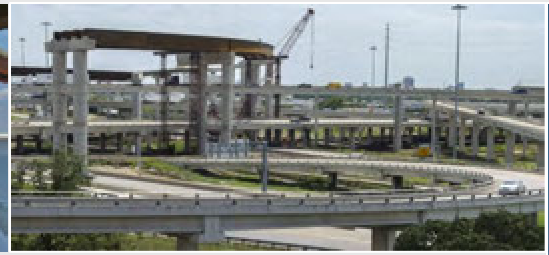
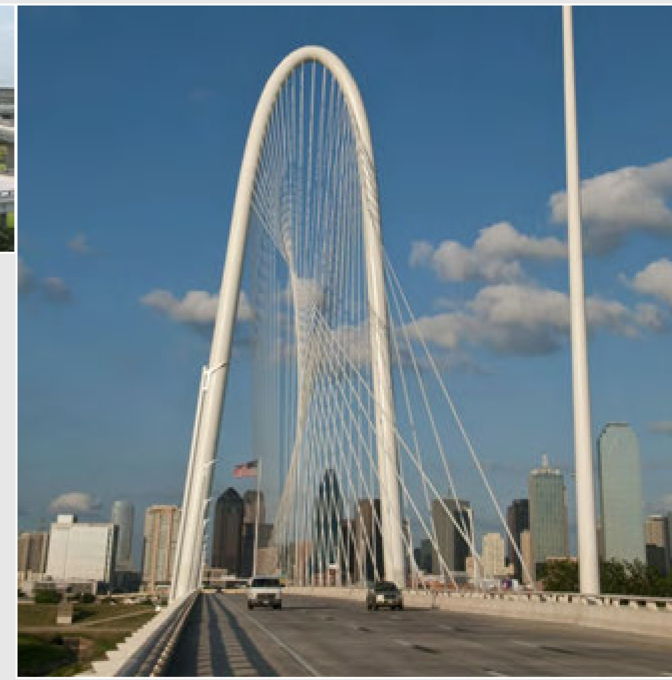




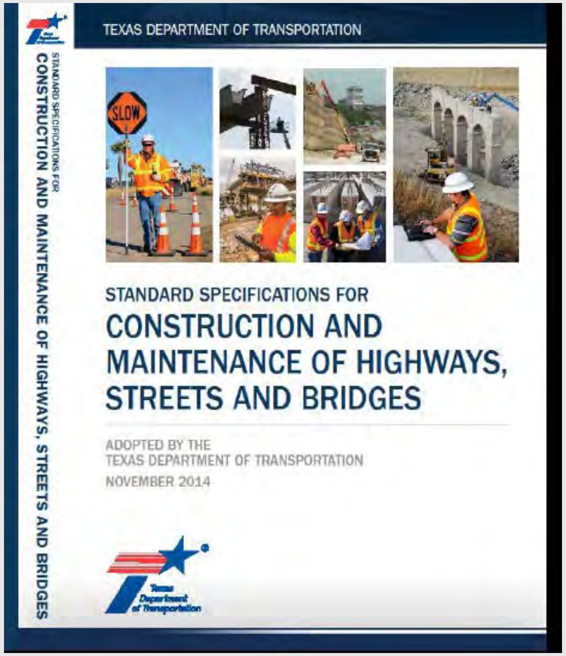
TXDOT PAINTING PRACTICES



Item 446

Steel Bridge Coatings Construction Specifications

- Standard Specifications Book, Item 446, “Field Cleaning and Painting Steel”
  - ftp://ftp.dot.state.tx.us/pub/txdot-info/des/spec-book-1114.pdf
- DMS-8104, “Paint, Shop Application for Steel Bridge Members”
  - http://ftp.dot.state.tx.us/pub/txdot-info/cst/DMS/8000_series/pdfs/8104.pdf



