AASHTO Subcommittee on Maintenance (SCOM)  
Bridge Technical Working Group (BTWG)  

BTWG Annual Update  

July 2014  

J. L. Milton  
Chair BTWG  
Bridge Preservation Specialist  
Virginia Department of Transportation
BTWG Leadership Team

- J. L. Milton - Chair
  Bridge Preservation Specialist
  Structure and Bridge Division
  Virginia Department of Transportation

- David R. Miller, P.E. – Vice Chair for Performance Measures and Environment
  Structure & Facilities Maintenance Administrator
  Louisiana Department of Transportation & Development
BTWG Leadership Team

- Steven J. Cook, P.E. – Vice Chair for Research and Workforce Development
  Operations/Maintenance Field Services Engineer
  Michigan Department of Transportation
Coordination with AASHTO Subcommittee on Bridges and Structures

- The Chair of the BTWG collaborated with the Chair of the AASHTO Subcommittee on Bridges and Structures (SCOBS) to appoint liaisons between the BTWG and SCOBS.
- David Miller from Louisiana will serve as the liaison from the SCOM BTWG to SCOBS.
- Ben Rabun from Georgia will serve as the liaison from SCOBS to the SCOM BTWG.
National Bridge Preservation Partnership Conference

- The AASHTO TSP.2 hosted the national bridge preservation partnership conference from April 21 – 25, 2014 in Orlando, Fl.
- The members of the BTWG were active participants in the planning of this meeting, and several members of the BTWG attended the meeting.
National Bridge Preservation Partnership Conference

• The meeting was very successful with more than 500 individuals in attendance.
• 52 agencies and 58 industry partners were represented.
• Our industry partners conducted 23 outdoor demonstrations and 6 indoor demonstrations.
Complete NCHRP Projects

Active NCHRP Projects

Active NCHRP Projects

Active NCHRP Projects

- NCHRP 14-30 – “Spot Painting to Extend Highway Bridge Coating Life” – Research Agency: Kentucky Transportation Center - Phase I underway - Estimated completion date: March 2016.
Active NCHRP Projects

NCHRP Problem Statements Submitted by the BTWG at the 2013 SCOM Meeting:

• Detection and Remediation of Total Soluble Salt Contamination Prior to Coating Structural Steel (F-06) - This project was selected by the AASHTO SCOR during the March 2014 meeting and was assigned NCHRP Project Number 10-97 – This project has an allocation of $500,000.

• Projects that are selected by the AASHTO SCOR are subject to approval by 2/3 of the AASHTO Board of Directors.
NCHRP Problem Statements Submitted by the BTWG at the 2013 SCOM Meeting:

• Quantifying the Environmental Benefits of Bridge Preservation Treatments (NCHRP Problem F-03) – This project was selected by the AASHTO SCOR during the March 2014 meeting – This selection is contingent on the availability of funds - An allocation of $500,000 was requested for this project.
NCHRP Problem Statements Submitted by the BTWG at the 2013 SCOM Meeting:

• Maintenance Actions for Fatigue Cracking in Steel Bridge Structures (NCHRP Problem F-05) – This project was not selected by the AASHTO SCOR during the March 2014 meeting – The BTWG will review this project for possible re-submission.
Work Plan for 2014

• Focus Area - Workforce Development

  o Continue working with TSP.2, FHWA BPETG, and industry on collection of maintenance training material and make available for practitioners – a page for shared training resources has been established on the TSP2 website: http://tsp2bridge.pavementpreservation.org/bridgetraining/

  o Support the FHWA proposed Peer exchange idea for bridge maintenance – the BTWG Vice Chair for Research and Workforce Development will serve as a member of the Steering Committee.
Work Plan for 2014

• Focus Area - Workforce Development
  o Support the planning efforts for and participate in the TSP.2 2014 national bridge preservation partnership conference.
  o Serve as a liaison and facilitator between the TSP.2 regional bridge preservation partnerships and AASHTO SCOM Leadership.
  o Continue working with TSP.2, FHWA BPETG, and industry on collection of acceptance and use of materials and products.
Work Plan for 2014

• **Focus Area - Performance Measures**
  
  o Provide comments on the FHWA NPRM for performance measures on bridges and for asset management.
  
  o Collaborate with FHWA BPETG, and other stakeholders on defining “State of Good Repairs” as it applies to the bridge assets.
Work Plan for 2014

• **Focus Area – Environment**
  
  o Submit previously listed research problem statement on quantifying the environmental benefits of bridge preservation treatments.
Work Plan for 2014

• Focus Area – Environment
  o Review and provide comments on Phase II of research project “Standard Practice for Washing and Cleaning Concrete Bridge Decks and Substructure Bridge Seats including Bridge Bearings and Expansion Joints to Prevent Structural Deterioration”.
  o The final report has been issued and a link to the report was distributed on January 30, 2014.
    http://www.wsdot.wa.gov/research/reports/fullreports/811.2.pdf
Work Plan for 2014

• **Focus Area – Research**

  o Submit previously listed research problem statements.

  o Implementation recommendations for NCHRP 14-24, Report 742 “Communicating the value of preservation”
    
      o Work with FHWA to add a training module to the NHI bridge preservation Course – this web based course is currently under development.

      o Conduct a workshop during the national bridge preservation partnership conference – a presentation titled “Communicating the Value of Preservation” was made at the conference.
Work Plan for 2014

• Focus Area – Research
  o Implementation recommendations for NCHRP 14-24, Report 742 “Communicating the value of preservation” (Continued)
    o Recommend that SCOM work with PI to host webinars
      – BTWG Chair contacted James Bryant on February 4, 2014 and was informed that a TRB Webinar was conducted on April 18, 2013.
    o Recommend that copies of the report “playbook” be provided to state DOTs managers such as public affairs, maintenance and operations, and other groups – ongoing.
Resolutions

