



STEEL BRIDGE FORUM
Raleigh, NC
September 14, 2011



Weathering Steel
The Other Corrosion Protection System



Bill McEleney
Director, National Steel Bridge Alliance

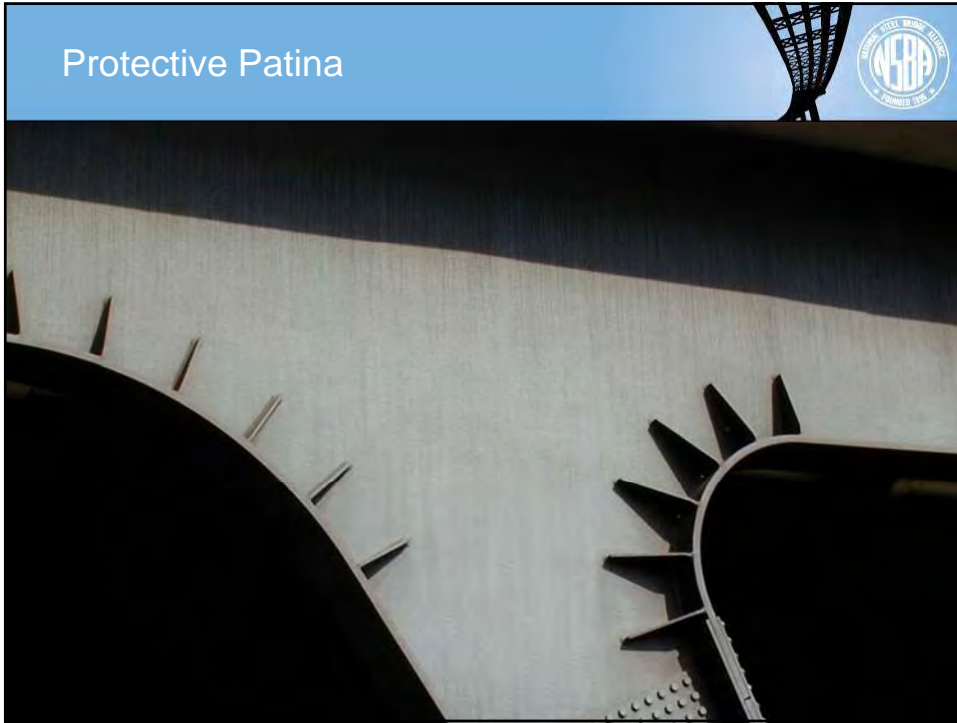


High Strength – Low Alloy Steel



- High strength - low alloy steel
- ASTM A709 - Grades 50W, HPS 50W, HPS 70W, & HPS 100W
- Expect 4 times the corrosion resistance of carbon steel
- Forms tight oxide coating (patina)

Protective Patina



Weathering Steel

- Patina is a thin layer of dense corrosion by-products that acts as a skin to protect against further corrosion.
- In use in United States since 1933.
- Developed for coal hopper cars to combat the corrosive effects of sulfur on steel.
- New High Performance Steel (HPS) has improved weathering characteristics.

Simple, Low Maintenance Bridge



Use of Weathering Steel



■ BENEFITS

- Lower Fab Cost
- Shorter Fab Time
- No Field Painting
- Natural Appearance
- Minimal Maintenance
- Lower Life Cycle Cost

■ CAUTIONS

- Not appropriate in foggy, coastal regions
- Not for use in tunnel-like conditions where deicing salts are used
- Evaluation needed in heavy industrial areas (corrosive chemicals)

Uncoated vs. Coated



Use of weathering steel is growing due to:

- Reduced cost for blast cleaning, edge grinding and surface preparation
- Avoided cost of first coating systems
- Time in the fabrication process to allow curing between coats
- Reduced maintenance costs; traffic impact

