

Beam End Treatments for Steel Bridges

Bobby Meade
Sudhir Palle
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Problems at Beam Ends

- **Debris build-up**
 - **Attracts/retains moisture**
- **Leaking joints**
 - **Deck run-off falls onto beam ends, bearings, etc.**
 - **Extended time of wetness**
 - **Exposure to deicing salts**
- **Results**
 - **Localized premature coating failures**
 - **Significant corrosion**
 - **Loss of section on steel members**

Typical Beam End Issues



Typical Beam End Issues



Typical Beam End Issues



Potential Beam End Treatments

- **Cleaning of affected areas**
 - **Debris removal**
 - **Washing**
- **Surface preparation and coatings application**
 - **Rough/pitted steel and high chloride levels**
 - **Minimizes chances of success with barrier and inhibitive coatings**
 - **Blast/power tool cleaning and zinc coatings are somewhat effective**
 - **Expensive**
 - **Worker safety & environmental issues (lead coatings)**
- **Other options?**

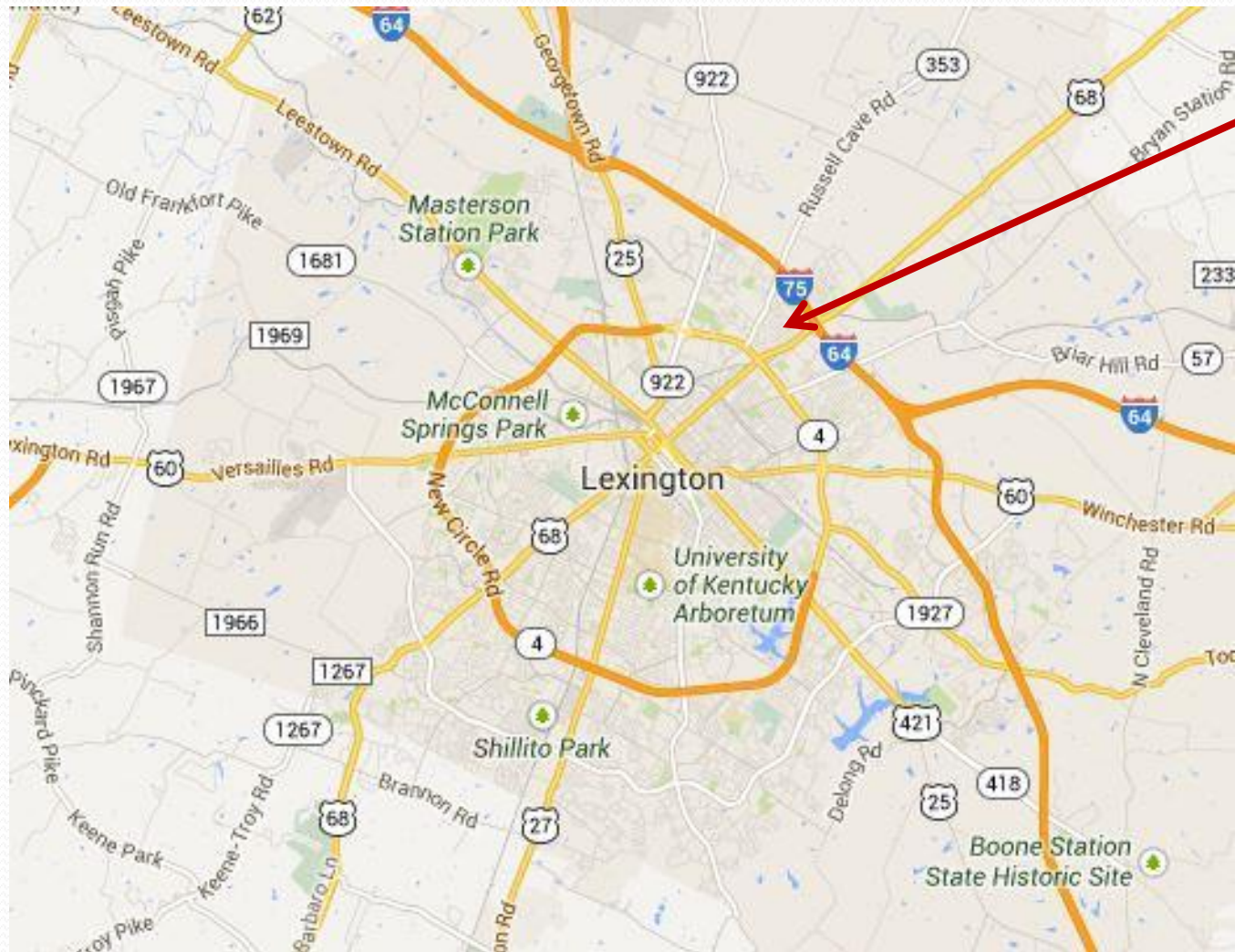
Desirable Characteristics of Beam End Treatments

