A Rational Approach for Planning Bridge Repainting Projects

Jeff Pouliotte
FDOT State Structures Maintenance Engineer
Purpose

• At the 2012 SEBPP Annual Meeting Jeff was asked to provide guidance to help other Southeastern States plan for and execute bridge repainting projects

• To achieve this objective a Team of Bridge Practioners and Paint Experts were assembled

• It was decided that a Report was needed to:
  – Develop a rational cost effective approach to evaluate paint options
  – Provide general guidance on what to do to achieve maximum service life for the option selected
SEBPP Paint Group Team

- Jeff Pouliotte, Florida DOT (SEBPP Member)
- Paul Vinik, Florida DOT (NTPEP Member)
- Wayne Fleming, Virginia DOT (NTPEP Member)
- Jeff Milton, Virginia DOT (SEBPP Member)
- Ed Welch, TSP-2
- Anwar Ahmad, FHWA
- Brian Hunter, North Carolina DOT
- Aaron Dacey, North Carolina DOT (SEBPP Member)
- Bruce Johnson, Oregon DOT
- Richard Kerr, Florida DOT (SEBPP Member)
Approach

• Paint Options:
  – Remove and Replace existing coating system
  – Overcoat existing coating system
  – Spot paint areas on the structure where the existing coating system needs restoration

• As part of the Report, create Flowchart that rationally depicts how to evaluate Paint Options

• Create Spreadsheet Calculator to perform life cycle cost analyses to evenly evaluate and aid in the selection of the appropriate Paint Option
Variables in Economic Analysis

- Cost of Painting per square foot
- Expected service life
- Duration of Maintenance of Traffic (MOT)
- Cost of MOT per day
- Surface area of the steel to be painted
- Presence of Heavy Metals
- Percent of Corrosion
- Current Interest Rate
Best Practices

• Field Evaluations
• Surface Preparation
• Coatings Application
• Quality Control
• Personnel Qualifications
• Contractor Qualifications
• Quality Assurance
• Inspection and Compliance Evaluations
Flowchart to select Paint Option

*SSPC TU3 - Society of Protective Coatings Technology Update 3. This update is utilized to assess whether the risk of overcoating an existing coating is warranted. Risk is assessed on adhesion and existing coating thickness. These parameters are usually quantified during an on-site condition assessment per ASTM standards.
Flowchart to select Paint Option

Bridge Coating Assessment

Is Corrosion >20% [Y] Yes [N] No

Is Corrosion >10% [Y] Yes [N] No

Continue monitoring

Calculate cost to remove and replace ($rr)

Overcoating meet SSPC TU3*? [Y] Yes [N] No

Calculate cost to overcoat ($oc)

Aesthetic Issue? [Y] Yes [N] No

Calculate cost to spot

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Flowchart to select Paint Option:

1. **Aesthetic Issue?**
   - Yes: $rr < $oc?
   - No: Calculate cost to spot

2. $rr < $oc? (Y/N)
   - Yes: Overcoat
   - No: $rr < $sp (Y/N)

3. $rr < $sp (Y/N)
   - Yes: $oc < $sp (Y/N)
   - No: Spot Paint

- Remove and Replace (Y/N)
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April 9, 2013

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State Structural Materials Systems Engineer
Florida Department of Transportation

Jeff Pouliotte, P.E.
State Structure Maintenance Engineer
Florida Department of Transportation

Curtis “Wayne” Fleming
Senior Materials Office Technician
Virginia Department of Transportation
## Spreadsheet Calculator

### 20 year Coating Maintenance Combinations

<table>
<thead>
<tr>
<th>Maintenance of Traffic Required (Days)*</th>
<th>Pb</th>
<th>No Pb</th>
<th>Expected Service Life</th>
<th>Pb</th>
<th>No Pb</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td></td>
<td></td>
<td>4.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>75</td>
<td></td>
<td></td>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>100</td>
<td></td>
<td></td>
<td>20</td>
<td></td>
<td></td>
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</tbody>
</table>

*The values in this table need to be specific to the structure.