Steel Coatings Specifications

- DMS-8100, Structural Steel Paints – Formula
- DMS-8101, Structural Steel Paints – Performance
  - http://ftp.dot.state.tx.us/pub/txdot-info/cmd/mpl/hicrnpnt.pdf
- DMS-8102, Paint Systems for Galvanized Steel
- DMS-8103, Galvanizing Repair Paints
  - http://ftp.dot.state.tx.us/pub/txdot-info/cmd/mpl/coldgalv.pdf
- DMS-8105, Paint, One Coat Overcoat
  - http://ftp.dot.state.tx.us/pub/txdot-info/cmd/mpl/pntoco.pdf

Item 407 – Steel Piling

- Inland
  - Shop-paint piling with 3 mils minimum dry film thickness inorganic zinc primer (IOZ) unless otherwise shown (System IV)
  - Apply appearance or intermediate coatings only if specified in the plans
- Marine
  - Apply marine-grade immersion coating system recommended by the manufacturer for marine, immersion service, and meeting the requirements of NORSOK Standard M-501, Coating System No. 7
  - Paint the portion of the pile to be above finished grade or dredge line, in water, and a minimum distance of 15 ft below finished grade or dredge line unless otherwise shown (10 ft in 2004 Book)

Item 446, Field Cleaning and Painting

- Paint Systems
  - System I-A (Overcoating, One Coat): Apply at least 4.0 mils dry film thickness (DFT) maintenance overcoat to all surfaces to be painted
  - System I-B (Overcoating, High Corrosion Environment)
    - Penetrating sealer: Apply 0.5–1.0 mil DFT of penetrating sealer to all surfaces to be painted
    - Prime coat: Apply 4.0–8.0 mils DFT of epoxy intermediate primer to areas that have received tool cleaning and to other areas where there is no existing primer
    - Appearance Coat: Apply 2.0–6.0 mils DFT of polyurethane appearance coat

Item 446, Field Cleaning and Painting

- Paint Systems
  - System II
    - Prime coat: Apply 3.5–10.0 mils DFT of epoxy zinc (OZ) primer in at least 2 coats
    - Appearance coat: Apply 2.0–5.0 mils DFT of acrylic latex appearance coat
  - Default paint system
  - Used for field painting bridges throughout state except along the coast

Item 446, Field Cleaning and Painting

- Paint Systems
  - System III-A
    - Prime coat: Apply at least 3.5 mils DFT of epoxy zinc (OZ) primer
    - Stripe coat: Apply stripe coat of epoxy intermediate coating
    - Intermediate coat: Apply at least 2.0 mils DFT of epoxy intermediate coating
    - Appearance coat: Apply at least 2.0 mils DFT of polyurethane appearance coating.
  - Used for field painting coastal bridges and for bridges suffering corrosion from road salt use

Item 446, Field Cleaning and Painting

- Paint Systems
  - System III-B
    - Prime coat: Apply at least 3.0 mils DFT of inorganic zinc (IOZ) primer
      - Spot-clean all damaged and unpainted areas. Apply at least 3.0 mils DFT of epoxy zinc primer to the spot cleaned areas.
    - Stripe coat: Apply stripe coat of epoxy intermediate coating
    - Intermediate coat: Apply at least 2.0 mils DFT of epoxy intermediate coating
    - Appearance coat: Apply at least 2.0 mils DFT of polyurethane appearance coat
  - Used for shop painting new steel intended for the coast. Can also be used for bridges where corrosion from road salt use is an issue.

Item 446, Field Cleaning and Painting

- Paint Systems
  - System IV
    - Prime coat: Apply at least 3.0 mils DFT of inorganic zinc (IOZ) primer
      - Spot-clean all damaged and unpainted areas. Apply at least 3.0 mils DFT of epoxy zinc primer to the spot cleaned areas
    - Appearance coat: Apply at least 2.0 mils DFT of acrylic latex appearance coat
  - Used for shop painting new steel not intended for the coast

