

WEATHERING STEEL

Faux Finish *the Other Corrosion Protection System*

Florida Department of Transportation
Design Conference 2008
People MOVING People

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National Steel Bridge Alliance



WEATHERING 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)



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:

7 to 10%

LIFE CYCLE SAVINGS:

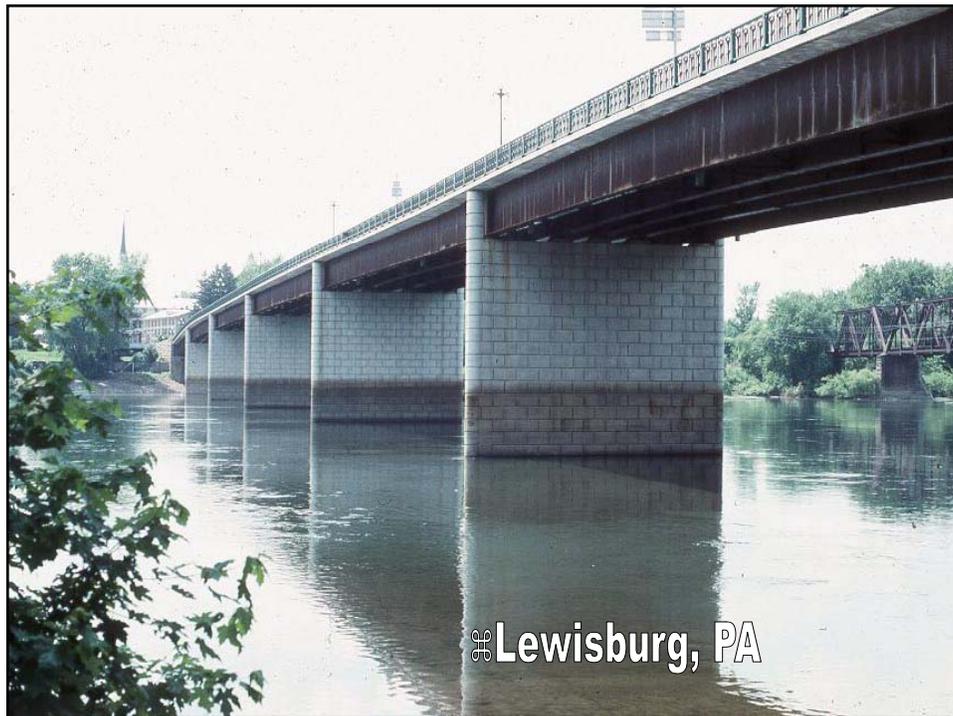
YES - ???