• 2013 - Formalizing the Organizational Relationships Between the TSP2 Bridge and Pavement Regional Preservation Partnerships and SCOM - the Technical Working Groups within the SCOM shall serve as the liaisons between AASHTO SCOM and the AASHTO Regional Bridge and Pavement Preservation Partnerships.
Resolutions

• 2012 - Promotion of Highway Bridge Measurement Criteria that Promotes Bridge Preservation - The AASHTO Highway Subcommittee on Maintenance and the members in attendance express their support for and endorse the use of bridge condition assessment criteria that are based on bridge element level inspection condition information, and, using this element level inspection condition information, allows for classification of bridges under categories that are easily understood by the general public, facilitates the achievement of a state of good repair, and extended service life. Condition categories such as “Good, Fair, and Poor”, or condition based health index, or a grading system.
Resolutions

• 2011 - Adoption of an AASHTO Bridge Preservation Definition - The AASHTO Highway Subcommittee on Maintenance requests that the AASHTO Standing Committee on Highways and the AASHTO Board of Directors adopt the bridge preservation definition along with commentary; and that the definition with commentary be included in the next update to the AASHTO Maintenance Manual.
Other Activities

• The Chair of the BTWG provided endorsements for the following national initiatives:
  o AASHTO SCOBS proposed CY 2014 Domestic Scan Program titled Bridge Recoating Best Practices (Note: the proposer was notified on January 7, 2014 that the scan was not selected – this proposal may be resubmitted).
Other Activities

• The Chair of the BTWG provided endorsements for the following national initiatives:
  
  o Proposal to elevate the TRB Bridge Preservation joint subcommittee to standing committee status - The Joint Sub-Committee was granted full committee status (AHD37) by the TRB Technical Advisory Panel beginning in April 2014.
  
  o The committee has been organized, and has conducted conference calls.
Maintenance Manager Newsletter

• The AASHTO SCOM publishes a quarterly newsletter titled “The Maintenance Manager.
• The Fall 2013 issue of this newsletter was published in November, and may be viewed at the AASHTO SCOM website: http://maintenance.transportation.org/Pages/default.aspx
Meetings of AASHTO SCOM

- 2014 – July 27-31 – Charleston, West Virginia
- 2015 – Iowa – Joint meeting with TRB – Theme: Practical Innovations In Maintenance – TRB is preparing a call for abstracts for papers concerning challenges/issues/unmet needs in maintenance
- 2016 – Nebraska
- 2017 – Rhode Island
- 2018 – North Carolina – Joint meeting with TRB
- 2019 – Michigan
TSP-2 Update

Subcommittee on Maintenance

Charleston, WV
July 27-31, 2014

Ed Welch
NCPP @ MSU
Five Years ago:

• You had to be told what TSP-2 was all about.
• Most of the state Bridge Preservation Practitioners did not know each other.
• There was no common place to ask Bridge Preservation Questions, on the phone or on the web.
• The Bridge Preservation relationships between Industry, State, FHWA, AASHTO, and Academia were not strong.
• Bridge Preservation Working Groups did not exist.
And: No one had any idea what this sign was all about??
Today:

- The States, Industry, Academia, AASHTO & FHWA have taken this initiative and grown it to where they are today:
  - Defining needs and developing Working Groups.
  - Undertaking much needed surveys of Bridge Preservation Practices and Procedures.
  - Initiating the first of its kind Regional Pilot Research Project.
  - Developing Research Problem Statements.
  - Developing direct relationships and networking with counterparts. (SCOM, SCOBS, AHD37, BPETG)
Today:

27 Bridge Working Groups
(some new were developed at the National Conference and some existing ones were “sunset”)

What Deliverables?

- Regional Working Group products
- National Working Group products
- Index of Presentations (Videos & PP’s)
- Specifications
- Research
- Training
- Network of Bridge Preservation Contacts
- Survey Results
“Where is TSP-2 going” Is the question on many minds:

• At the National Conference, the attendees were asked to ponder the future needs for Bridge Preservation. By the end of the Conference they were able to refine and develop the focus of the future of their Regional and National Initiatives.

• They understand that they, as Bridge Preservation Practioners, have developed considerable credibility around the country, and their perspective of needs is respected and will be brought forward.
National Bridge Preservation Conference-2014

- Took place in Orlando, FL from April 21-25, 2014.
- There were 514 Attendees. (42 from FLDOT)
- All but five states were able to attend.
- There were twelve attendees from Local Agencies.
- There was one representative from Canada.
- Regional Partnerships held both Common and Individual Meetings.
- 64 Technical Presentations were made during three concurrently running tracts.
- 24 Live Outdoor Demonstrations were presented.
- 6 Indoor Demonstrations were presented.
- There were 59 National Industry Members that exhibited
- And no one snuck off to the Magic Kingdom!
Thank You
AASHTO SCOM

July 28, 2014
Richard C. Van Allen, PE
Manager of Bridge Operation
Connecticut Department of Transportation
NORTHEAST BRIDGE PRESEVATION PARTNERSHIP

TSP2
OFFICERS

• Chair (State Rep) - Richard Van Allen
  Connecticut DOT
• Vice-Chair (State Rep) - David Fish
  Rhode Island DOT
• Vice-Chair (Industry) – Thomas Pechillio
  Collins Engineers, Inc.
• Secretary/Treasurer (State Rep)
  Tony McCloskey – Pennsylvania DOT
Directors

• Mike Stenko – Transpo Industries, Inc.
• Richard Dunne – Michael Baker, Jr., Inc.
• Rod Thornton – Maryland SHA
• Tripp Shenton- University of Delaware