### Example Conditions

<table>
<thead>
<tr>
<th>Maintenance of Traffic Cost ($/day)</th>
<th>650</th>
</tr>
</thead>
<tbody>
<tr>
<td>150,000 ft²</td>
<td></td>
</tr>
<tr>
<td>yes</td>
<td>Pb</td>
</tr>
<tr>
<td>3% Interest rate</td>
<td></td>
</tr>
<tr>
<td>19% Corrosion</td>
<td></td>
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</tbody>
</table>

### 20 year analysis

#### Remove and Replace

<table>
<thead>
<tr>
<th>Future Value of MOT at yr 20</th>
<th>($118,349.07)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Future Value Cost to Remove and Replace</td>
<td>($2,303,255.07)</td>
</tr>
<tr>
<td>Present Value Cost of Paint without MOT</td>
<td>$1,200,000.00</td>
</tr>
<tr>
<td>Present Value Cost of Paint with MOT</td>
<td>$1,265,000.00</td>
</tr>
</tbody>
</table>

#### 2 overcoats and 1 spot paint (5% progressive corrosion)

<table>
<thead>
<tr>
<th>Future Value of MOT at yr 20</th>
<th>($177,247.85)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Future Value Cost to Overcoat</td>
<td>($750,000.00)</td>
</tr>
<tr>
<td>Value of Initial Overcoat at yr 20</td>
<td>($1,365,566.25)</td>
</tr>
<tr>
<td>Value of second Overcoat at yr 20</td>
<td>($1,042,796.57)</td>
</tr>
<tr>
<td>Value of Spot paint at yr 20</td>
<td>($461,864.31)</td>
</tr>
<tr>
<td>Total Future Value Cost at year 20</td>
<td>($3,047,474.98)</td>
</tr>
<tr>
<td>Present Value Cost</td>
<td>$1,673,742.48</td>
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</table>

#### 1 Overcoat and 3 spot paints (5% progressive corrosion)

<table>
<thead>
<tr>
<th>Future Value of MOT at yr 20</th>
<th>($166,934.11)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present Value Cost to Overcoat</td>
<td>($750,000.00)</td>
</tr>
<tr>
<td>Value of Initial Overcoat at yr 20</td>
<td>($1,365,566.25)</td>
</tr>
<tr>
<td>Value of First Spot Paint at yr 20</td>
<td>($500,542.35)</td>
</tr>
<tr>
<td>Value of Second Spot Paint at yr 20</td>
<td>($528,531.65)</td>
</tr>
<tr>
<td>Value of Third Spot Paint at yr 20</td>
<td>($541,496.09)</td>
</tr>
<tr>
<td>Total Future Value Cost at year 20</td>
<td>($3,103,070.45)</td>
</tr>
<tr>
<td>Present Value Cost</td>
<td>$1,704,276.77</td>
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</table>

#### 5 spot paints (5% progressive corrosion)

<table>
<thead>
<tr>
<th>Future Value of MOT at yr 20</th>
<th>($149,300.12)</th>
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</thead>
<tbody>
<tr>
<td>Present Value Cost to Spot Paint</td>
<td>($285,000.00)</td>
</tr>
<tr>
<td>Value of Initial Spot Paint at yr 20</td>
<td>($1,389,915.17)</td>
</tr>
<tr>
<td>Value of 2nd Spot Paint at yr 20</td>
<td>($572,792.63)</td>
</tr>
<tr>
<td>Value of 3rd Spot Paint at yr 20</td>
<td>($604,822.01)</td>
</tr>
<tr>
<td>Value of 4th Spot Paint at yr 20</td>
<td>($619,657.79)</td>
</tr>
<tr>
<td>Value of 5th Spot Paint at yr 20</td>
<td>($621,127.87)</td>
</tr>
<tr>
<td>Total Future Value Cost at year 20</td>
<td>($3,086,615.60)</td>
</tr>
<tr>
<td>Present Value Cost</td>
<td>$1,695,239.40</td>
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</table>
SEBPP Paint Group Goals for the Future

• For 2013-2014: Survey all SE States & Report Coating Systems & Repainting Practices that give the Best Results

• New Members Recruited:
  – Graham Bettis, Texas DOT
  – Dan Muller, North Carolina DOT
  – Thomas A Stephens, Baton Rouge DPW
  – Regis Doucette, Chlor-rid
  – Wayne Senick, Termanrust Technologies
  – Kevin Irving, AZZ Galvanizing Services

• Future?
Questions?

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