Cost Studies



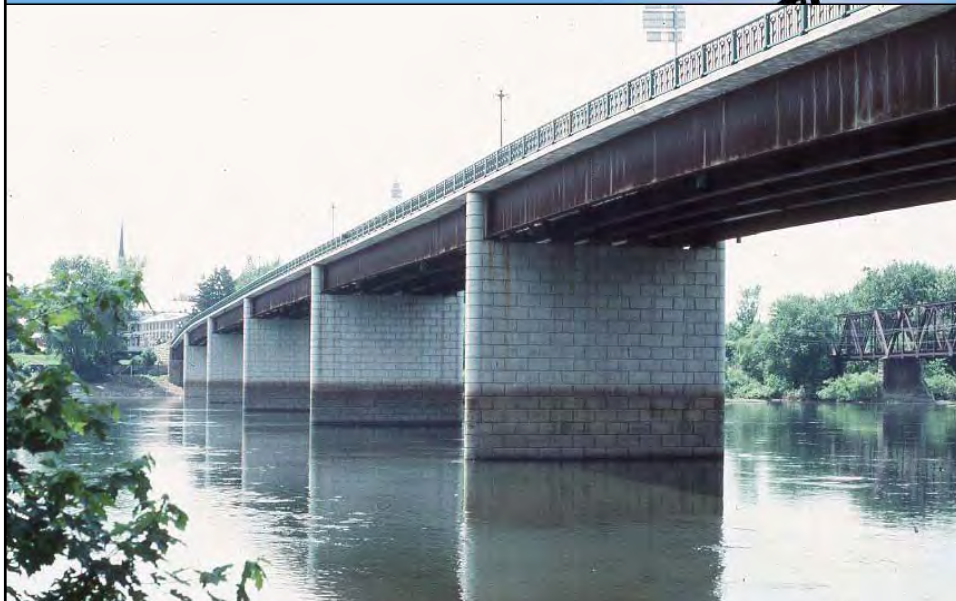
- *FIRST COST SAVINGS:*
10 TO 18%
- *LIFE CYCLE SAVINGS:*
YES - ???

Relative First Costs



- Material costs 3 - 4 cents/pound more
- But, painting costs significantly higher
 - 12 – 20 cents/pound
- Net costs favors Weathering Steel

Lewisburg, PA



Example – Lewisburg, PA



- 1223' bridge length (886 tons total)
- Material extra (@ \$.03): \$ 53,160
- Painting cost avoided (3 coats): \$ 270,674
- Net 1st Cost Savings: \$ 217,514
- Life Cycle Cost Savings (est.): \$ 1.5 M

