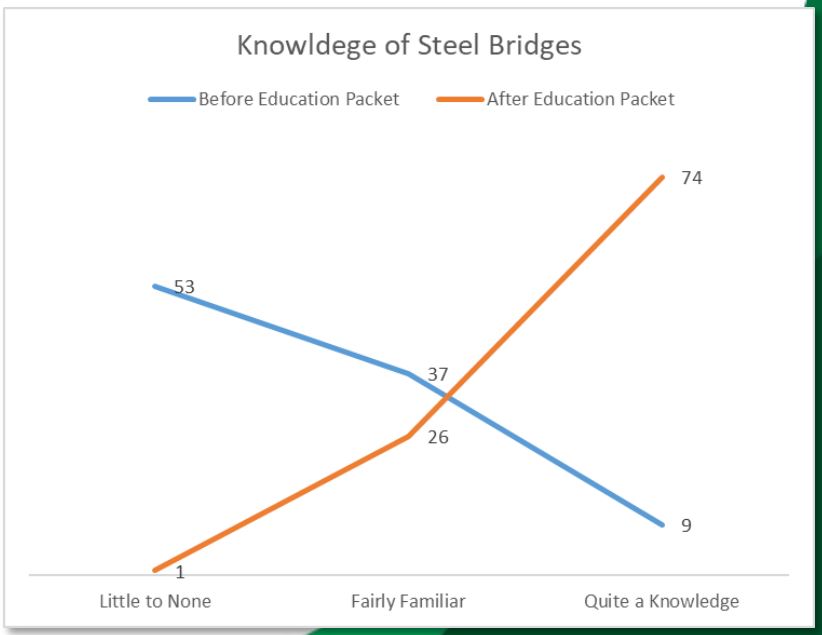
Getting Students, Faculty and Young Engineers Familiar with Steel Bridges and the Steel Bridge Industry

Steel Bridge Education Lectures: From Concept to Delivery

11 Workshops
Over 1600 Certificates Awarded
Over 3500 Registered
One More Planned for Fall 2025

Lecture 1: Bridge Infrastructure & the Steel Bridge Industry
Lecture 2: Short Span Steel Girder Economics & eSPAN140
Lecture 3: Multi-Span Steel Girder Bridges & SIMON
Lecture 4: Detailing, Fabrication and Durability & Corrosion Protection
Lecture 5: Accelerated Bridge Construction Applications
Lecture 6: Manufacturer Bridge Solutions Showcase





New Online University Lecture Part II: Simple Span Bridge Design

6-part steel bridge design education packet based on NSBA Navigating Routine Steel Bridge Design

Similar Online Certificate Program to Steel Bridges from Concept to Delivery

Target Audience:

University Students

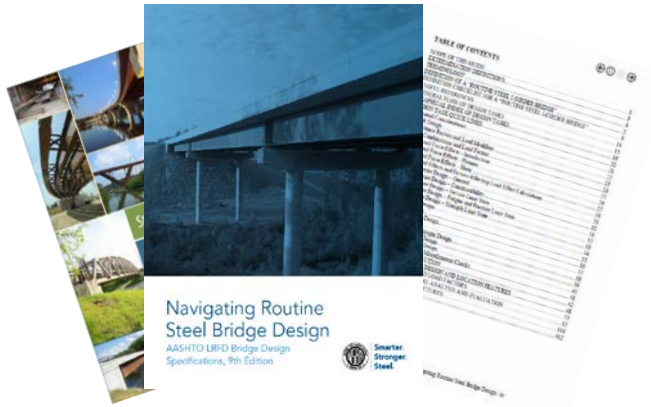
Young Professionals

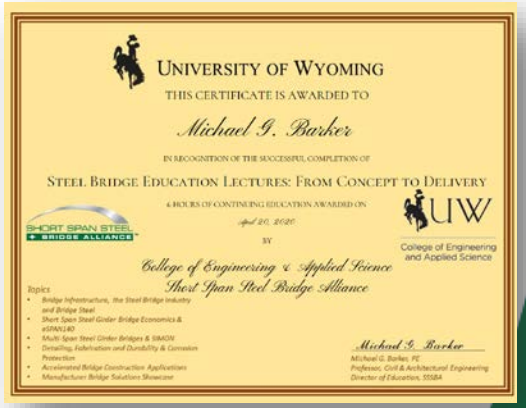
First Offering in 2024

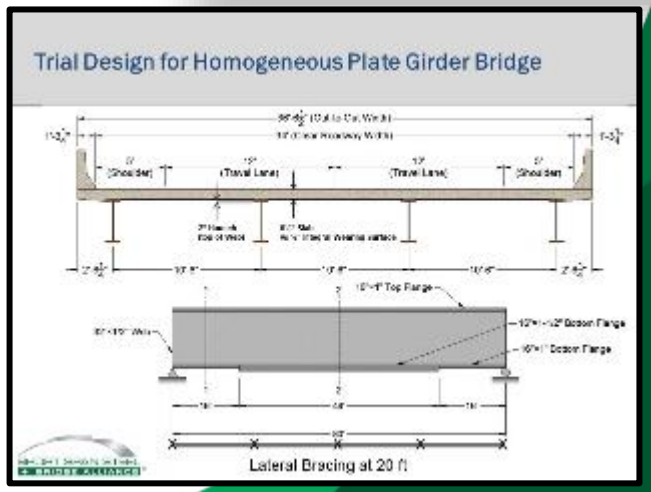
80 ft Simple Span Plate Girder Design

Lecture 1: Introduction & Trial Bridge Design
Lecture 2: Bridge Design
Lecture 3: Bridge Analysis & Design Limit States
Lecture 4: Strength Design
Lecture 5: Serviceability & Construction Design
Lecture 6: Detailing & Final Thoughts

[First Offering in Fall 2025]







Workshops: Professional

Free Customized Workshops for Counties, DOTs, and Design Firms

Topics: Education, Events, Professional, Recommended

Short span bridges provide vital links in the nation's infrastructure network. Yet, nearly a quarter of these bridges are classified as structurally deficient or functionally obsolete.

According to ASCE, more than 30% of existing bridges have exceeded their 50-year design life. This situation presents a significant challenge for cash-strapped state and local governments.

The SSSBA has developed technological and design innovations for bridges under 140 feet that save significant time and costs for county and state bridge officials.

Over the past 10-years, over 5,000 bridge owners and designers have learned about the cost and time advantages of short span steel bridges in SSSBA workshops and conferences throughout North America.

And now, the SSSBA is offering **complimentary** customized educational guest speakers/webinars and workshops (on-site or virtual) specifically for county engineers, state DOTs, and design firms. The webinars/workshops are taught by industry experts with decades of experience in the cost-effective design and construction of short span bridges.

The workshops can be set up as:

- 1-2 hour webinar on a specific topic (can be used as a "guest speaker" for your event).

SHORT SPAN STEEL BRIDGE ALLIANCE

Short Span Steel Bridge Workshops

Over the past 10-years, over 5,000 bridge owners and designers have learned about the cost and time advantages of short span steel bridges in SSSBA workshops and conferences throughout North America.

And now, the SSSBA is offering **complimentary** customized educational workshops (on-site or virtual) specifically for county engineers, state DOTs, and design firms. The workshops are taught by industry experts with decades of experience in the cost-effective design and construction of short span bridges.

The workshops can be set up as:

- 1-2 hour webinar on a specific topic.
- 3-4 hour (half-day) workshop to provide practical information on the safe and cost-effective design, detail, fabrication and installation of short span steel bridges.
- 6 hours (full-day) session to provide an in-depth overview of short span steel bridges.

Suggested topics to select from include:

- Practical & Cost-Effective Steel Bridge Design
- Free Design Tools (eSPAN140 and SIMON)
- Pre-engineered Bridge Solutions
- Coating Solutions (galvanized, painted, and weathering steel)
- Accelerated Bridge Construction Options
- Case Studies (from local counties)
- Buried Soil Steel Bridge Structure Alternatives
- Life-Cycle Analysis

Sample Workshop Agenda (can also be altered for a virtual meeting)

4-Hour Workshop Agenda

00:00 (40 min) Introduction, Short Span Steel Bridge Overview & Design Tools (eSPAN140)
00:40 (35 min) Bridge Economy & Life Cycle Costs
01:15 (35 min) Steel Bridge Case Study
01:50 (25 min) Break (networking)
02:15 (35 min) National Steel Bridge Alliance Design Resources & SIMON (design software)
02:50 (35 min) Buried Steel Bridges Design & Construction
03:25 (35 min) Pre-Fabricated Steel Bridges & Accelerated Bridge Construction
04:00 Adjourn
** Each presentation will allow 5-10 minutes of Q&A*

6-Hour Workshop Agenda

00:00 (45 min) Introduction, Short Span Steel Bridge Overview & Design Tools (eSPAN140)
00:45 (40 min) Bridge Economy & Life Cycle Costs
01:25 (35 min) Steel Bridge Case Study
02:00 (25 min) Break (networking)
02:25 (40 min) National Steel Bridge Alliance Design Resources & SIMON (design software)
03:05 (35 min) Practical Detailing, Durability and Steel Protection Systems
03:40 (40 min) Press-Brake Tub Girder Bridges
04:20 (25 min) Break (Lunch?)
04:45 (35 min) Buried Steel Bridges Design & Construction
05:20 (40 min) Pre-Fabricated Steel Bridges & Accelerated Bridge Construction
06:00 Adjourn
** Each presentation will allow 5-10 minutes of Q&A*

Contact Dan Snyder, Director of the SSSBA, for more information (dsnyder@steel.org – 301-367-6179)

www.ShortSpanSteelBridges.org

Workshop: DIY County Bridges in 6 Steps

6-part Education to Potentially 3000 Counties on How They Can Build Their Own Bridges

Based on Whitman County, WA, Experience

Workshop Benefits

- Save Money and Build More Bridges!
- Workforce Development
- Minimize Public Inconvenience
- Accelerate Construction
- Use/Share County Equipment

Agenda (4 hours, including breaks)

- Module 1: Can My County Build This Bridge? (35 minutes)
- Module 2: Permits, Environmental Issues and Geotech Considerations (35 minutes)
- Module 3: Selecting Bridge Type and Bidding an Award (35 minutes)
- Module 4: Foundation and Substructure Design/Installation (35 minutes)
- Module 5: Installing the Bridge (35 minutes)
- Module 6: Commissioning and Opening to Traffic (35 minutes)

NACE 2022 One Hour Presentation
NACE 2023 2 Hour Workshop

Sample Video
https://www.shortspansteelbridges.org/county-saves-steel/

Online Webinars: Professional – New This Year

Feb 19th 1pm ET - Steel vs. Concrete Life Cycle Performance and Costs – 500 PDH Certs

April 23rd 1pm ET - Unlocking the Potential of Buried Steel Structures

Sept 10th 1pm ET –Next-Gen Steel Bridge Design Tools for Smarter Solutions

Dec 10th 1pm ET – Simple for Dead, Continuous for Live Designs for Optimal Performance

www.ShortSpanSteelBridges.org

Today's Steel Bridges

State of the Art & Innovative Designs
Speed of Construction – Accelerated Bridge Construction
Cost Effective
Sustainable
Resilient
Durable

Corrosion Protection Systems Overview

Steel Bridge Longevity – Resistance to Moisture, Salt and Pollutants

- Practical and Effective Design
  - Adequate Drainage
  - Joints and Jointless Decks

- Corrosion Protective Systems – Steel Chemistry and Protective Coatings
  - Weathering Steel
  - Galvanizing
  - Metalizing
  - Painting

Corrosion Protection Systems Overview

Which Protective System is Best for This Bridge?

Any May Be Most Suitable Considering:

- Environmental Conditions
- Life Cycle Performance and Life Span
- Maintenance and Inspection Considerations
- Initial Costs and Life Cycle Costs
- Size of Bridge Components
- Aesthetics

Today's Session

Industry Experts Presenting On:

Weathering Steel: Brandon Chavel, NSBA

Galvanizing: John Krzywicki, AGA

Metalizing: Ben Bristol, ISC

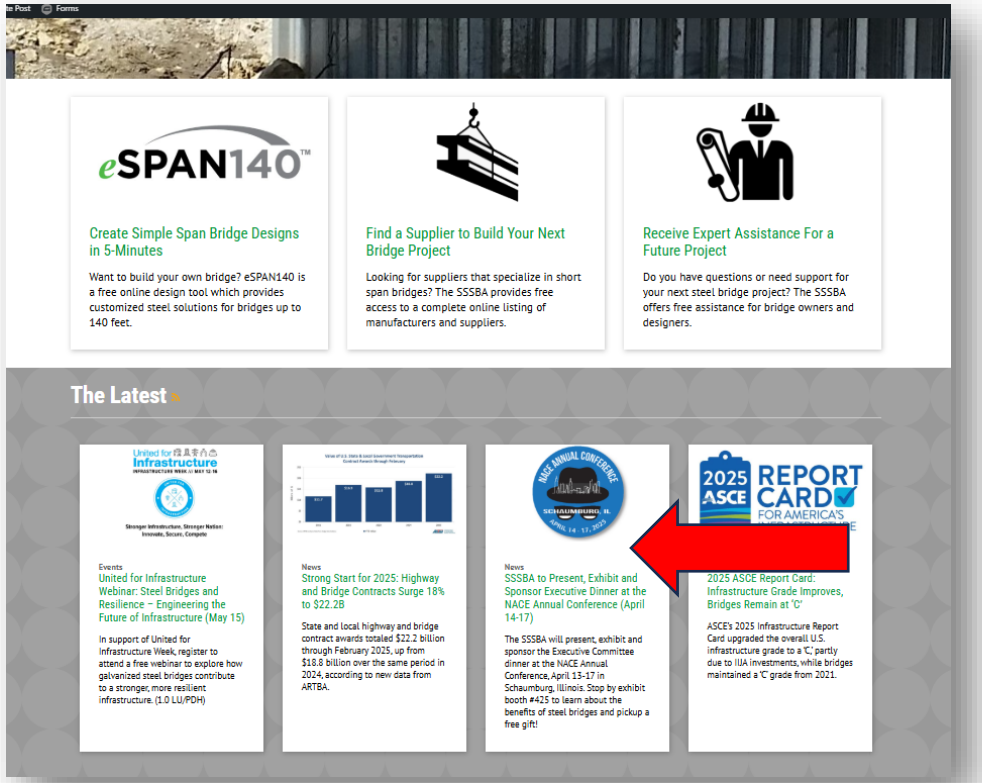
Painting: Derrick Castle, Sherwin-Williams

Advantages
Challenges
New Construction & Repair/Rehab
Case Studies & Examples
Future Trends

Panel Discussion with Well-Known NACE County Engineers
Jeff Blue, Champaign County, IL
Brian Keierleber, Buchanon County, IA
Mark Servi, Barron County, WI (Retired?)