Relative First Costs

Material costs 3 - 4 cents/pound more

But, painting costs significantly higher

Net costs favors Weathering Steel



Example

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

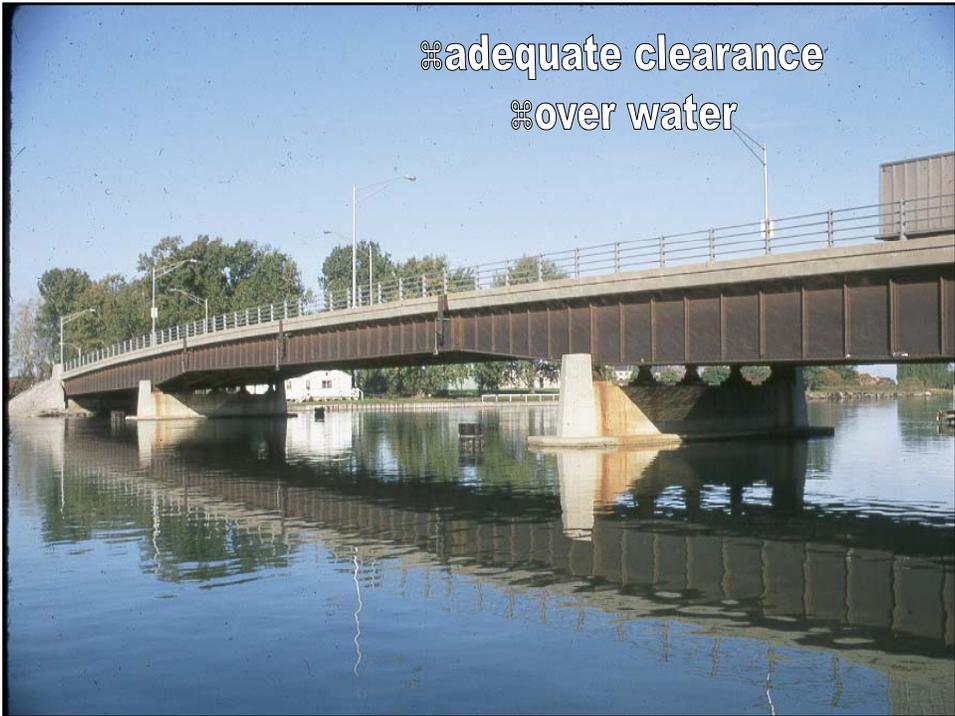
⌘ Lewisburg, PA

DESIGN CONSIDERATIONS

SITE EVALUATION

- ♦ environmental / climatic
- ♦ site configuration

