WSDOT’s Bridge Management and Performance Measures

DeWayne Wilson  
Bridge Management Engineer.

Lynn Peterson  
Secretary of Transportation

Western Bridge Engineers Seminar  
Bellevue, Wa  
September 5, 2013
Definition of a “Performance Measure”

Performance measurement has been defined as:

- “the process of quantifying the efficiency and effectiveness of past actions”
- "the process of evaluating how well organizations are managed and the value they deliver for customers and other stakeholders”.

Performance measures are a tool to help us understand, manage and make improvements.
## WSDOT Bridge Network Performance Measure

### % of bridges in Good / Fair / Poor condition by Deck area

<table>
<thead>
<tr>
<th>Deck Condition Code</th>
<th>NBI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td>8</td>
</tr>
<tr>
<td>Fair</td>
<td>6</td>
</tr>
<tr>
<td>Poor</td>
<td>4</td>
</tr>
</tbody>
</table>

### Superstructure Condition Code

- Good: 7
- Fair: 5
- Poor: 3
2013

% of bridges in Good / Fair / Poor condition by Deck area

- **80.20%**
  - 2,844 bridges
  - 37.2M sq. ft.
- **11.40%**
  - 285 bridges
  - 5.3M sq. ft.
- **8.30%**
  - 138 bridges
  - 3.8M sq. ft.

- **Fair**
- **Poor**
- **Good**
% of bridges in Poor condition by Deck area

- 2013: 8.30%
- 2012: 8.90%
- 2011: 9.70%
- 2010: 7.40%
- 2009: 6.10%
Steel Structures Painting Council

“All coating systems will fail eventually.”

The question is – “When?”
Steel Bridge Painting

Paint Age 29 yrs
Painting Cycles

Steel Truss Bridges
- Lead based Paint 15-20yrs
- Zinc/Moisture Cured Urethane Paint 20-25yrs

Steel Girder Bridges
- Lead based Paint 20-25yrs
- Zinc/Moisture Cured Urethane Paint 30-35yrs
### BMS Paint Condition States

<table>
<thead>
<tr>
<th>Condition</th>
<th>State 1:</th>
<th>State 2:</th>
<th>State 3:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>“Good”</strong></td>
<td>The paint system is sound and functioning as intended.</td>
<td>The paint system may be chalking, peeling, curling, or showing distress with no exposure of metal.</td>
<td>The paint system is no longer effective. The metal substrate is exposed.</td>
</tr>
<tr>
<td><strong>“Fair”</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>“Poor”</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**BMS Paint Condition States**

### Condition State 1:

SR20 John Pierce Waterfall
Paint is 45 yrs old

The paint system is sound and functioning as intended.

<table>
<thead>
<tr>
<th>904</th>
<th>Organic Zinc/Urethane Paint System</th>
<th>22,440</th>
<th>SF</th>
<th>22,225</th>
<th>200</th>
<th>15</th>
</tr>
</thead>
</table>

*6/28/2012 Inspection*
Condition State 2:

The paint system may be chalking, peeling, curling, or showing distress with no exposure of metal.
Condition State 3: The paint system is no longer effective. The metal substrate is exposed.
Past Due (Steel Corrosion) = >2% CS3
Due (Paint failed with little steel corrosion) = <2% CS3
OK (Paint in Good condition)
Performance measurement has been defined as “the process of quantifying the efficiency and effectiveness of past actions”

**WSDOT Steel Bridge Inventory**
313 Bridges
Total surface Area of Steel = 24.2 M sq. ft.

**Steel Bridge Painting 2003 thru 2012**
18 Bridges
Total surface Area of Steel = 2.6 M sq. ft.

**Steel Bridge Painting (on Average)**
Total surface Area of Steel = 9.7 M sq. ft.

*Last 10 years Painted about 25% of the Average*
SR 141 White Salmon River

Year Built – 1940
Year Last Painted – 1988

Action          Year     Cost $

Planned Paint Year – 2014 $0.9 M
Do Nothing SD Year – 2018
Do Nothing Rehab Year - 2025 $3.0 M
Do Nothing Replace Year – 2035 $7.7 M

Paint Condition - Past Due
SR 508 South Fork Newaukum River

Year Built – 1930
Year Last Painted – 1978

Paint Condition - Past Due
SR 508 South Fork Newaukum River

Year Built – 1930

<table>
<thead>
<tr>
<th>Options</th>
<th>Year</th>
<th>Cost $</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paint Bridge</td>
<td>NA</td>
<td>$0.4 M</td>
</tr>
<tr>
<td>Rehab Bridge</td>
<td>NA</td>
<td>$??? M</td>
</tr>
<tr>
<td>Replace Bridge</td>
<td>????</td>
<td>$8.1 M</td>
</tr>
</tbody>
</table>

Suff Rating 2.0 SD
### WSDOT steel bridge painting needs

**Ten-year plan FY2013 - FY2023; Dollars in millions**

<table>
<thead>
<tr>
<th>Category</th>
<th>Number of bridges</th>
<th>Cost to repaint</th>
</tr>
</thead>
<tbody>
<tr>
<td>Past due for painting</td>
<td>28</td>
<td>$150</td>
</tr>
<tr>
<td>Due for painting</td>
<td>74</td>
<td>$200</td>
</tr>
<tr>
<td>Steel trusses – due within next ten years</td>
<td>51</td>
<td>$192</td>
</tr>
<tr>
<td>Unpainted weathering steel</td>
<td>5</td>
<td>$3</td>
</tr>
<tr>
<td>Oregon-owned border bridges</td>
<td>2</td>
<td>$21</td>
</tr>
<tr>
<td><strong>Ten-year total</strong></td>
<td><strong>160</strong></td>
<td><strong>$566</strong></td>
</tr>
</tbody>
</table>

Data source: WSDOT Bridge and Structures Office.

---

**Bridges on Primary Freight Routes:**

- **80**
- **$415**
2023
(Projected Steel Bridge and Paint Condition with - No Funding)

% by steel surface area

10 year Need = $566 million
2023
(Projected Steel Bridge and Paint Condition with - $185M Funding)

10 year Need = $566 million

- SD 67
- Past Due 94
- Due 59
- OK 68

2013
“Performance Measure”

*Performance measures are a tool to help us understand, manage and make improvements.*

Performance measures with good assumptions can help us make predictions on future bridge conditions.
Thank You