2010 Western Bridge Preservation Partnership Meeting
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Determining the Overcoatability of Existing Coating Systems On Steel Structures

A Systematic Approach to Decision Making

What will be covered:

- What is Overcoating?
- Spot Repair vs. Zone Painting
- Pros and Cons of overcoating
- How to determine if a given coating can be overcoated
  - Data Collection
  - Data Interpretation
  - Risk Management
  - Adoption of Strategy for Overcoating

What is "Overcoating"?

Overcoating: Application of coating materials over an existing coating in order to extend its service life, including use of the appropriate cleaning methods. The procedure includes preparation of rusted or degraded areas, feathering edges of existing paint, low-pressure water washing of the entire structure to remove contaminants, application of a full intermediate coat over repaired areas, and optional application of a full topcoat over the entire structure. . .

vs

Repaint: Complete removal of the existing coating system followed by application of a new coating system (including appropriate cleaning methods.)

Definitions from SSPC: The Society for Protective Coatings
TECHNOLOGY UPDATE NO. 3: Overcoating, p. 10-51 (SSPC-TU 3)

Spot Repair vs Zone Painting

Spot repair: A procedure entailing surface cleaning of isolated corrosion or paint breakdown areas using appropriate cleaning methods, and subsequent coating of these areas.

Zone painting: A procedure entailing surface preparation using appropriate cleaning methods and painting of a defined area of a structure. Zone painting may involve (a) many spot repairs within a defined area or (b) removal of all coating in a defined area, followed by application of a new coating system to that area.

Definitions from SSPC: The Society for Protective Coatings
TECHNOLOGY UPDATE NO. 3: Overcoating, p. 10-51 (SSPC-TU 3)

Spot Repair

Zone Painting

Overcoating: Pros vs Cons

- Pros
  - Improves **appearance** and **extends service life** for years and potentially provides a sound base for future overcoats.
  - Is usually done at a fraction of the cost of repainting

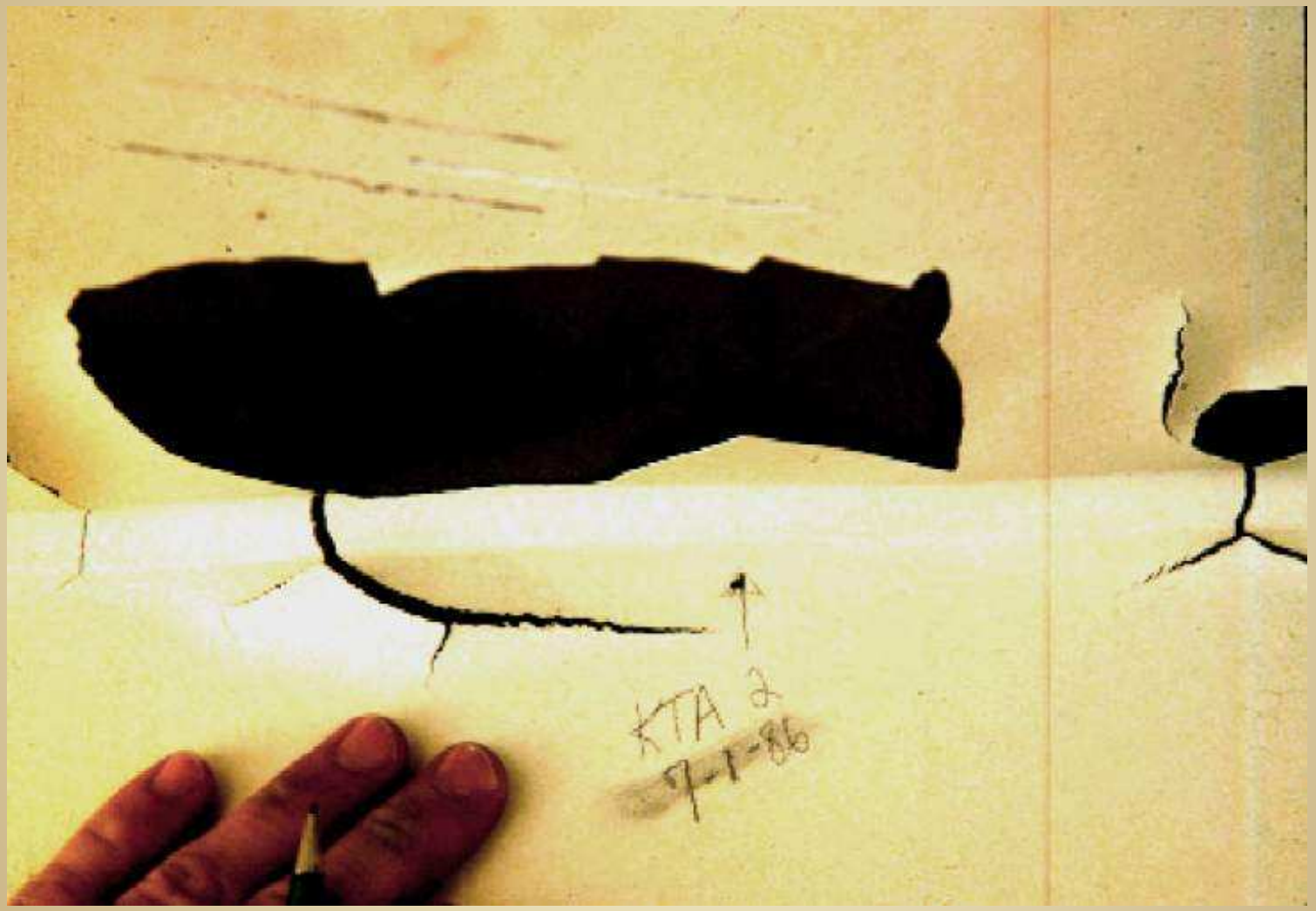
- Cons
  - There can be premature coating system failure
    - Rusting
    - Disbonding (including blisters) due to adhesion issues

  - Overcoating always entails some risk
    - The word "risk" is used 40 times in SSPC-TU 3
    - The word "overcoating" is used 87 times.