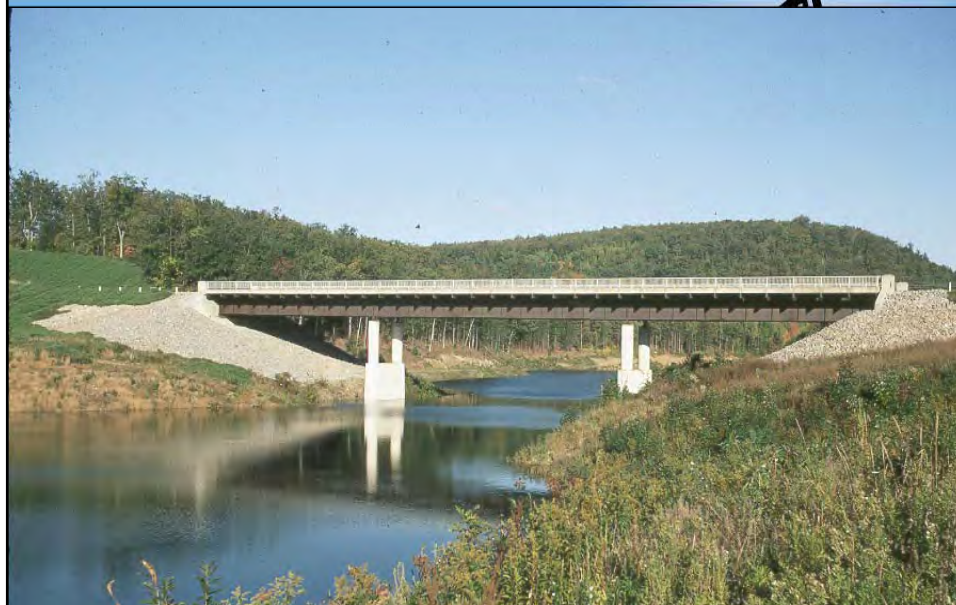
Design Considerations



- **SITE EVALUATION**
 - Environmental / Climatic
 - Site Configuration

FHWA Technical Advisory T 5140.22

Good Site for A588



Adequate Clearance Over Water



Avoid Tunnel-Like Conditions

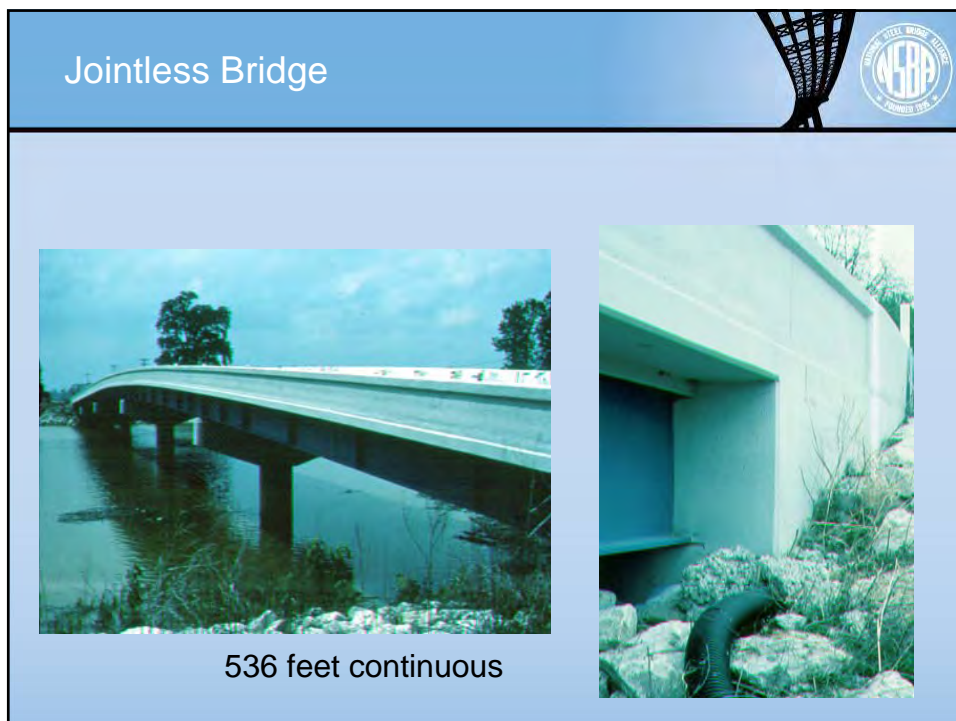
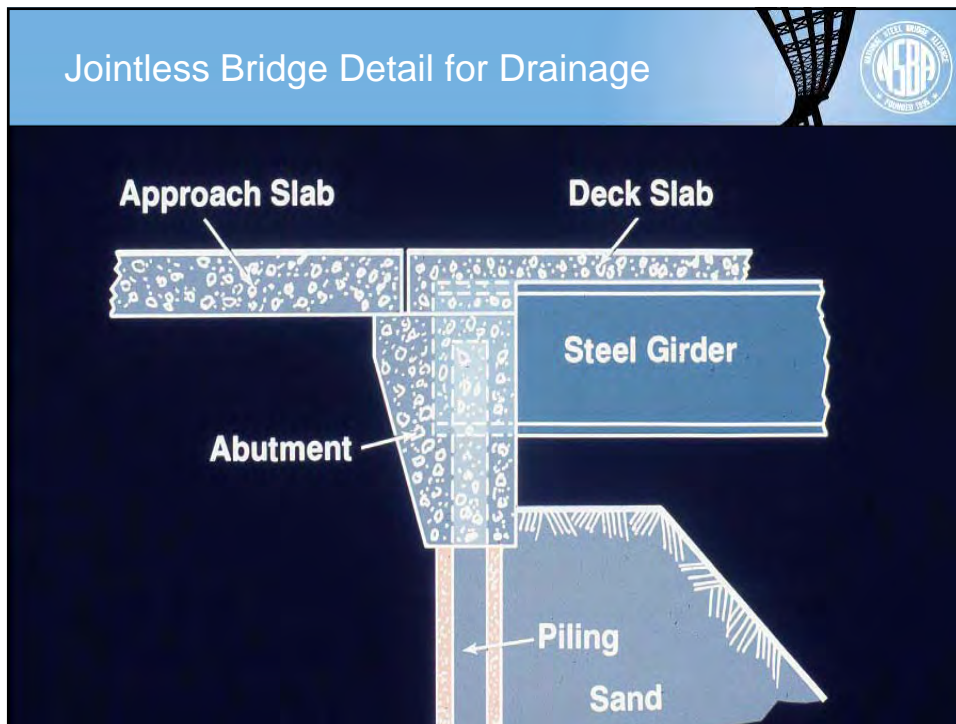