Download Slide Deck

Go to: https://www.shortspansteelbridges.org/



https://www.shortspansteelbridges.org/sssba-to-present-and-exhibit-at-nace-conference-april-14-17/

Uncoated Weathering Steel (UWS)

Brandon Chavel
Vice President - Bridges
American Institute of Steel Construction /
National Steel Bridge Alliance
E-mail: chavel@aisc.org
Phone: 312.805.2137

Uncoated Weathering Steel Overview

- **What is weathering steel?**
  - **Gr 50W and HPS 70W**
  - **Contain small amounts of copper, phosphorus, chromium, nickel, and silicon to attain their weathering properties.**
  - **Facilitate protective oxide layers called “PATINA”.**
  - **Patina is essentially an oxide film of corrosion by-products about the same thickness as a heavy coat of paint**

Uncoated Weathering Steel Overview

- **What is weathering steel?**
  - **As corrosion continues, a protective barrier layer forms that greatly reduces further access to oxygen, moisture, and contaminants.**
  - **This stable barrier layer greatly resists further corrosion, reducing it to a low value.**
  - **Weathering steel bridges initially look orange-brown in color.**
  - **The color will darken as the patina forms.**

Image credit: Google Maps

Uncoated Weathering Steel Overview

- **Example:**
  - **Exchange Street, Akron, Ohio. This bridge is UWS, built in 1973, and still maintains a superstructure condition rating of 7 (out of 10)!**

Image credit: Google Maps

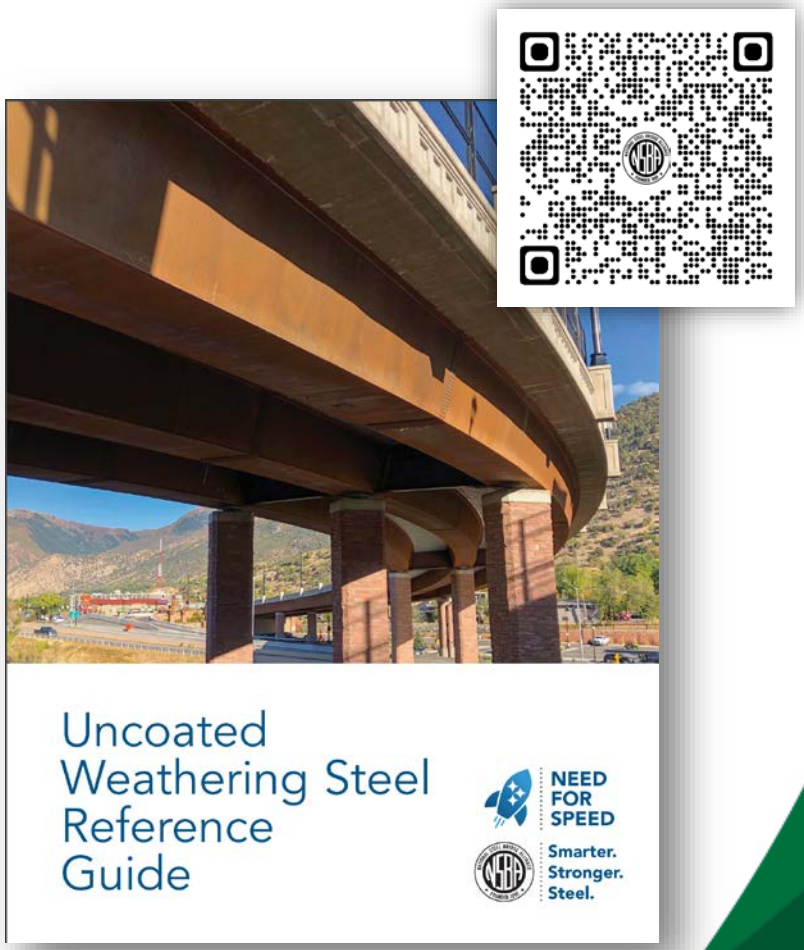
Uncoated Weathering Steel Overview

- **Example:**
  - **96th Street over I-69, Indianapolis. This bridge is UWS, more than 50 years old in rated good condition over interstate traffic.**

Image credit: Google Maps

Uncoated Weathering Steel Reference Guide

- Purpose of the Guide
- Overview of Content
- Benefits of UWS
- When to use UWS
- Detailing for UWS
- Aesthetic guidance



aisc.org/uwsguide

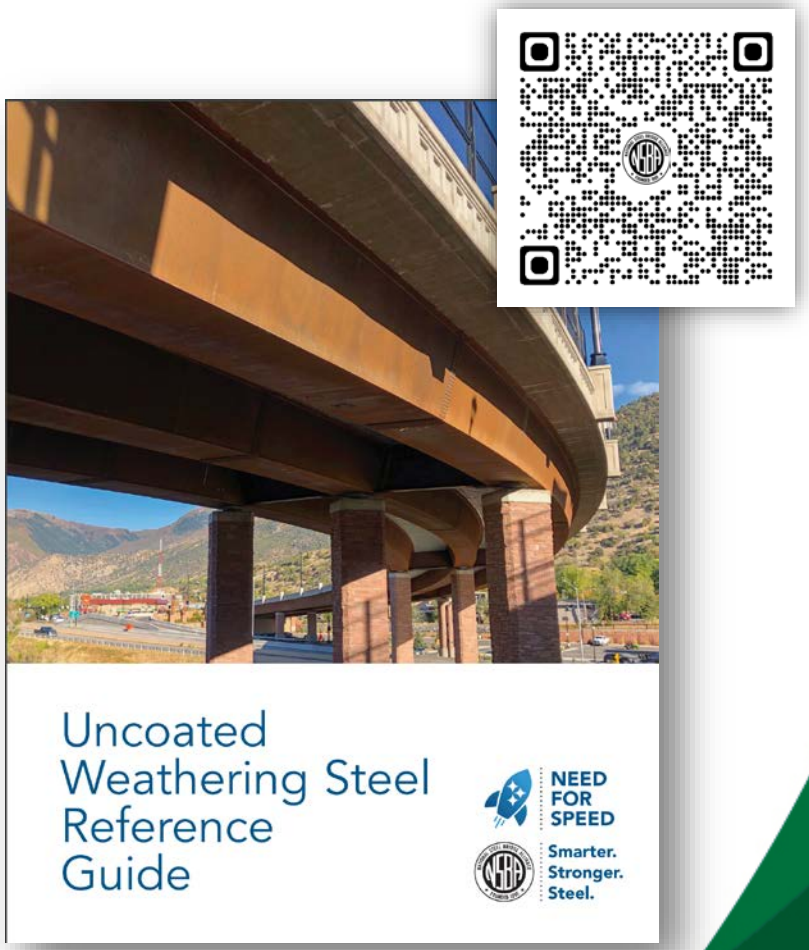
Uncoated Weathering Steel Reference Guide

- **Sponsored by AISC/NSBA**

- **Research team:**

    - **Univ. of Delaware**
        - **Dr. Jennifer McConnell**

    - **Modjeski and Masters**



aisc.org/uwsguide

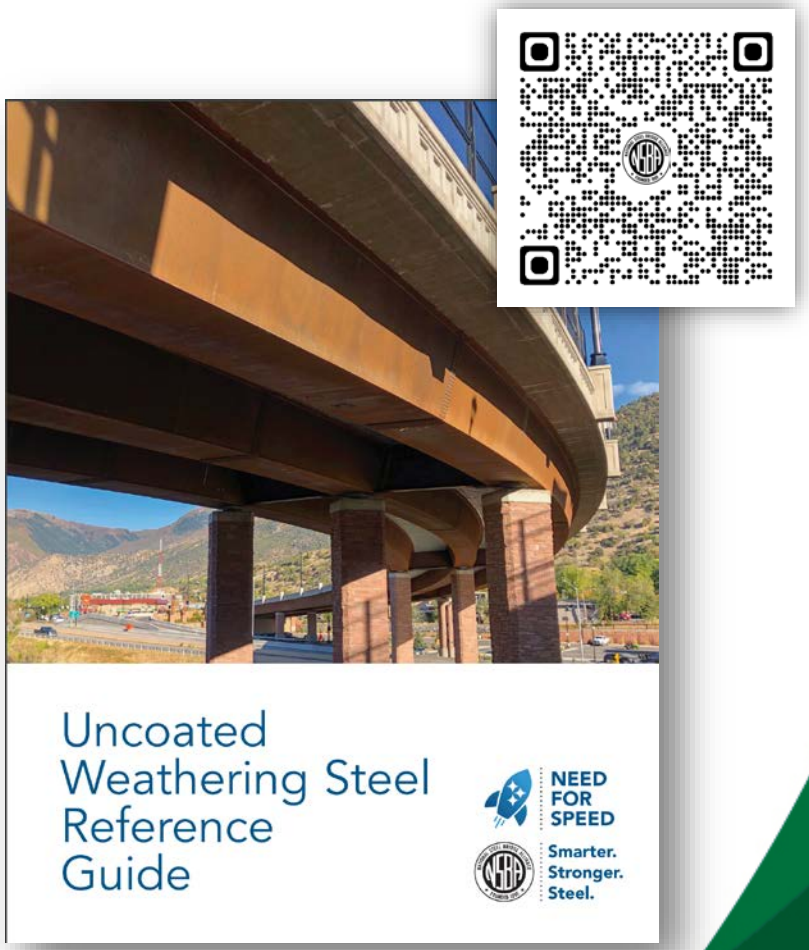
Uncoated Weathering Steel Reference Guide

- **Purpose of the Guide**
  - **Need for broad guidance and collection of best practices**
  - **Little published guidance on when and how to use Uncoated Weathering Steel**
  - **FHWA Technical Advisory (TA) is old (1989)**
  - **Owners and designers need basis for determining when use of UWS is appropriate**
  - **Guide is being turned into an AASHTO/NSBA Steel Bridge Collaboration document that will be used to replace FHWA TA.**

Uncoated Weathering Steel Reference Guide

- Guide Content
  - Chapter 1 – Introduction
  - Chapter 2 – Design Recommendations
  - Chapter 3 – Fabrication and Construction
  - Chapter 4 – In-Service Inspection
  - Chapter 5 – Maintenance
  - Chapter 6 – Repair and Rehabilitation

  - Recommendations given as minimum requirements, and improved performance



aisc.org/uwsguide

Uncoated Weathering Steel Reference Guide

- Advantages of Uncoated Weathering Steel
  - 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

Uncoated Weathering Steel Reference Guide

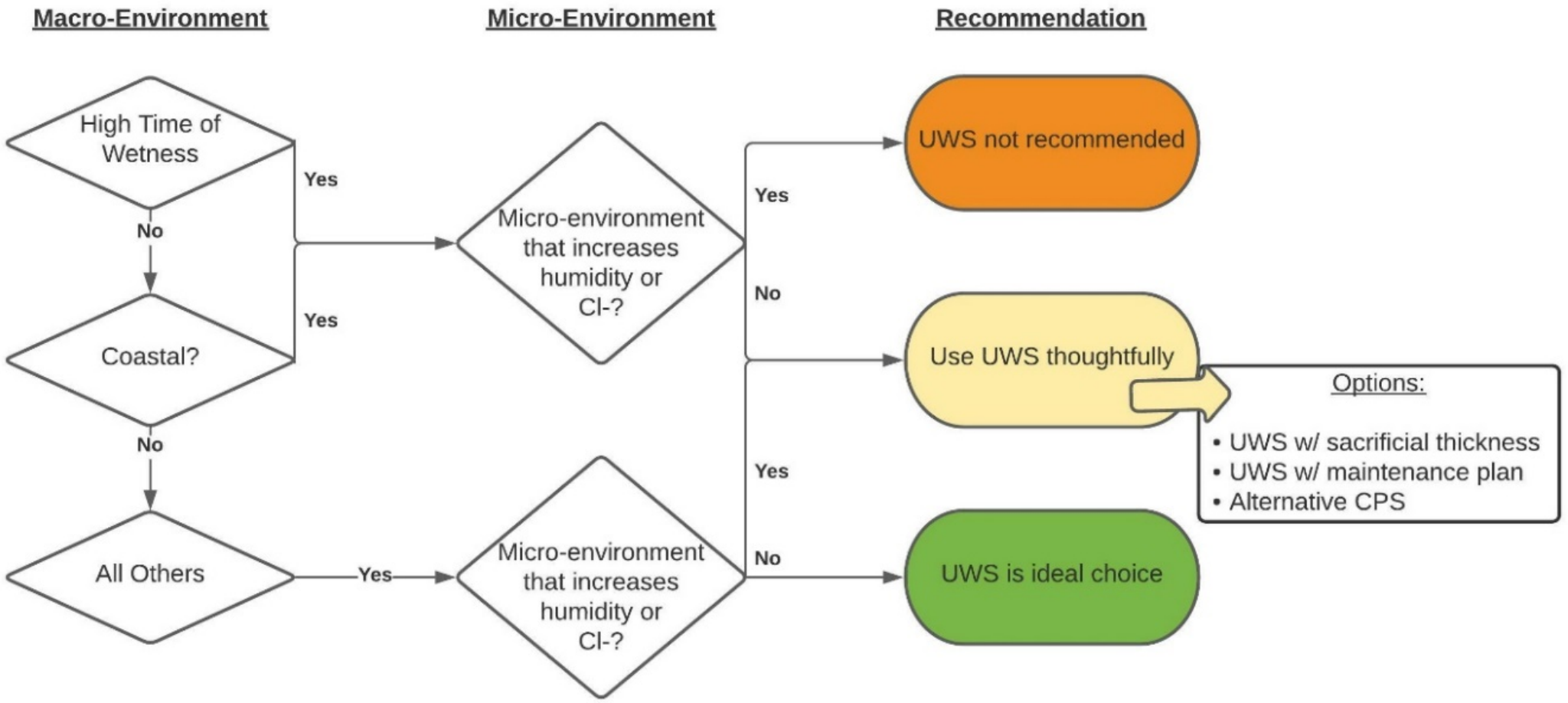
- Design Recommendations
  - When to use UWS, and when to proceed cautiously