- **Effective beam end treatments**
 - **A 5-year service life (min.)**
 - **Applied with minimal surface preparation**
 - **Tolerant of rough surfaces/residual chlorides**
- **Application by state forces**
 - **Limited worker safety & environmental issues**
 - **No specialized skill requirements (painters)**
 - **Basic tools**

Project Treatment Options

- **KTC looked “outside the box” for solutions**
 - **Super barriers**
 - **Tapes (4 tested)**
 - **Adhesive sheets (3 tested)**
 - **Greases (2 tested)**
 - **Non traditional liquid-applied coatings (2 tested)**

Coatings Field Application



I-64/75 Over US 68

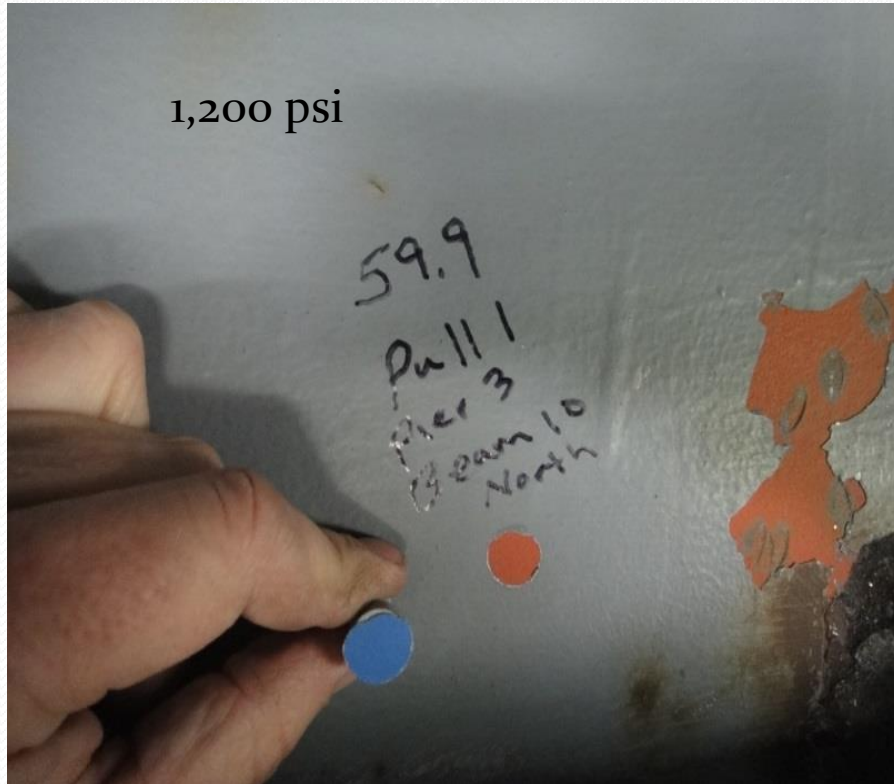
March 2013



Steel Condition



Steel Coating Condition



Surface Preparation



Surface Preparation



Surface Preparation



Surface Preparation



Surface Preparation



Products Applied to Steel



