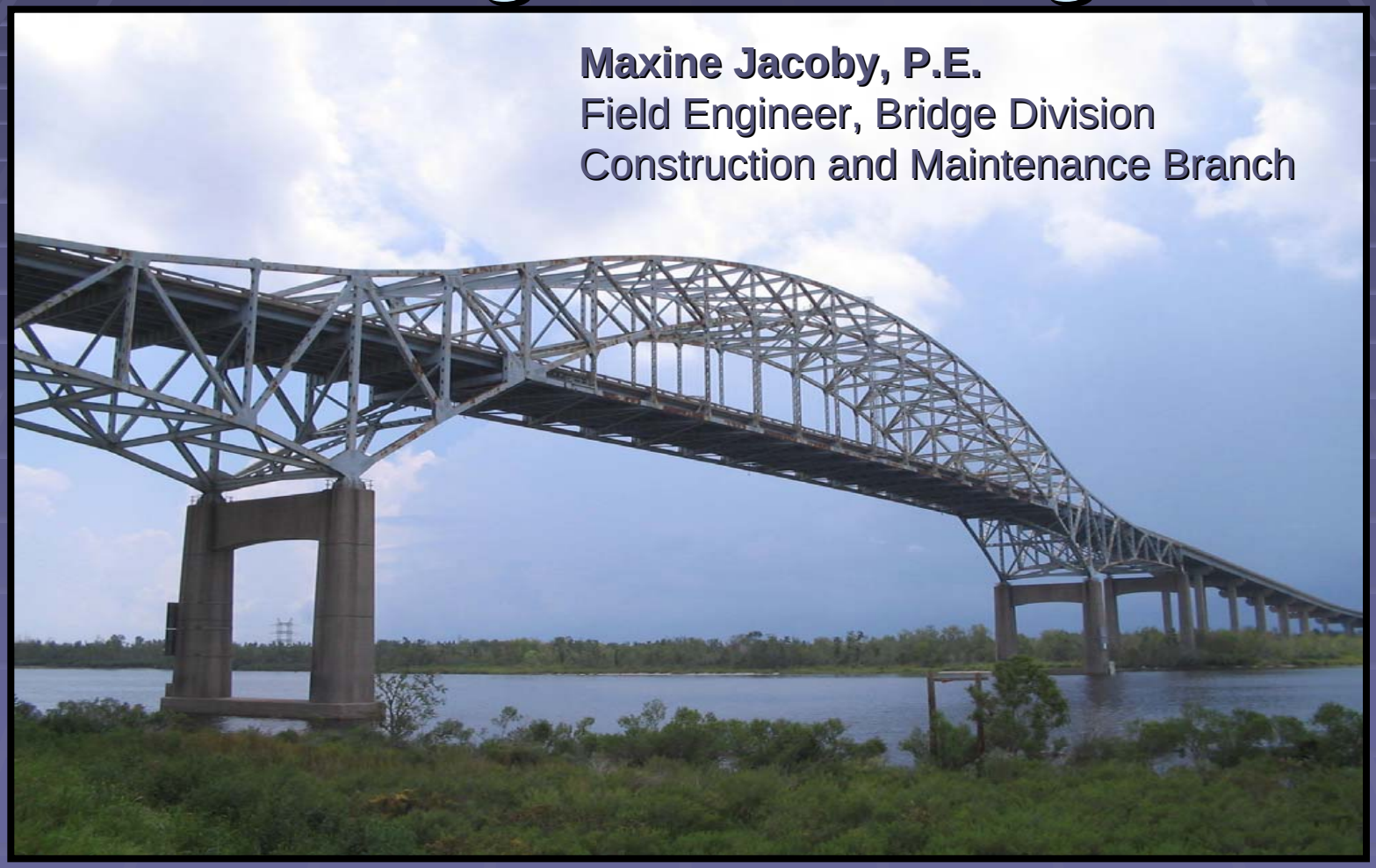
Bridge Painting



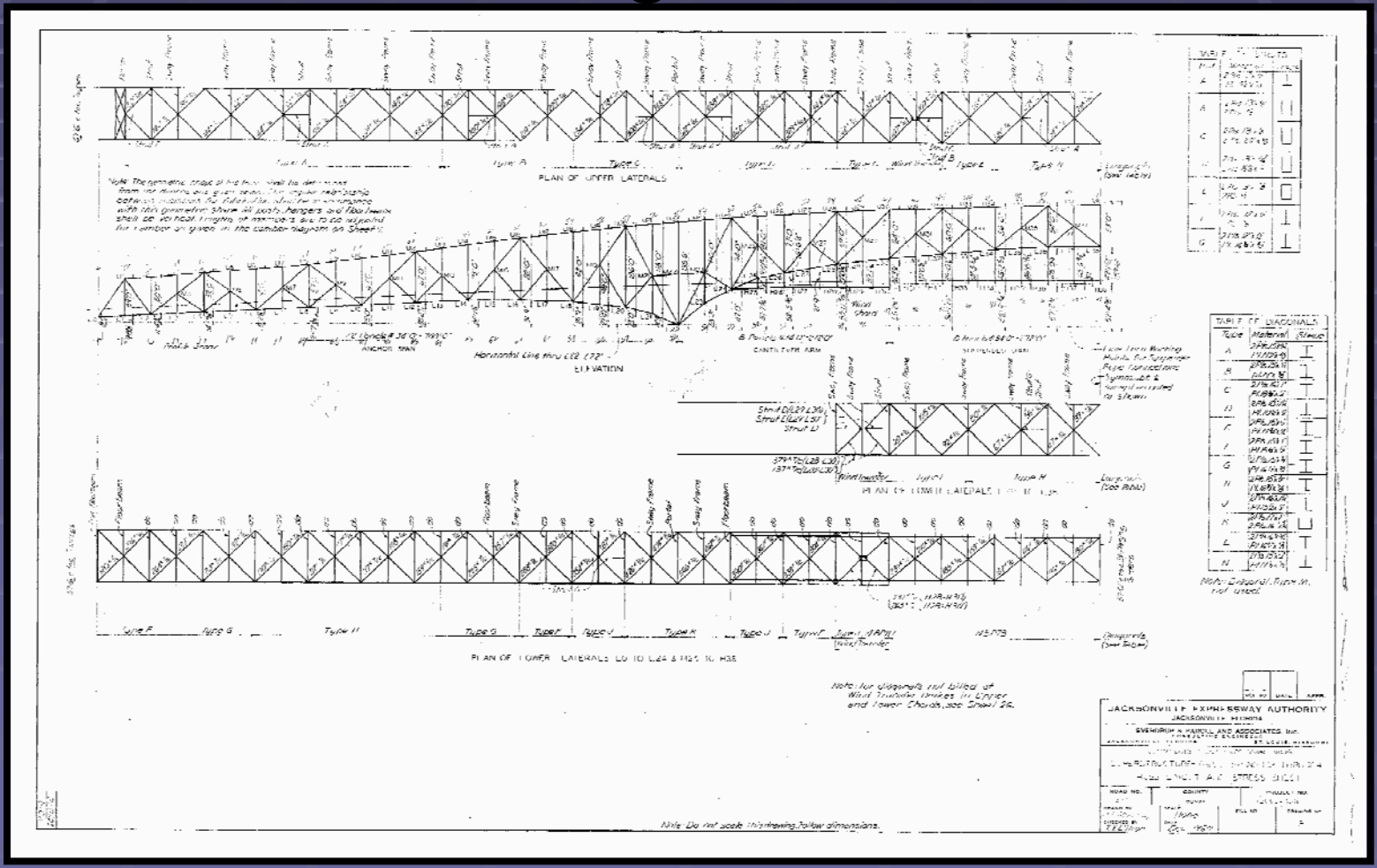
Maxine Jacoby, P.E.
Field Engineer, Bridge Division
Construction and Maintenance Branch

Coatings Condition Survey

An Essential Step in the Planning Process!