  - Macro-environment
    - High Time of Wetness environments
    - Coastal environments

  - Micro-environment
    - Deicing salt / tunnel-like situation
    - Low vertical clearance over water
    - Vegetation / shelter

Uncoated Weathering Steel Reference Guide

- **When to use UWS**



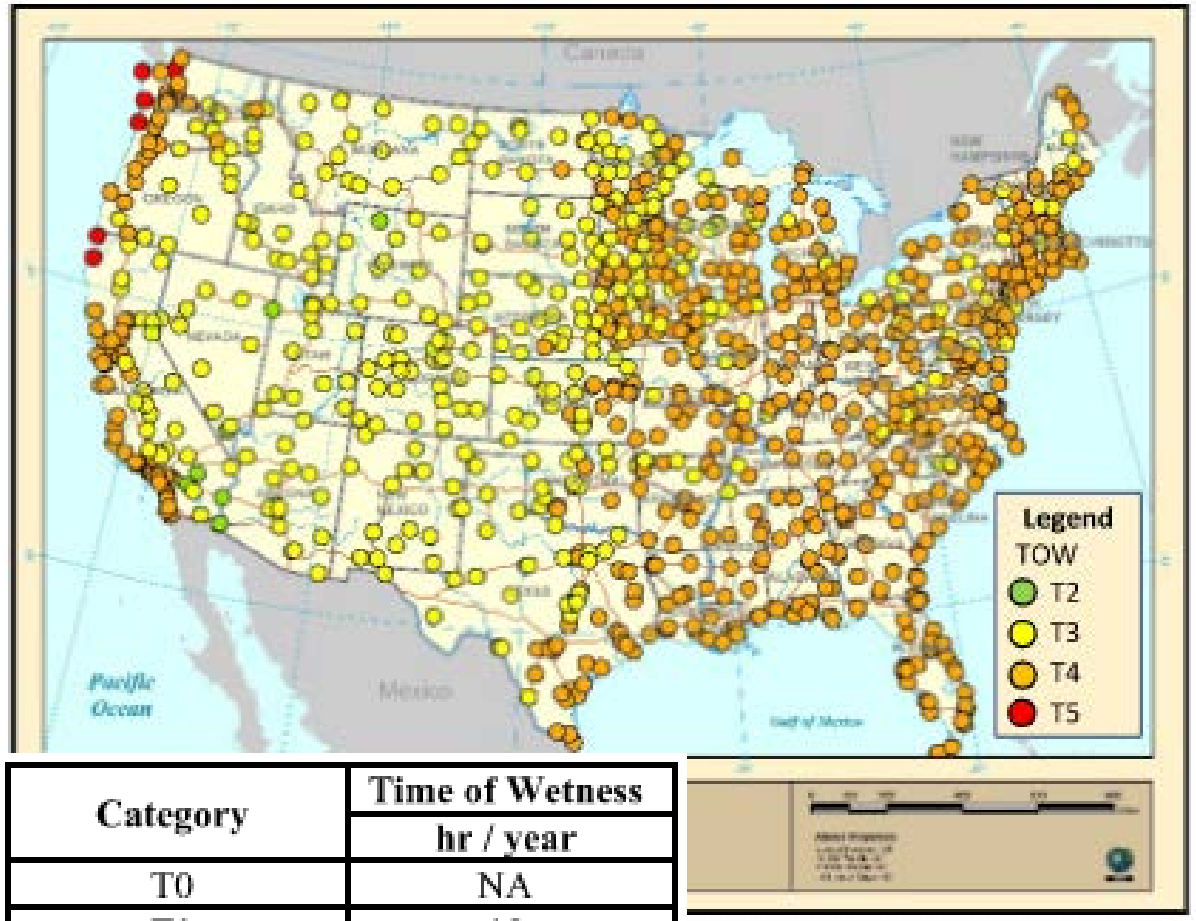
Uncoated Weathering Steel Reference Guide

- **Tables of UWS Use**

Micro-Environment	Macro-Environment		
	All Others	High Time of Wetness	Coastal
All Others	UWS is ideal choice	Use UWS thoughtfully	Use UWS thoughtfully
Highway Crossings with Extreme Salt Use	Use UWS thoughtfully	Use UWS thoughtfully	Use UWS thoughtfully
Water Crossings with Low Vertical Clearance	If minimal vegetation, use UWS thoughtfully; if dense vegetation, UWS not recommended	UWS not recommended	UWS not recommended
Sites with Dense Vegetation or Shelter	UWS is ideal choice, if vegetation can be maintained and, for water crossings, adequate vertical clearance over water provided	UWS not recommended	Depending on severity, UWS not recommended or UWS with sacrificial thickness recommended

Uncoated Weathering Steel Reference Guide

- Time of Wetness
  - Quantitative measure of time where atmospheric conditions are favorable for moisture to form on the surface of a metal or alloy.
  - When relative humidity is greater than 80% and the temperature is above freezing (32°F, hours/year).



Category	Time of Wetness hr / year
T0	NA
T1	10
T2	250
T3	2500
T4	5500
T5	>5500

Uncoated Weathering Steel Reference Guide

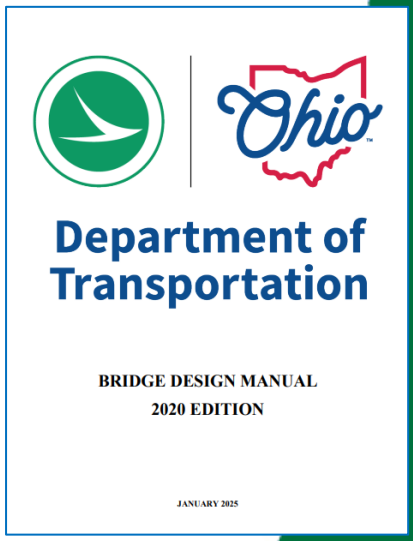
- Mico-environments
  - Low clearance waterways – current guidance thought to be conservative
  - Tunnel-like environments – understanding is evolving*
  - Heavy deicing salts + high traffic counts
  - Dense vegetation around superstructure

Ohio DOT's take on UWS and "tunnel like"

- ODOT BDM 308.2.2.1.d
  - UWS is primary system

  - Use a coating system when ALL of these are met:
    - A. Vertical clearance is 20-ft or less
    - B. ADT is 50,000 or larger
    - C. ADTT is 20% or more

  - Tunnel like, when ALL these are met:
    - A. Vertical clearance is 20-ft or less
    - B. Bridges over interstates or four lane divided highways
    - C. ADTT = 10% or more under the bridge
    - D. Posted speed limit under the bridge is 55 mph or greater



Ohio DOT's take on UWS and "tunnel like"

- **ODOT BDM 308.2.2.1.d**
  - **When "Tunnel like" – coat fascia girder**

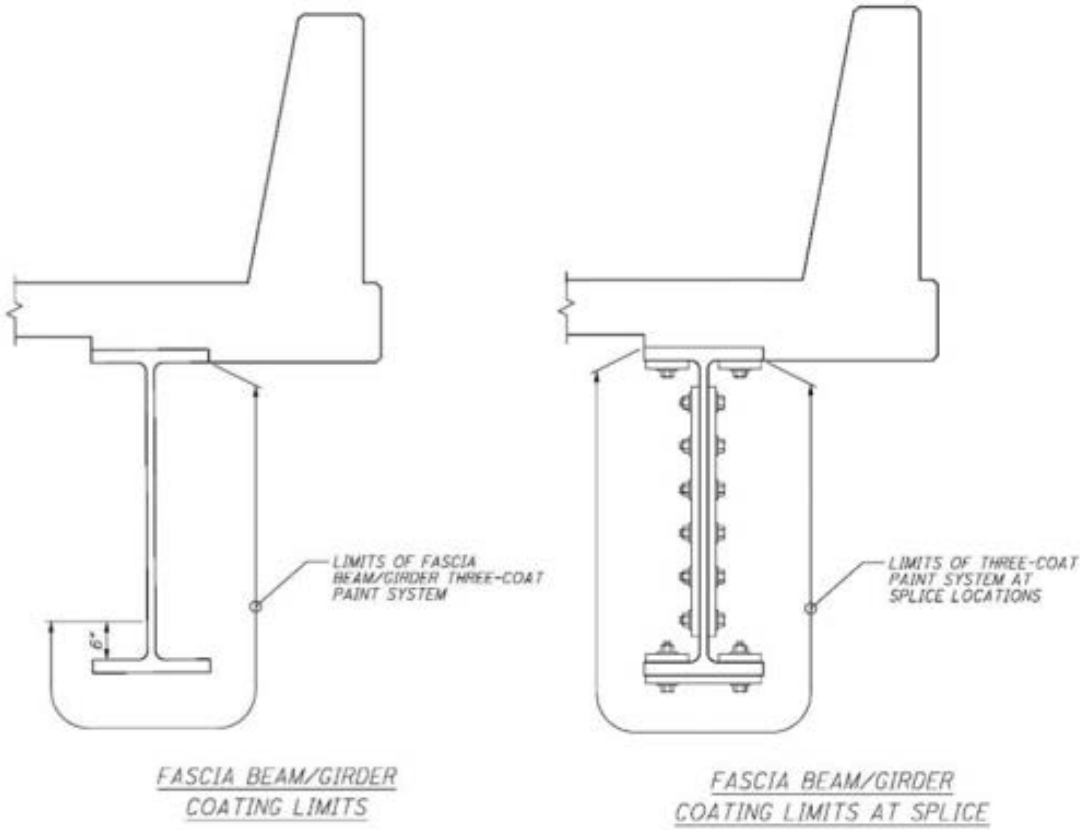
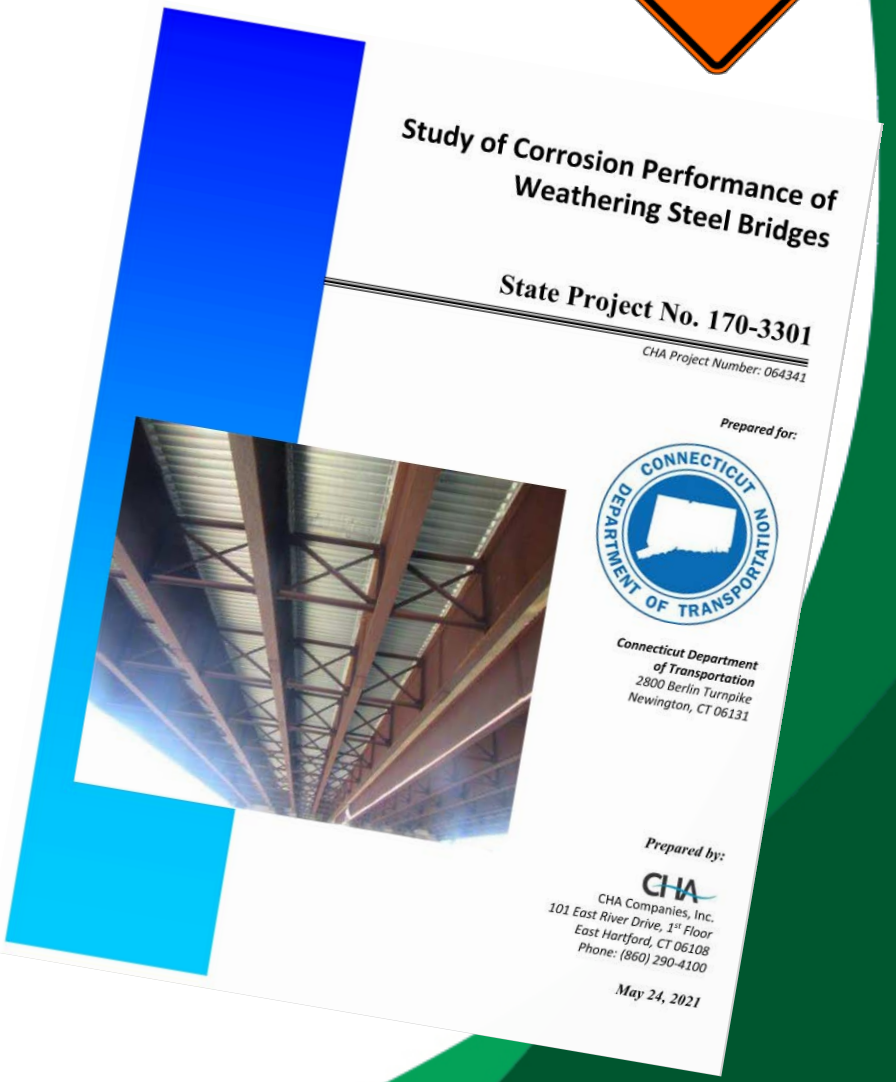