• Ex-Officio
• Dennis O’Shea – FHWA
• Pete Weykamp – Green-Pedersen, Inc.
  Past-Chair
RECENT ACTIVITIES

• Monthly conference calls
• National Bridge Preservation Meeting
REGIONAL WORKING GROUPS

• Deck Overlays and Protection
  • Leader – Richard Dunne

• Beam End Treatments
  • Leader – Ben Foster

• Bridge Washing
  • Leader – Rod Thornton
NATIONAL WORKING GROUPS

• Participation in National Coding Group
• “National Paint Team”
• Leader – SEBPP - Jeff Pouliottte
COMPLETED WORKING GROUP TOPICS

• Small Movement Joint Research Project
• Leader – Tripp Shenton
David Steele – Chair
Midwest Bridge Preservation Partnership

Officers and Directors

David Steele – Chair
Drew Storey – Vice Chair (State Rep.)
Kevin Irving – Vice Chair (Ind. Org.)
Jason DeRuyver – Secretary\Treasurer
Lisa Zentner – Industry Organization
Tom Donnelly – At-Large Director
Siva Vanugopalan – At-Large Director
Nancy Huether – State Agency Director
Glenn Washer – Academic Director
Mike Wenning – Local Agency Director
Sonny Jadun – Ex Officio
Scott Stotlemeyer – Ex Officio

Kentucky Transportation Cabinet
Indiana Department of Transportation
AZZ Galvanizing Services
Michigan Department of Transportation
Crafco
Transpo Industries
Siva Corrosion Services
North Dakota Depart. of Transportation
University of Missouri-Columbia
GAI Consultants, Inc.
FHWA
Missouri Department of Transportation
MWBPP

Meeting Schedule

* Teleconference – 1st Tuesday of each month @ 2pm E.S.T.

* Regional Meeting – Week of October 19th in Kansas City
MWBPP

Working Groups

1. Annual Meeting Working Group - Don Whisler & Scott Stotlemeyer
2. Bridge Preservation Research – Glen Washer
3. Communicating the Benefits of Bridge Preservation – Drew Storey
4. Deterioration Modeling – Fouad Jaber
5. Outreach to Local Agencies – Mike Wenning
6. Preservation Matrix – Eric Burns
7. Regional Specifications & Product Evaluation Database – Drew Storey
8. Social Media Development – Lorella Angelini
9. Systematic Preventive Maintenance – Scott Stotlemeyer
Working Group

Social Media Development

• Establish a blog on the TSP2 website
• The blog site will start off with six topics concerning Bridge Preservation.
• Objective-stimulate an exchange of ideas and opinions about bridge preservation.
• Target Audience-bridge preservation insiders, experts, and practitioners.
• Construction contractors, product manufacturers, consulting engineers, bridge owners, and the general public.
• Aiming to have the blog up and running by January 1, 2015.
Outline

- Division of Highways Organizational Structure
- Bridge Data
- Current Bridge Management Practice
- Bridge Funding/Prioritization
- Current Bridge Preservation Practice
- Bridge Inspection
- Looking Forward
- Discussion
Division of Highways – Districts

Responsible for day to day operations
Bridge Engineer
Design Eng. – Repair/new design, Br. Repair Crews
70 Bridge Inspectors statewide
Division of Highways – Central Office

Bridge inspection
Bridge management
Load rating
- Independent review of new designs
OS/OW Permits
CHMD, C&P
Bridge Data

- 7160 Vehicular Bridges
- 6915 State Owned
- 70% < 100 feet in length
  - Longest 4009 ft
- ≈ 40 Million ft² Deck Area
- Average Age 40 years

Blennerhassett Island Bridge

Wheeling Suspension Bridge (165 yrs)

Monument Place Bridge (197 yrs)
New River Gorge Bridge (above)
- 876’ high
  - 3rd highest vehicular bridge in US
  - 15th highest vehicular bridge in world
- 1700’ long arch
  - 4th longest in the world
- 3030’ total length

Glade Creek Bridge (below)
- 699’ high
  - 37th highest vehicular bridge in world
- 2179’ long deck truss
## Bridge Data

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Deck Area</th>
<th>SD Deck Area</th>
<th>% SD</th>
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<tbody>
<tr>
<td>2009</td>
<td>36,249,730</td>
<td>3,642,816</td>
<td>10.05%</td>
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<tr>
<td>2010</td>
<td>36,451,159</td>
<td>3,584,086</td>
<td>9.83%</td>
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<td>2011</td>
<td>36,831,275</td>
<td>3,504,968</td>
<td>9.52%</td>
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<td>2012</td>
<td>38,030,481</td>
<td>3,236,826</td>
<td>8.51%</td>
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<tr>
<td>2013</td>
<td>39,804,337</td>
<td>3,141,076</td>
<td>7.89%</td>
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</table>
Current Bridge Management Practice

- Local knowledge of district personnel
- Central office prioritization

\[
CRF = \frac{(ADT) \times (DL) \times (PF) \times (RLF)^2}{100,000}
\]

- DL – Detour length; PF – Posting factor; RLF – Remaining life factor

\[
BRF = \frac{(CRF) + [100 - (SR)] + (DPV)}{3}
\]