- Assessing Existing Coating's Performance Level
- Budgeting & Prioritizing Work Between Bridges
- Developing Plans, Specifications & General Notes

Review of Background Information



Jobsite Assessment

Identify:

✓ Equipment access & staging issues.

✓ Complicated design details.

✓ Nearby sensitive areas such as homes, schools, etc. where public activities occur.

To Paint or Not to Paint…?

Spot Repair & Overcoat?

Remove & Repaint?

Visual Observations

- Degree of Corrosion
  - SSPC VIS 2 ~ a photographic standard
- Presence of Paint Defects
  - Runs, Sags ~ Poor application
  - Fading / Chalking ~ Sun damage
  - Delamination ~ Poor initial surface prep
  - Blisters ~ Contaminants
  - Cracking ~ Poor recoat potential

Visual Findings → Direction

- Establish Maintenance Priorities
  - Level of Corrosion
  - Public Image
  - Lumping of nearby bridges
- Determine Type of Maintenance Work
  - < 25 % ~ Spot Repairs / Overcoat
  - > 25 % ~ Full Removal / Replacement
- Assess Need for Additional Sampling/Testing

Existing Dry Film Thickness (DFT)

Test Frequency Determined by:

- Structure Size
- Type of Coatings Present
- Variance in measurements

"…over-coating is not recommended if existing dry film thickness exceeds 20 mils."

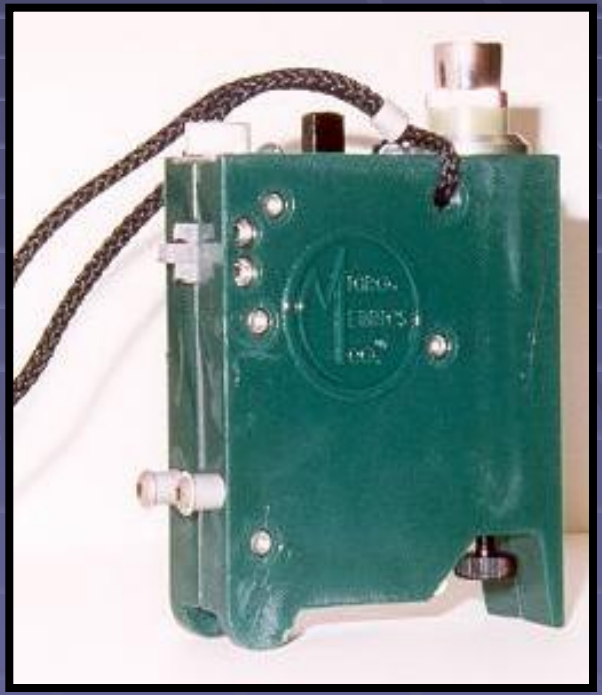
Electronic DFT Gage

Number/Thickness of Coats

A Destructive Test:

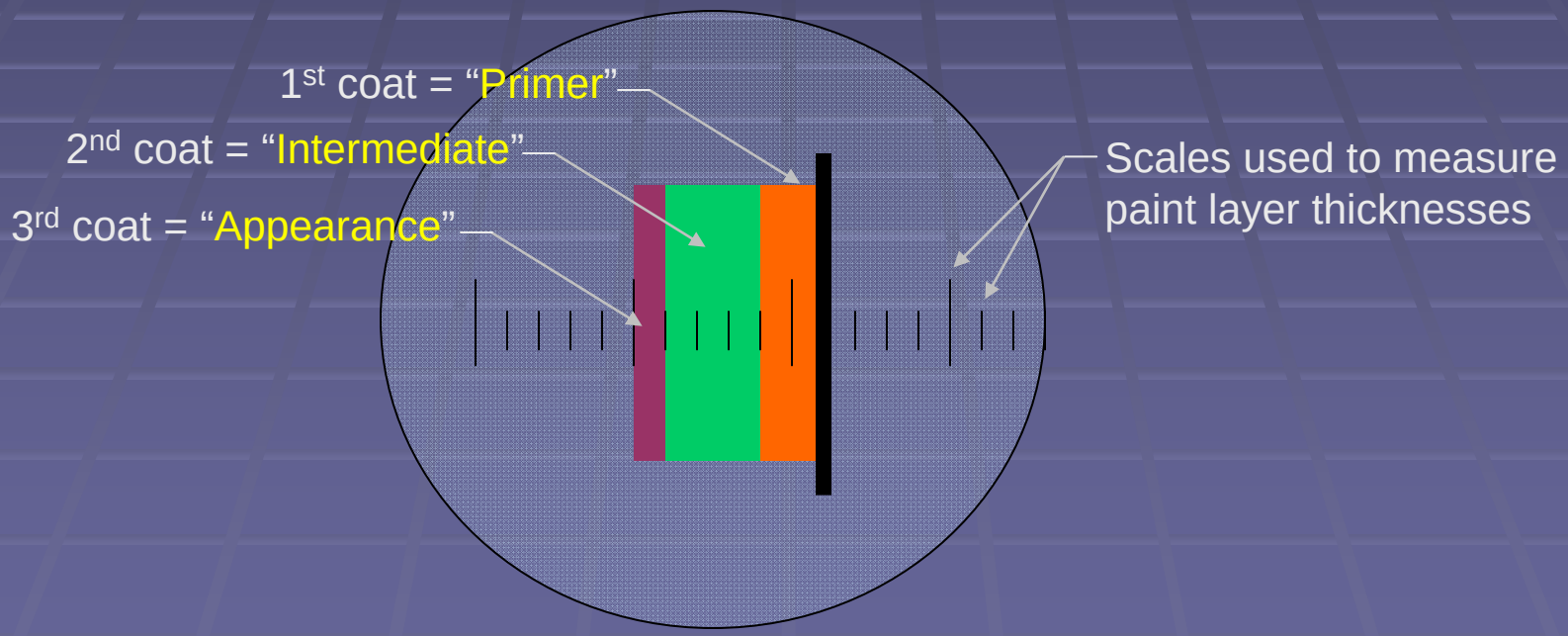
- Notch through all coats of paint
- Thickness measured by test scale

"…a good method of determining what is already there, and to what extent it can be built upon."



Tooke Gage

Number/Thickness of Coats



Tooke Gage's View Finder

Condition of Base Metal

Another Destructive Test:

- Remove all Paint & Examine Base Metal
- Looking for problems
  - Embedded debris
  - Mill scale
  - Rough edges
  - Rust pits and/or deep profile

"…new paint only helps if it stays on the structure."

what lies beneath?

Adhesion Testing

ASTM D 3359 ~ Standard Test Method for Measuring Adhesion by Test

0A; Within Layer

2A; To Primer

3A-4A; Topcoat

Adhesion Testing

ASTM D 4541 ~ Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers

Adhesion Testing

ASTM D 4541 ~ Evaluation of Dollies (Typical Results)

Testing for Soluble Salts

SSPC Guide 15 ~ "Field Methods for Retrieval and Analysis of Soluble Salts on Steel and Other Nonporous Substrates"

- Extraction Methods
- Analytical Methods

"… elevated levels of soluble salts trigger the need for additional cleaning and testing prior to and during blasting operations."

Testing for Hazardous Materials

Required for bridges suspected of having Lead Based Paint (painted prior to 1990's).

- Random, yet representative
- Sandwich bag size, ¼" minimum depth
- Collect coating completely down to the steel
- Avoid rust, debris and contaminants
- Properly label and send to CST for analysis

"Lead was finally removed from the primer specification in 1993, though existing stocks in District warehouses and maintenance yards were still being used."