    *Note – Risk management is part of an Overcoating Strategy

Rusting Steel – SSPC VIS2

Disbonding Coating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Development of an Overcoating Strategy

Four Part Process

A. Data Collection
B. Data Interpretation
C. Risk Management
D. Adoption of Overcoating Strategy

Development of an Overcoating Strategy

A. Data Collection

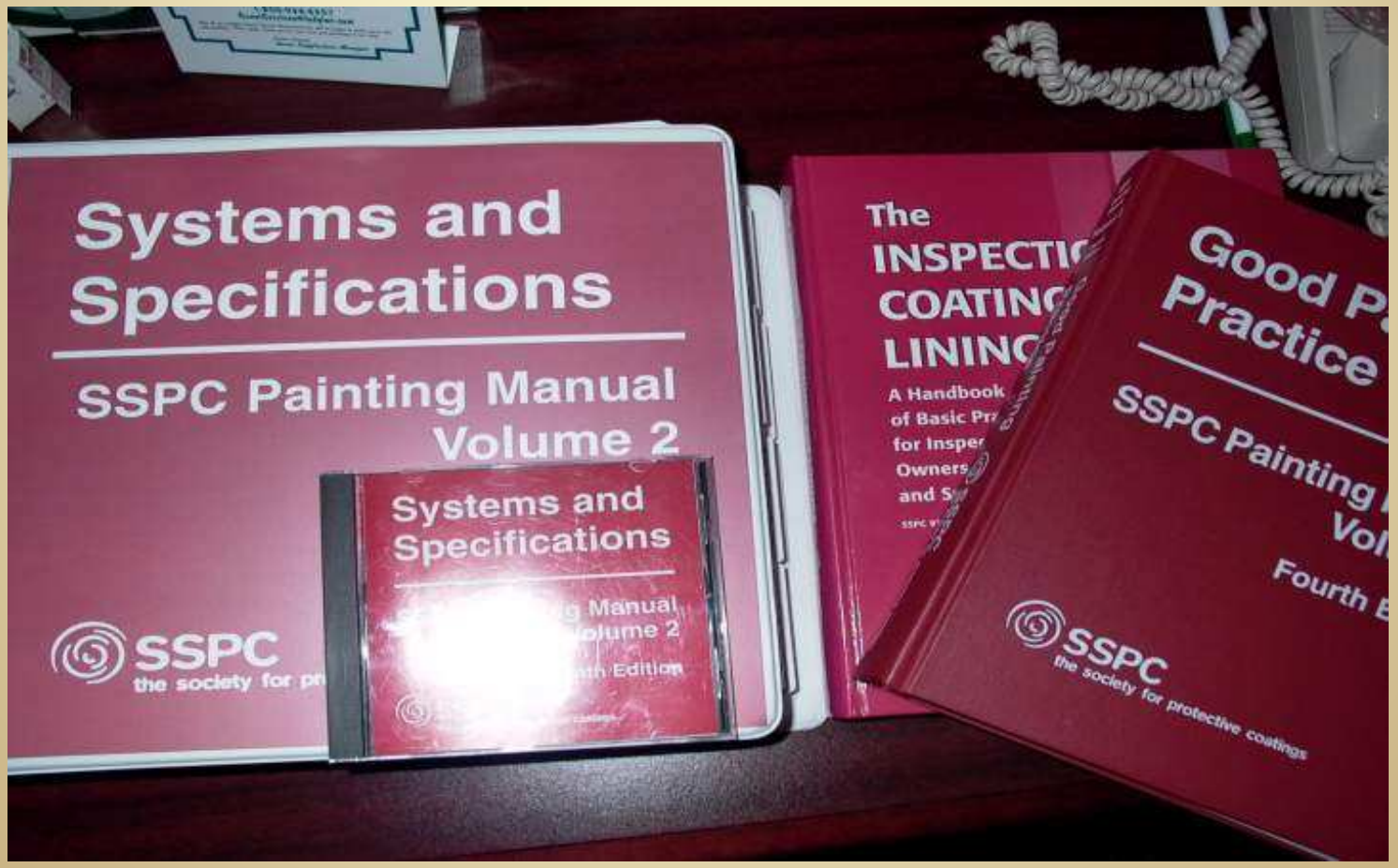
Data Collection

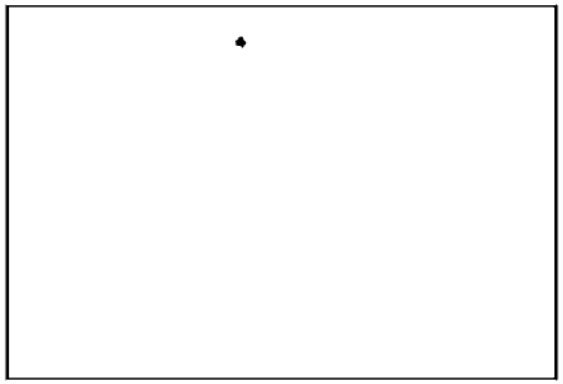
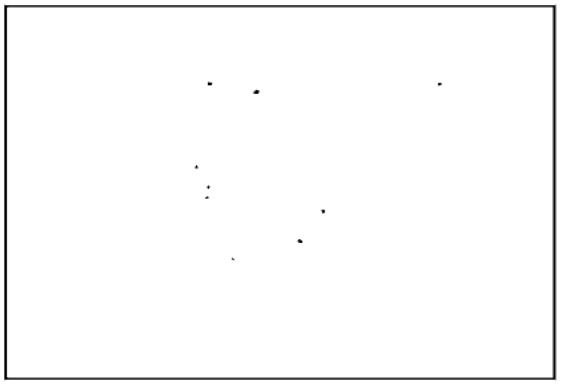
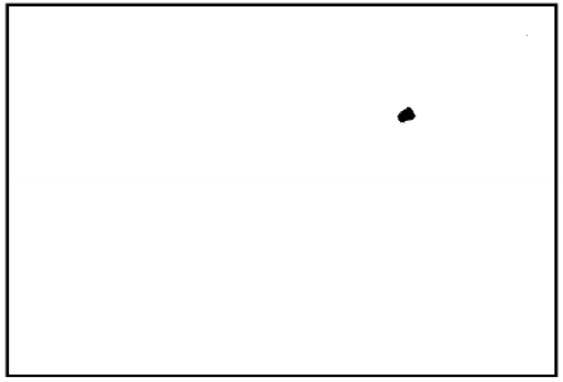
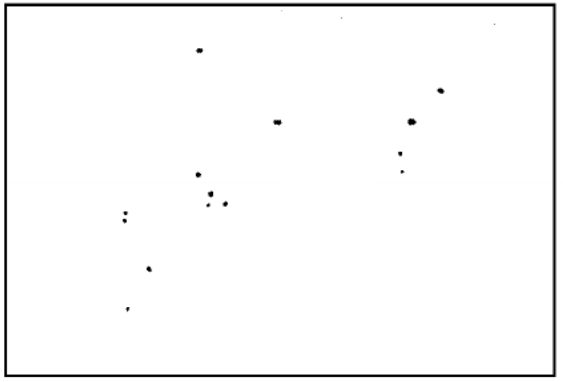
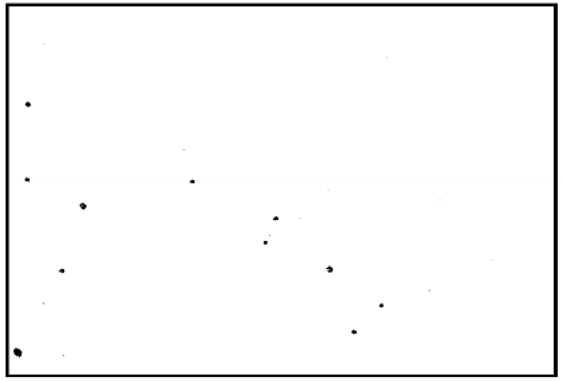
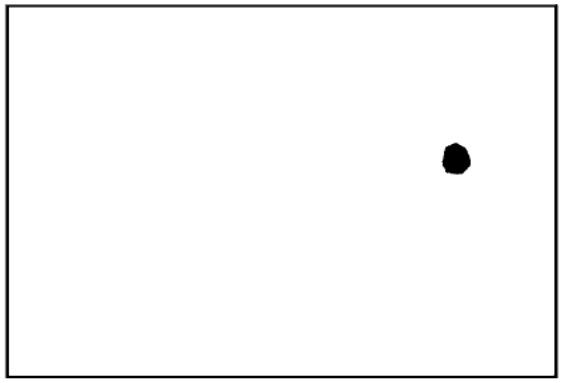
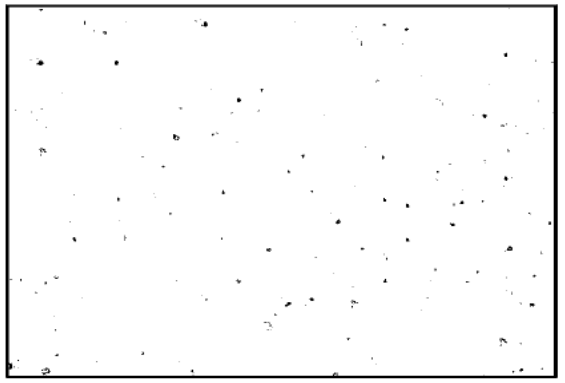
1. How does the current coating look?
   A. Percentage rusted or otherwise distressed
      a) Blisters