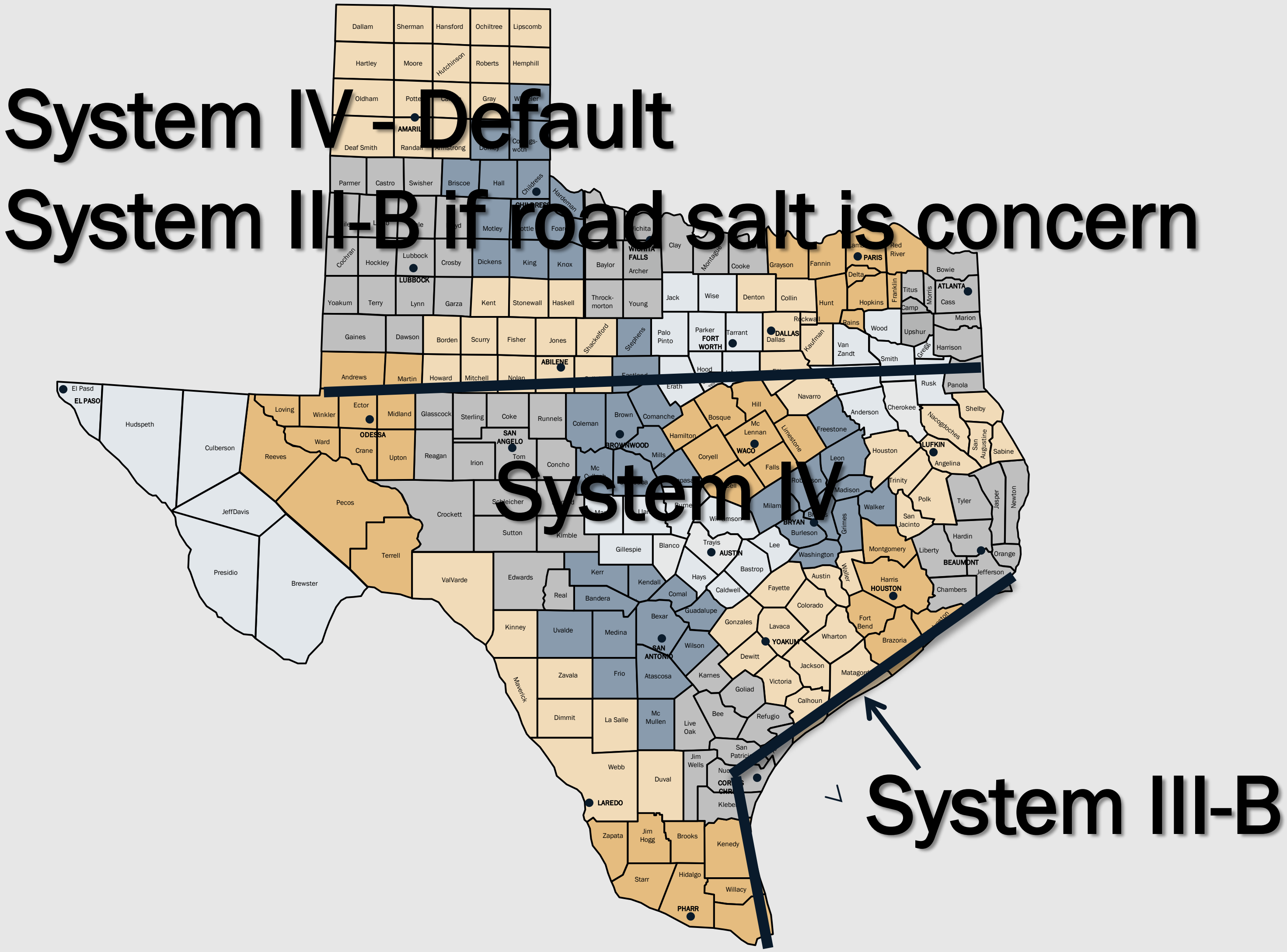
Special Protection Systems

- NORSOK M501 System 7
  - Steel pilings in marine environments
  - Norwegian Oil & Gas offshore coatings testing protocol
- Moisture-cured Urethane (MCU) Zinc
  - Have allowed substitution of MCU Zinc for OZ in System III-A
  - MCU Zinc/Polyaspartic Urethane
- Al or Zn Metalizing of concrete or steel
- Calcium Sulfonate