CST Laboratory Testing

Microscopic Examination

- Number of Coats
- Thickness of Coats
- Microscopic Defects

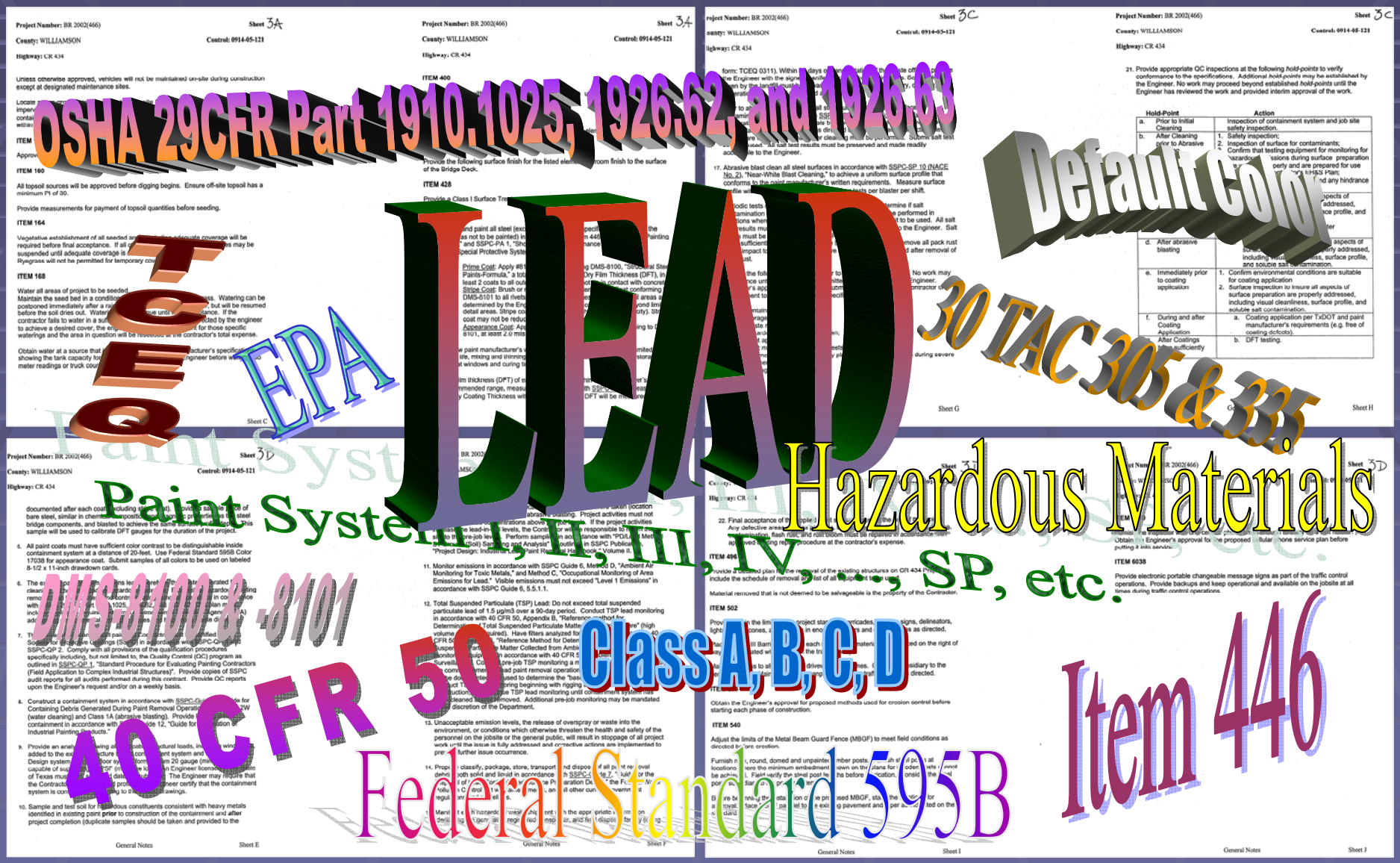
Infrared Spectroscopy ~ to identify generic paint type used

Atomic Absorption Spectroscopy ~ to determine presence of hazardous materials

Indicate Test Sites and Results

REMEMBER: Photograph these notations for your records!