- Higher BRF value shows higher priority of bridge

Risk-based data driven?
# Bridge Funding/Prioritization

<table>
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<th>Funding Category</th>
<th>Type of Work</th>
<th>Federal (Million $)</th>
<th>State (Million $)</th>
<th>Total (Million $)</th>
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<td>1</td>
<td>Rehab</td>
<td>18.0</td>
<td>4.5</td>
<td>22.5</td>
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<tr>
<td>2</td>
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<td>3A</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>3B</td>
<td></td>
<td></td>
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<td>7</td>
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<td>0.0</td>
<td>0.8</td>
<td>0.8</td>
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<tr>
<td>Discr.</td>
<td></td>
<td>0.0</td>
<td>1.5</td>
<td>1.5</td>
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<tr>
<td>Total Rehabilitation</td>
<td></td>
<td>18.0</td>
<td>6.8</td>
<td>24.8</td>
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<tr>
<td>1</td>
<td>Replace</td>
<td>58.0</td>
<td>14.5</td>
<td>72.5</td>
</tr>
<tr>
<td>2</td>
<td></td>
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<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Minor</td>
<td></td>
<td>0.0</td>
<td>7.2</td>
<td>7.2</td>
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<tr>
<td>6 Major</td>
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<td>12.0</td>
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<td>Discr.</td>
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<td>0.0</td>
<td>5.0</td>
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<td>Total Replacement</td>
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<td>58.0</td>
<td>38.7</td>
<td>96.7</td>
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<td>C&amp;P</td>
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<td>3.5</td>
<td>7.5</td>
</tr>
<tr>
<td>8B</td>
<td>C&amp;P</td>
<td>0.0</td>
<td>1.0</td>
<td>1.0</td>
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<tr>
<td>10</td>
<td>Overlay</td>
<td>4.5</td>
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<td>Total Prev. Maint.</td>
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<td>8.5</td>
<td>5.4</td>
<td>13.9</td>
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<td>Total Bridge Program</td>
<td></td>
<td>84.5</td>
<td>50.9</td>
<td>135.4</td>
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</tbody>
</table>

- Category 1 – Large bridges (S, F)
- Category 2 – Small bridges (S, F)
- Category 3A – Major bridges (S, F)
- Category 3B – Small bridges (S, F)
- Category 5 – Interstate (S, F)
- Category 6 Major or Minor (S)
- Category 7 – CHMD repair (S)
Preventive Maintenance Activities

Deck
- Repair/replace joint
- Sealing
- Minor rehab
- Overlays
- Flushing drains
- Sealing/patching cracks
- Repair/replace approach slab

Miscellaneous
- Vegetation/debris removal
- Erosion/scour control
- Other on case by case basis

Superstructure
- Restore bearing area
- Reset bearings
- Lubricate bearings
- Seal concrete
- Retrofit fatigue prone details

Substructure
- Sealing concrete
- Clean bridge seats

Paint
- Full, Overcoat or Spot
Bridge Inspection

- NBI inspections
- Element Level on NHS bridges 2014
- InspectTech for data collection and reporting

- QAQC Procedures
  - District report office review (QAQC Technicians)
  - Random selection of district bridges for field review
    - Independent inspection and load rating
    - Five bridges per team leader every other year
Looking Forward

- **Bridge Management**
  - Multi-objective analysis
  - Deterioration modeling
    - Regression analysis

- **Bridge Preservation**
  - Establish a policy for cyclical preventive maintenance actions
  - Refine current condition driven decision making policies
  - Continued involvement in TSP2 preservation partnerships

- **Bridge Inspection**
  - Fully implement Element Level Inspections (NHS, non-NHS)
  - Develop inspection reporting methods that will be more useful to various management systems.
Discussion

BRIDGE PRESERVATION AHEAD
National Cooperative Highway Research Program (NCHRP)

Research for Improved Highway Operations and Maintenance

Report to the AASHTO Highway Subcommittee on Maintenance

Charleston, West Virginia, July 2014

(NCHRP Liaison: Amir N. Hanna)
NCHRP- National Cooperative Highway Research Program

• An AASHTO program sponsored by state DOTs
• Started in 1962
• Annual funding ~ $40 million/year
• Contributes to advancements in all aspects of highways
• 8 fields of research (Administration, Planning, Design, Materials and Construction, Soils and Geology, Maintenance, Traffic, and Special Projects)
• 25 Subject areas (e.g., economics, forecasting, pavements, bituminous materials, mechanics and foundations, snow and ice control, maintenance of ways and structures, equipment, illumination and visibility, and special projects)
NCHRP: Goal-Oriented Research

- Responds to state DOT needs: DOTs and AASHTO committees propose research topics; SCOR selects projects.
- Ensures applicability of the results: state DOTs and other sectors of the highway industry participate in monitoring the research.
- Results are published by NCHRP (reports, digests, synthesis, CD-ROMs, and Web documents) or by AASHTO (guides/manuals, specifications, and test methods), and often adopted by state DOTs and other organizations.
Scope of NCHRP Projects Related to Maintenance

- Pavement Maintenance
- Snow and Ice Control
- Bridges and Structures
- Roadside
- Maintenance Equipment
- Workforce Development
- Etc.
Three Types of NCHRP Projects
(of Interest to the AASHTO Highway Subcommittee on Maintenance)

• **Research Projects**
  Selected by SCOR once/year (March).

• **Research for AASHTO Standing Committee on Highways** *(20-07 projects)*
  Selected by NCHRP Project Panel SP20-07 twice/year (May and October).

