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Specification Requirements for Preserving Steel Bridges

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TxDOT – Bridge Division

New-Steel Paint Specifications

- Painted Steel New Construction: Item 441 - “Steel Structures”
  - System III-B: IOZ Primer, Epoxy Intermediate, and Urethane Appearance Coat
  - System IV: IOZ Primer and Latex (acrylic) appearance coat
  - Inside Box Members: IOZ Primer
  - Galvanizing: Yes – this would be worth trying in the right circumstances
  - Painting is in accordance with DMS-8104, “Paint, Shop Application for Steel Bridge Members.”
- Weathering Steel (Extra Credit)
  - Coat Beam Ends: AMA-Carson County – CSJ:0275-02-075 (02/25 Letting)
    - IOZ and Appearance Coat to inside faces only (Diaphragms and Bearings).

Coated Weathering Steel Beam Ends

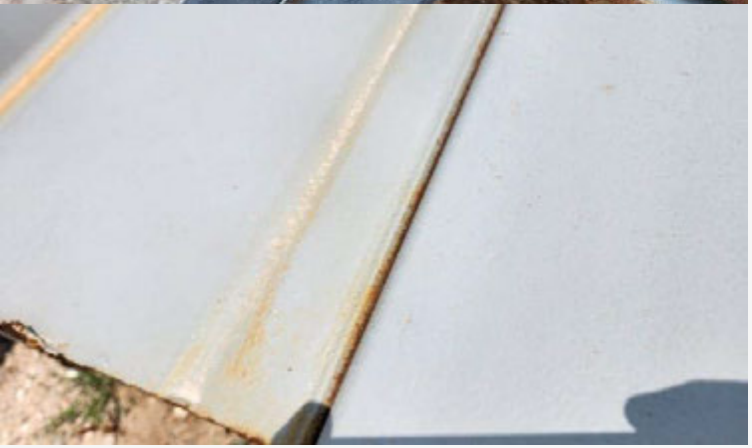
2012

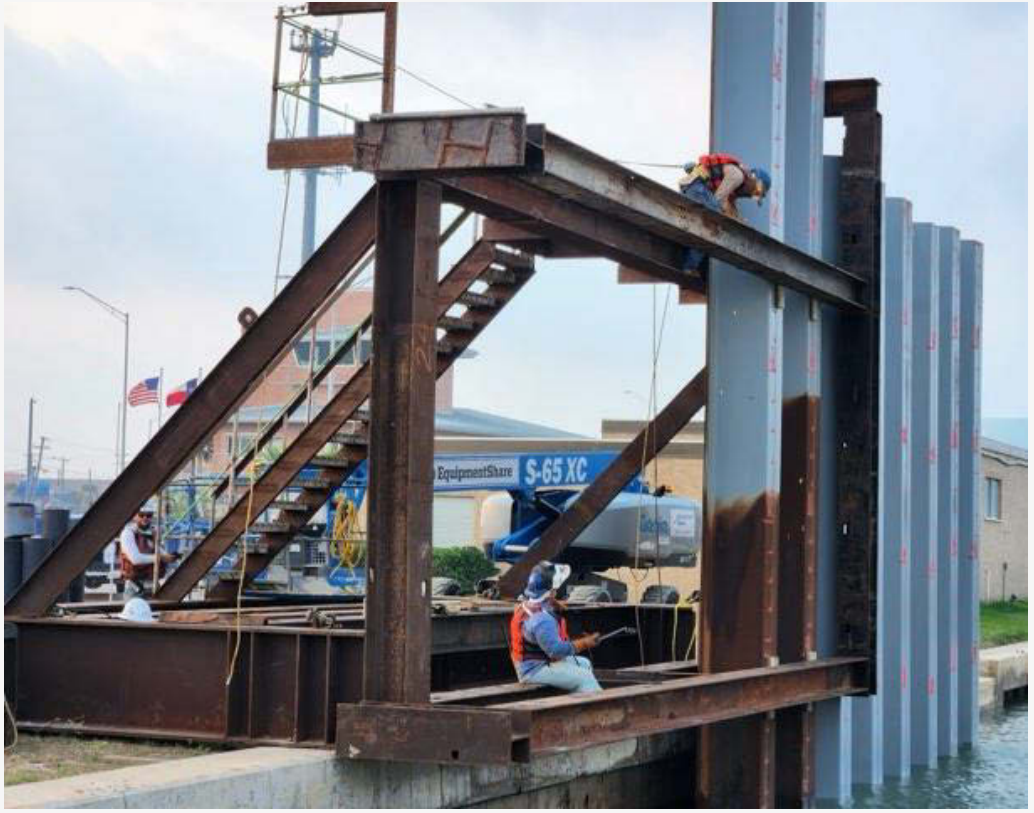
2024

Steel Paint Specifications – Steel Piling

- Item 407 Steel Piling
  - System III-B: IOZ Primer, *Epoxy Intermediate, and Urethane Appearance Coat*
  - System IV: IOZ Primer *and Latex (acrylic) Appearance Coat*
  - Marine Immersion
    - ~~NORSOK Standard M-501, Coating System No. 7~~
      - Very Limited Application (Not for Sheet Piling)
      - Complete Immersion
      - Zinc primer generally better option
- Variations
  - Galvanizing: Yes – this would be worth trying for trestle pile bents

Sheet Piling





Field Steel Paint Specifications

- Repainting Steel: Item 446 – "Field Cleaning and Painting Steel"
  - System I: Overcoating "One-Coat" System (DMS-8105)
    - Previously had I-A and I-B – Now System I is the old System I-A
    - Generally thought as a preservation coating for non-rusting steel
  - System II: Epoxy Zinc Primer and Latex (acrylic) Appearance Coat (DMS-8101)
  - System III-A: Epoxy Zinc Primer, Epoxy Stripe Coat, Epoxy Intermediate Coat and Urethane Appearance Coat (DMS-8101)
  - Paint Inside Box: Refers to 441 – But use a zinc primer (OZ or IOZ?)
  - Special Protection System: **Must Define the System on the Plans**

Field Steel Paint Specifications (continued)

