Bridge Repair and Rehabilitation

Seth Schickel, PE, HNTB
Stephanie Wagner, PE, INDOT

February 11th, 2015

The Next 18 Months of Bridge Projects

31 New/ Replacement
60 Rehabs (more than overlay)

494 Preventative Maintenance
Bridge Repair vs. Rehabilitation Considerations

Preventative Maintenance
- What exactly is it?
- What’s it mean to designers?

Polymeric Overlays
- When should they be used?
- Guidance/Tips for Designers

Rehabilitation Issues
- Hydrodemolition
- Fiber Wrap
- Example Repairs

Preventative Maintenance

Design Memo 14-08 “Bridge Preservation”

Highlights
- Bridge/ Culvert Preservation Initiative
- Addition of LMC Overlays
- Level One Exempt
Bridge Repair vs. Rehabilitation
Considerations

2/11/2015

FHWA
Agreement to spent federal aid funds on “Preventative Maintenance”

Asset Engineers
Funding Mechanism

Design Engineers
Determines Design Standard to be followed

Bridge/ Culvert Preservation Initiative

- Applicable Treatments
- Controlling Criteria

Bridge Rating ≥ 5

- Deck
- Wearing Surface
- Super-structure
- Sub-structure
Project Development Process

Field Check → Meeting Minutes → Final Plans → Final Tracings

* Must address Deteriorated Bridge Railing and ADA Compliance

Project Development Process

Early Considerations

- Load Rating
- Scour Analysis
- Traffic Maintenance
Is it Preventative Maintenance?!

SR 61 over Koehler Ditch
- LMC Overlay
- Barrier Reconstruction
- Resurface Approach Asphalt

I-469 over Houk Ditch
- LMC Overlay
- Coping Reconstruction
- New RCBA's
Is it Preventative Maintenance?!

Co. Rd. over I-65
- Polymeric Overlay
- Mudwall Patching
- Joint Repair

Is it Preventative Maintenance?!

US 31 over Mayflower Road
- LMC Overlay
- Convert to Semi-Integral
- New RCBA's
Preventative Maintenance Wrap Up

- Memo 14-08 and BCPI set criteria
- Streamlined project development process (PDP)
- Discuss expectations at Field Check

Polymeric Overlays a.k.a. Thin Overlays

[Image of Polymeric Overlays]
## When is Polymeric Appropriate?

<table>
<thead>
<tr>
<th>More Appropriate</th>
<th>Not Appropriate</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Ratings ≥ 5</td>
<td>• Ratings &lt; 5</td>
</tr>
<tr>
<td>• Original Deck Surface</td>
<td>• Overlaid Surface</td>
</tr>
<tr>
<td>• Minimal other work required</td>
<td>• Structure has additional issues</td>
</tr>
<tr>
<td>• Newer Bridge Decks</td>
<td>• Older Bridge Decks</td>
</tr>
</tbody>
</table>

## Polymeric Overlay Considerations

- Future Repair Schedule
- Other Work Items
- Traffic Maintenance
- Life Cycle Cost
Recurring Special Provision
738-B-297 Polymeric Concrete Bridge Deck Overlay

Step 1: Patching

Step 2: Shot Blasting
Recurring Special Provision
738-B-297 Polymeric Concrete Bridge Deck Overlay

Step 3:
Test Patch

Recurring Special Provision
738-B-297 Polymeric Concrete Bridge Deck Overlay

Step 4 & 5:
Application
Recurring Special Provision
738-B-297 Polymeric Concrete Bridge Deck Overlay

Step 6: Final Test

Polymeric Overlay Stats

24 Contracts since 2009

Total Contract Cost
- Average: $15/sft
- Range: $5 – 26/sft

Factors
- Amount of “Other” Work
- Maintenance of Traffic
- Bridge Size
Performance by NBI Rating

2014 NBI Ratings for Bridge with Polymeric Overlays

- Wearing Surface
- Deck

Overlay Construction Date

Polymeric Overlays Wrap Up

- Not the answer to all our problems...
- Use accurate costs for comparison
- Don’t forget to consider design life
- KEEP THE PLANS SIMPLE
Other Rehabilitation Issues

Highlights

• Fiber Wrap
• Hydrodemolition Update
• Joint Repairs
• Pile Bent Repair

Fiber Reinforced Polymers (FRP)
Fiber Wrap Repair Process

Step 1: Remove Deteriorated Concrete
Step 2: Reconstruct Deteriorated Sections

Step 3: Apply Fiber Wrap
Step 4: Apply Finish Coating

Fiber Wrap Stats

- 21 Contracts Since 2000
- Use Increasing Recently
- Primary Function: Encasement *
- Average Cost $15/ sft (when included with other work)
Fiber Wrap Unique Provision

- Show Limits in Plans
- Glass Fiber (for Encasement)
- Lump Sum Pay Item
- Patching and Coating Included

* Avoid pulling provisions from old contracts.
* Check INDOT website for most recent unique provisions.

Fiber Wrap

Considerations

- Design Life
- Alternative Repair Cost
- Is it Structural?
Hydrodemolition Update

“... all waste water... shall be contained, tested for pH, stored and transported to a disposal facility...”

“The cost of the waste water control... shall be included in the cost of hydrodemolition.”

The 3Rs of Joints

- Repair, Retrofit, Replacement
Bridge Repair vs. Rehabilitation
Considerations

Pile Bent Repair

Before

After

Preventative Maintenance

Polymeric Overlays

Rehabilitation Issues

• Conclusion
• Questions?
• Contact

Stephanie Wagner
317.233.2095
sjwagner@indot.IN.gov

Seth Schickel
317.917.5289
sschickel@hntb.com