• **Synthesis of Information Related to Highway Problems** *(20-05 projects)*
  Selected by NCHRP Project Panel SP20-05 once/year (May).
Publication/Dissemination of Project Reports

😊 Published by AASHTO
😊 Available on AASHTO (SCOM) Website
😊 Published in the NCHRP publication series (as NCHRP reports, syntheses, or research results digests)
😊 Summarized and made available on NCHRP Website
Recent NCHRP Publications


- Project 18-06A: Service Life of Corrosion-Damaged Reinforced Concrete Bridge Superstructure Elements (published as NCHRP Report 558)

- Project 20-7(234): Guidelines for Selection of Bridge Deck Overlays, Sealers, and Treatments (submitted to AASHTO)
Research in Progress

• Project 14-23: Practical Bridge Preservation Actions and Investment Strategies

• Project 14-27  A Guide for the Preservation of Highway Tunnel Systems

• Project 14-28  Condition Assessment of Bridge Post-Tensioning and Stay Cable Systems Using NDE Methods
Research in Progress

• Project 14-29: Assessing, Coding, and Marking of Highway Structures in Emergency Situations

• Project 14-30: Spot Painting to Extend Highway Bridge Coating Life

• Project 14-32: Proposed Revisions to the AASHTO Movable Bridge Inspection, Evaluation, and Maintenance Manual
Anticipated/Pending Projects

• Project 12-100: Guidelines for Maintaining Small Movement Bridge Expansion Joints

• Project 10-97  The Detection and Remediation of total Soluble Salt Contamination Prior to Coating Structural Steel
Programmed for FY 2015:

- 12 Continuation projects ($8,780,000)
- 46 New projects ($19,850,000)
- 3 Contingent projects (1,300,000)
- Total 48 projects ($28,630,000) in 18 problem areas (bridges, maintenance, materials, pavements, etc.)
- 3 Projects (+ 1 contingent project) related to maintenance (from 6 submitted by SCOM)
NCHRP FY 2015 Selected Projects

• **Project 10-97:** The Detection and Remediation of Total Soluble Salt Contamination Prior to Coating Structural Steel

• **Project 13-05:** Guidelines for the Development of Highway Operations Equipment Utilization Measurement and Management

• **Project 14-34:** Performance-Based Winter Maintenance: Developing a Toolkit of Measures, Standards, and Monitoring Tools

• **Contingent:** Quantifying Environmental Benefits of Bridge Preservation
NCHRP FY 2015 Program

- March 25-26, 2014: FY 2014 projects selected
- April 2014: Program announcement
- May 14, 2014: Solicit panel nominees
- National Academies acceptance
- Panel formation
- July-December 2014: 1st and 2nd panel meetings (develop RFPs and select agencies)
- February 1, 2015: FY 2015 authorization
- February-March 2015: Contracting
NCHRP FY 2016 Program

- July 9, 2014: Solicitation of FY 2016 problem statements
- Sept. 15, 2014: End date for problem statements
- Nov. 18, 2014: Respond to submitters
- December 2, 2014: End date for submitter comment
- January 2, 2015: Mail candidates to SCOR/RAC
- February 20, 2015: SCOR/RAC ballots due
- March 7, 2015: Ballot summary report to SCOR
- March 24-25, 2015: SCOR meeting/project selection
NCHRP: Advancing transportation and meeting states’ needs for more than half a century

- http://www.trb.org ........ NCHRP
- Contact: Amir N. Hanna
  ahanna@nas.edu
  202/334-1432
FHWA Update- Bridge Preservation

AASHTO SCOM, BTWG Meeting, Charleston, WVA
July 29, 2014

Anwar S. Ahmad, P.E.
Senior Bridge Preservation Engineer
Federal Highway Administration
Office of Bridges & Structures
Presentation Outline

- Training Initiatives
- Bridge Preservation Expert Task Group Activities
- Implementation of SHRP2 “Service Life Design for Bridges”
Web-based Training Modules

- Three free web-based training modules developed by FHWA are now available on SSPC website http://www.sspc.org/training/Training-FHWA-Bridge-Preservation

1. Safety During Bridge Preservation
2. Coating and Painting Bridge Superstructures
3. Sealing and Waterproofing Bridge

- Target Audience: Bridge construction and maintenance Personnel
- The training is free
- Each self-paste module is approximately 90 minutes long
Web-based Training Modules - Technical Panel

- Michael Sprinkle, VDOT
- Mike Stenko, Transpo Industries
- Lorella Angelini, Consultant
- Heather Stiner, SSPC
- Ted Hopwood, University of Kentucky
- Kevin Irving, AZZ Galvanizing
- Tony Serdens, GPI
- Chris Farschon, GPI
- Tim Cupples, FHWA
- Anwar Ahmad, FHWA
Welcome to NHI Course Number 130106A, Lesson 1: Definitions and Terminology.

A compliant version of the training is available at http://connect.connectsolutions.com/......

Image Description: Worker spraying sealer on a bridge deck using a handheld tank and spray wand.
NHI Bridge Preservation Course Series

- **Course 1** – Bridge Preservation Fundamentals – 4 hrs
- **Course 2** – Establishing a Bridge Preservation Program – 5 hrs
- **Course 3** – Communication Strategies for Bridge Preservation – 3 hrs

- **Target Audience:** includes Federal, State, and local bridge engineers and managers involved in or becoming involved in highway bridge preservation

- **Project Status:**
  - Development Completed
  - Conducting Pilot Testing----looking for volunteers
NHI Bridge Preservation Course Series - Technical Panel

- Jeff Milton, VDOT
- Tony McCloskey, PennDOT
- Chris Lee, NCDOT
- Sonny Jadun, FHWA
- Debbie Lehmann, FHWA
- Anwar Ahmad, FHWA
- Louisa Ward, FHWA, NHI
- Gerald LaCosta, FHWA, NHI
NHI Bridge Maintenance Training Course

- Update the Bridge Maintenance Reference Manual
- Develop new web-based training modules
- Update the Instructor-led training course – 4 days

- **Target Audience:** Individuals involved in onsite bridge maintenance activities and those that supervise and manage these activities

- **Project status:**
  - Work began July 2013 (40% complete)
  - Target Completion Date: 2016
Bridge Preservation Expert Task Group