- Special Specification 4010, "Steel Bridge Zone Painting"
  - Intended that the Paint System is Specified on the Plans
  - Still can use System I, System II, & System III-A
  - Special Paint System is more commonly Specified
    - Again – **Must Define it on the Plans**
    - Typically-either a Zinc Primer System or an Overcoat System
  - Painter Qualification (AMPP QP1/QP2) Requirements not Included
  - General Containment Requirements
  - Non-recyclable Abrasive Allowed

Abrasive Blasting Options

Abrasive blasting is associated with zinc primer.

- Item 446 defaults to requiring the use of a recyclable steel grit abrasive for abrasive blasting.
- Item 446 does allow a plan note supersede the recyclable abrasive requirement, but needs to be specified in the contract.
- Special Specification 4010 defaults to a non-recyclable abrasive.

Difference between Blast Media

Blast media type significantly effects the project execution – not so much the finished product.

- Recyclable Abrasive (Steel Grit)
  - Specified to Minimize Hazardous Waste
  - Significant Equipment Requirement (Cost, Weight)
  - Typically Results in Faster Surface Preparation
- Non-Recyclable Abrasive (sand, slag, garnet)
  - Generates Significant Amounts of Waste
  - Equipment Mobilization Significantly less
  - Can be Slower

What Steel gets Preserved?

Superstructures
- Beam Facias
- Beam Ends
- Bearings
- Pin & Hanger
- Diaphragms
- Cross-Frames
- Trusses

Substructures
- Straddle Caps
  - Exteriors
  - Interiors
- Hanger Locations

Bearings
- Under Concrete

Piling
- H-Piling
  - Trestle Bents
  - Footings
- Sheet Piling
  - Marine

Access Considerations

When considering what to do with steel bridges – understanding access may be a factor.

- Zone painting with an overcoat system, potentially may have less significant requirements.
- Full repainting with abrasive blasting will typically require a cable system for supports.

Access Considerations

Installation of Cable Support System

Worker Supported on Cables

Containment Options

There is significant difference in containment requirements depending on paint system specified and which specification is used.