      b) Peeling
   B. Use SSPC Vis 2 to characterize
2. How thick is the coating in place?
   A. Number of coating layers in place
3. How well is it adhered?
   A. X cut tests
   B. Cross hatch tests
   C. Adhesion Test Dollies
4. What is the condition of the substrate?

Data Collection

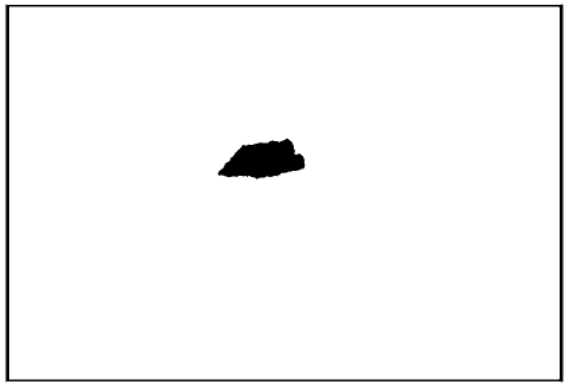
1. How does the current coating look?
   A. Percentage rusted or otherwise distressed
      - Blisters
      - Disbonding/Peeling
   B. Use SSPC Vis 2 to characterize
      - **SSPC-VIS 2 - Standard Method of Evaluating Degree of Rusting on Painted Steel Surfaces**

SSPC: The Society For Protective Coatings

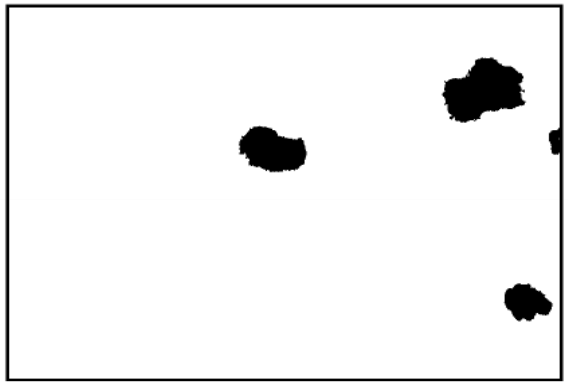


SPOT RUSTING	GENERAL RUSTING	PINPOINT RUSTING
		
Rust Grade 9-S, 0.03% Rusted	Rust Grade 9-G, 0.03% Rusted	Rust Grade 9-P, 0.03% Rusted
		