- Comprised of Bridge Preservation Experts from FHWA, State DOT’s, Academia, Industry, (Local Government to be added soon)
- FHWA and State DOT Co-Chairs (Anwar Ahmad-FHWA, Bruce Johnson- Oregon DOT)
- Guided by adopted Operating Guidelines
- One meeting per year plus scheduled monthly teleconferences
# BPETG Members

<table>
<thead>
<tr>
<th>Name</th>
<th>Organization</th>
<th>Name</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anwar Ahmad</td>
<td>FHWA - HQ</td>
<td>John Hooks</td>
<td>TSP.2</td>
</tr>
<tr>
<td>Allison Klein</td>
<td>ARTBA</td>
<td>Larry O’Donnell</td>
<td>FHWA – Resource Center</td>
</tr>
<tr>
<td>Barton Newton</td>
<td>California DOT</td>
<td>Lorella Angelini</td>
<td>Angelini Consulting</td>
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<tr>
<td>Bob Kogler</td>
<td>Rampart</td>
<td>Michael Brown</td>
<td>Virginia Center for Innovation &amp; Research</td>
</tr>
<tr>
<td>Bruce Johnson</td>
<td>Oregon DOT</td>
<td>Mike Stenko</td>
<td>Transpo Industries</td>
</tr>
<tr>
<td>Chris Keegan</td>
<td>Washington DOT</td>
<td>Paul Jensen</td>
<td>Consultant</td>
</tr>
<tr>
<td>Dave Juntunen</td>
<td>Michigan DOT</td>
<td>Pete Weykamp</td>
<td>New York DOT (retired)</td>
</tr>
<tr>
<td>Ed Welch</td>
<td>TSP.2</td>
<td>Siva Venugopalanch</td>
<td>SCS, Inc</td>
</tr>
<tr>
<td>George Hearn</td>
<td>Univ. of Colorado</td>
<td>Steve Varnedoe</td>
<td>Agile Assets</td>
</tr>
<tr>
<td>Jeff Milton</td>
<td>Virginia DOT</td>
<td>Sue Lane</td>
<td>FHWA - LTBPP</td>
</tr>
<tr>
<td>Jeremy Shaffer</td>
<td>Bentley Systems</td>
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</table>
Bridge Preservation Expert Task Group

Accomplishments

- Development of a Strategic plan
- Provided leadership in the development of the Bridge Preservation definition that was adopted by AASHTO in 2011
- Published a paper for TRB on bridge preservation related performance measures
- Developed a white paper on challenges on implementing new or innovative products
Accomplishments (continued)

- Contributed to the bridge preservation website (tool box) http://www.fhwa.dot.gov/bridge/preservation/
- Developed a communication and outreach plan
- Contributed to the publication of technical articles
- Coordinated with AASHTO on updating the Preservation Research Roadmap
BPETG Work Plan for 2014

1. Complete and publish the bridge preservation innovation challenges and opportunities survey results
2. Develop methodology and examples of Bridge Preservation performance measures using element level data
3. Work with AASHTO on development of a definition and commentary for a State of Good Repair
4. Develop the exchange function on the TSP.2 website
5. Publish Bridge Preservation articles
6. Conduct Bridge Preservation Webinar Series
7. Develop a template for intern/scholarship program
8. Support TSP.2 regional partnership activities
9. Support development of training courses
10. Support updating the research roadmap
**Challenge**

- Designing for durability – Engineered service life that leads to lower life cycle cost for bridges.

**Solution**

- The *Service Life Design Guide for Bridges* is a comprehensive reference document that complements AASHTO specifications.
Solution: Service Life Design Guide

- “Fault Tree” Decision Matrix
- Bridge System Selection
- Materials Selection
- Bridge Deck
- Corrosion Protection
- Fatigue & Fracture
- Jointless Bridges
- Bridge Expansion Devices
- Bridge Bearings
- Life Cycle Cost Analysis
Benefits

- Maximizes bridge service life: lower life-cycle cost.
- Applicable to any bridge type and size.
- Provides solutions for a variety of service environments.
- Provides design guidance for jointless integral bridges.
Benefits cont’d

- Extends integral abutment designs to curved girder bridges.
- Guide is customizable to agency experience and application.
- Allows for maintenance planning at the design stage.
- Minimizes bridge maintenance, resulting in fewer traffic delays.
- Complements AASHTO specifications.
R19A Implementation Strategies

- Identified a list of potential additional development items:
  - Self-guided examples for different bridge types and climate zones
  - More coverage for pre-stressed concrete elements/systems
  - A practical life cycle cost analysis (LCCA) decision-making framework

- Planning for a parallel process to accomplish:
  - Utilize “early adopter” agencies to ground truth the guide
  - Refine the guide to cover the additional development efforts mentioned above and incorporate lessons learned from the early adopters
R19A Implementation Strategies

- Collaboration with stakeholders including TRB, AASHTO, FHWA, and Industry
- Implementation Planning Workshop – held in 12/2013
- Implementation Strategic and Tactical plans completed
- Included in the FHWA 4th call for implementation assistance program (IAP) in June 2014
  - Evaluating received applications.....notification to selected agencies for implementation assistance will be sent out soon
Strategic Highway Research Program2, R19A “Bridges for Service Life”

Design for Service Life Guide:  
http://www.trb.org/Main/Blurbs/168760.aspx

SHRP2 Implementation Assistance Website:  
http://www.fhwa.dot.gov/goshrp2

- Included in the FHWA 4th call for implementation assistance program (IAP) in June 2014
  - Evaluated received applications.....notification to selected agencies for implementation assistance will be sent out soon
Thank You

Anwar S. Ahmad, P.E.
Senior Bridge Preservation Engineer
Federal Highway Administration
Telephone: (202) 366-8501
Email: Anwar.Ahmad@dot.gov
Update to SCOM BTWG
July 29, 2014