Figure 308-1

Image credit: Google Maps

Connecticut Study

- UWS Study
  - Considered 138 UWS bridges
  - Bridges with older details have some issues
    - Expansion joint leaks
    - Average section loss of 0.093”, or greater
  - Structures with newer details performing well
    - No Expansion Joints
      - Integral Abutments
      - Deck over backwall
    - Girder ends coated
  - General take away:
    - Issues result from leaky expansion joints and not so much salt spray from below


Study of Corrosion Performance of Weathering Steel Bridges

State Project No. 170-3301

CHA Project Number: 064341

Prepared for:

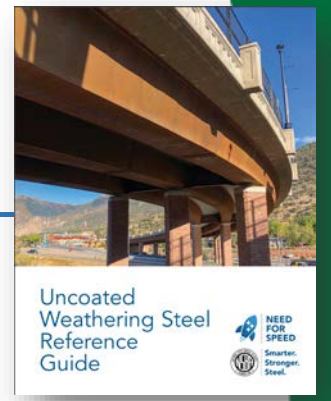
Connecticut Department of Transportation
2800 Berlin Turnpike
Newington, CT 06131

Prepared by:

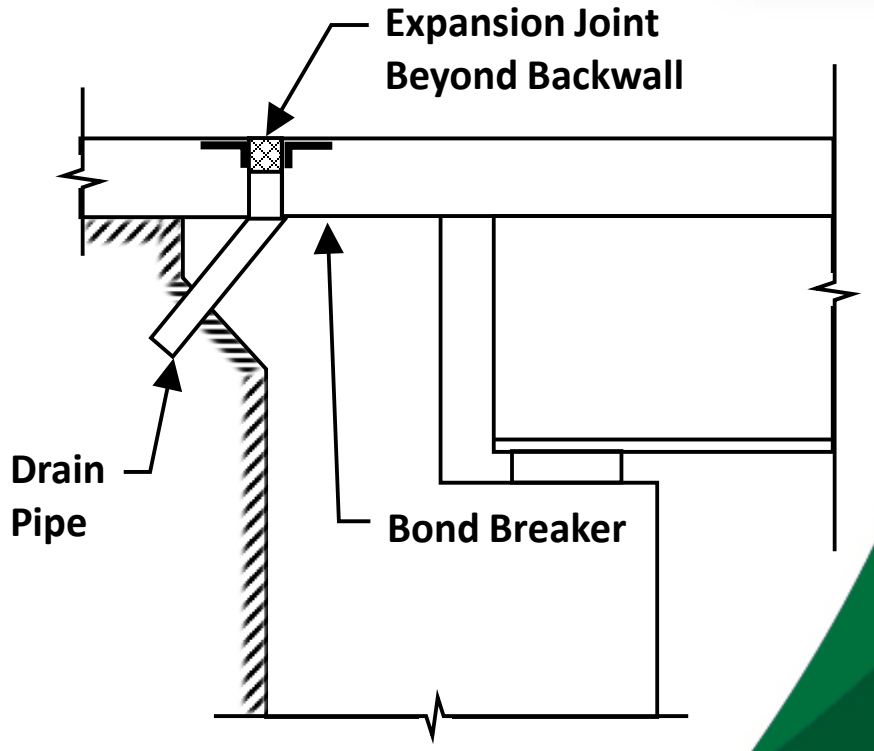
CHA Companies, Inc.
101 East River Drive, 1st Floor
East Hartford, CT 06108
Phone: (860) 290-4100

May 24, 2021

Uncoated Weathering Steel Reference Guide



- **Design Recommendations**
  - **Eliminate joints wherever possible!**
  - **Integral abutment jointless, semi-integral abutments, moving joints behind the back walls, link slabs, etc.**
  - **Attention needs to be paid to the drainage system**
  - **Experience is clear – water directly discharging on steel is bad!**



Uncoated Weathering Steel Reference Guide

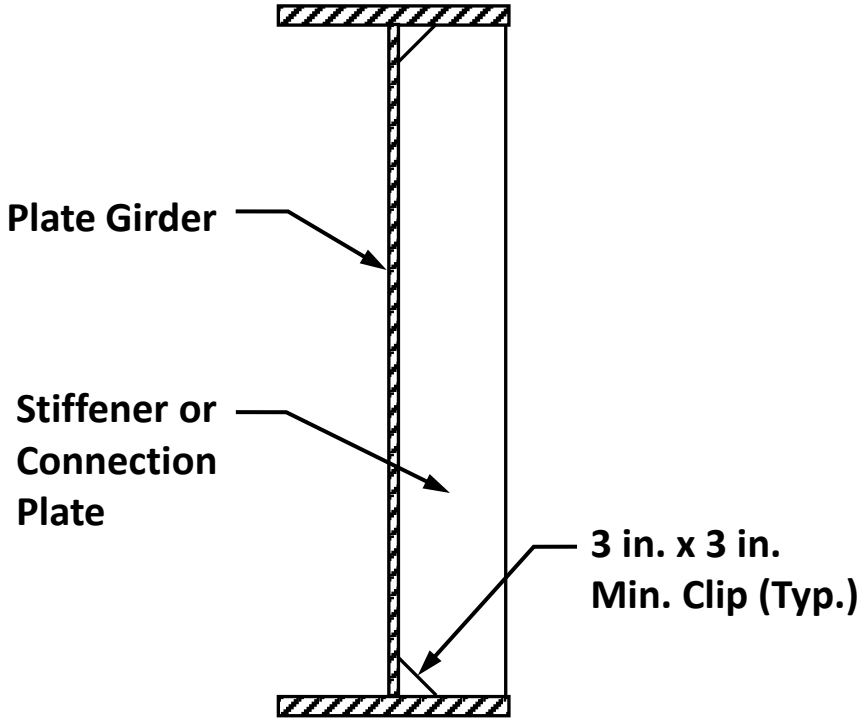
- **Details to Avoid Corrosion**
  - **UWS needs dry cycles to function properly**
  - **Trapped debris retains moisture**
  - **Continuous moisture prevents patina formation**


Image credit: Modjeski & Masters


Image credit: Modjeski & Masters

Uncoated Weathering Steel Reference Guide

- **Stiffener Clips**
  - **The larger the clip, the better for drainage control**
  - **Many states use 2” clips**
  - **3” may better to avoid clogging with debris**



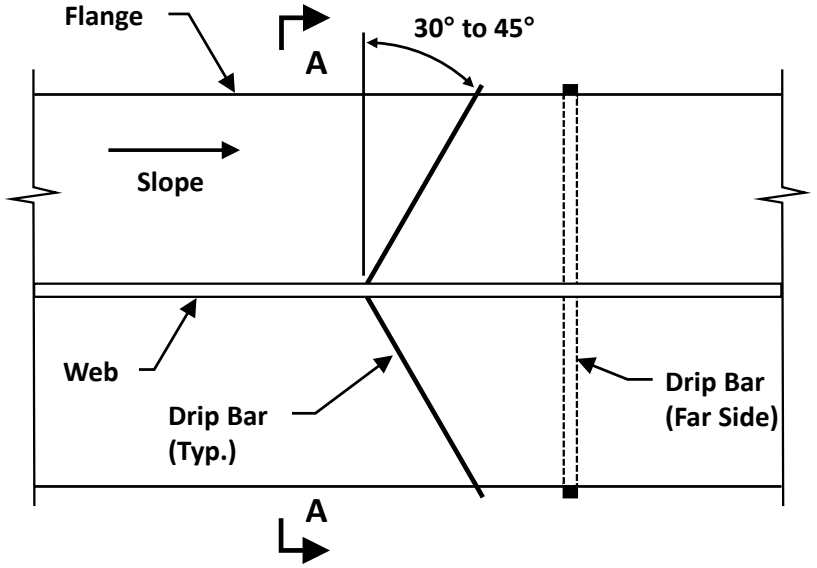
Uncoated Weathering Steel Reference Guide

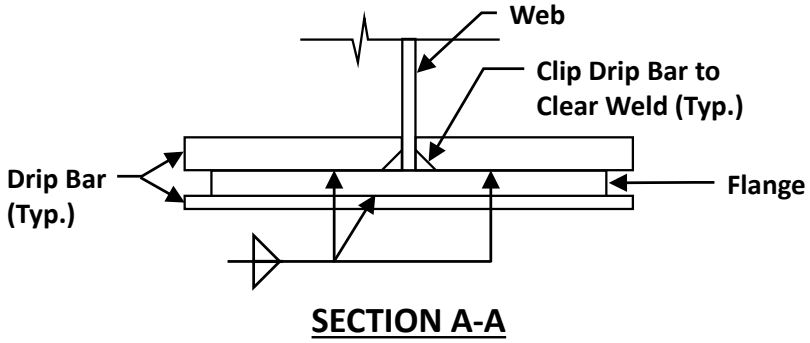
- Tactical Coating
  - Coating beam ends near joints is a common practice that has proven to be successful
  - Coating over interior piers sometimes performed
  - Beam ends encases in concrete should be painted – condensation and capillary action

Image credit: Modjeski & Masters

Uncoated Weathering Steel Reference Guide

- **Drainage Control**
  - **Water flowing down flanges can collect and cause damage, staining**
  - **Drip bars are one way of controlling this drainage**
  - **Welded, or bonded with epoxy**

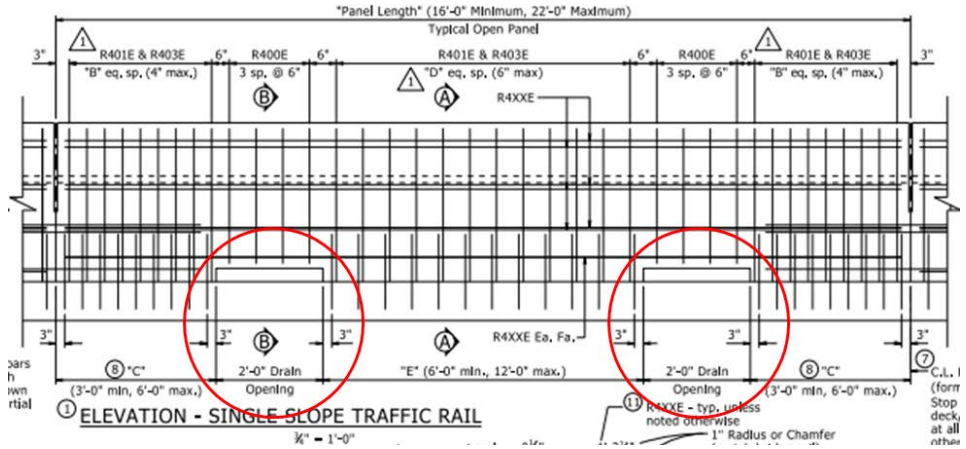




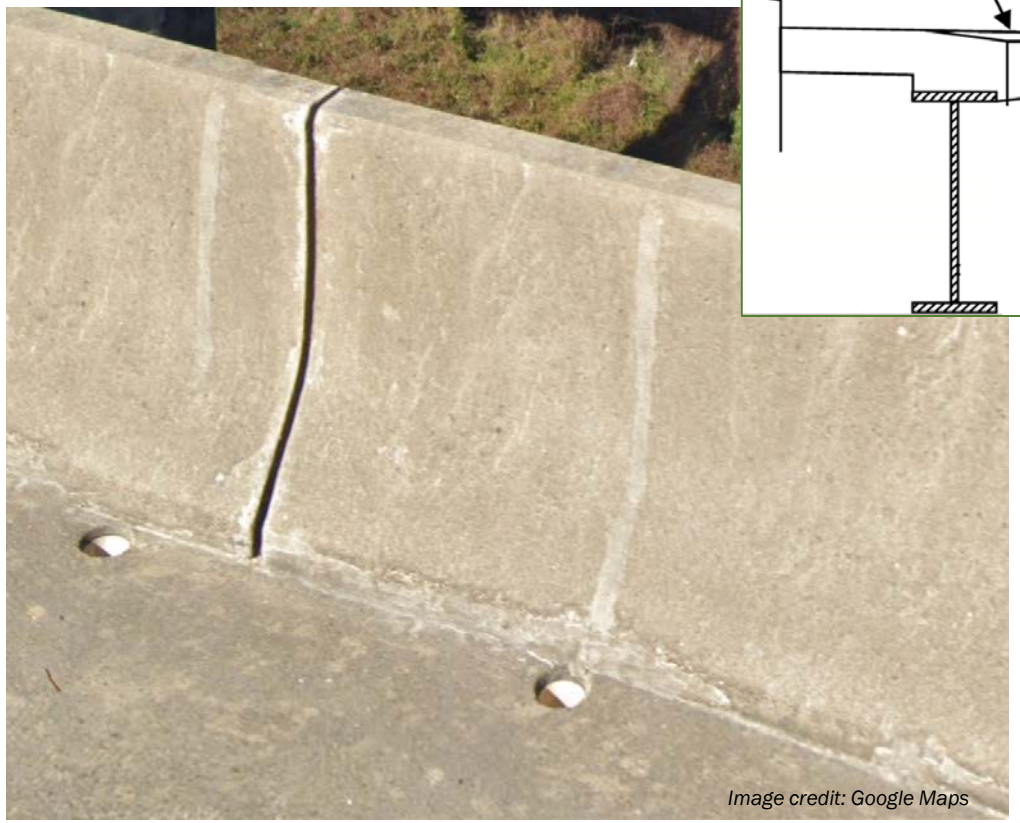
SECTION A-A

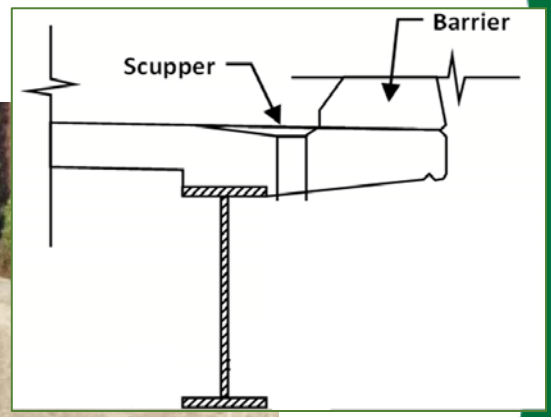
Uncoated Weathering Steel Reference Guide