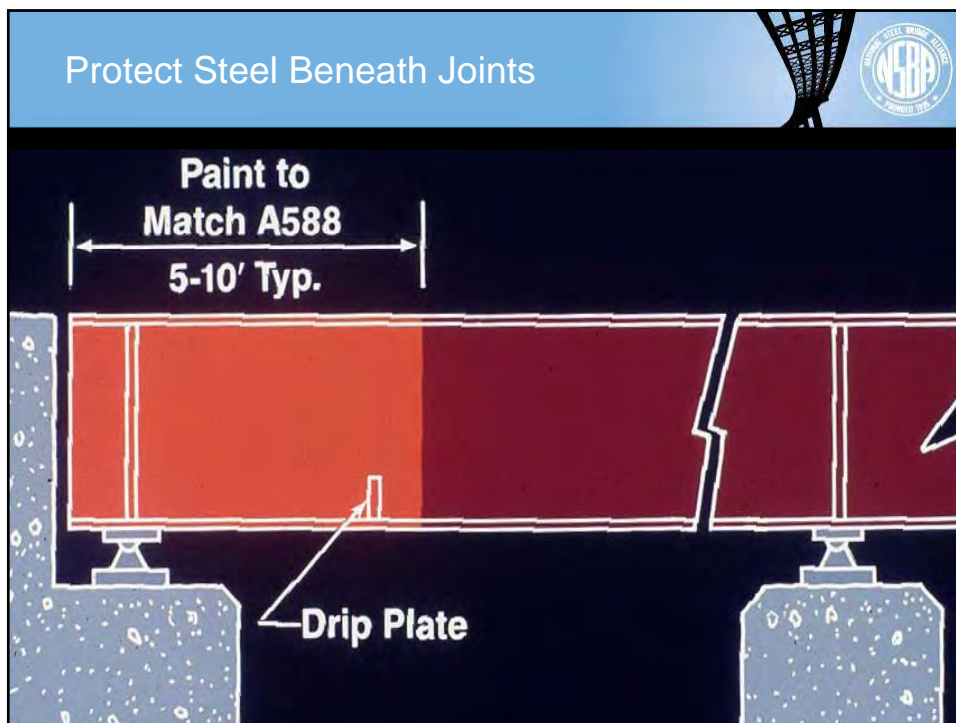
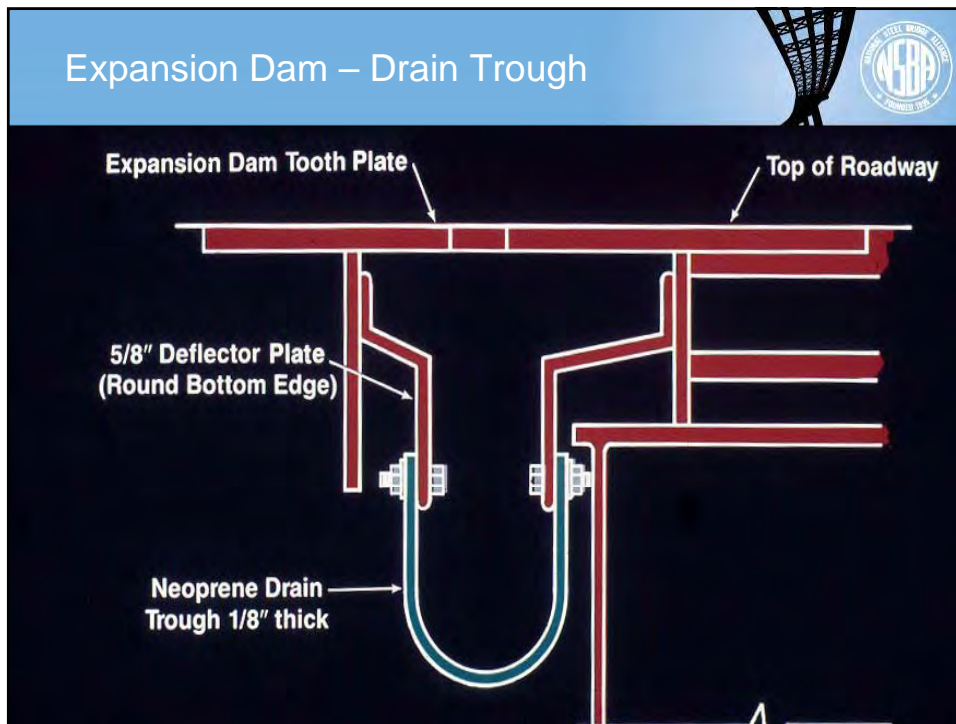
Design Considerations