Ben Rabun, P.E
T9 – Bridge Preservation

- SEBPP Coating Group
- PT Grout update:
  Florida
  ASBI
- LTBP Update
- National Bridge Measures
- NCHRP 14-23
- TSP2 update
- R19A
- TRB Bridge Preservation Vision
SEBPP Coatings Group Update

Jeff Pouliotte
FDOT State Structures Maintenance Engineer
Chair of SEBPP Coatings Group
Presentation Breakdown

- Revisions to SEBPP Documents: “A Rational Approach for Planning Bridge Repainting Projects Report” and “Calculator”, to include User Costs

- SEBPP Survey of Best Practices for Coating Structural Steel

- National Bridge Preservation Partnership (NBPP) Panel Discussion & National Interest
Bridge Repainting Report and Calculator

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

• The Report has a Flowchart that rationally depicts how to evaluate Paint Options

• The Spreadsheet Calculator evaluates life cycle costs to aid in the selection of the appropriate Paint Option
Flowchart to Select Paint Option

1. **Bridge Coating Assessment**
   - Is Corrosion >20%?
     - Y: Overcoating meet SSPC-TU3?*
     - N: Is Corrosion >10%?
       - Y: Calculate cost to remove and replace (Sp1)
       - N: Overcoat

2. Continue monitoring

3. Calculate cost to overcoat (Sp1)

4. Aesthetic Issue?
   - Y: Calculate cost to spot
   - N: $1r < $1nc?
     - Y: Overcoat
     - N: $1r < $1sp
       - Y: Spot Paint
       - N: Overcoat

*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.
# Paint Cost Option Evaluation Calculator

<table>
<thead>
<tr>
<th>Spot Paint</th>
<th>Pb</th>
<th>No Pb</th>
<th>Expected Service Life</th>
<th>Maintenance of Traffic Required (Days)*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10</td>
<td>3</td>
<td>4.5</td>
<td>30</td>
</tr>
<tr>
<td>Over Coat</td>
<td>5</td>
<td>3</td>
<td>15</td>
<td>75</td>
</tr>
<tr>
<td>Remove &amp; Replace</td>
<td>5</td>
<td>3</td>
<td>70</td>
<td>100</td>
</tr>
</tbody>
</table>

Green = Input Parameters
Red = Calculated Parameters

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

## 20 year Coating Maintenance Combinations

<table>
<thead>
<tr>
<th>Remove and Replace</th>
<th>Overcoat</th>
<th>Spot Paint</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

## Example Conditions

- Maintenance of Traffic Cost ($/day): 850
- Area of Steel (yd²): 150,000
- % Pb Paint: 19%
- % Corrosion: 3%
- Annual Percentage Rate of Change (APR): 0%
- Average Motorist Delay (min): 20000
- % AADT (total): 3%
- % AADT that is trucks: 0.5
- Passenger vehicle pay factor: 25

## 20 year analysis

### Remove and Replace
- Total future Value Cost to Remove and Replace: ($14,765,836.30)
  - Future Value of User Delay Cost to Remove and Replace: ($2,944,232)
  - Future Value of MOT at yr 20: ($118,169)
  - Present Value Cost to Paint without MOT: ($1,200,000)
  - Present Value Cost to Paint with MOT: ($1,297,500)

### 2 overcoats and 1 spot paint (% progressive corrosion)
- Total future Value Cost at yr 20: ($5,895,068)
  - Total future Value of User Delay Cost at Year 20: ($6,366,051)
  - Total future Value of MOT at yr 20: ($159,823)
  - Future Value of Initial Overcoat at yr 20: ($1,200,000)
  - Future Value of Second Overcoat at yr 20: ($871,215)
  - Future Value of Spot paint at yr 20: ($323,377)
  - Present Value Cost to Paint: ($1,222,230)
  - Present Value Cost to Overcoat: ($856,675)
  - Present Value User Delay Cost to Overcoat: ($886,250)

### 1 Overcoat and 3 spot paints (% progressive corrosion)
- Total future Value Cost at yr 20: ($6,297,664)
  - Total future Value of User Delay Cost at Year 20: ($6,848,553)
  - Total future Value of MOT at yr 20: ($150,884)
  - Future Value of Initial Overcoat at yr 20: ($1,200,000)
  - Future Value of First Spot Paint at yr 20: ($818,182)
  - Future Value of Second Spot Paint at yr 20: ($441,566)
  - Future Value of Spots paint at yr 20: ($362,297)
  - Total Present Value Cost: ($4,828,385)
  - Present Value Cost to Overcoat: ($756,000)
  - Present Value User Delay Cost Overcoat: ($886,250)

### 5 spot paints (% progressive corrosion)
- Total future Value Cost at yr 20: ($5,696,513)
  - Present Value Cost: ($4,059,712)
  - Present Value Cost to Spot Paint: ($2,285,000)
  - Present Value User Delay Cost Spot Paint: ($886,250)
SEBPP Coatings for Structural Steel Panel Discussion at NBPP

• Topic # 1 – Surface Preparation
• Topic # 2 – Sulfate and Nitrate Contamination
• Topic # 3 – Materials
• Topic # 4 – Maintenance Coating
• Topic # 5 - Coatings and Application
• Topic # 6 – Metalizing and Galvanizing
• Topic # 7 - Over-coating, Spot Coating, Zone Coating, or Remove and Replace
• Topic # 8 - Pack Rust

Should the SEBPP Coating Group become an NBPP Coatings Group?
FDOT GROUTED PT INSPECTION FINDINGS AND FUTURE DIRECTION