Paint Systems Recap

System Function	System	Primer	Intermediate	Topcoat	Notes
Overcoating	I-A	One-coat overcoat	N/A	N/A	
Overcoating	I-B	Penetrating epoxy sealer	Epoxy intermediate	Polyurethane	
Field Painting	II	OZ	N/A	Acrylic Latex	▪ Default system – non-coastal bridges
Field Painting	III-A	OZ	Epoxy intermediate	Polyurethane	▪ Coastal bridges ▪ Road salted bridges
Shop Painting	III-B	IOZ	Epoxy intermediate	Polyurethane	▪ Coastal bridges ▪ Road salted bridges
Shop Painting	IV	IOZ	N/A	Acrylic Latex	▪ Default system – non-coastal bridges

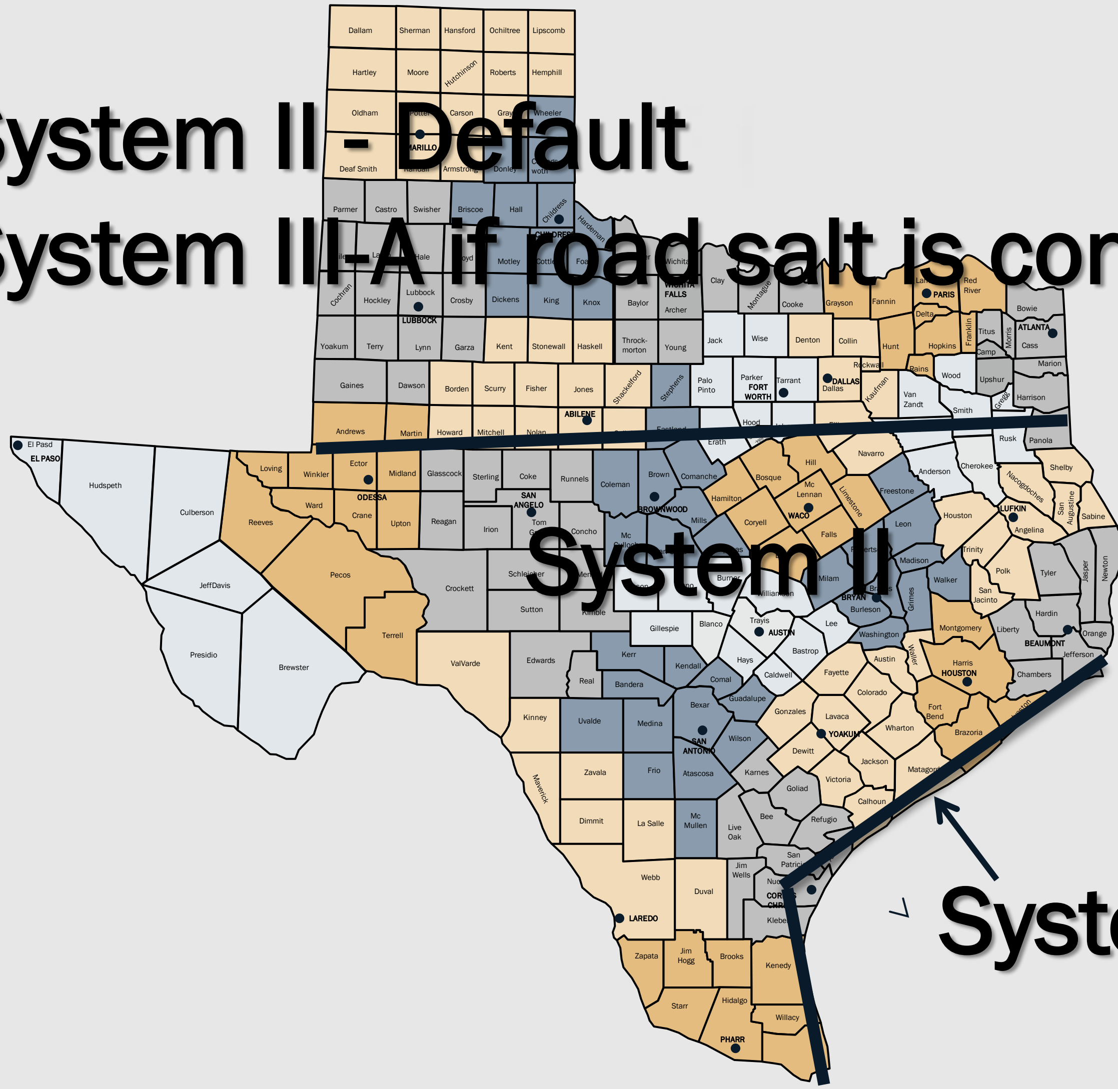
Paint System Recommendations – New Construction