- ***SITE EVALUATION***
- ***DETAILS – DRAINAGE CONTROL***

FHWA Technical Advisory T 5140.22





Weathering Steel



Design Considerations



- ***SITE EVALUATION***
- ***DETAILS – DRAINAGE CONTROL***
- ***DETAILS – STAINING***

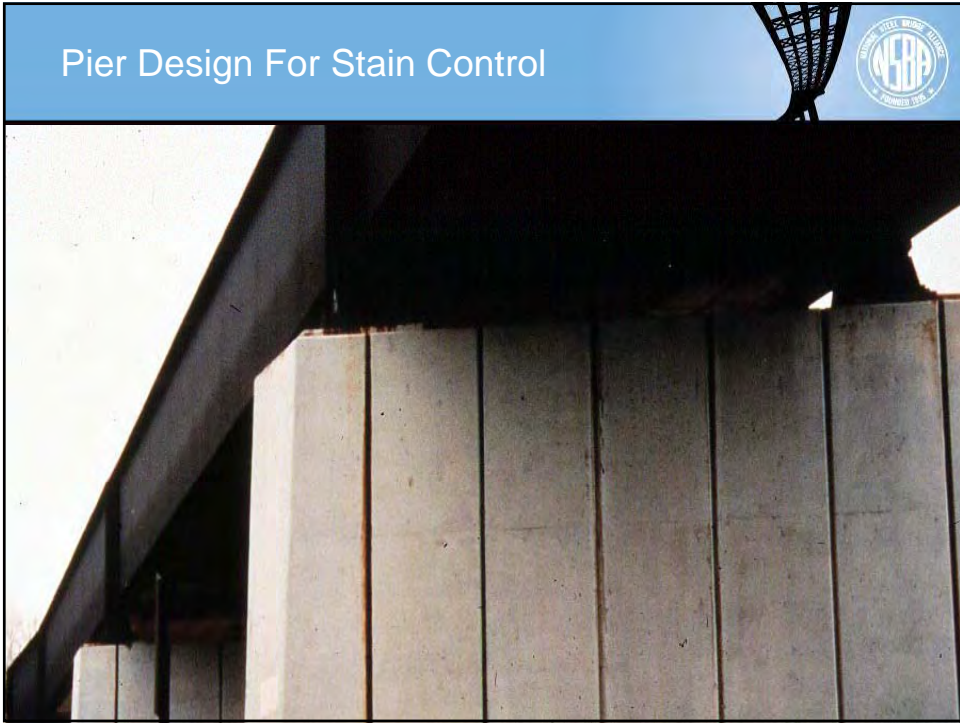
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Wrap For Stain Control