Visual & Test Results → General Notes



Referenced Specifications

TxDOT

SSPC-PA 1
April 1, 2000
Editorial Revisions November 1, 2004

SSPC: The Society for Protective Coatings

PAINT APPLICATION SPECIFICATION NO. 1

Shop, Field, and Maintenance Painting of Steel

1. Scope

1.1 This specification covers procedures for the painting of steel surfaces. The scope of this specification is rather broad, covering both specific as well as general requirements for the application of paint. This specification does not provide detailed descriptions of surface preparation, pretreatments, or selection of primers and finish coats. This specification does provide detailed coverage of the procedures and methods for application after the selection of the coating materials has been made.

2. Description

2.1 This specification for shop, field, and maintenance painting is intended to be used for steel which, because of its exposure condition, will be subjected to corrosive attack, either from the weather or from the service environment, and where a high quality of cleaning and painting is essential. It is not contemplated that the requirements of this specification are necessary for the cleaning and painting of steel which will not be subjected to corrosive attack. The following is a summary of the major sections of this specification.

1. Scope
2. Description
3. Reference Standards
4. Definitions
5. Pre-Application Procedures
   - 5.1 Materials Handling and Use
   - 5.2 Surface Preparation
   - 5.3 Pretreatments
   - 5.4 Coating Materials Preparation
6. Factors Affecting the Application of Coatings
   - 6.1 Temperature
   - 6.2 Moisture
   - 6.3 Humidity
   - 6.4 Cover
   - 6.5 Defects
   - 6.6 Striping
   - 6.7 Continuity
   - 6.8 Thickness
   - 6.9 Recoating
   - 6.10 Tinting
   - 6.11 Intercoat Adhesion
   - 6.12 Contact Surfaces
   - 6.13 Induction Time and Pot Life
7. Application Methods
   - 7.1 General
   - 7.2 Brush Application
   - 7.3 Roller Application
   - 7.4 Spray Application (General)
   - 7.5 Air Atomizing Spray Application
   - 7.6 Airless Spray Application
   - 7.7 Air-Assisted Airless Application
   - 7.8 Hot Air Spray Application
   - 7.9 Hot Airless Spray Application
   - 7.10 Plural Component Spray Application
   - 7.11 High Volume Low-Pressure Spray
8. Shop Coating
   - 8.1 Applicability
   - 8.2 Number of Coats and Type of Coating
   - 8.3 Damage to Shop Coating
   - 8.4 Contact Surfaces
   - 8.5 Requirements for Welding
   - 8.6 Rust Preventive Compounds
   - 8.7 Erection Marks
9. Field Coating
   - 9.1 Applicability
   - 9.2 Surface Preparation
   - 9.3 Touch-up of Shop Coated Surfaces
   - 9.4 Field Coating Procedures
10. Repair of Damaged Intact Coatings
    - 10.1 Applicability
    - 10.2 Surface Preparation for Recoating
    - 10.3 Incompatibility
    - 10.4 Work to be Performed
11. Application Procedures for Generic Groups of Coatings
    - 11.1 General
    - 11.2 Drying Oil Curing Coatings
    - 11.3 Vinyls and Chlorinated Rubber Coatings
    - 11.4 Bituminous Coatings
    - 11.5 Epoxy and Coal Tar Epoxy Coatings
    - 11.6 Zinc-Rich Coatings
    - 11.7 Urethane Coatings
    - 11.8 Waterborne Thermoplastic Coatings
12. Curing and Handling of Coatings
    - 12.1 Drying of Coatings
    - 12.2 Handling of Coated Steel
13. Inspection
14. Safety and Environmental Concerns
15. Disclaimer
16. Notes

Appendix A - Additional Reference Materials

3. Referenced Standards

3.1 The latest issue, revision, or amendment of the referenced standards in effect on the date of invitation to bid shall govern unless otherwise specified.