Rust Grade 8-S, 0.1% Rusted	Rust Grade 8-G, 0.1% Rusted	Rust Grade 8-P, 0.1% Rusted
		
Rust Grade 7-S, 0.3% Rusted	Rust Grade 7-G, 0.3% Rusted	Rust Grade 7-P, 0.3% Rusted

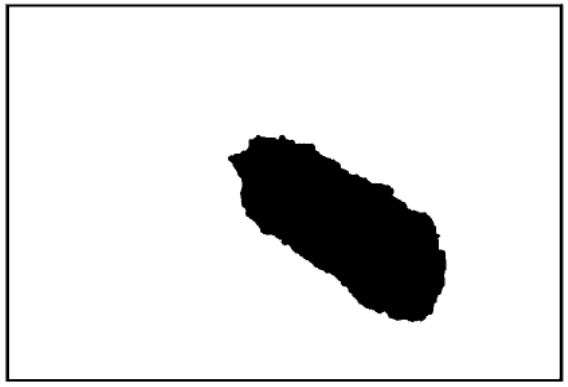
SPOT RUSTING



Rust Grade 6-S, 1% Rusted

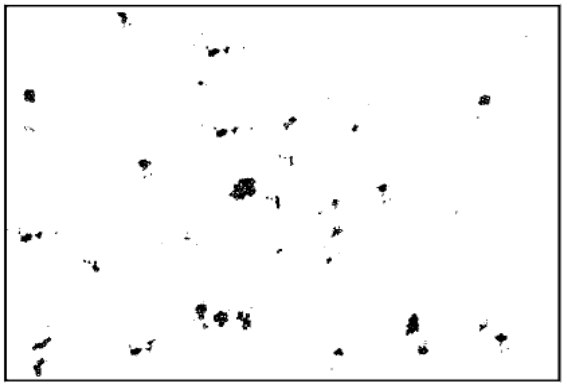


Rust Grade 5-S, 3% Rusted

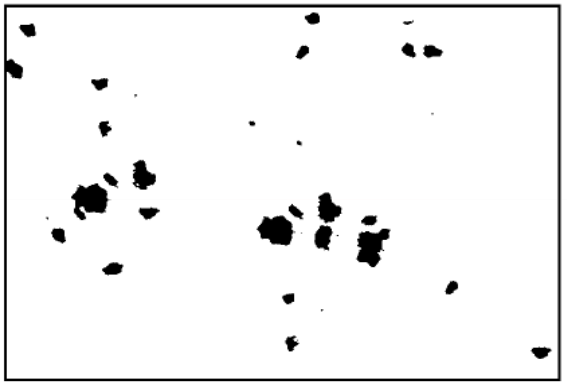


Rust Grade 4-S, 10% Rusted

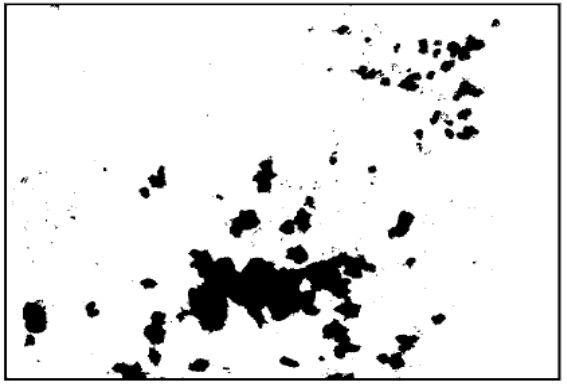
GENERAL RUSTING



Rust Grade 6-G, 1% Rusted

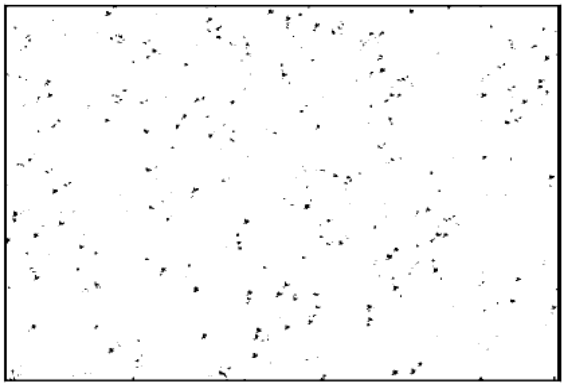


Rust Grade 5-G, 3% Rusted