Drip Pan For Stain Control





Substructure Coating for Stain Control



Substructure Material for Stain Control



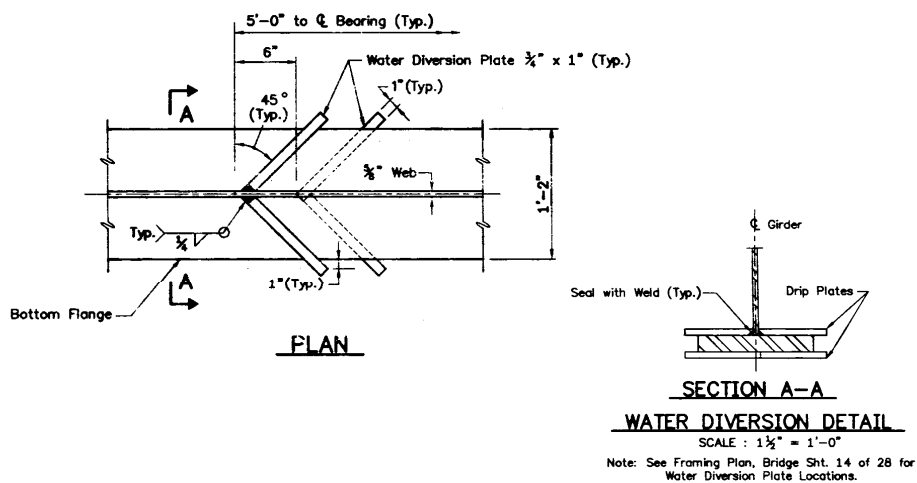
Substructure Material for Stain Control



Drip Bars For Stain Control



Drip Bar Detail For Stain Control



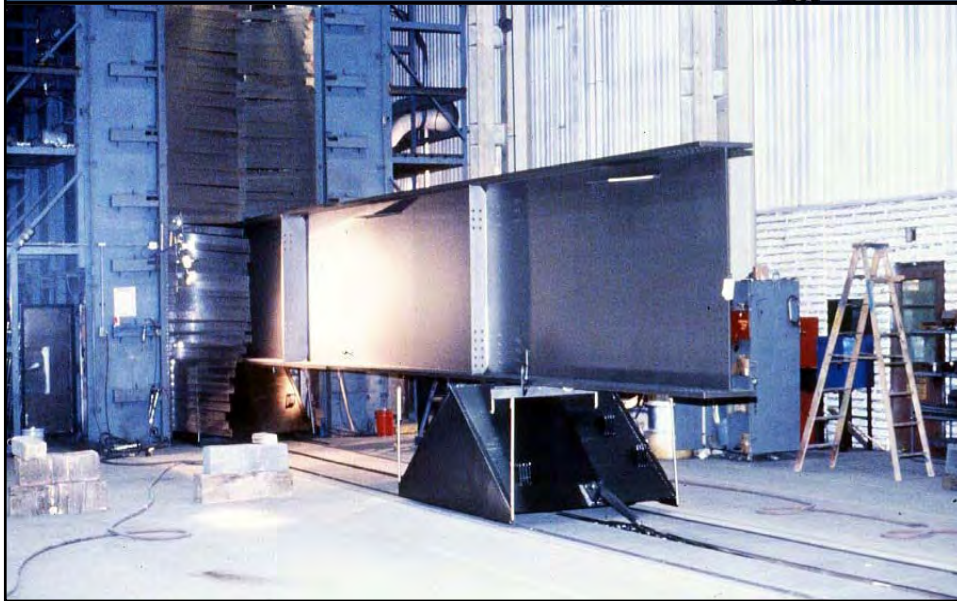
Design Considerations



- **SITE EVALUATION**
- **DETAILS – DRAINAGE CONTROL**
- **DETAILS – STAINING**
- **DETAILS – SURFACE PREPARATION**

not in FHWA Technical Advisory T 5140.22

Blast (SP-6) For Aesthetic Patina



Blast Fascia Only



Maintenance Actions



- Implement procedures to detect and minimize corrosion
- Control roadway drainage
- Regularly remove all dirt debris, etc that trap moisture
- Regularly remove vegetation which prevents natural drying
- Maintain covers and screens over access holes

FHWA Technical Advisory T 5140.22

Weathering Steel



That's Nice, But...



- .. what about when weathering steel doesn't 'work'?