7-7

Industry

Lead & Hazardous Disclosure

The existing paint system contains lead; therefore, the waste generated from cleaning will be classified as hazardous materials. Establish a hazardous coating removal plan to document and control coating removal operations in compliance with OSHA 29CFR Part 1910.1025, 1926.62, and 1926.63. This plan must include all applicable federal and state requirements addressing environmental protection issues and hazardous waste disposal.

The successful (cleaning and painting) Contractor must be certified by the Society for Protective Coatings (SSPC) in accordance with SSPC-QP 1 and SSPC-QP 2. Comply with all provisions of the qualification procedures specifically including, but not limited to, the Quality Control (QC) program as outlined in SSPC-QP 1, "Standard Procedure for Evaluating Painting Contractors (Field Application to Complex Industrial Structures)". Provide copies of SSPC audit reports for all audits performed during this contract. Provide QC reports upon request by Engineer and/or on a weekly basis.

Typically language used in the General Notes

Worker & Environmental Safety

Texas Department of Transportation

Training Summary

Course Detail

Course Title:	Lead Awareness
Course Code:	SFH766
Description:	This course provides an overview of lead awareness. Some topics discussed are: a description of lead, where you find it, the health hazards associated with lead, how to protect yourself from these hazards, and what to do if you are exposed to lead in the workplace.
External Charge:	
Training Coordinator:	Johannsen,Laura L
Telephone:	512/486-5408
Fax Number:	512/486-5464

Available online at "I-WAY"

TxDOT Policy: "Repainting where lead is involved should be done in a general construction contract that is separate from any other bridge work (i.e., widening, or new construction); but it may be included within maintenance/repair contracts."

Containment System

Containment System

Standard Requirements:

Rigid floor system ~ Formed from 20 gauge (min.) steel

Work Platform ~ Capable of supporting 25 PSF (min.) live load for abrasive blasting, or 10 PSF (min.) live load for water blasting

Watertight ~ Ceiling and floors contoured to eliminate ponding

Walls ~ Full height & capable of withstanding winds up to 30 MPH

Air Quality & Emission Testing

Ventilation must keep ambient Total Suspended Particulate (TSP) lead below limits prescribed by (OSHA) 40 CFR 50

Abrasive Blast System

An Abrasive Recycling System (with recyclable abrasive) is required when removing existing coatings containing hazardous materials.

Waste Storage & Disposal

50 TAC 305 & 50 TAC 335 are Texas laws related to handing, storage, classification, and disposal of hazardous waste materials.

Include on Drawings: Limits of Painting

BRIDGE SURFACE AREA QUANTITY SUMMARY
(FOR CONTRACTOR'S INFORMATION ONLY)

EAGLE NEST CANYON
CSJ: 0022-05-020
TOTAL STEEL SURFACE AREA = 26,500 SF

PECOS RIVER
CSJ: 0022-06-045
TOTAL STEEL SURFACE AREA = 137,000 SF

DEVIL'S RIVER
CSJ: 0022-09-047
TOTAL STEEL SURFACE AREA = 465,000 SF

1

* ITEMS TO BE PAINTED SHALL INCLUDE GIRDERS, DIAPHRAGMS, CONNECTIONS PLATES, BEARINGS, STIFFENERS, AND LATERAL BRACING. PAINTING OF GIRDERS SHALL INCLUDE THE WEB, BOTTOM FLANGE, AND UNDERSIDE OF TOP FLANGE. ANY ADDITIONAL ITEMS SHALL BE VERIFIED BY THE ENGINEER.