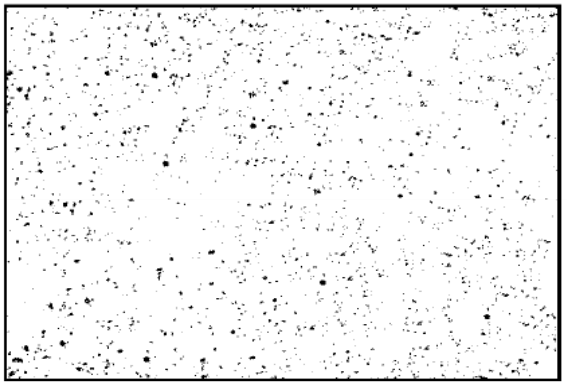


Rust Grade 4-G, 10% Rusted

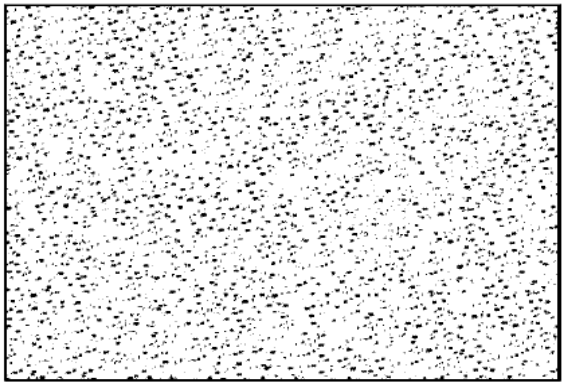
PINPOINT RUSTING



Rust Grade 6-P, 1% Rusted



Rust Grade 5-P, 3% Rusted



Rust Grade 4-P, 10% Rusted

Disbonding/Peeling Paint

Blistering Paint

Disbonding/Peeling Paint

Visual Appearance – XX% per SSPC-VIS 2

Data Collection

2. How thick is the existing coating

Dry Film Thickness Gage

Tooke Gage

Data Collection

3. How well is it adhered?

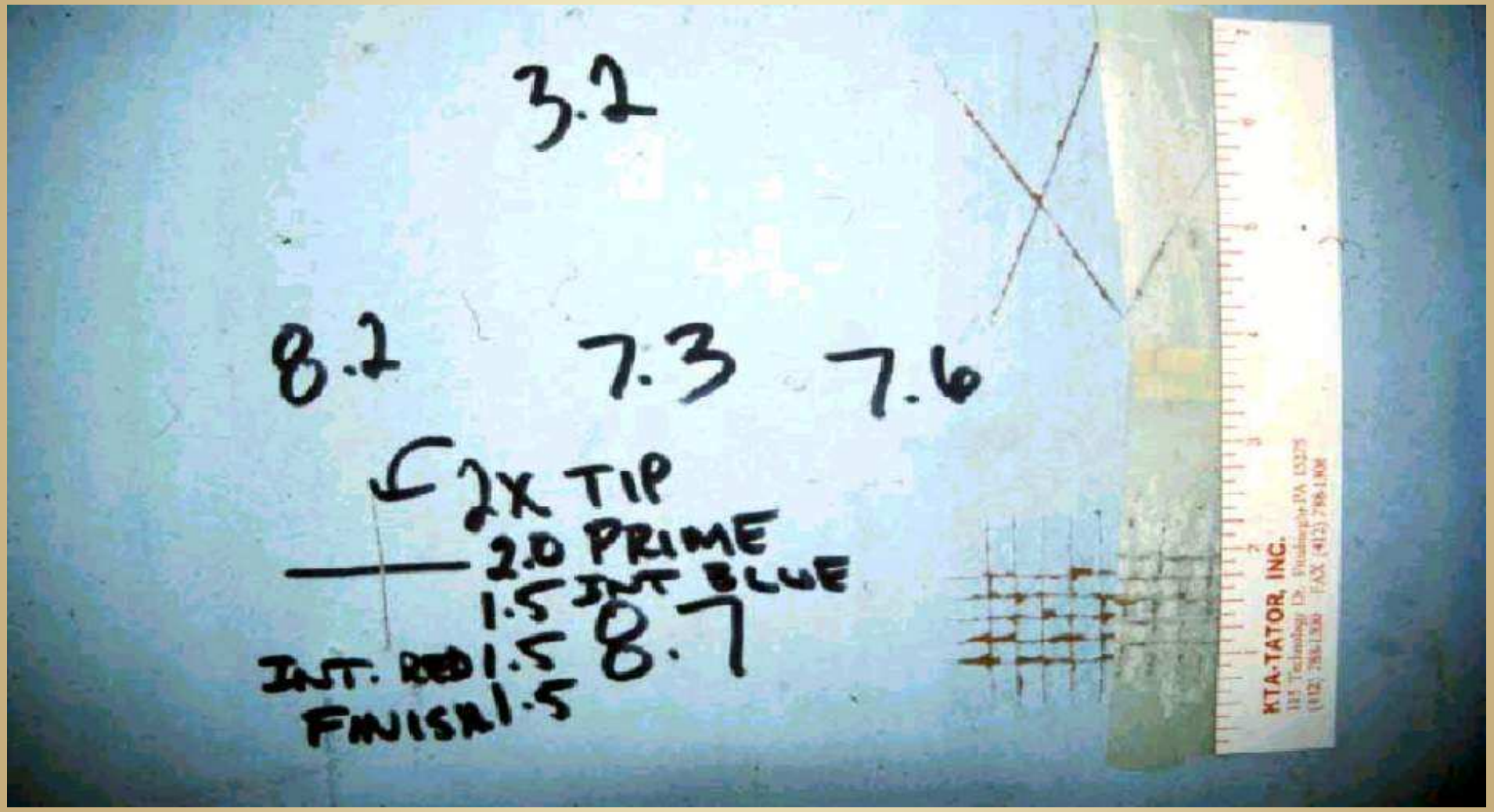
ASTM D3359 - 09 Standard Test Methods for Measuring Adhesion by Tape Test