Products Applied to Steel



Products Applied to Steel



Products Applied to Steel



Products Applied to Steel



Products Applied to Steel



Products Applied to Steel



Products Applied to Steel



Products Applied to Steel



Follow-on Evaluations

October 2015/September 2016



Follow-on Evaluations

October 2015/September 2016



Aerospace Sealant

Paint

Grease

09 02 2016

Follow-on Evaluation October 2015/September 2016



09.02.2016

Follow-on Evaluation October 2015/September 2016



Grease

09 02 2016

Follow-on Evaluation

October 2015/September 2016



Gypsum/Caster Oil

Paint

10.09.2015 13:22
09.02.2016

Follow-on Evaluation

October 2015/September 2016



Gypsum/Caster Oil

Paint

09 02 2016

Follow-on Evaluation

October 2015/September 2016

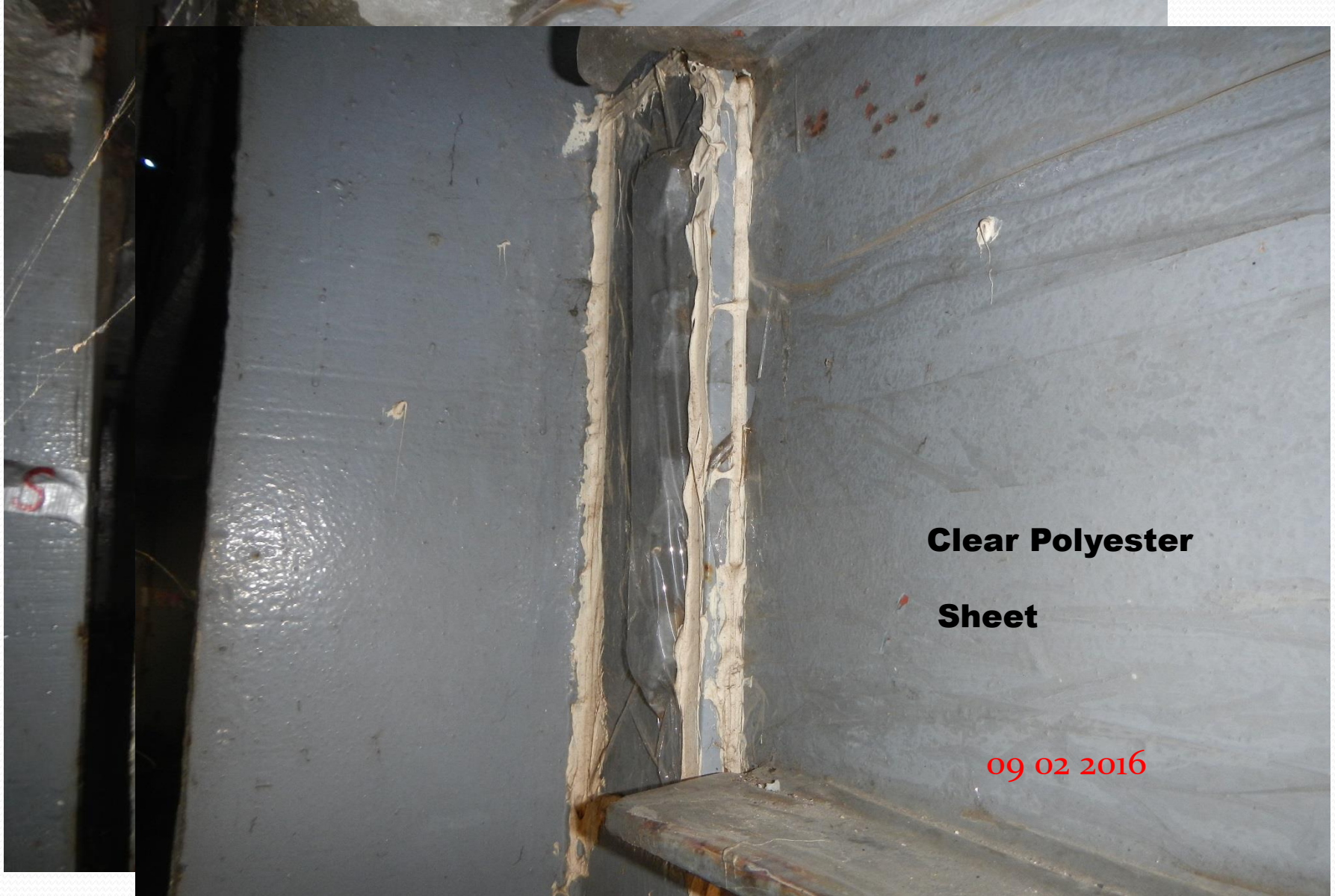


**Clear Polyester
Sheet**

10.09.2015 12:59 09.02.2016

Follow-on Evaluation