- Item 446 states: “AMPP Guide 6, Class 1A, Level 1 emissions and other requirements” (4.6.2).
- Special Specification 4010 - General requirements: “Erect enclosures around areas that will be abrasive blast cleaned with an impermeable bottom to contain all removed material and blast materials”.

Containment

Cable over Open Lane

Containment Adjacent to Traffic

Equipment Placement and Containment

Blast Pot and Air Compressor

Scaffold Support System

Equipment Placement and Containment

Lower Road Closed for Work

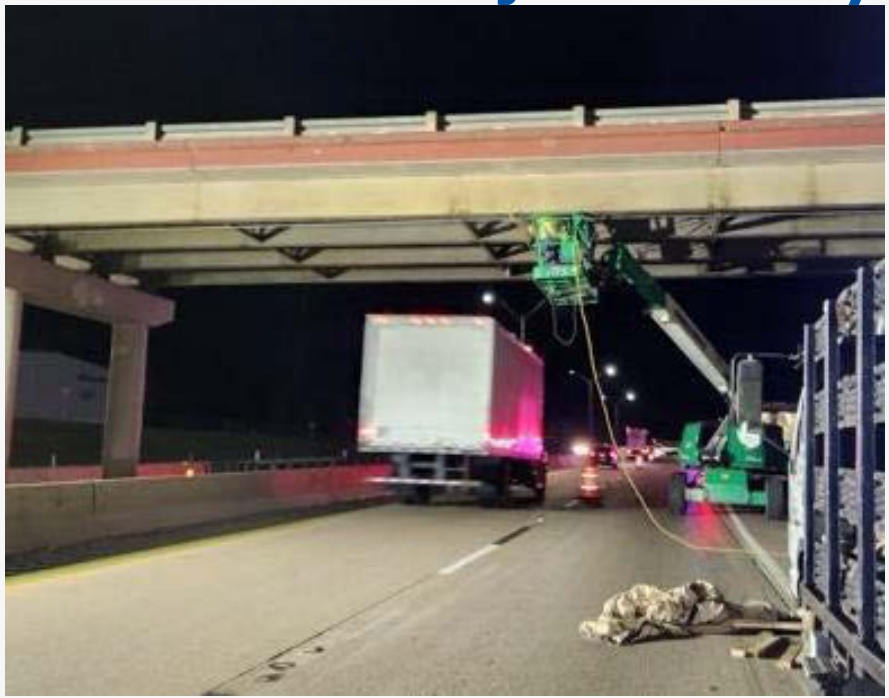
Scaffold Support System

Work over Railway

Access is Complicated

Work is Slow

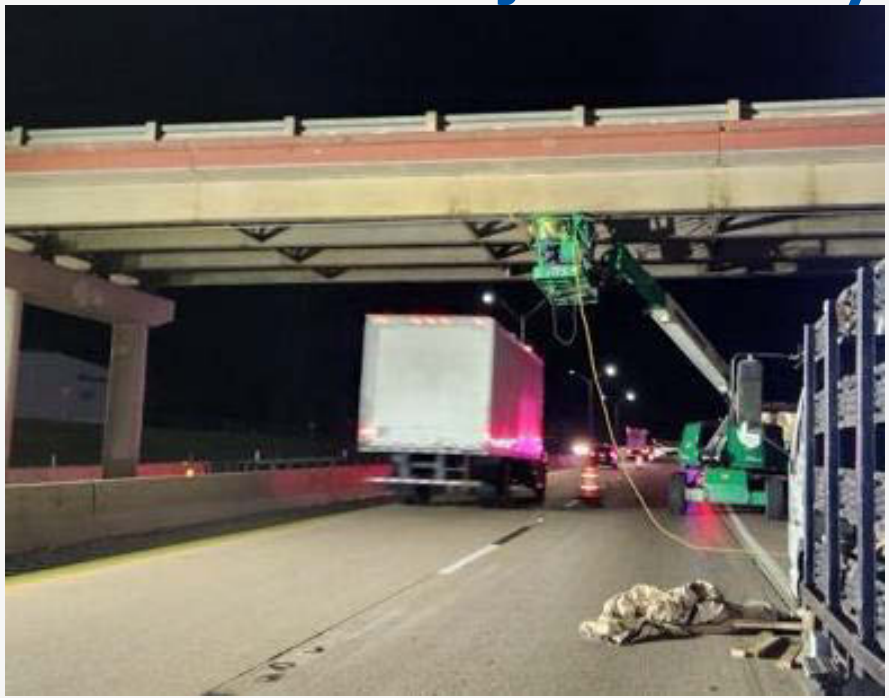
Work Over Major Roadway



Single Lane TCP Night Closures

Equipment Mobilized

Work Over Major Roadway



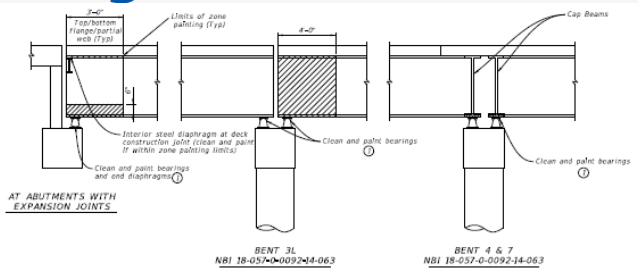
Single Lane TCP Night Closures

Equipment Mobilized

Precise Zone/Spot Painting Details

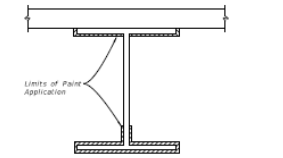
Detailed field investigation and plan preparation can be beneficial.

- Location of paint failure and corrosion is showing to be predictable.
- Being specific on what paint system is applied where gets the gold star.



PARTIAL STEEL BEAM ELEVATION