- Method A X cut tests
- Method B Cross hatch tests

ASTM D4541 - 09 Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers

- Test dollies

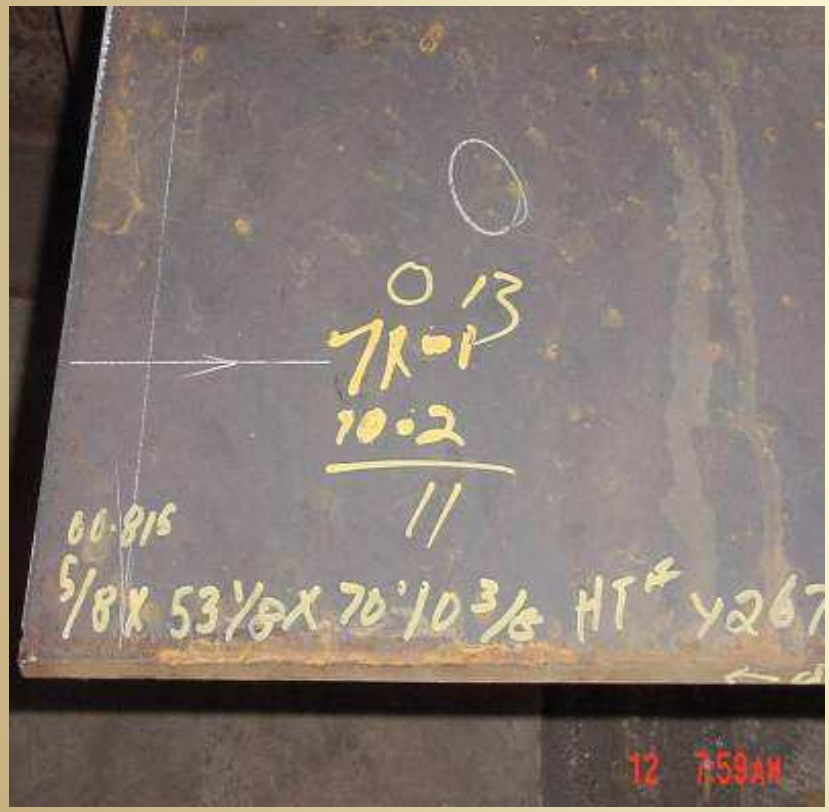
Evaluation Of Test Patch

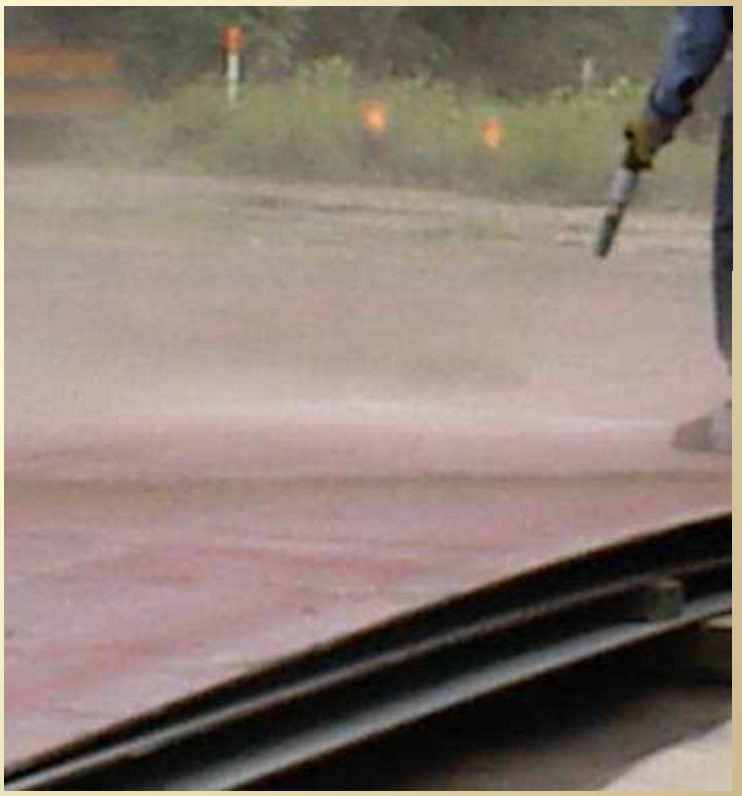


Data Collection

4. What is the condition of the substrate?

Mill Scale vs Blast Cleaned Surface





Adhesion Tester

Test Dollie

ASTM D 4541

ASTM D 3359

Development of an Overcoating Strategy

B. Data Interpretation

Data Interpretation

1. Use a decision matrix to develop a maintenance strategy

   A. See sample decision matrix in SSPC-TU3

      a) Appendix A, Table 1 (p 10-58)

Data Interpretation

A. Sample decision matrix SSPC-TU3

TABLE 1
RISK OF SALVAGING EXISTING COATING BASED ON ADHESION/THICKNESS CHARACTERISTICS

ADHESION CLASSIFICATION			COATING THICKNESS		
ASTM D 3359 Method B* (using 5 mm guide)	Percentage Removed	ASTM D 3359 Method A	< 10 mils (< 254 μm)	10-20 mils (254-508 μm)	> 20 mils (> 508 μm)
5B	0%	5A	OK	OK	OK
4B	1% to 5%	4A	OK	OK	OK
3B	6% to 15%	3A	OK	OK	OK
2B	16% to 35%	2A	LR	LR	MR
1B	36% to 65%	1A	MR	HR	HR
0B	> 65%	0A	NO	NO	NO

OK = essentially no risk
LR = low risk
MR = moderate risk
HR = high risk
NO = integrity too poor to salvage

* Method B is not recommended for use on films above 5 mils in thickness unless otherwise agreed upon between the contracting parties.

SSPC-TU3, p 10-58

Data Interpretation

Maintenance Strategy Illustration

Strategy:

- When there is more than 16% of the surface requiring surface preparation effort, overcoating is not an option.
- Spot or Zone cleaning and overcoating are viable options when a little- or-no-risk-of-failure condition exists i.e. there is no more than 5% rust and the total coating film thickness is less than 25 mils.