- **Drainage Details to avoid with UWS**



Drainage through the barrier

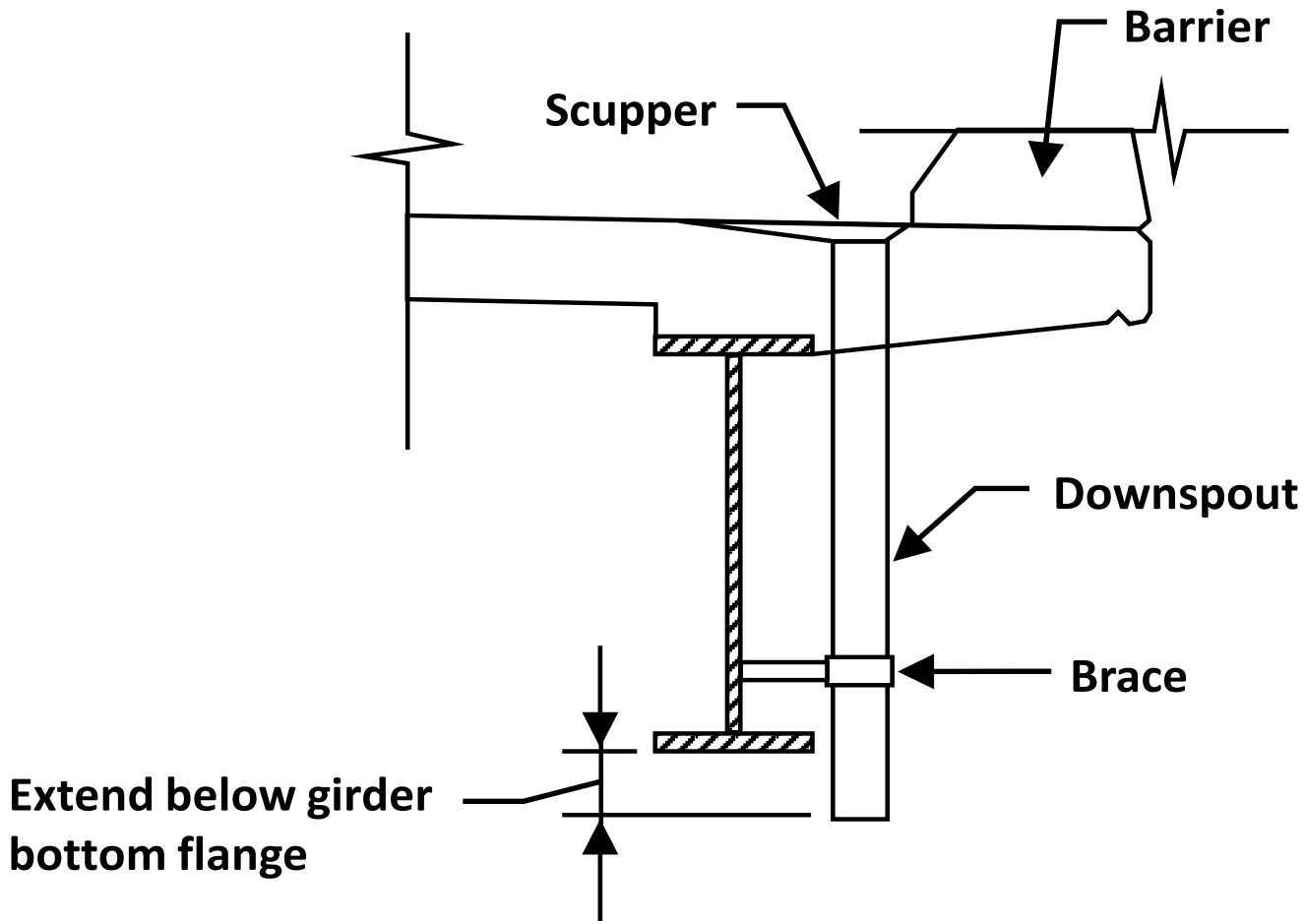




Drainage through the deck only
no downspout

Uncoated Weathering Steel Reference Guide

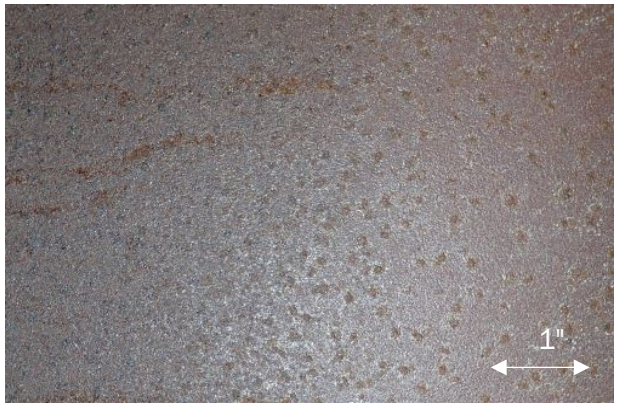
- **Preferred Drainage Details**

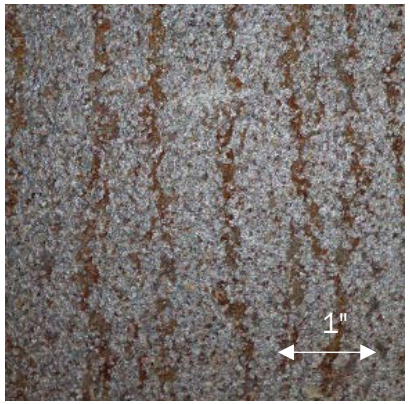


Uncoated Weathering Steel Reference Guide

- **Inspection of Weathering Steel Bridges**
  - **Guidance provided on evaluating the patina on existing bridges**
  - **Examples of good performing patina and poor performance provided**

Good performance





Poor performance

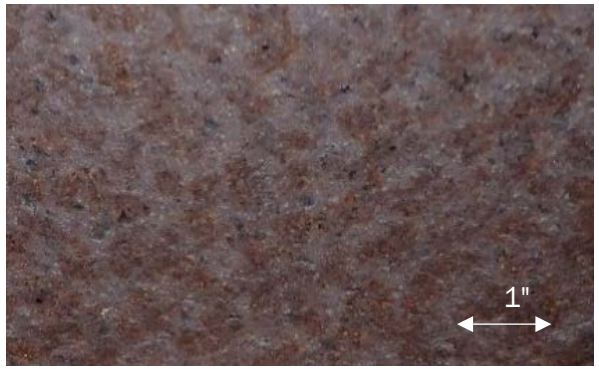


Image credits: Modjeski & Masters

Uncoated Weathering Steel Reference Guide

- **Maintenance Practices**
  - **Joint sealing**
  - **Drainage system clearing**
  - **Girder washing**

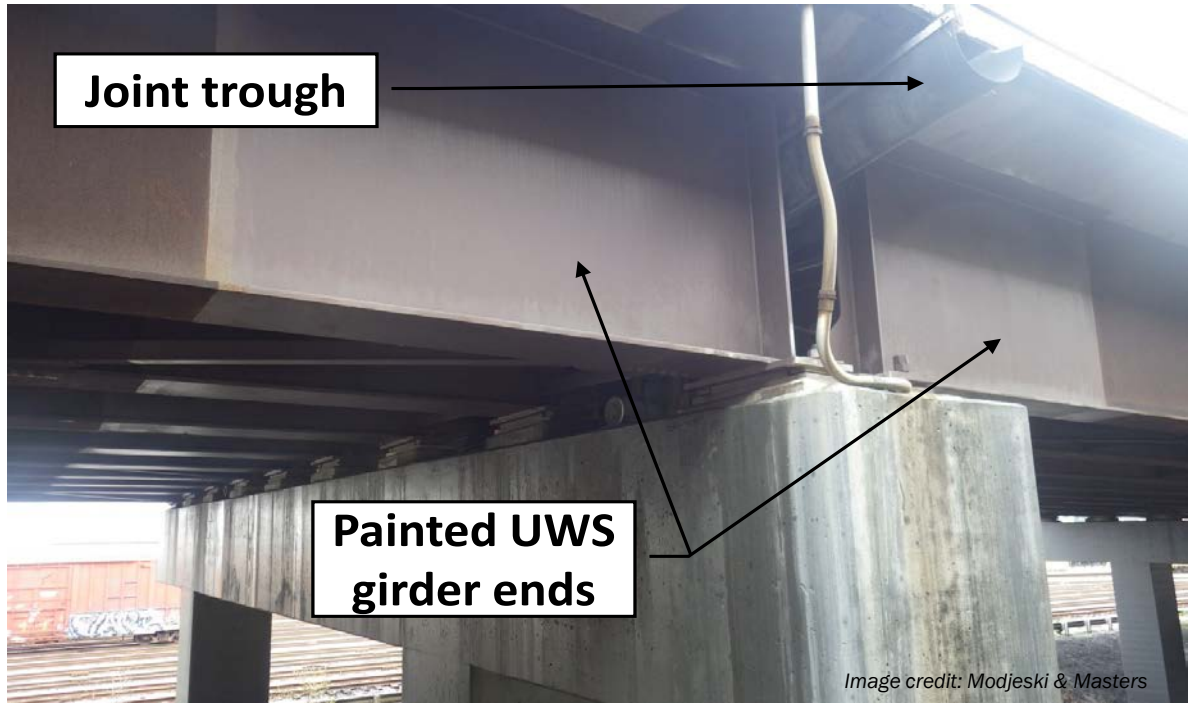

Image credit: Modjeski & Masters


Image credit: Modjeski & Masters


Image credit: Modjeski & Masters

Uncoated Weathering Steel Reference Guide

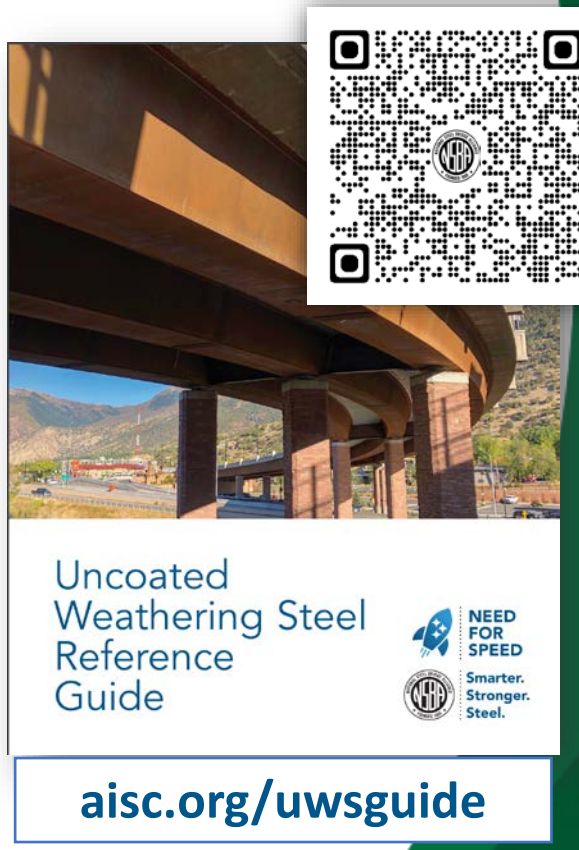
- **Repair and Rehabilitation**
  - **If UWS not performing as expected, can be painted**
  - **Still likely lower overall cost than if it was coated initially**
  - **Need only paint those areas with poor performance**



Future Developments

- **AASHTO/NSBA Steel Bridge Collaboration Guideline**
  - **Combine current Guide with FHWA Guidance**
  - **Gain approval from all 50 states**

- **NSBA Coating Performance Studies**
  - **University of Delaware**



aisc.org/uwsguide

Uncoated Weathering Steel (UWS)

