Washington State
Polyester Concrete Activity

Andre’ La Foe
Bridge Deck Program Manager
Polyester Concrete Overlays
<table>
<thead>
<tr>
<th>Property</th>
<th>¾” Polyester</th>
<th>1.5” Mod Concrete</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compressive Strength, psi</td>
<td>6,000</td>
<td>7,000+</td>
</tr>
<tr>
<td>Flexural Strength, psi</td>
<td>1,500-2,000</td>
<td>0 - 500</td>
</tr>
<tr>
<td>Wear</td>
<td>3/8” / 25 yrs</td>
<td>NA</td>
</tr>
<tr>
<td>Cure Time (3,000psi)</td>
<td>3-4 hr</td>
<td>42 hr</td>
</tr>
<tr>
<td>Chloride permeability</td>
<td>0</td>
<td>300 - 700</td>
</tr>
</tbody>
</table>
Polyester Concrete - Weather Restrictions

- Temperatures above 50 (> 60 preferred)
- Deck Temp less than 80 deg?
- Dry (no rain for 24 hours)
- Wind not a factor
Level of effort/expense for repairs is increased

- High risk for full depth repairs
- High risk for extended traffic closures
- Full depth repairs require formwork
Asset Management - Selection Determination

WSDOT Bridge Asset Management Form - Bridges in "Poor" condition

<table>
<thead>
<tr>
<th>Bridge Number</th>
<th>00071019</th>
<th>Bridge Name: SAMISH RIVER</th>
<th>Milepost: 234.04</th>
<th>County: Skagit</th>
<th>Region: Northwest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year Built / Year Widened:</td>
<td>1963</td>
<td>Bridge Type: CS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bridge Width (curb-to-curb):</td>
<td>33.5 ft.</td>
<td>Bridge Length: 187 ft.</td>
<td>Max Span: 40 ft.</td>
<td>Number of Main/Approach Span: 5 / 0</td>
<td>Overall Bridge Condition: Poor</td>
</tr>
<tr>
<td>Average Daily Traffic:</td>
<td>22,561</td>
<td>Truck %: 14%</td>
<td>Number of Lanes: 2</td>
<td>NBI: YES</td>
<td></td>
</tr>
<tr>
<td>Vertical Clearance:</td>
<td>NA</td>
<td>Detour Length (Miles):</td>
<td>Deck Thickness: 10.5 in.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design Load:</td>
<td>HS 20</td>
<td>Load Restricted Bridge:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pin Number:</td>
<td>103573B</td>
<td>PFMS AID Date: 11/12/2019</td>
<td></td>
<td></td>
<td>Bridge Deck View</td>
</tr>
<tr>
<td>Project Name:</td>
<td>15/50 Samish River - Bridge Deck Overlay</td>
<td>Bridge Profile View</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Bridge Inspection Information**

- Date Inspected: 5/23/2018
- Superstr Code: 6
- Substr Code: 7
- Deck Code: 4
- Sour: 8

**Year "POOR"**

- Year "POOR" fixed: 2010
- Year "POOR" Projected

**Problem**

- Concrete Deck Deterioration
- Cure: Deck Repair and Overlay
- Status: Prioritized for Bridge Rehabilitation
- Preservation Cost: $1,500,000

This bridge is classified in "POOR" condition due to the NBI DECK CODE.

The 2014 bridge inspection noted 187 SF of deck patching (3.3%). The NBI deck code is a "4" based on the deck patching exceeding 2%.

The original concrete slab thickness is 18.5 inches with 1.5 inches of concrete cover over the top mat of deck reinforcing.

A future bridge deck rehabilitation project will shotblast 1/2 inch from the existing slab, perform deck repair and apply a 3/4" polyester overlay.
Polyester Concrete Overlays
Washington State’s Concrete Bridge Deck Program

- Bare Conc: 8.8M SF (19.3%)
- Bare Conc-ECR: 13.2M SF (28.9%)
- Conc Overlays: 14M SF (30.8%)
- Asphalt: 8.5M SF (18.6%)
- Polyester: 28 SF (1.6%)
- Polymer: 833k SF (0.8%)
<table>
<thead>
<tr>
<th>Option</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epoxy Rebar</td>
<td>$1/SF</td>
</tr>
<tr>
<td>ACP w/membr</td>
<td>$20/SF</td>
</tr>
<tr>
<td>Conc Overlay</td>
<td>$80/SF</td>
</tr>
<tr>
<td><strong>Polyester Overlay</strong></td>
<td><strong>$120/SF</strong></td>
</tr>
<tr>
<td>Replace Deck</td>
<td>$300/SF</td>
</tr>
<tr>
<td>Replace Bridge</td>
<td>$1000/SF</td>
</tr>
</tbody>
</table>
Polyester Concrete - History Summary