Include on Drawings: Paint Systems

ITEMS OF WORK:

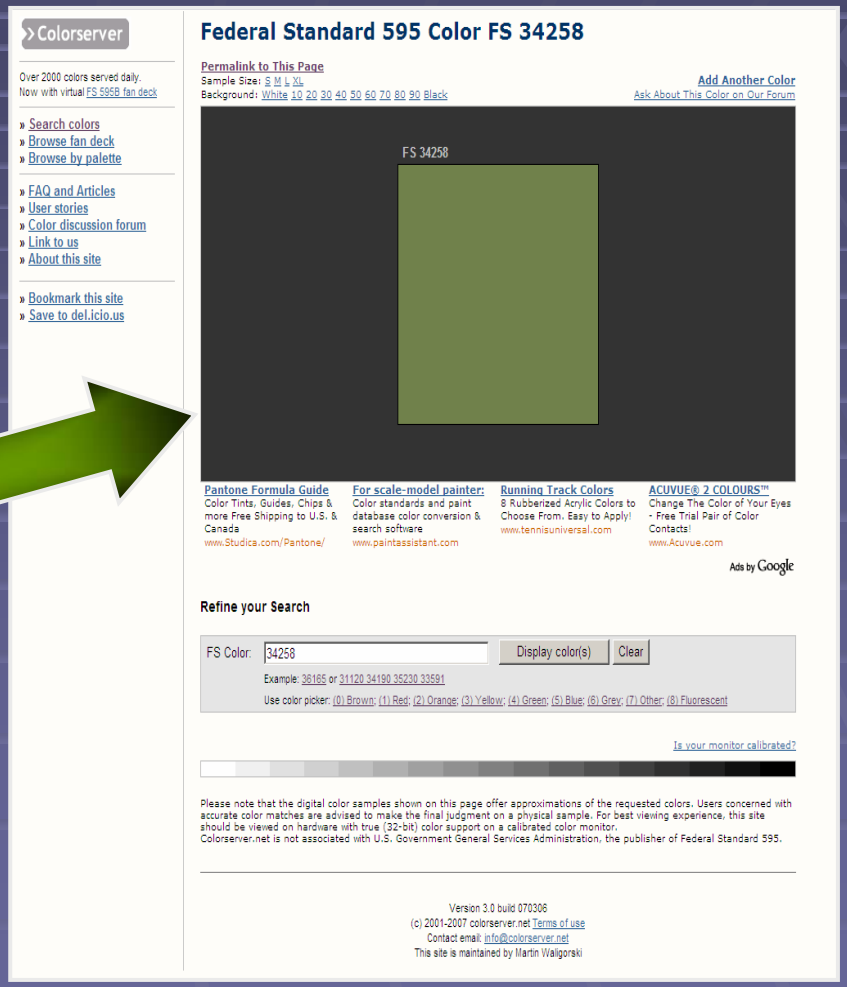
Clean and Paint all steel bridge components in continuous plate girder spans (approx. 32,000 SF) in accordance with Item 446, "Cleaning and Painting Steel." Use Paint System II, appearance coat to be Federal Standard 595B Color FS 34258.

ITEM	DESCRIPTION	QTY	UNIT
0420 2004	CL C CONC (BENT)	3.33	CY
0434 2030	LAMINATED ELASTOMERIC BEARING	32.00	EA
0446 2003	CLEAN & PAINT EXIST STR (SPL PROT SYS)	1.00	LS
0495 2001	RAISING EXIST STRUCT	1.00	LS

Paint System I: for over-coating existing paints ~ water blast/hand tools only
Paint System II: for new or existing steel ~ the default system
Paint System III: for new steel only (3 Coats) ~ harsh environments
Paint System IV: for new steel only (2 Coats) ~ mild environments
Special Protection System: for unique applications (H-piles, repairs, etc.)

Include on Drawings: Paint Colors

Deck Fan



Internet

Bridge Construction & Maintenance Branch

- 6 Professional Engineers plus 1 E.I.T.
- 4 Certified Structural Steel Field Inspectors.

"We serve as in-house consultants to the Districts and Divisions on bridge construction and maintenance issues."

Branch Manager: Brian Merrill, P.E. @ (512) 416-2232

Contact for Paint Issues: Maxine Jacoby, P.E. @ (512) 416-2751

Questions?

BRIDGE DIVISION

Texas Department of Transportation