FHWA Technical Advisory T 5140.22



#avoid 'tunnel-like' conditions



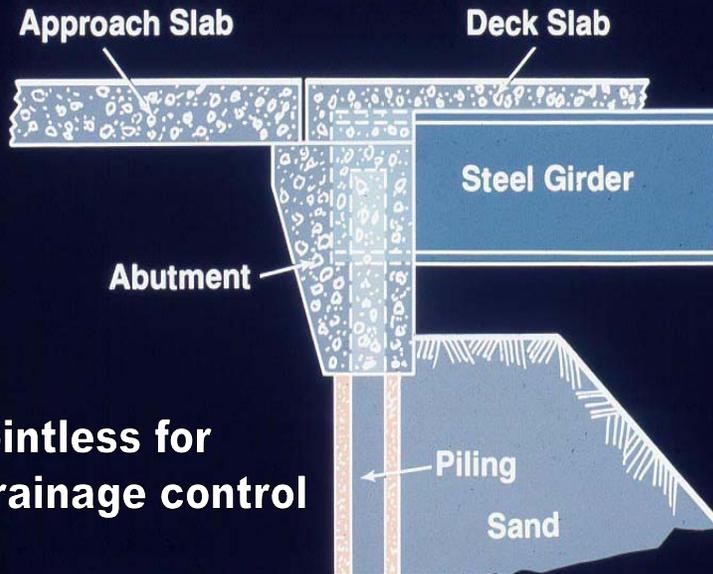
DESIGN CONSIDERATIONS

SITE EVALUATION

DETAILS - DRAINAGE CONTROL

FHWA Technical Advisory T 5140.22

Jointless Bridge Detail



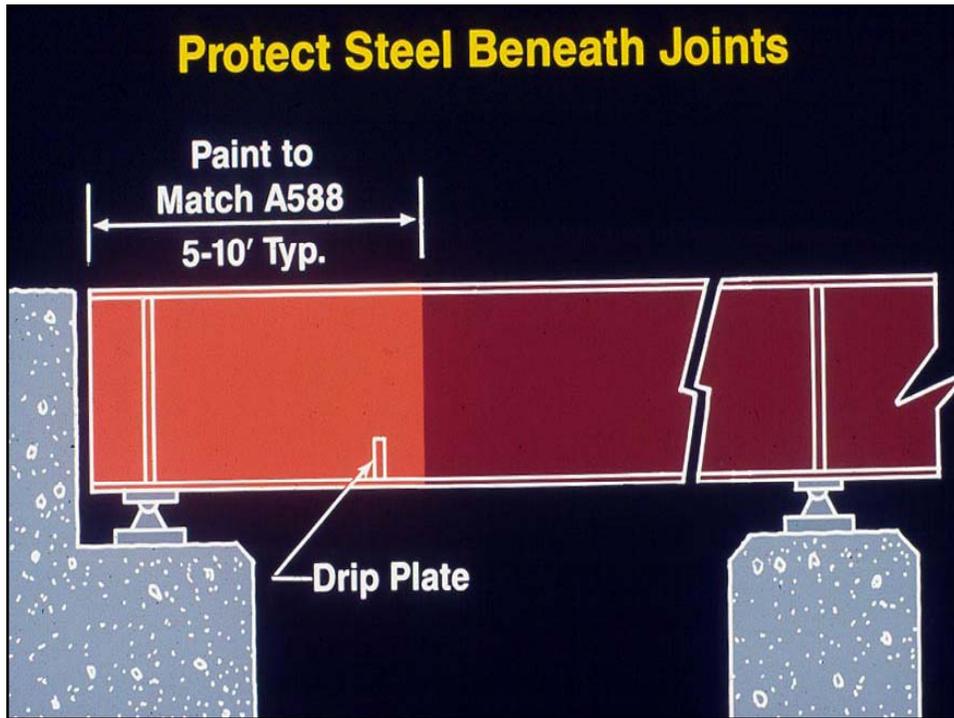
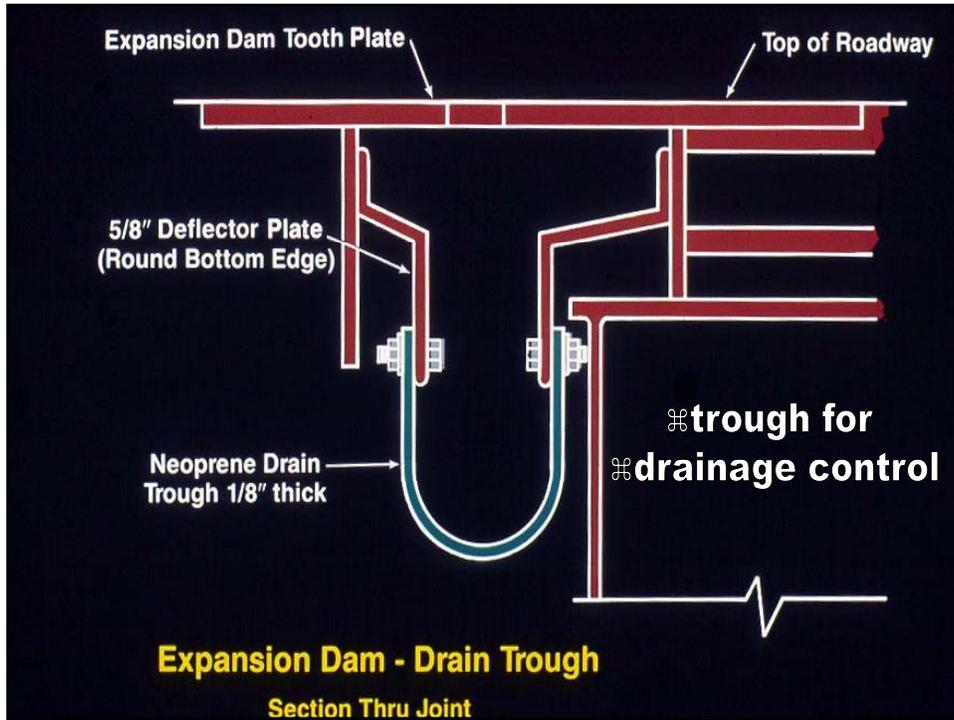
⌘ jointless for
⌘ drainage control