October 2015/September 2016



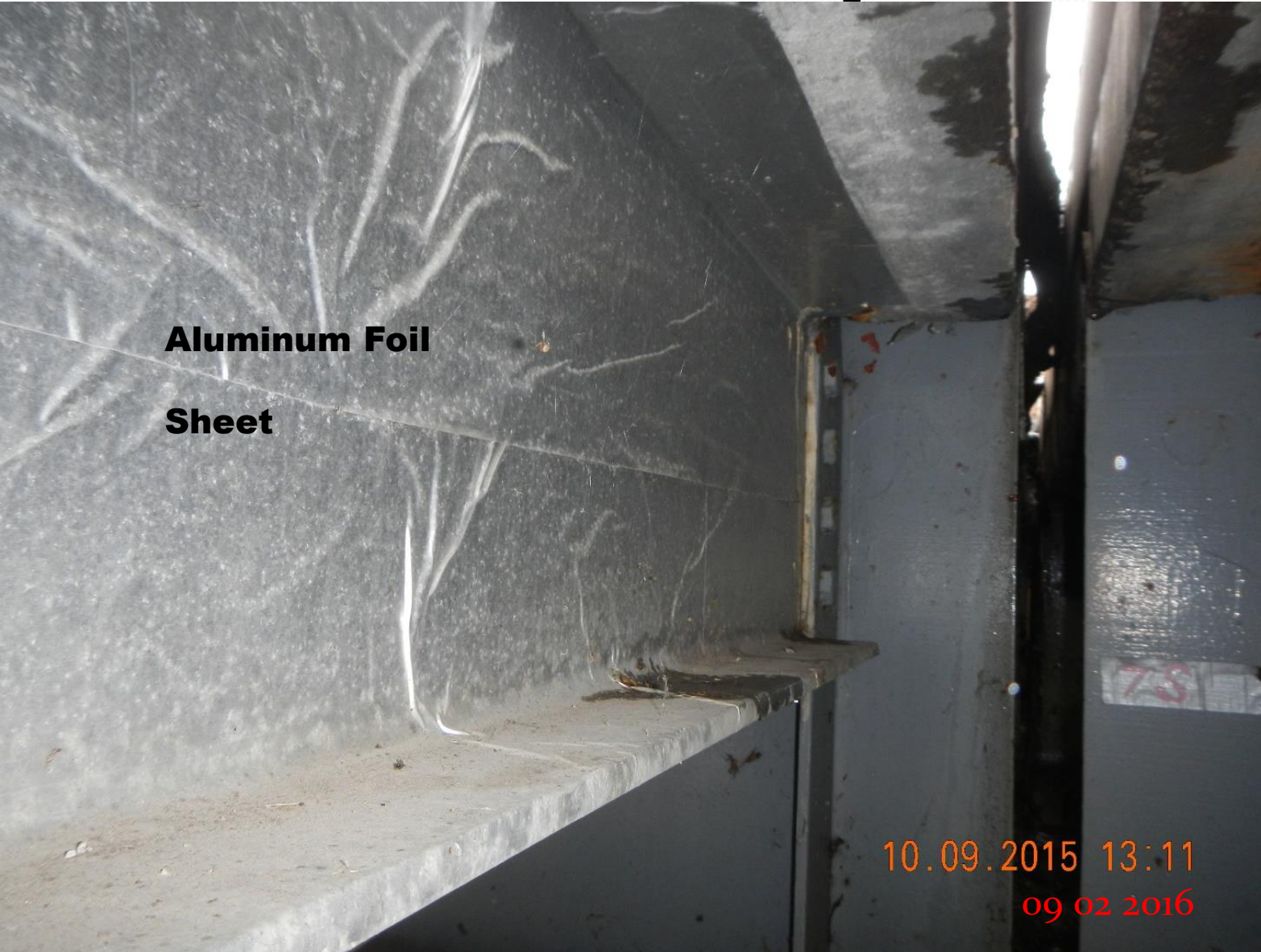
Clear Polyester

Sheet

09 02 2016

Follow-on Evaluation

October 2015/September 2016



**Aluminum Foil
Sheet**

10.09.2015 13:11
09 02 2016

Follow-on Evaluation

October 2015/September 2016

**Aluminum Foil
Sheet**

7 N

09 02 2016



Follow-on Evaluation October 2015/September 2016

Polyvinyl Fluoride

Tape



10.09.2015 13.07.2016

Follow-on Evaluation

October 2015/September 2016



Polyvinyl Fluoride

Tape

09 02 2016

Follow-on Evaluation October 2015/September 2016



Polyurethane

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09.02.2016

Sheet

Follow-on Evaluation

October 2015/September 2016



Polyurethane

Sheet

09 02 2016

Follow-on Evaluation

October 2015/September 2016



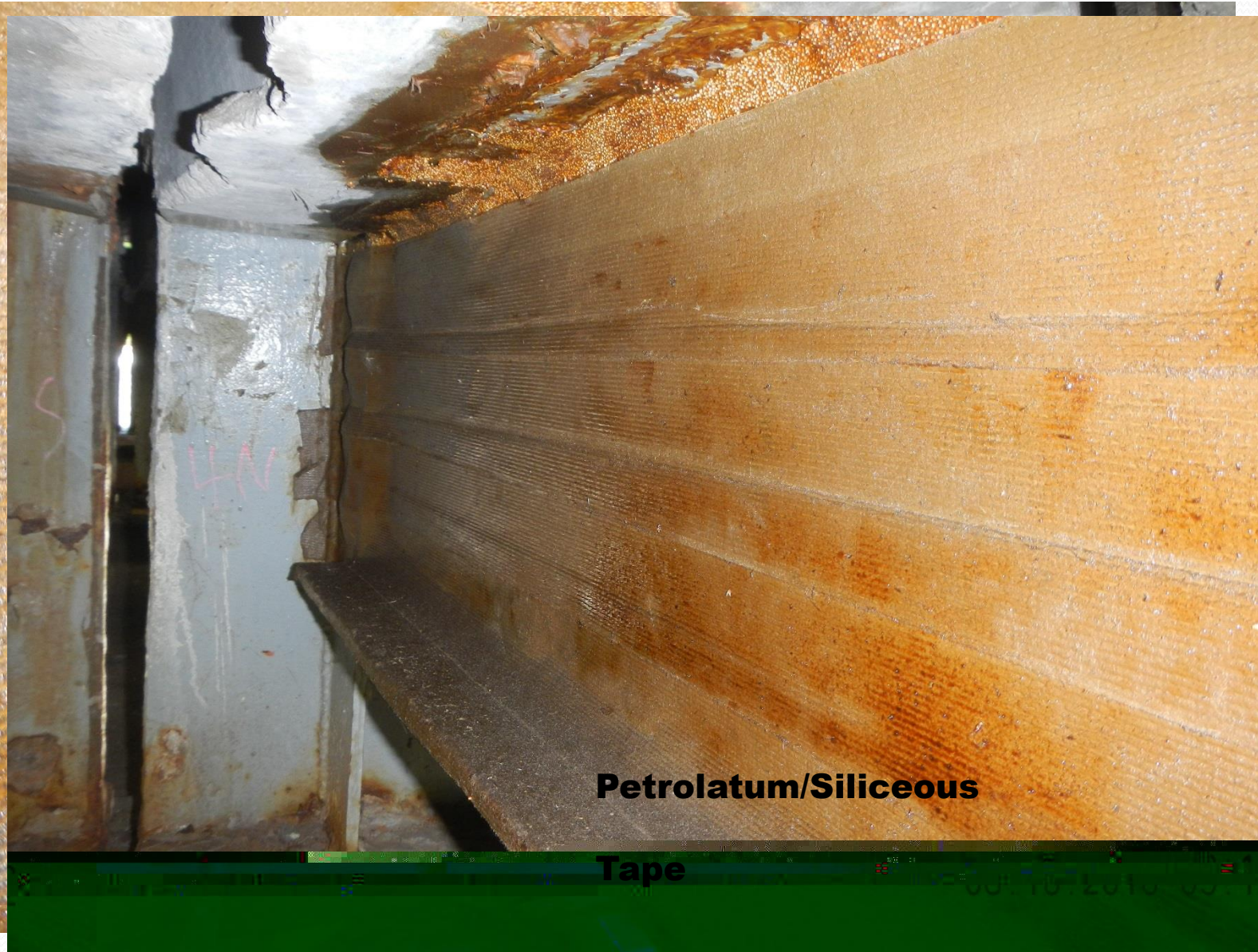
Petrolatum/Siliceous

10.09.2015 12:52

Tape

Follow-on Evaluation

October 2015/September 2016



Petrolatum/Siliceous

Tape

Follow-on Evaluation

October 2015/September 2016



Polymer Compound

Tape

09 02 2016

10.09.2015 13:04

Follow-on Evaluation

October 2015/September 2016



Polymer Compound

Tape

5N

09 02 2016

Follow-on Evaluation

October 2015/September 2016



Conclusions

- **Effective beam end treatment materials have been identified**
- **They can be applied with low-tech surface preparation**
- **They can protect steel in a challenging environment**
- **The remaining issue will be their durability**

Content from Two Research Studies

- **KTC-16-03/SPR12-433-1F**
Thin Film Concrete Coatings
- **KTC-16-08/SPR14-484-1F**
**Chloride Contamination Remediation
On Steel Bridges**

Thank You!

Bobby Meade

bobby.meade@uky.edu

502-517-1257

- Bobby.meade@uky.edu
- Susan.paine@uky.edu
- Ted.hopwood@uky.edu