- 3 Bridges: 26.5K SF (3.2%)
- 17 Bridges: 272K SF (33.1%)
- 8 Bridges: 534.3K SF (63.7%)

- 28 Bridges: 833K SF
- Ave Age: 18 yrs
- Oldest: 30 yrs
- Range: 4 - 30 yrs (1989 - 2019)
- 8 bridges > 25 yrs
Polyester Overlays from 1989 to 1999

1st application: Holder Creek

14 Bridges = 254,071 SF
SR-18 Holder Creek Bridge

- Built: 1961
- Polyester applied: 1989
- ADT: 9722
• Deck condition after 10 years.
• Under contract for rehab.
Polyester Overlays – Next Up

# 15 SB. Toutle R: 2019
SB I-5 Toutle River Bridge – Deck Rehab

- Bridge Built – 1969
- ADT – 22,511
## Deck – Looking North

<table>
<thead>
<tr>
<th>Element</th>
<th>Element Description</th>
<th>Total</th>
<th>Units</th>
<th>CS 1</th>
<th>CS 2</th>
<th>CS 3</th>
<th>CS 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>Concrete Deck</td>
<td>14,832</td>
<td>SF</td>
<td>14,373</td>
<td>450</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>35</td>
<td>Concrete Deck Soffit</td>
<td>14,832</td>
<td>SF</td>
<td>14,702</td>
<td>126</td>
<td>4</td>
<td>0</td>
</tr>
</tbody>
</table>
Thin polymer overlay applied in 1991
BRIDGE PLAN VIEW GPMR COVERAGE MAP

GPMR DECK SCAN NOTES
- SCAN COLLECTION DATE 10/25/18
- CONTROL UNIT SIR30 HIGH SPEED MULTI CHANNEL RADAR
- ANTENNA ARRAY (3 EACH) 3000 MHZ WIDEBAND HIGH FREQUENCY TRANSDUCERS
- 3D GPMR IMAGE SIZE X= 304.00’ Y= 48.00’ Z= 12.00’
- DATA PROFILES 2.0’ ON CENTER
- (X, Y, Z) ORIGIN IN NE CORNER OF DATA SET/ DECK
- ⊙ INDICATES COVER THICKNESS FIELD MEASUREMENT
- BLUE LINES INDICATE DATA GAP BETWEEN MIDDLE & WEST LANES
- GREEN LINES INDICATE PROFILE POSITION

GPR DATA
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Cowichan County, WA

Don Spann—WASHDOT
Consulting Engineer

Don Spann—WASHDOT
Consulting Engineer

SB MP 51.48—51.98
DD00401

WSDOT
Department of Transportation

GPMR Concrete Deck Testing

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GPMR Scan Data 2019

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2019-05-21
• Does not replace the need for the Chain Drag Inspection
Verify the Clearcover Prior to Surface Removal

- Damaged reinforcing from milling
NB I-5 Seattle Viaduct – Deck Rehab
<table>
<thead>
<tr>
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<th>CS 2</th>
<th>CS 3</th>
<th>CS 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>804</td>
<td>Polyester Concrete Overlay</td>
<td>383,043</td>
<td>SF</td>
<td>382,743</td>
<td>0</td>
<td>300</td>
<td>0</td>
</tr>
</tbody>
</table>

Bridge Built – 1966  
Length – 5762’  
ADT – 90,000  
Polyester applied – 2007
This element defines a joint with steel sliding plates. The quantity should equal the length measured along the expansion joint.

> 1,800 LF of sliding plate joints
NB I-5 Seattle Viaduct – Modified Joint Detail
Modified Joint - Surface Condition
• Programming for resurfacing is a consideration after approx. 10 yrs. of service life.
• ¾” thickness limits multiple resurfacing passes.
Periodic Resurfacing of Polyester Overlays

- New SR-99 Tunnel Surfacing.
Periodic Resurfacing of Polyester Overlays

- New SR-99 Tunnel Surfacing.
Questions?