- (Note that the AASHTO, Guide For Painting Steel Structures, 1994 indicates that when the surface preparation area exceeds 15-20 percent of the total surface area, the economics are such that total removal of lead paint on bridges is the most viable option.)*

Development of an Overcoating Strategy

Risk Management

Risk Management

1. Test Maintenance Strategy
2. Test Patch Application
3. Test to Assess Coating Compatibility, Appearance and Adhesion

Risk Management

1. Test Maintenance Strategy on typical surfaces to be overcoated

   - Having a solid, well developed Maintenance Strategy is a critical part of risk management

Risk Management

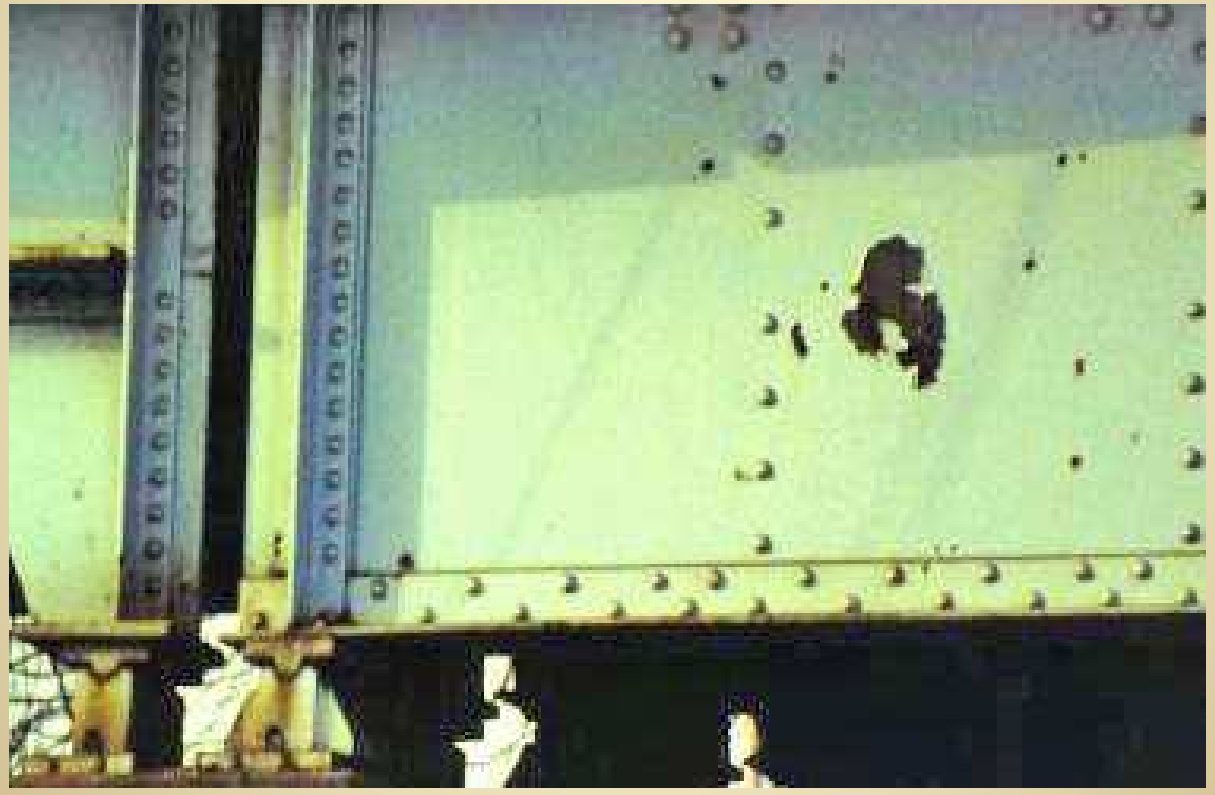
Select test locations for evaluation that properly characterize differences in configuration and exposure; that is, vertical versus horizontal surfaces and sheltered versus unsheltered exposure.

2. Test Patch Application

Test patches are described in ASTM D 5064, and SSPC-Guide 9, Section 6.2.2, and SSPC-TU 3, section 3.4.4.

Compatibility Issues

Blisters, Lifting, Cracking



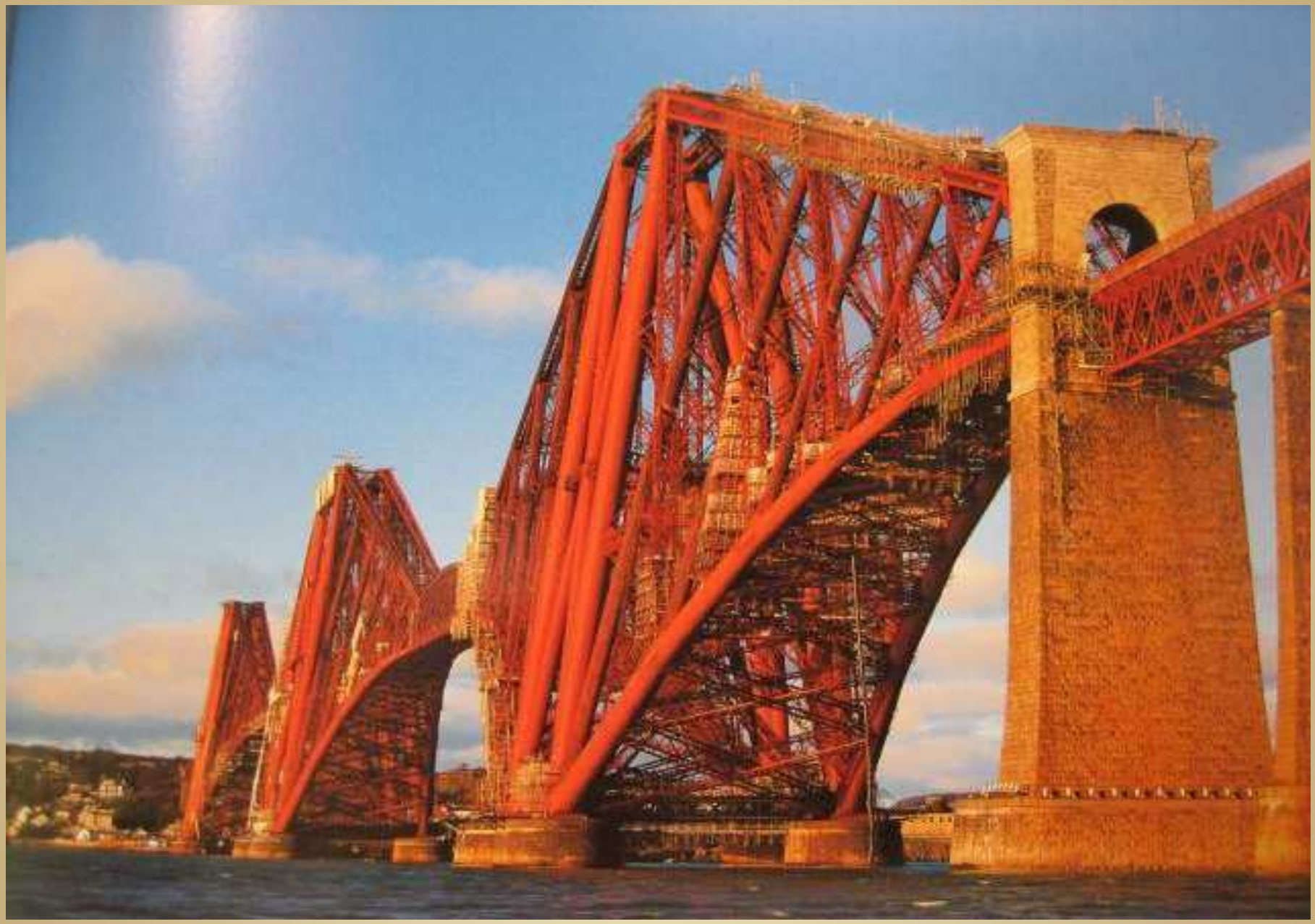
What Does One Conclude?