Jointless Bridge



536 feet continuous







DESIGN CONSIDERATIONS

SITE EVALUATION

DETAILS - DRAINAGE CONTROL

DETAILS - STAINING

FHWA Technical Advisory T 5140.22





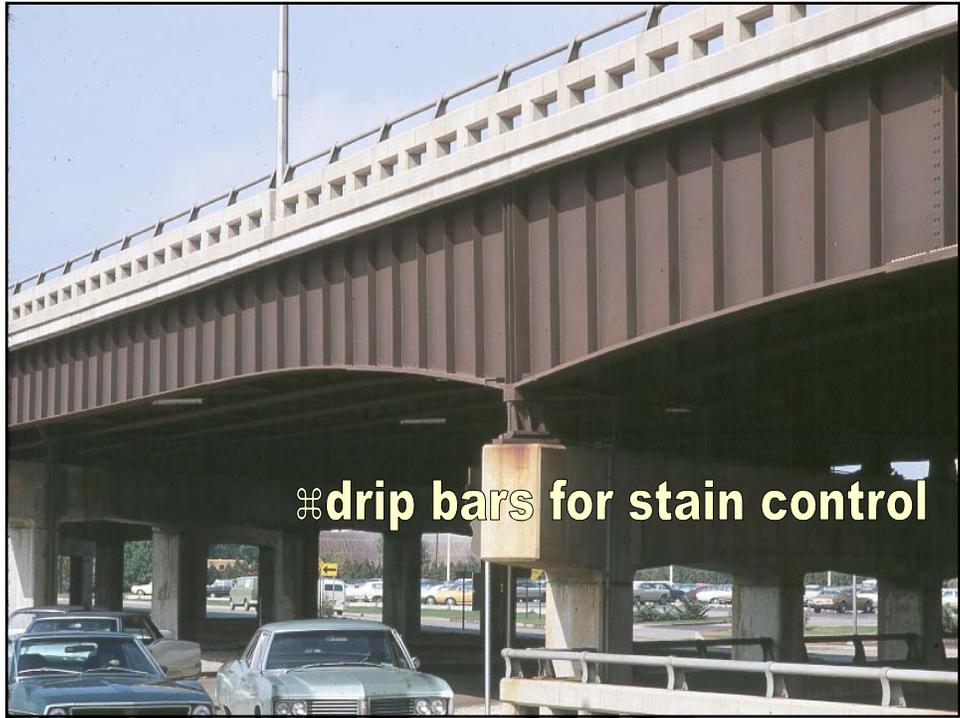
⌘ pier design for stain control



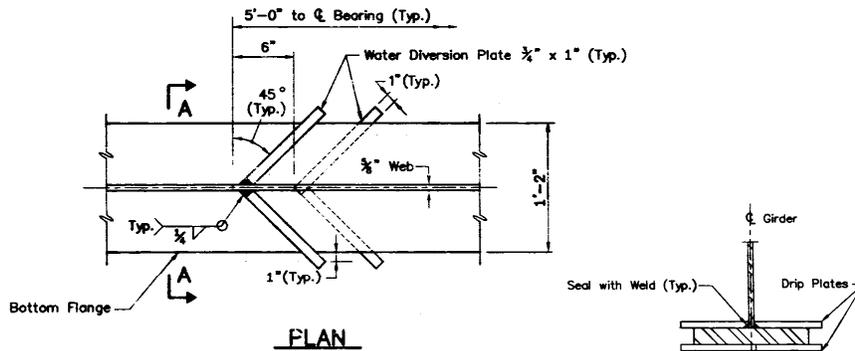
⌘ substructure coating
⌘ for stain control

⌘ substructure material
⌘ for stain control





Drip Bar Detail for Stain Control



SECTION A-A
WATER DIVERSION DETAIL
 SCALE : 1 1/2" = 1'-0"
 Note: See Framing Plan, Bridge Sht. 14 of 28 for Water Diversion Plate Locations.