Paint System Recommendations – Field Painting

System II - Default

System III-A if road salt is concern



TxDOT Painting Practices - Zone Painting

- Zone Painting
  - Surface preparation and repainting of localized areas, like areas under joints and beam ends, that are experiencing general corrosion and coating failure
  - Rest of coating must be in good condition
- Rarely used

TxDOT Painting Practices - Overcoating

- Overcoating
  - Surface preparation and repainting of rusted “spot” and failed coating areas, followed by an application of a topcoat to the entire surface
  - Rusted areas must be less than 10-20% of the total surface area of a structure
- Small percentage of painting projects

System I-A

System I-B

Overcoating Examples – Cannot Overcoat

Overcoating Examples

Very little corrosion but appearance coat eroding due to run-off

Overcoating not necessary

TxDOT Painting Practices – Blast & Repaint

- Blast & Repaint
  - Complete removal of existing coating system and rust, and repaint
- Vast majority of painting projects

Blast & Repaint Examples

Remove failed coating system

Remove leaded paint system

Blast & Repaint Examples - System III-A

Corrosion from leaking deck and joints from road salt use

Bridge over coastal waters

TxDOT Painting Practices

- New Steel
  - Item 441/DMS-8104
    - AASHTO/NSBA Steel Bridge Collaboration S8.1
    - SSPC PA-1
  - IOZ primer only
  - Topcoats applied in the field

TxDOT Painting Practices

Zone Painting

- Rarely used
- Paint Systems
  - System II: Interior
  - System III-A: Marine
- Life expectancy: 10-20 years
- Cost: ~$30/ft^2

Overcoating

- Small percentage of painting projects
- Paint Systems
  - System I-A: Interior
  - System I-B: Marine
- Life expectancy: 10-20 years
- Cost: <$10/ft^2 to >$30/ft^2

Blast & Repaint

- Majority of painting projects
- Paint Systems
  - System II: Interior
  - System III-A: Marine
- Life expectancy:
  - Interior: 20+ years
  - Marine: 15-20 years
- Cost:
  - Range: $10- 25/ft^2
  - Avg: ~$15/ft^2

Item 446, Field Cleaning and Painting

- Contractor Qualifications: SSPC QP-1 or 2
- Containment Requirements:
  - SSPC Guide 6, Class 1A, Level 1 Emissions
  - enclosure of all sides of area with air-impenetrable walls
  - rigid, watertight floor formed from minimum 20 gauge steel
  - overlapping seams and entryways
  - exhaust air filtration system

Item 446, Field Cleaning and Painting

- Surface Preparation:
  - Pressure wash the structure first
  - SSPC SP-10 Surface Prep
    (blast to near-white metal)
  - Minimum surface profile of 1.5 mils
  - Recyclable abrasive (steel grit) with an abrasive recycling system; steel shot is not allowed
  - areas under 1 sq. ft. may be tool-cleaned to SSPC SP 11 with at least a minimum 2 mil profile

Item 446, Field Cleaning and Painting

- Inspection hold points are to be observed, per 446.4.7.1:
  - No work may proceed beyond the listed hold point until the Engineer has reviewed and given provisional approval
- Paint is to be applied:
  - to clean, dry, firm surfaces
  - to form a smooth, continuous, tightly adhering film of uniform thickness and appearance, free of sags, runs, pinholes, holidays, overspray, or other defects
  - to the minimum specified DFT

