

# METALLIZING AND COATING OF THE STICKNEY POINT DRAW BRIDGE

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GPI



FRANK D. REA, PCS, GREENMAN-PEDERSEN, INC.

# METALLIZING

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- Also Known as Thermal Spray Coating (TSC)
- Molten Metal is Sprayed Onto the Substrate
  - Zinc
  - Aluminum
  - Alloy – 85% Zinc / 15%
- Provides Galvanic/Sacrificial Protection

# METALLIZING

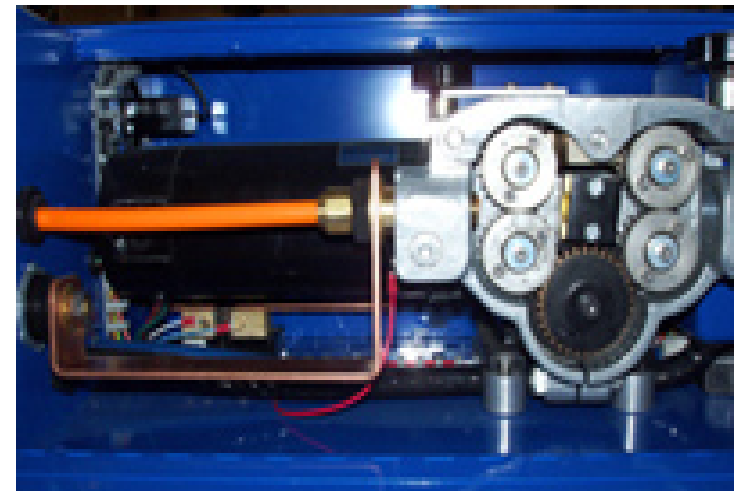
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- Characteristics
  - Porous
  - Durable
  - Heat resistant
  - Chemical resistant
  - Acid sensitive
  - Dull gray appearance
  - Application slower than liquid coating
  - High initial cost (lower life cycle cost)
  - Long service life

# METALLIZING

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- Components
  - Power Supply
  - Powder or Wire
  - Compressed Air
  - Flame or Arc Gun



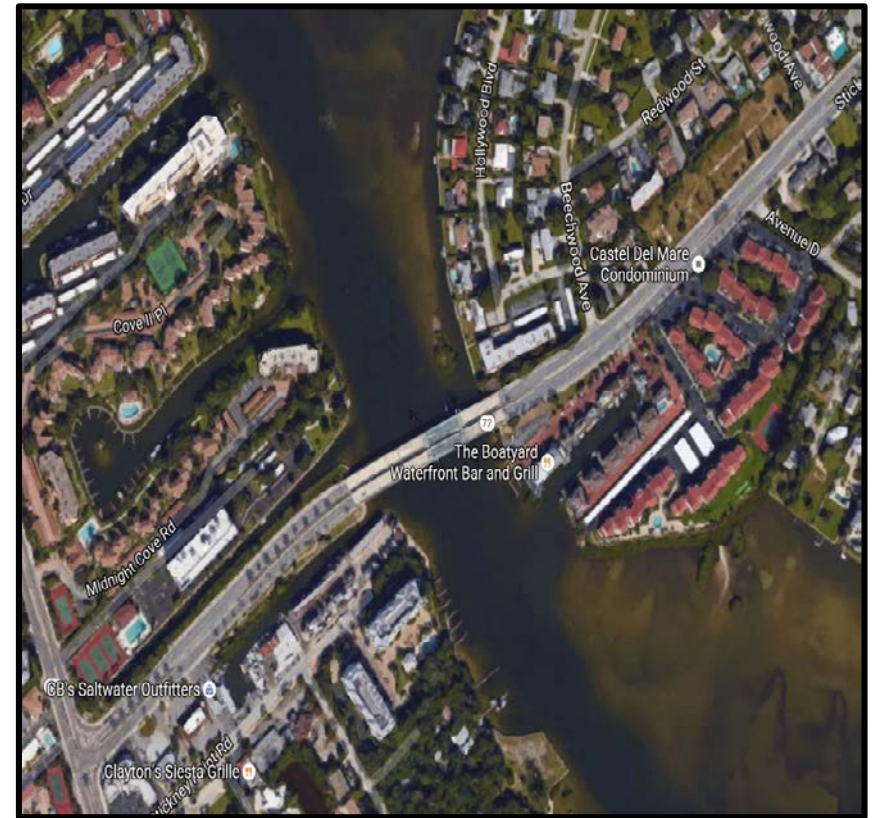
# COATINGS CONDITION ASSESSMENT

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# COATINGS CONDITION ASSESSMENT

## Site Specific Issues

- ISO 12944-2 C5-M Very High, Marine Coastal/Offshore Areas with High Salinity
- SSPC Environmental Zone 2B Frequently Wet by Saltwater
- Marinas, Restaurants, Residences, Manatees, Sea Turtles
- Traffic – Bottleneck
- Navigable Waterway
- Counterweights Dip into Saltwater



SR 72, Sarasota, Florida

# COATINGS CONDITION ASSESSMENT

## Project Specific Issues

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- Bascule Bridge
  - Machinery, Electrical
  - Grating
  - Openings/Closings



# COATINGS CONDITION ASSESSMENT

## Field Evaluation

- Bridge No. 170052 – Eastbound (EB)
- Visible Corrosion 5-8%
- Average DFT 6.2 – 8.6 mils
- Two Coats
- ASTM D 3359 Adhesion 0A – 5A
- Significant Chalking





# COATINGS CONDITION ASSESSMENT

## Field Evaluation

- Bridge No. 170065 – Westbound (WB)
- Visible Corrosion 3- 5%
- Average DFT 12.1 – 21.9 mils
- Three Coats
- ASTM D 3359 Adhesion 0A – 5A
- Peeling of Top Coat
- Significant Chalking