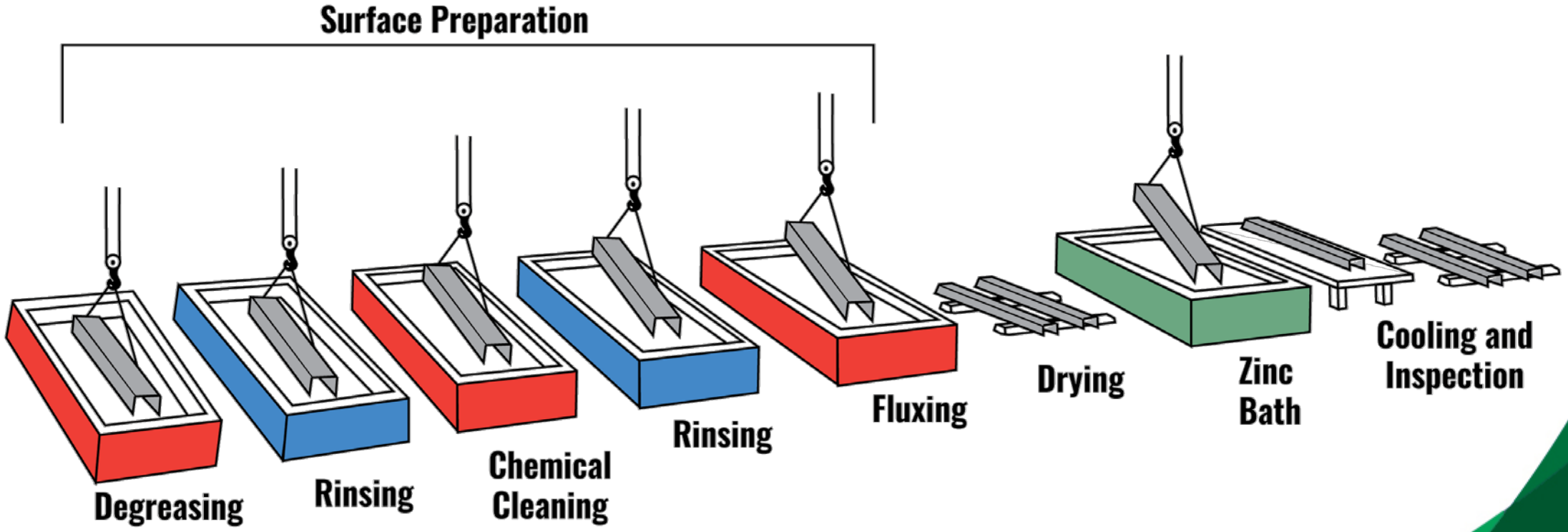
Brandon Chavel
Vice President - Bridges
American Institute of Steel Construction /
National Steel Bridge Alliance
E-mail: chavel@aisc.org
Phone: 312.805.2137

Galvanizing

John Krzywicki
Marketing Director
American Galvanizers Association (AGA)
jkrzywicki@galvanizeit.org
720-361-4489

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 Overview – Inspection & Quality Control

- Steel inspected after galvanizing to verify conformance to specs
- Visual inspection with naked eye
- Coating thickness checked by magnetic thickness gauge
- AGA Resources
  - Inspection of HDG Steel Products Guide (PDF)
  - AGA Online Inspection Course
  - FREE Inspection Mobile App
    - galvanizeit.org/mobile

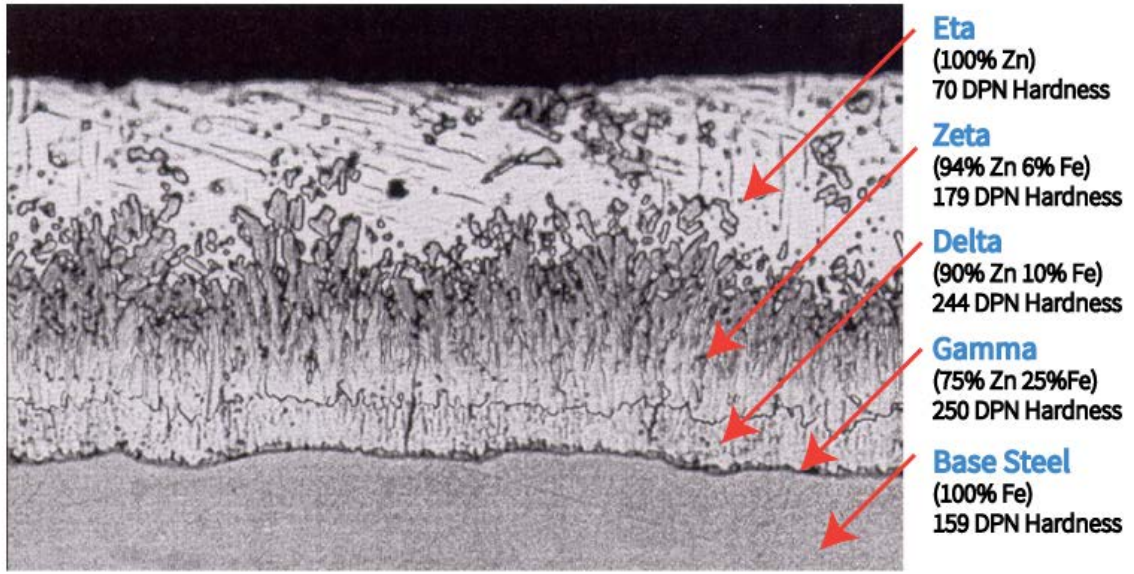
Download on the App Store

GET IT ON Google Play

Galvanizing Advantages: Longevity & Durability

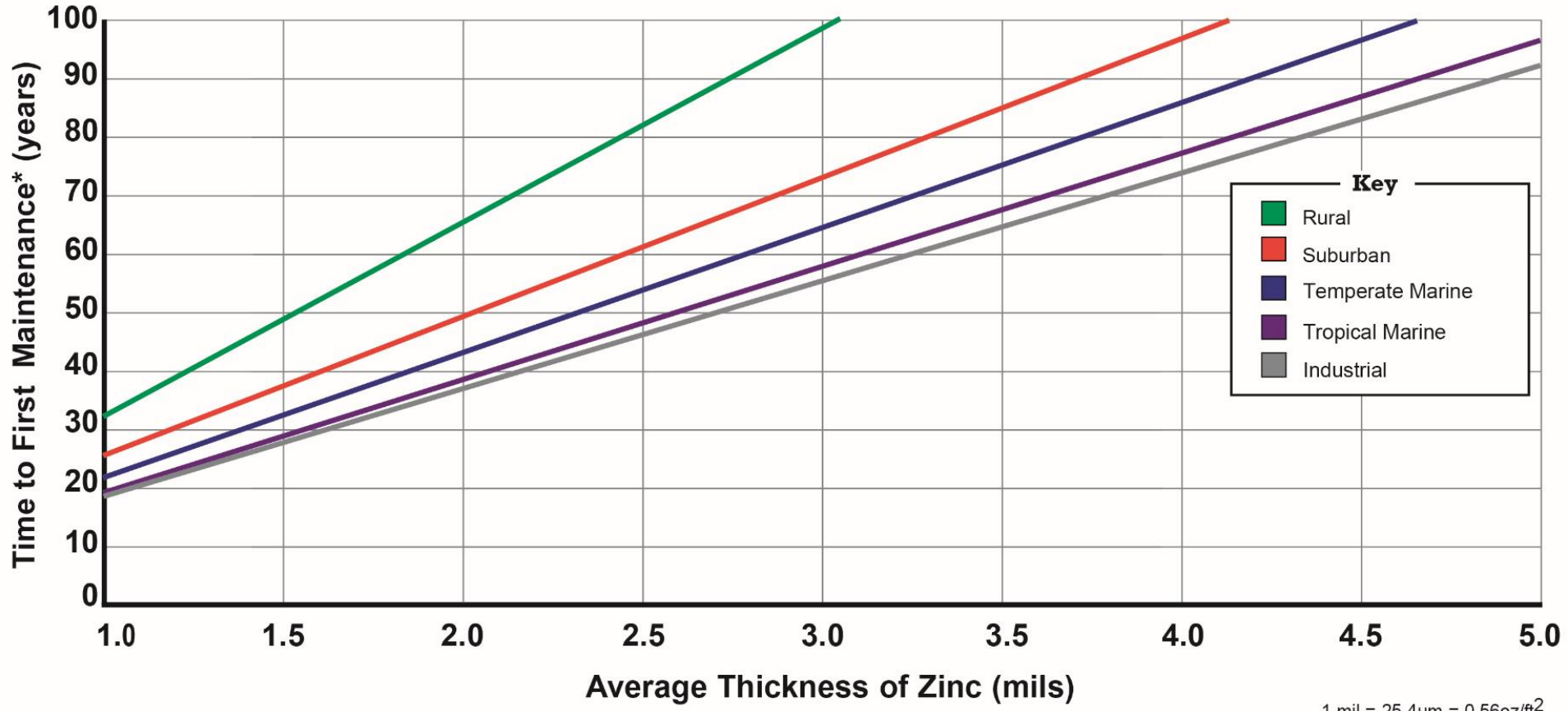
- Zinc coating provides three types of corrosion protection:
  1. Barrier
     - Isolates steel from environment / atmosphere
  2. Cathodic
     - Zinc will sacrificially corrode to protect underlying steel
  3. Zinc Patina
     - Protective layer of corrosion products
     - Develops naturally as HDG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

- Aesthetics: Silver/matte gray finish
- Methods to Maximize Aesthetics
  - Follow ASTM A385
  - Increase and optimize venting & drainage
  - Low-reactivity welding electrodes
  - Provide designated lift points
- Duplex System (Paint over HDG)
  - Synergistic Effect
  - Provide 1.5x – 2x sum of the systems alone
  - Extends maintenance cycle of paint

Panther Creek Bridge, Klamath, CA | 2024

Galvanizing Challenges: Proper Design Practices

- Communication is key
  - Throughout design process between all parties
  - Improves overall quality, turnaround times, and minimizes costs
- Follow best design practices
  - ASTM A385, A384, A143
  - AASHTO/NSBA S8.3
  - AGA Design Guide
  - AGA Online Design Seminar

Galvanizing New Construction and Repair/Rehab

New Construction

- Proper Storage
  - Mitigate wet storage stain
- No special handling
- Stud Welding
  - Before HDG – best corrosion protection
  - After HDG – mask top flange, stud weld in field

Repair/Rehab Construction

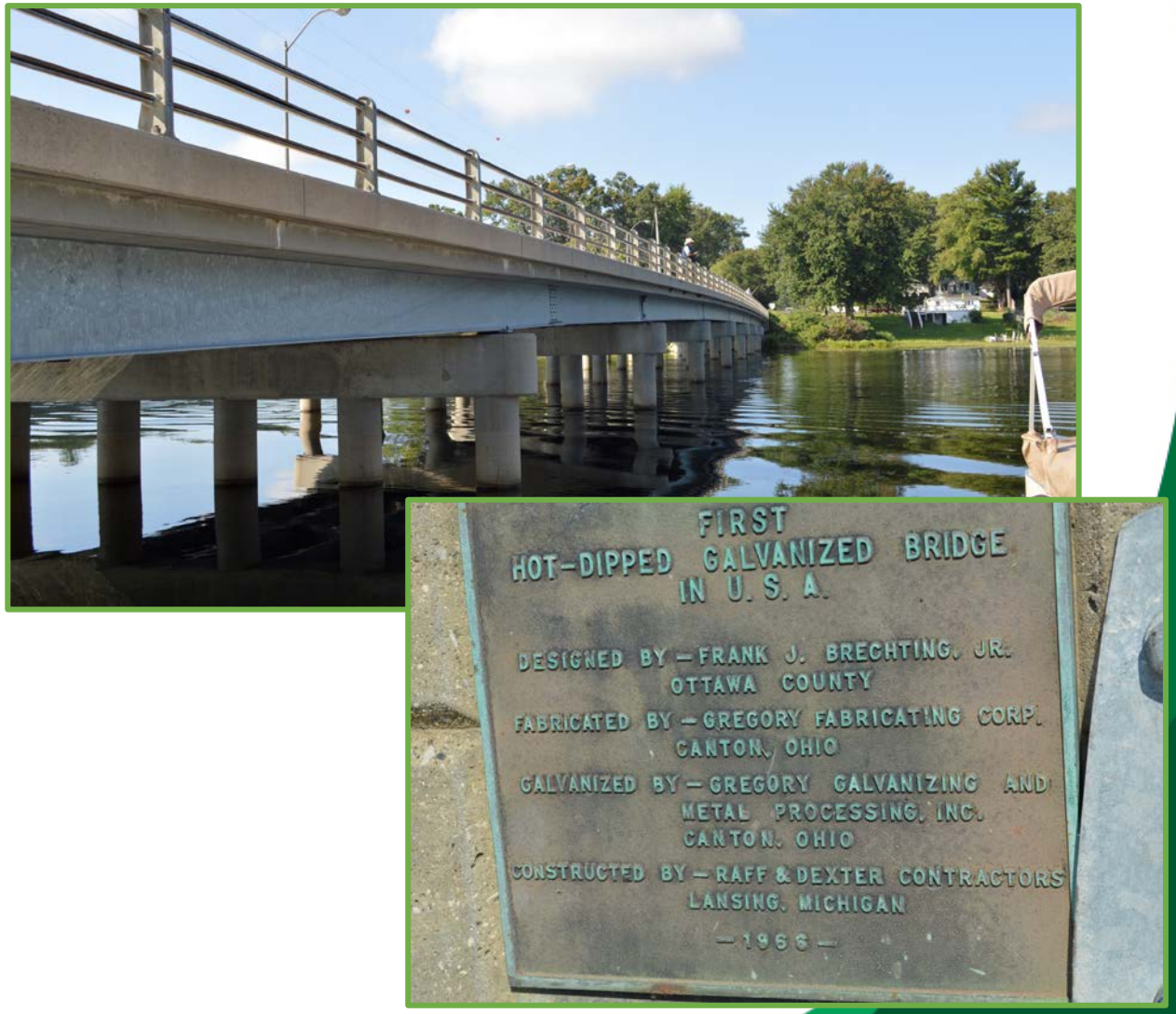
- Thermal Spray Zinc (TSZ) Metallizing
- Zinc-rich Paint
- In some cases, steel can be disassembled, stripped and re-galvanized.