Conclusion

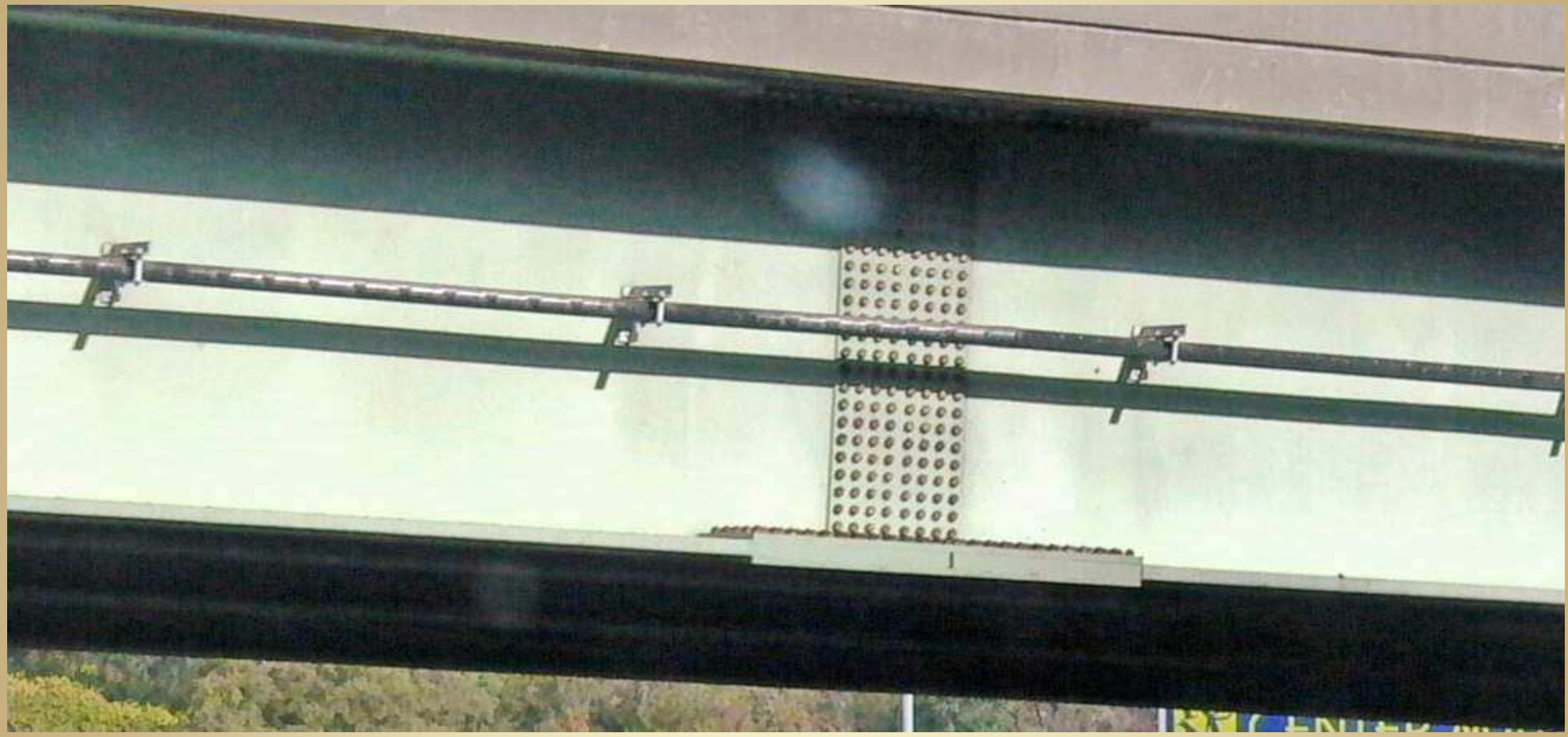
- Overcoating creates a risk of failure that is higher than repainting because of the unknowns presented by the old coating.

- The Overcoatability of the existing coating system can be assessed to determine the risk of early rusting or disbonding and the resultant poor appearance and possible corrosion damage to the substrate.

Can this coating be successfully Overcoated?




CHECK
YOUR
HEADLIGHTS



Questions?