DESIGN CONSIDERATIONS

SITE EVALUATION

DETAILS - DRAINAGE CONTROL

DETAILS - STAINING

SURFACE PREPARATION

not in FHWA Technical Advisory T 5140.22

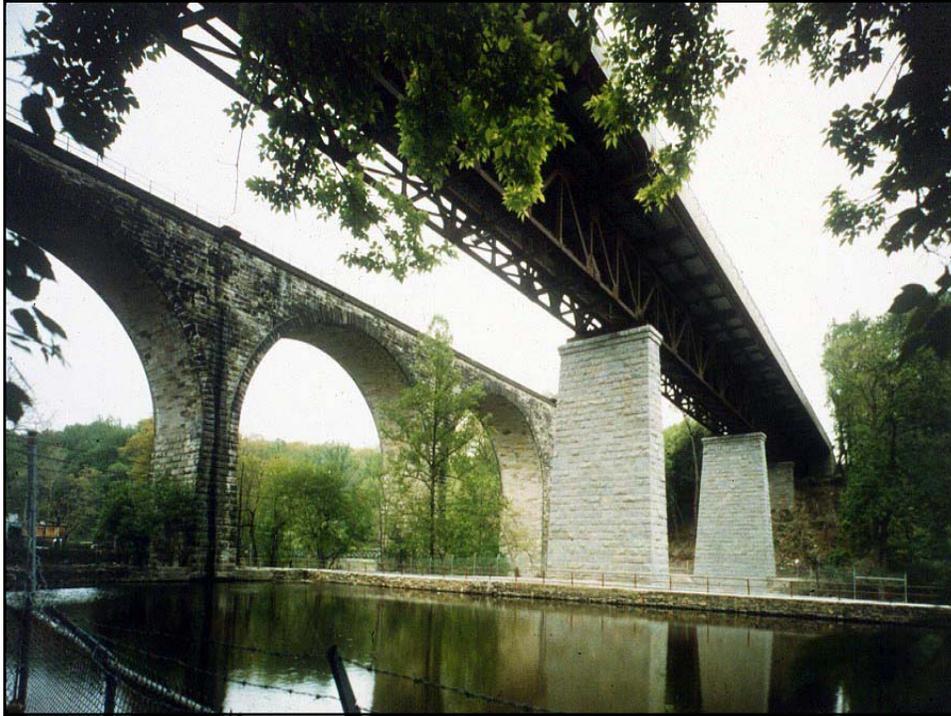




MAINTENANCE ACTIONS

- 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



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

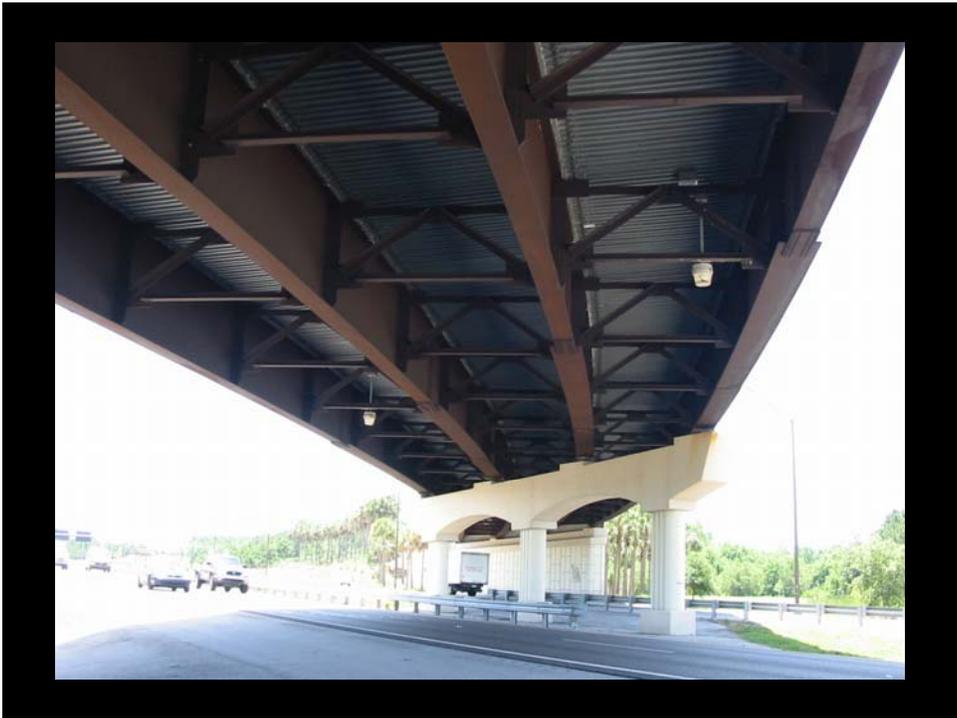
-- in Florida ??

SunCoast Parkway - 1999

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

Van Dyke over SunCoast













W. Bowman over SunCoast