Dimensions shown are basis of paint estimate but do not define exact limits of repainting. Address deteriorated paint as directed by the Engineer. Painting perimeter does not need to be a vertical plane except on exterior surfaces of exterior beams.



STEEL BEAM CROSS SECTION WITH ZONE PAINT LIMITS AT ABUTMENTS

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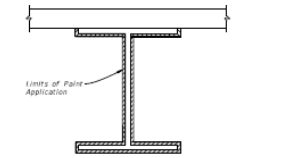
NBI: 18-057-0-0092-02-063



STEEL BEAM CROSS SECTION WITH ZONE PAINT LIMITS AT BENT 3L

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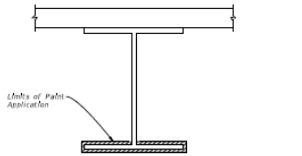

STEEL CAP BEAM CROSS SECTION WITH ZONE PAINT LIMITS AT BENT 4 & 7

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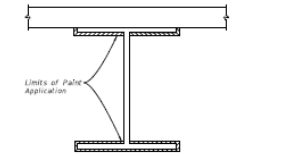


DIAPHRAGM CROSS SECTION WITH ZONE PAINT LIMITS AT ABUTMENTS

NBI: 18-057-0-0092-14-212
NBI: 18-057-0-0092-14-213

APPROXIMATE CLEAN & PAINT QUANTITIES ②
NBI 18-057-0-0092-14-212

BRIDGE ELEMENT	LOCATION	QUANTITY
ABUTMENT 1	NUMBER OF BEARINGS (EA)	5
	BEAM END AREA (SF)	64
	DIAPHRAGM AREA (SF)	84
ABUTMENT 5	NUMBER OF BEARINGS (EA)	5
	BEAM END AREA (SF)	64
	DIAPHRAGM AREA (SF)	84
TOTAL QUANTITY (SF)		295

APPROXIMATE CLEAN & PAINT QUANTITIES ②
NBI 18-057-0-0092-14-213

ITEM	BID ITEM DESCRIPTION	UNIT
ABUTMENT 1	NUMBER OF BEARINGS (EA)	6
	BEAM END AREA (SF)	95
	DIAPHRAGM AREA (SF)	116
ABUTMENT 6	NUMBER OF BEARINGS (EA)	6
	BEAM END AREA (SF)	95
	DIAPHRAGM AREA (SF)	116
TOTAL QUANTITY (SF)		420