Painting Concerns – Improper Surface Prep

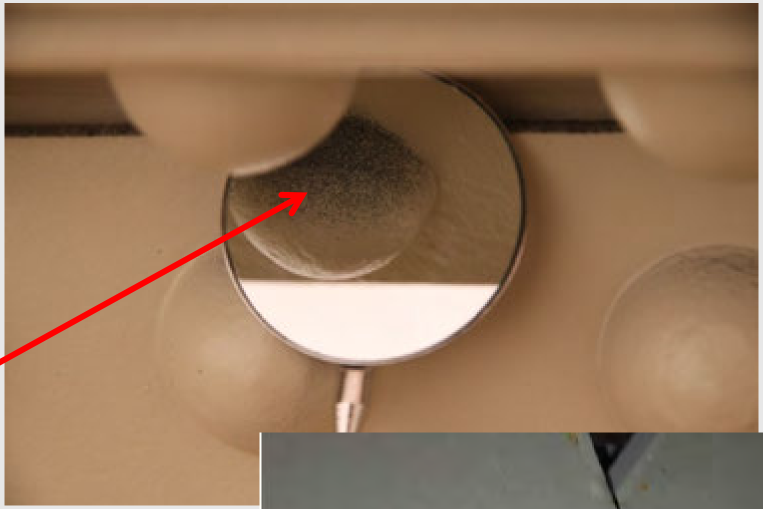
- Per SSPC SP-10:
  - All paint and rust to be removed
  - no more than 5% staining is allowed per any 9 in^2