Galvanizing Case Studies: Lizotte Bridge

- The Lizotte Bridge in Quebec, built in 1963, is the world's first fully galvanized bridge.
- After nearly 60 years, the bridge shows no corrosion and still meets new coating specifications.
- Not expected to require any maintenance for at least another 60 years - easily surpassing the 100-year bridge life desired today

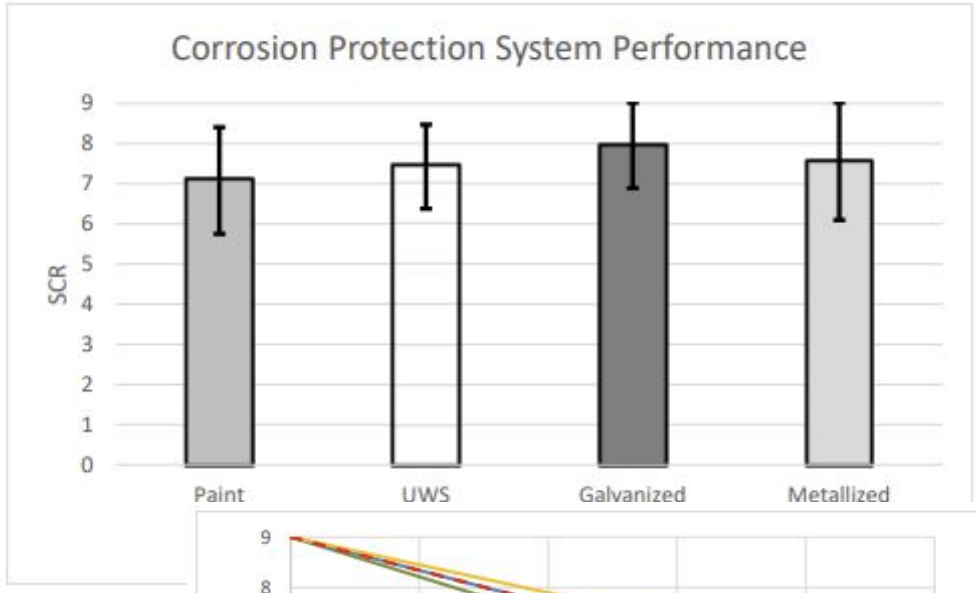
Galvanizing Case Studies: Stearns Bayou Bridge

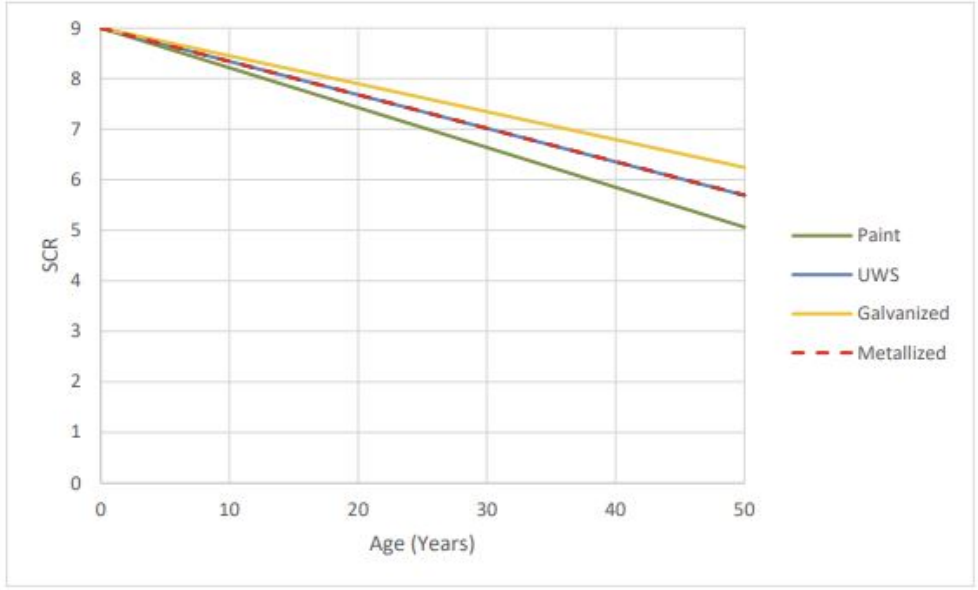
- Built in 1966, Stearns Bayou Bridge in Michigan is the first hot-dip galvanized bridge in the U.S.
- Based on an inspection in 2017, the galvanized steel components on the bridge are not expected to require any maintenance for at least another 70 years - easily surpassing the 100-year bridge life desired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



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





Galvanizing Future Trends: 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

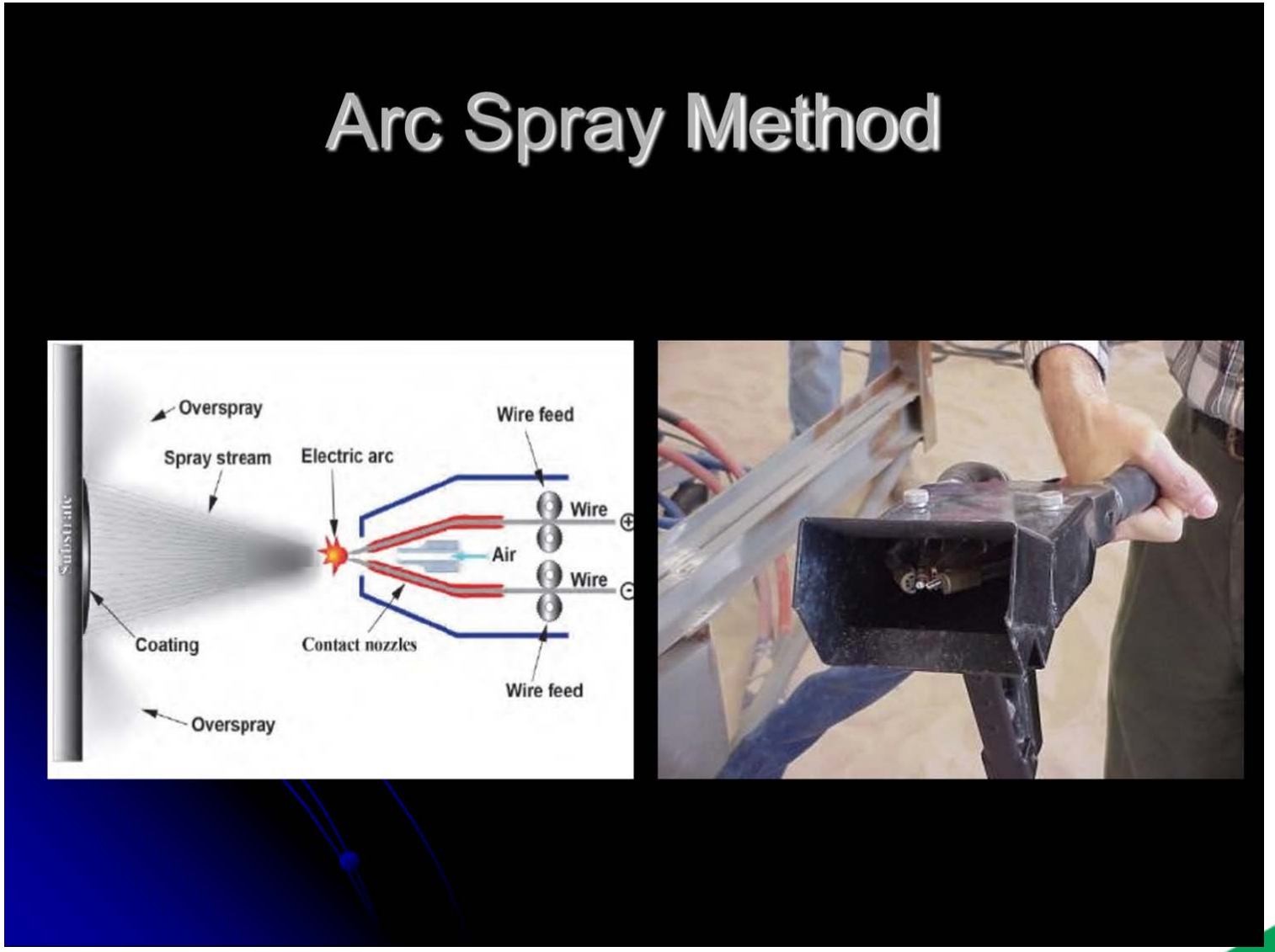
Metalizing

Wes Love
Quality Manager
Industrial Steel Construction
wlove@iscbridge.com

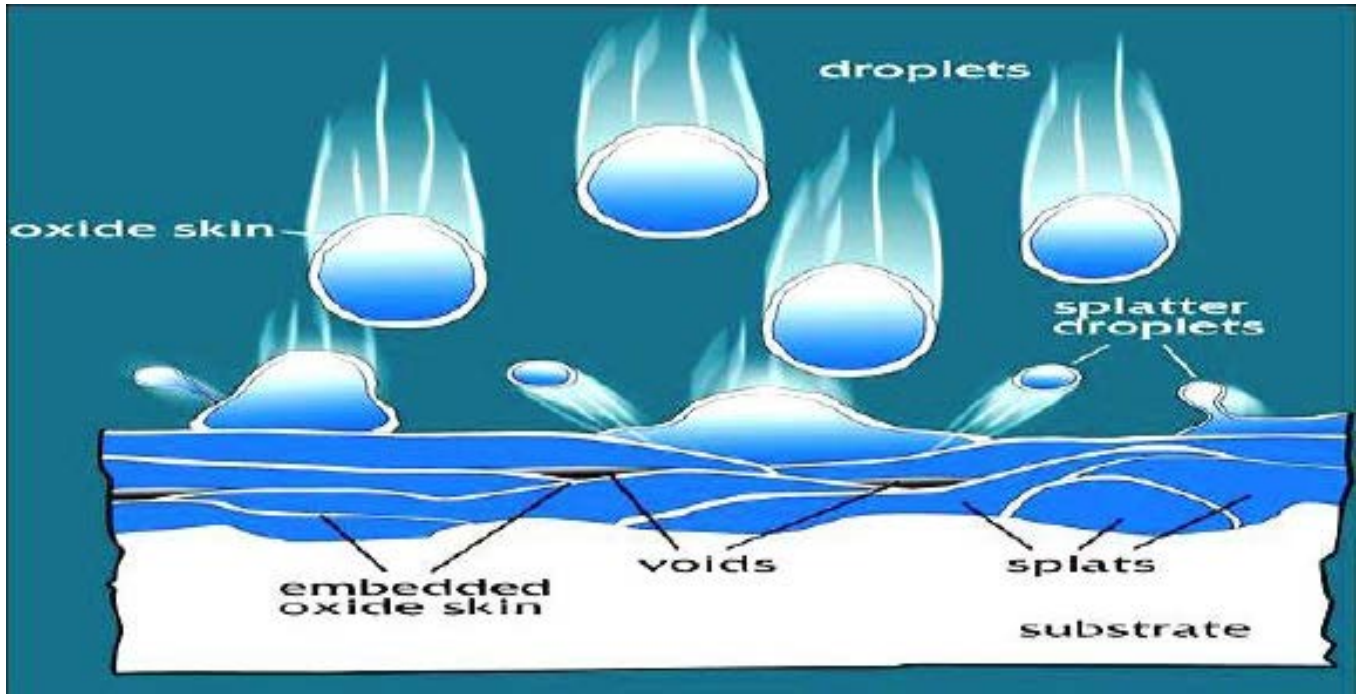
Metalizing Overview

- 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.

Metalizing Overview



Metalizing Overview



Molten metal particles impact the surface flatten out, solidify and create a layered metallic coating.

Metalizing Advantages

- No VOCs produced
- Lower life-cycle-cost
- Less rework for defects
- ***Lower maintenance cost***
- ***No size limitations***
- No undercutting of TSC that would lead to corrosion.
- Portable Equipment adapted for field applications.
- Cost per Square Foot

Metalizing Advantages

Steel Bridges

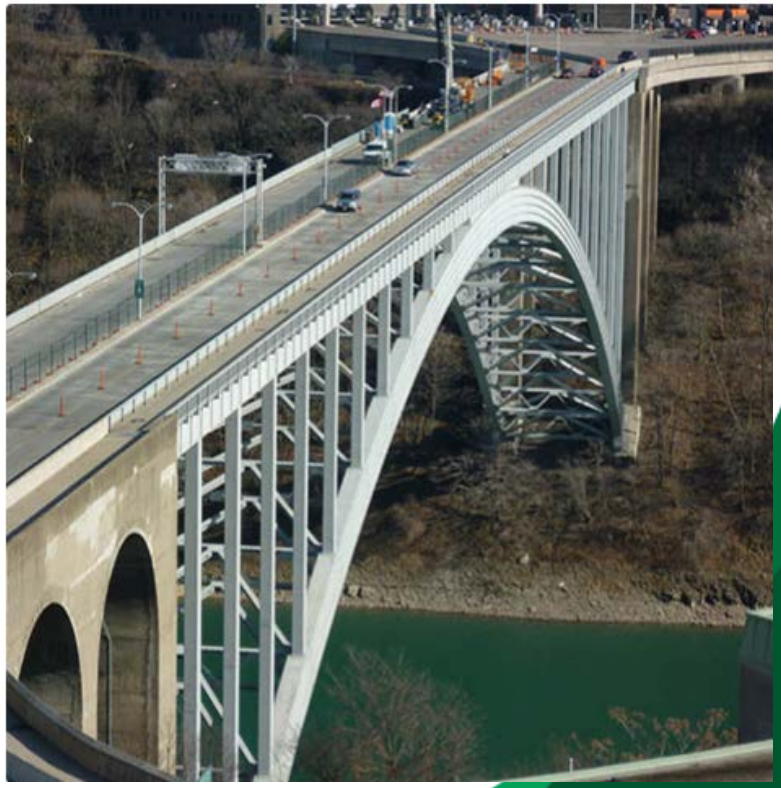
Metalizing offers long term corrosion protection for steel bridges. The ability of thermal sprayed zinc, aluminum, and zinc/aluminum coatings to provide effective long term protection for steel exposed to a variety of environments is well proven.