- weathering steel issue or other?
- field painting of weathering steel
 - FHWA Report – Maintenance Coating of Weathering Steel; FHWA-RD-91-087, March '92

Weathering Steel



- A proven, effective corrosion control system
- Specific site conditions
- Cost effective
- Low maintenance

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QUESTIONS ??



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In Florida?



SunCoast Parkway - 1999

- 3 overpasses
- Guardrail
- Light poles
- Less than 10 miles from Gulf of Mexico

Van Dyke over SunCoast



Van Dyke over SunCoast



Van Dyke over SunCoast



Van Dyke over SunCoast



Van Dyke over SunCoast



Van Dyke over SunCoast



Van Dyke over SunCoast



Van Dyke over SunCoast

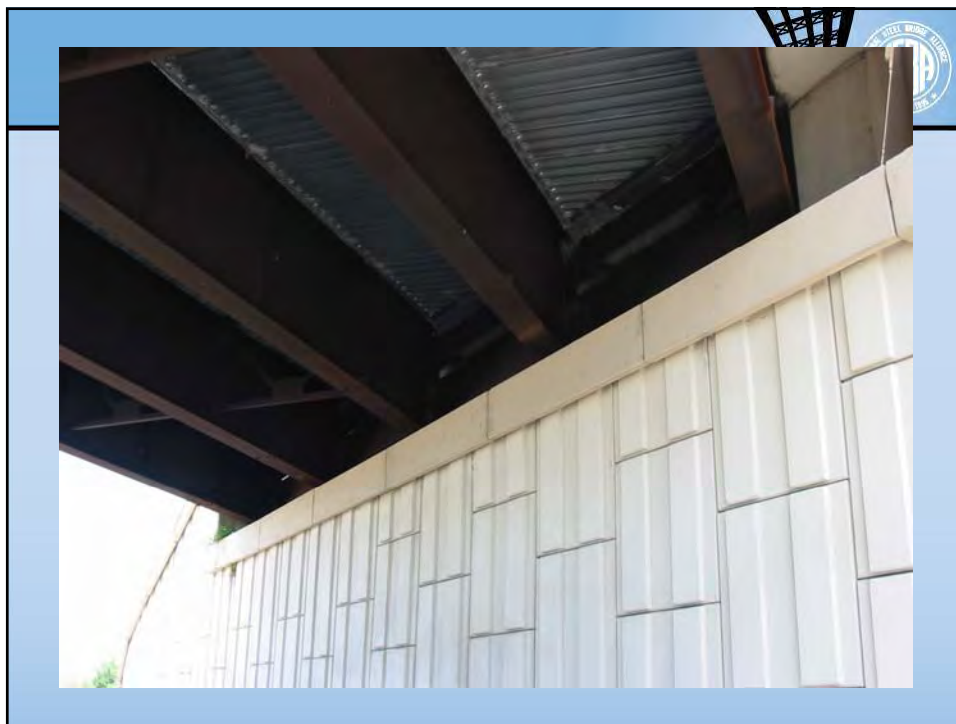


Van Dyke over SunCoast



Caldwell over SunCoast





W. Bowman over SunCoast



W. Bowman Over SunCoast



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