Excessive staining

Missed areas behind rivets

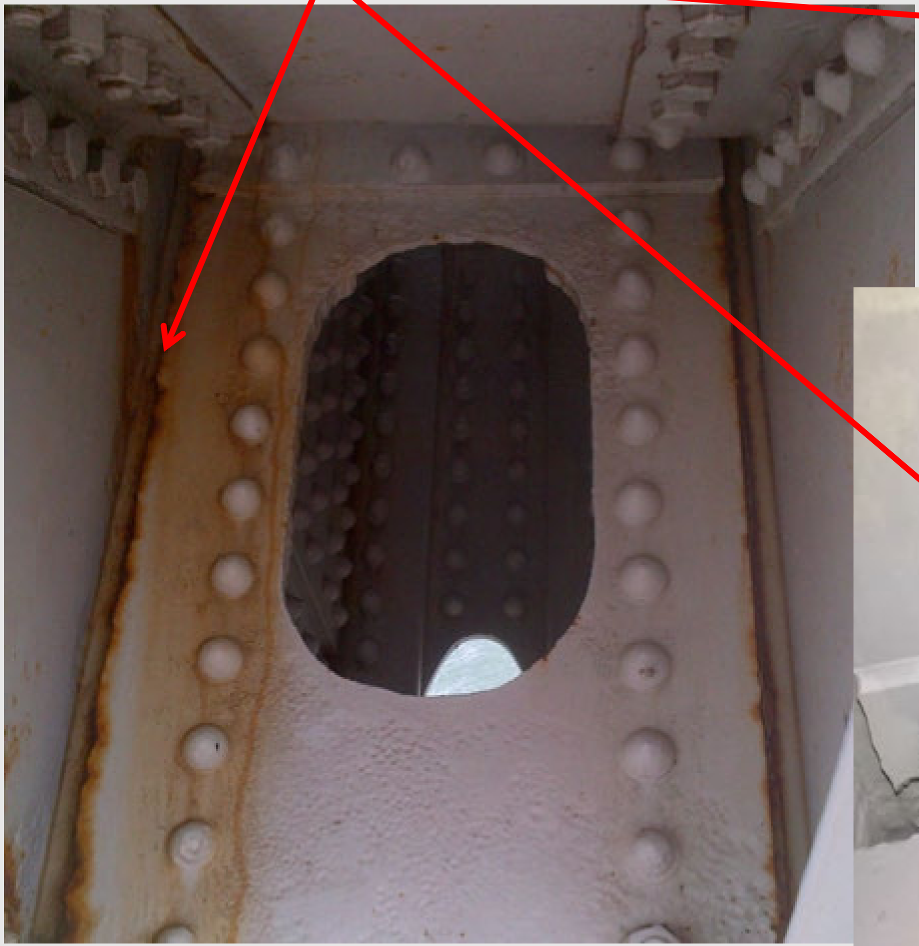
Painting Concerns – Missed Paint Areas

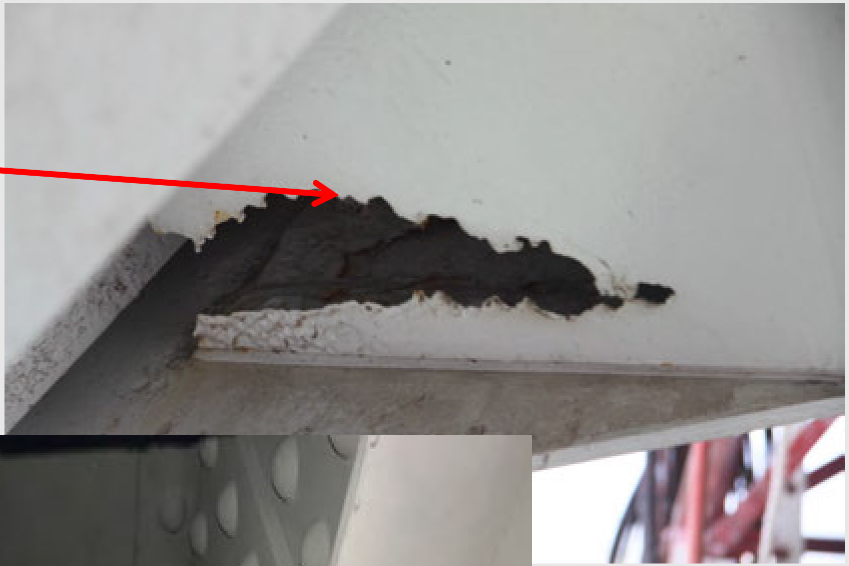
- Areas, such as the back side of nuts and bolts and hard-to-reach areas, often get missed during the painting operations



Painting Concerns - Knife Edges

Unrepaired knife edges





Painting Concerns – Structural Repairs

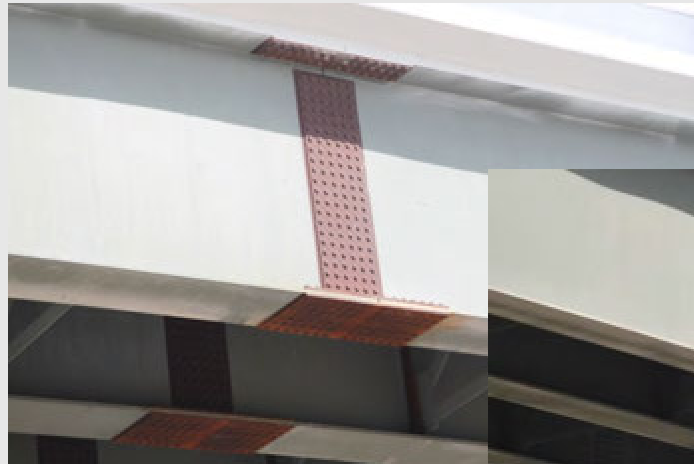
- Often done after painting operations
- Can damage paint system
- Touch-up repair often poorly done
- Blast & prime first

Painting Concerns – Derigging Touch-up

- Improper touch-up after derigging

Painting Concerns – New Steel Erection

- Bolt-up areas and faying surfaces
- Proper surface prep
- Appearance coat application