Projected over a 50 year period, it has been estimated that metalizing steel bridges could reduce coating costs by 50%.

The Rainbow Bridge, connecting Niagara Falls New York, USA to Niagara Falls, Ontario, Canada, was metalized with 8-12 mils of 85/15 zinc/aluminum. A properly applied metalized coating can realistically provide 30 years of corrosion protection.

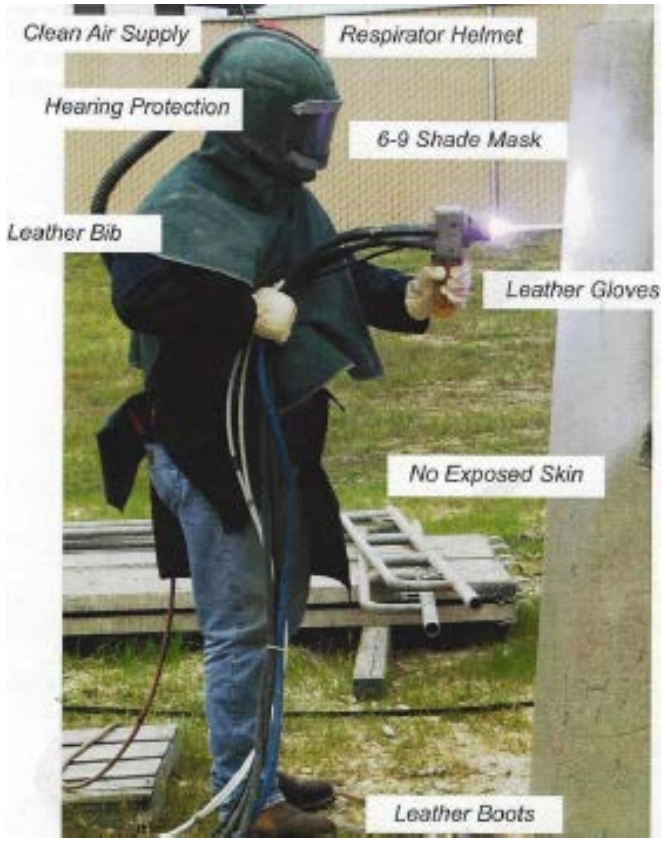
Coating thickness can be varied depending on the atmospheric condition at the installation site. Where required, a thicker coating can be applied to extend the service life of the coating

TMS METALIZING SYSTEMS, LTD.



Metalizing 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



Metalizing New Construction

ISC Job No.	Project Name	Project No.	Structure No.	Location	Scope of Project	Top Coated	Metallizing Start Date	Metallizing Finish Date
F775	Circle Interchange NW Ramp I-90 NB/I-290 WB	60W28	016-1705	Chicago, IL	123 Plate Girders, Splice Plates	No	January 2015	December 2015
F780	SB IL-171 to NB I-55 Ramp E over I-55 (Stevenson Expressway)	60W77	016-1512	Chicago, IL	12 Plate Girders, Splice Plates, Crossframes	No	July 2015	August 2015
F798-F800	I-55 (Stevenson) and US-41 (Lake Shore Drive) Interchange	60L70	Outbound Structures	Chicago, IL	266 Plate Girders, Splice Plates	No	September 2015	March 2016
F805-F807	I-55 (Stevenson) and US-41 (Lake Shore Drive) Interchange	60X07	Inbound Structures	Chicago, IL	236 Plate Girders, Splice Plates	No	April 2016	August 2016
F832	S.R. 80 (Southern Boulevard) over Lake Worth Lagoon Bridge	419013-1-52-01	930559	West Palm Beach, FL	4 Bascule Girders, Floorbeams, CTWT Boxes	Epoxy, Urethane	June 2019	August 2020
F837	Circle Interchange NE Flyover	62B76	016-1710	Chicago, IL	20 Plate Girders, 1 Beam, Splice Plates	No	April 2017	September 2017
F880-F883	Jane Byrne Interchange Ramps	60X93	016-1706,1714,1715,1718	Chicago, IL	234 Plate Girders, 38 Beams, Splice Plates	No	October 2019	September 2020
F884	I-290 EB Ramp to I-90/94 NB	60X79	016-1712	Chicago, IL	40 Plate Girders, Splice Plates	No	April 2020	June 2020
F892	Montrose Avenue over FAI 90/94 and the CTA Blue Line	62F95	016-0852	Chicago, IL	45 Plate Girders, Splice Plates	No	June 2020	December 2020
F893-F894	I-74 over Market Street	70C64	SN 010-0021	Champaign County, IL	112 Plate Girders, Splice Plates	No	October 2020	February 2021
F895	U.S. 150 (Bloomington Road) over I-57	70B98	010-1050	Champaign County, IL	21 Plate Girders, Splice Plates	Sealer, Fascia Epoxy	September 2020	December 2020
F897-F898	I-294 Ramp C Flyover, Dixie Creek Bridge and Ramp F2	I-19-4495	016-2101, 2102	Cook County, IL	279 Plate Girders, Splice Plates	Sealer, Fascia Epoxy & Urethane	January 2021	October 2021
F899	Adams Street and Jackson Boulevard Bridges	60X94	016-1701, 1702	Chicago, IL	128 Plate Girders, Splice Plates	No	March 2021	March 2022
F901	I-74 over Salt Fork Vermilion River	70A92	092-0006, 0007	Vermilion County, IL	84 Plate Girders, Splice Plates	Sealer	May 2021	June 2022
F903	20th Street over US Rte. 20	64A08	101-0188	Winnebago County, IL	14 Plate Girders, Splice Plates	Sealer, Fascia Epoxy	April 2021	June 2021
F909	I-294 SB over I-55	I-20-4519	010-1050	Cook County, IL	24 Plate Girder Ends	Sealer	May 2021	September 2021
F911	I-55 over IL Rte. 59	62M63	099-4666	Joliet, IL	21 Plate Girders, Splice Plates	No	September 2021	November 2021
F913	SB Chavez Dr Ramp J & NB Chavez Dr Ramp I over I-69/I-475 Ramps	204861A	S13 & S14 of 25132	Flint, Genesee Co, MI	13 Plate Girder Ends	Epoxy, Urethane	March 2022	June 2022
F917	Ohare to WB IL Rte. 390 Ramp Q1 at I-490 & IL Rte. 390 Interchange	I-20-4722	Br #1674	DuPage County, IL	12 Plate Girder Ends	Epoxy, Urethane	October 2021	November 2021
F939	CSX CREATE P3 - Flyover Spans- Straddle Bent 16 & 17 Caps	P3-BOCT-TSB-007-Z-Stage II		Cook County, IL	2 Bolted Bent Caps	Epoxy, Urethane	January 2024	
F942	CSX CREATE P3 - Bridge over 69th Street	P3-BOCT-TSB-007-Z-Stage II		Cook County, IL	22 Plate Girders & Floor system	No	March 2024	
F943	CSX CREATE P3 - Bridge over 71st Street	P3-BOCT-TSB-007-Z-Stage II		Cook County, IL	27 Plate Girders & Floor system	No	May 2024	
F961	Black Hawk Bridge over Missippi River Iowa D.O.T.	IA 9 / WI82 OVER MISSISSIPPI RIVER		ALLAMAKEE COUNTY, IOWA	Truss, 5400 Tons	Epoxy, Urethane	October 2024	
F962	IL 2 OVER ROCK RIVER (SB) SECTION 77-1BR	STRUCTURE No 101-0221(SB)		WINNEBAGO COUNTY, ILLINO	65 Girders	No	June 2024	
F966	I-90 at Foster Ave.	Structure No 016-1669		Cook County, IL	65 Girders	No	February 2025	
F967	I-290 at Ashland Ave.	Structure No. 016-0783		Cook County, IL	65 Girders	No	February 2025	

1757 Girders Metalized at ISC since 2015

Metalizing Case Studies/Examples

Extensive testing by FHWA of metallized coatings applied to steel have concluded:

- Zn and 85/15 ZnAl of 6 mils applied over SP-10. provided at least 20 years of maintenance free corrosion protection with expectation of providing +30 years.

- No undercutting from intentional coating defects.

Metalizing Future Trends

Increase in number of Bridges on the East Coast and Midwest States

- Illinois D.O.T.
- Illinois Tollway
- Blackhawk Bridge – Iowa D.O.T. Designed as a +100 Year Structure
- Metalizing can be a cost-effective coating for Rural Structures with minimal to no maintenance cost of the coating.

Painting

Derrick Castle
Market Manager – Bridge and Highway
The Sherwin-Williams Company
Derrick.Castle@sherwin.com
913-481-0612

Painting Overview

- 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

Painting Advantages

- Cost effective
  - Single coat, two-coat and three-coat systems
  - Fast cure times promote production throughput
    - Shop or field application
- Long term corrosion protection
  - Many systems based on zinc-rich technologies
  - Proven performance
- Aesthetics
  - Wide range of colors and finishes
- Availability
  - Local stores
  - Direct shipping

Painting 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

Painting New Construction and Repair/Rehab

- New construction
  - Class B slip critical compliance
  - Improved throughput times
    - Single coat zinc-rich primers
    - Two-coat systems with fast cure/recoat times
- Repair/Rehabilitation
  - Class B slip critical compliance
  - Systems matched to surface preparation and environmental exposures

Painting Case Studies/Examples

- **NSBA Report – Single Coat IOZ**

Painting Future Trends

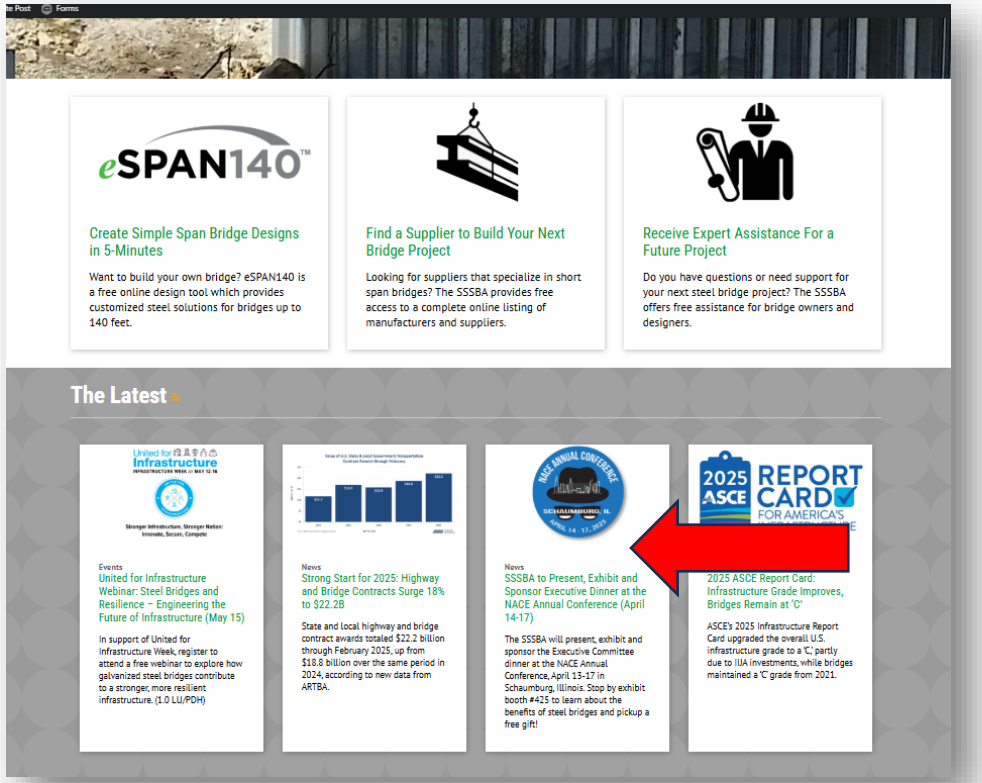
- **Single coat and two-coat systems**
- **Duplex coatings**
- **Textured epoxy coating for rebar**
- **Fireproofing**

Panel Discussion

- Jeff Blue, Champaign County, Illinois
- Brian Keierleber, Buchanan County, Iowa
- Mark Seri, Previously with Barron County Highway Department, Wisconsin

Download Slide Deck

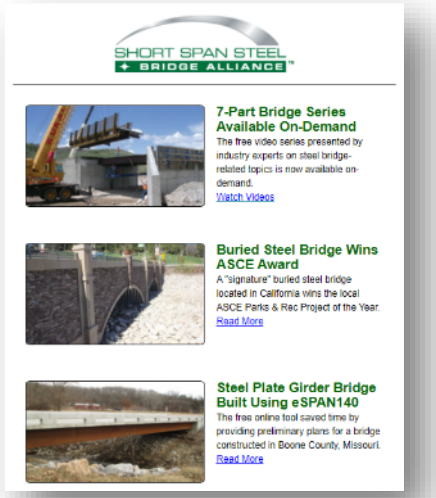
Go to: https://www.shortspansteelbridges.org/



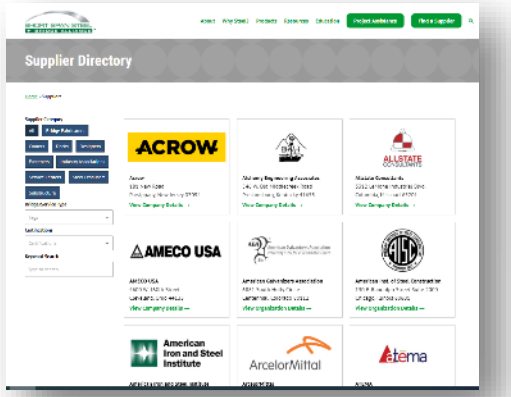
https://www.shortspansteelbridges.org/sssba-to-present-and-exhibit-at-nace-conference-april-14-17/

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™

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