# DESIGN

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# DESIGN

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- Scope of Work – Full Removal and Replacement of the Existing Coating System
  - Distribution of Corrosion and Coating Defects
  - Thin, Existing Coatings on the Eastbound Bridge
  - Peeling of Top Coat
  - Extensive Degradation and Chalking of Existing Coatings

# DESIGN

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- Metallizing
  - 50+ Years of Corrosion Protection
  - Advances in Portable Metallizing Equipment
  - Decrease in Future Maintenance Painting Projects
  - Blast, Metallize and Seal in One Shift
  - Lower Ambient Condition Requirements



# DESIGN

- Technical Special Provisions
  - Florida DOT, Section 561, “Coating Existing Structural Steel”
  - SSPC-CS 23.00/AWS C.2.23/NACE No. 12, “Application of Thermal Spray Coatings (Metalizing) of Aluminum, Zinc, and Their Alloys and Composites for the Corrosion Protection of Steel”

## SECTION 561 CLEANING, METALIZING AND PAINTING STRUCTURAL STEEL

### 561-1 Description.

Perform cleaning, painting and metalizing of structural steel and hand rails in accordance with Section 560, Section 561 and Joint Standard SSPC-CS 23.00 / AWS C2.23M / NACE No. 12, “Specification for the Application of Thermal Spray Coatings (Metalizing) of Aluminum, Zinc, and Their Alloys and Composites for the Corrosion Protection of Steel.” Do not metalize the top surface of the top flange of floor beams, girders and stringers underneath existing galvanized grating; bearing assemblies; and counterweight steel frames susceptible to immersion. For structural steel metalized per the contract documents, the metalizing is equivalent to the “prime coat” as defined in the Specifications; the seal coat (100% solids epoxy sealer) is equivalent to the “intermediate coat” as defined in the Specifications; and the top coat (aliphatic polyurethane) is equivalent to the “finish coat” as defined in the Specifications. The color of the finish coat must meet Federal Standard 595B, Color No. 15187. Apply a UV resistant polyurethane clear coat over finish coat surfaces of fascia beams and girders.

### 561-2 Construction Sequence.

The following sequence must be followed for the bascule leaf and steel flank spans:

- T2.1 Blast all steel surfaces to be metalized to SSPC-SP5; blast top surfaces of top flanges and bearing assemblies to SSPC-SP10.
- T2.2 Metalize and seal all surfaces to be metalized.
- T2.3 Remove existing deck grating.
- T2.4 Vacuum Power Tool clean areas of top surface of top flanges of floor beams, girders, stringers that were inaccessible to blasting due to being under the existing deck grating.
- T2.5 Install new deck grating.
- T2.6 Paint top surface of top flanges of floor beams, girders, stringers as specified.
- T2.7 Apply finish coat and UV resistance clear coat to metalized and sealed surfaces.

### 561-3 Qualifications.

Submit all qualifications to the Engineer for approval prior to commencing any work on the components to be metalized. Determination of satisfactory qualifications will be at the sole discretion of the Department. Quality Control / Quality Assurance personnel are prohibited from

# REQUIREMENTS SPECIFIC TO METALLIZING

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- NACE No. 1 / SSPC-SP5, “White Metal Blast”
- Deeper Anchor Profile – Minimum 2.5 mils
- Contractor / Applicator Pre-Qualification
- Adhesion Testing – ASTM D4541
- Flexibility – Mandrel Testing



# REQUIREMENTS SPECIFIC TO METALLIZING

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- 8-12 Mils DFT, Multiple Passes, 3' x 3' Work Area
- Distance from the Substrate



# OTHER KEY ISSUES

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- Key Requirements/Issues
  - Soluble Salts
  - Edges, Connections, Fasteners
  - Blasting, Metallizing, Sealing and Adhesion Testing must be done in one shift
  - Caulking
  - Anchor Profile
  - Clear Coat – After Repairs, Degradable Dye
  - Dry Film Thickness Measurements – SSPC PA-2





# LESSONS LEARNED

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- Not Recommended for Incentive/Deceptive Contracts
  - Changes are Under Restraint



# LESSONS LEARNED

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- Flame Hardened Edges



# LESSONS LEARNED

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- Counterweights Dipping Into Water



# LESSONS LEARNED

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- Counterweights Dipping Into Water
  - Coal Tar Epoxy Originally Specified
    - Possible Odor Problems
    - Undesirable Finish Color
  - Contractor Offered to Metallize at No Extra Cost
  - Holiday Testing was Required



# LESSONS LEARNED

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## Alternate Sealer

100% Solids Epoxy  
Penetrant Sealer

1.0 to 1.5 mils

Dry to Recoat – 16 hrs

Fast Cure Epoxy

2.0 to 3.0 mils

Dry to Recoat – 8 hrs

100% Holiday Detection Testing was a condition of approval of the change order

# LESSONS LEARNED

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- Deck Grating – Tops of Floor Beams
  - Restrictive Lane Closures Prevented Metallizing



# LESSONS LEARNED

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- Deck Grating – Tops of Floor Beams
  - Specified Sequence
    - Blast the Top of Floor Beams While Deck was Removed
    - Replace Deck
    - Power Tool Touch Up Surface Preparation
    - Apply Two Coats of Aluminum Epoxy Mastic
  - Too much Time was Allowed to Elapse Before Application of the Coatings



# LESSONS LEARNED

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- Difficult to Access Areas



# LESSONS LEARNED

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- Easy to Maintain Areas



THANK YOU!

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*QUESTIONS?*

# ACKNOWLEDGEMENTS

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