Painting Concerns – New Steel Erection

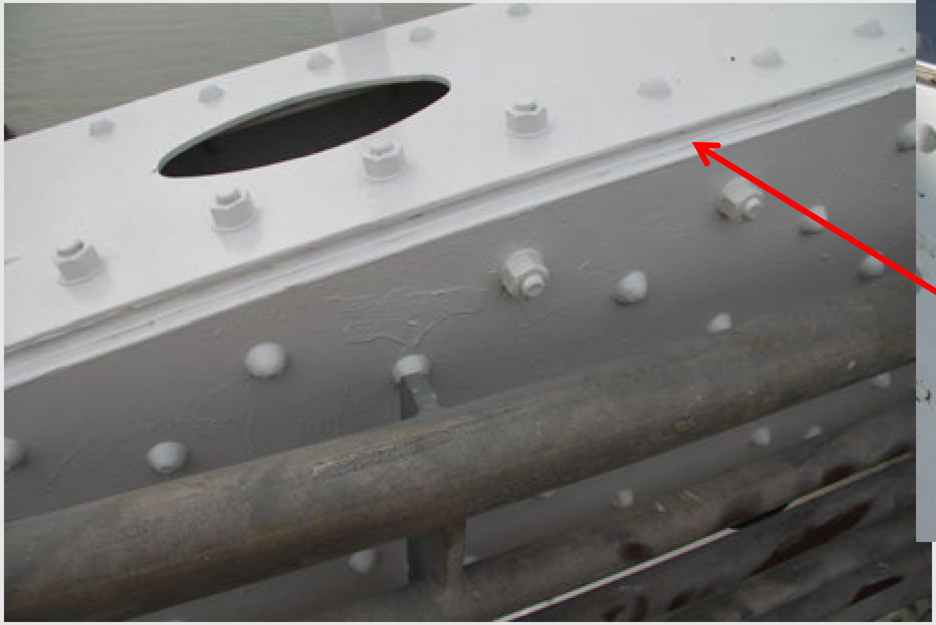
- Touch-up repairs of primer

Recommended General Notes

- Stripe Coating
  - A stripe coat shall be applied by brush to all rivets, bolts, edges, crevices, back-to-back steel components, corners, weld areas, and other detail areas as determined by the Engineer. Stripe coat shall be with the epoxy intermediate. Extend stripe coat at least 1” beyond limits of detail areas. Stripe coat must be free from holidays (total opacity). Stripe coat may not be reduced or thinned.

Recommended General Notes

- Caulking
  - Before applying the appearance coat but after application of the intermediate coat, caulk gaps or crevices greater than 1/16 inch throughout the length of the project. Use a paintable caulk meeting the requirements of DMS-8142, “Paintable Caulk for Concrete and Steel,” and that is listed on the MPL, “Paintable Caulk for Concrete and Steel.” Apply sealant in a manner that does not trap moisture.



Caulking of gaps

Pay Schedule Guidance

- Lump Sum
  - Must be broken down, typically by span.
  - Greater weight must be given to truss portions of bridge over girder segments.
  - Rule-of-thumb for progress payments:
    - Contractor operations are typically sectioned by the Bay or Span
    - Progress payments should follow the following breakdown:
      - No more than 40-50% payout (per Bay or Span division of Lump Sum) for blasting <u>and</u> priming of Bay or Span
      - ~20% payout per additional coat – include stripe coat payment with the application of full intermediate coat
      - Always retain 10-20% for touch-up and repairs after derigging and containment removal

3rd-Party Coatings Inspection

- CST maintains a consultant coatings inspection contract to provide 3rd-Party inspection for all types of coatings projects, including painting or metalizing of concrete or steel structures and certain types of structural repairs such as CFRP wrapping and patch repair of concrete .
- All 3rd-Party inspectors are NACE CIP certified with years of coating industry experience and understand all the nuances of the industry standards and practices.
- CST will provide project oversight and conduct periodic site visits.
- Experience has shown that the quality of the resulting coatings project is generally better when consultant inspection is utilized.

Project Inspection

- TxDOT Project Manager
  - NACE Online training
    - I.C.I. Online - Intro to Coating Inspection

      https://nace.org/Training-and-Education/Training-Programs/I-C-I--Online---Intro-to-Coating-Inspection/
- Consultant inspector reports to local project manager with my office providing oversight
- Issues are expected to be resolved between inspector and contractor
- Consultant inspector is not permitted to perform any QC for contractor

Coatings and Traffic Materials Branch (CST/M&P-CTM)

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