APPROXIMATE CLEAN & PAINT QUANTITIES ②
NBI 18-057-0-0092-02-063

ITEM	BID ITEM DESCRIPTION	UNIT
ABUTMENT 1	NUMBER OF BEARINGS (EA)	19
	BEAM END AREA (SF)	246
BENT 4 (ORIGINAL BRIDGE)	NUMBER OF BEARINGS (EA)	4
	CAP BEAM AREA (SF)	323
BENT 7 (ORIGINAL BRIDGE)	NUMBER OF BEARINGS (EA)	4
	CAP BEAM AREA (SF)	323
BENT 3L (SE WIDENING)	NUMBER OF BEARINGS (EA)	6
	BEAM END AREA (SF)	224
ABUTMENT 10	NUMBER OF BEARINGS (EA)	19
	BEAM END AREA (SF)	246
TOTAL QUANTITY (SF)		1361

Options

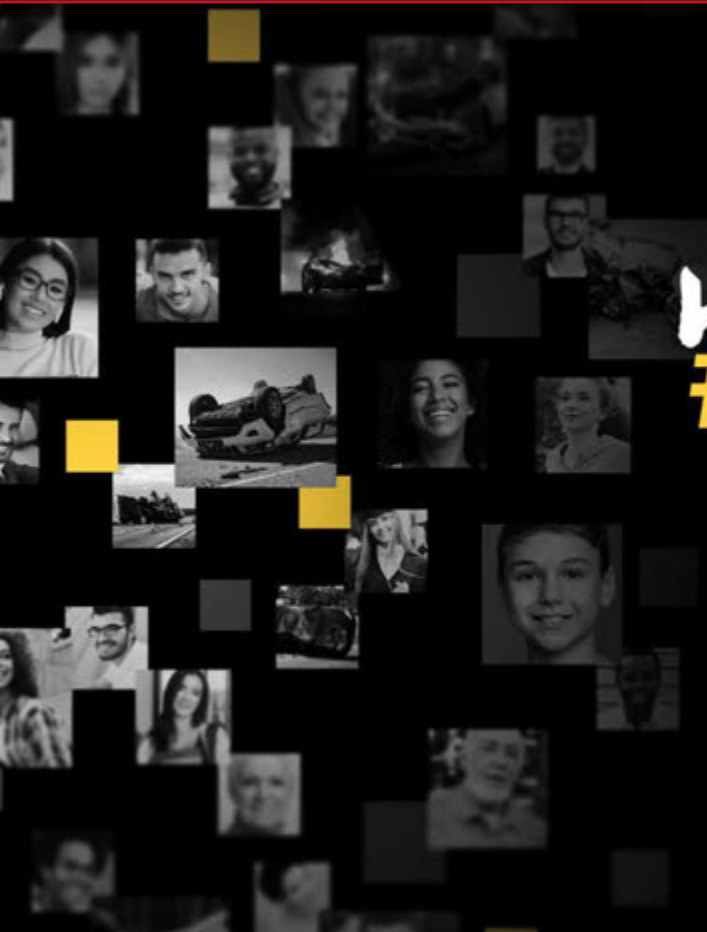
Condition

Painter is Happy

Precision

Summary

- New Painted Steel Gets Zinc Primer (OZ or IOZ, 2 or 3 coat system)
  - Implement Stripe Coat on Areas of Known Distress (not currently being done)
  - White Polyamide Epoxy inside Boxes has not Held up Well (Specify IOZ)
  - Do not use NORSOK on Sheet Piling
- Weathering Steel – Consider Painting Beam End Interior Surfaces with IOZ
- Repainting Steel Zinc Primer Last Longer but Requires Abrasive Blasting
  - Determine when to Allow Non-recyclable Abrasive
  - Think about Access and Containment Requirements
- Zone Painting
  - Waterblast and Overcoat System showing mixed Success
  - Abrasive Blast and Zinc Primer System should Last Longer
  - Field Survey to Determine Area for Zone Painting and Specific Plans Helpful
  - Do not Special Special Protective System without a Designation



HELP
#EndTheStreakTX

End the streak of daily deaths on Texas roadways.

TxDOT.gov
#EndTheStreakTX Toolkit