JEFF POULIOTTE
STATE STRUCTURES MAINTENANCE ENGINEER
TENDON REQUIRING REPLACEMENT
NATIONAL GROUTING ISSUES ARISE

- FHWA letter concerning excessive chlorides in Sika 300PT grout
- Other DOT’s reported grout quality control issues
- Other DOT’s reported similar corrosion findings
- Some Sika 300PT bag weights were 10% lighter than specified on the packaging
- Wood chips were found in prepackaged bags of thixotropic grout from various Manufactures
Grout segregation characterized as:
• A. Wet plastic
• B. Sedimented Silica
• C. White chalky

Corrosion attributed to wet plastic grout but not necessarily to void presence.
Grout segregation created environment with dissimilar pore water chemistry and physical properties.
Specification for Grouting of Post-Tensioned Structures
Conclusions

• Specs for Grouted PT are available
• Cementitious Grout – over 60 years of experience
  – Inorganic
  – High pH
  – Enhanced Properties
  – Structural Design Advantages
  – Specification Improvements Ongoing
Long-Term Bridge Performance (LTBP) Program

AASHTO SCOBS T-9 Technical Committee
June 23, 2014
Columbus, Ohio

Sue Lane, P.E.
Development and Outreach Engineer
Long-Term Bridge Performance Program
Federal Highway Administration

Hamid Ghasemi, Ph.D.
Team Leader & Program Manager
Federal Highway Administration

Robert Zobel, Ph.D., P.E.
Technical and Development Engineer
Federal Highway Administration

Tom Saad, P.E.
Federal Highway Administration
Selection Criteria for Candidate Bridges

- Bridge Type:
  - Steel Multi-Girder Bridge with CIP Deck
  - Prestressed Concrete Multi-Girder Bridge with CIP Deck
  - Box Girder and Adjacent Box Beam Bridges
- State Owned (also representative of local bridges)
- Eliminate if service under is RR
- $10 \leq \text{Max Span Length} \leq 50\text{m}$
- Maximum of 4 lanes on bridge
- ADT $\leq 50,000 \text{ VPD}$
- Built after 1960
Bridge Types and Sample Size
(Most Common Bridges)

Minimum of 65 Bridges in Each Cluster

Climate Zones
ZNUM
- Hot-Humid
- Mixed-Humid
- Mixed-Dry
- Hot-Dry
- Cold
- Very Cold
- Marine

14 Suggested Clusters
Product of LTBP Data-Driven Decision

- LTBP Bridge Portal
- Protocols: Improved and Standardized Evaluation Techniques
- NDE and SHM: Streamline
- Bridge Practices Timeline
  - Owners
  - Steel Industry
  - Concrete Industry
- Quantify Benefits of Preservation Strategies
- Enhanced Design, Construction, Maintenance & Rehabilitation Practices
- Improved Deterioration and Forecasting Models
- Support Life-Cycle Cost Models
National Bridge Performance Measures

Bruce Johnson
State Bridge Engineer
Oregon DOT

SCOPM recommendations from Dr. Matthew Hardy, AASHTO
June 2014

International Bridge Conference
Pittsburgh, Pennsylvania
SCOPM Bridge Recommended Measures

- **Percent of Deck Area on Structurally Deficient Bridges**—NHS bridge deck area on structurally deficient bridges as a percentage of total NHS bridge deck area.

- **NHS Bridges in Good, Fair and Poor Condition based on Deck Area**—Percentage of National Highway System bridges in good, fair and poor condition, weighted by deck area.

The first measure is required in MAP-21 and AASHTO supports this as an initial measure. However, this measure could steer a State DOT to implement a worst-first approach for maintaining bridge condition. Therefore, AASHTO is exploring the second measure.

- FHWA had input on this recommendation and will publish a NPRM in 2014
• Expand first measure to include non-NHS bridges
  1. NHS bridge deck area on structurally deficient bridges as a percentage of total NHS bridge deck area.
  2. Non-NHS bridge deck area on structurally deficient bridges as a percentage of total NHS bridge deck area.
• Modify the second measure to the following:
  – NHS Bridges in need of:
    • Cyclic Maintenance: NBI 7-9 (Sub for Good)
    • Preventive Maintenance: NBI 5-6 (Sub for Fair)
    • Replacement or Rehab: NBI 0-4 (Sub for Poor)
  – Overall condition is the lowest of the major component
  – Reported by:
    1. Count of Bridges
    2. Bridge Deck Area
Possible LTBP Bridge System Measure

Long Term Bridge Performance Rating

- Functionality & Utility Index
  - User Safety & Service, Cost to Agency and Users
- Serviceability & Durability Index
  - Level of Service, Condition
- System Integrity & Resilience Index
  - Safety, Stability & Robustness

Weighted Combination

- $FUI_F$
- $FUI_U$
- $SDI_S$
- $SDI_D$
- $SIRI_S$
- $SIRI_{GH}$

Data-driven metrics (model and experiment), heuristic-based metrics, qualitatively assessed metrics
• National Bridge Measures are Coming Your Way Soon

Thank you
NCHRP 14-23

Practical Bridge Preservation Actions and Investment Strategies

Update for
AASHTO SCOBS T-9 Committee Meeting
June 23, 2014

National Center for Pavement Preservation
Michigan State University
NCHRP 14-23 Phases

• Phase I – Preservation Actions That Impact Bridge Service Life
• Phase II – Development and Validation of the Proposed Methods
• Phase III – Draft Handbook for Bridge Preservation
• Phase IV – Final Products
  – Final Project Report
  – Handbook
  – Analysis Tool
Impacts of Bridge Preservation Actions

Extension of life resulting from improvement in condition state

NCHRP 14-23 Update
Creation of Deterioration Models

Polynomial regression and piecewise linear representations of deterioration?

Why? – Because we want to predict from a condition state, independent of age, to condition in the future

NCHRP 14-23 Update
Proposed Method to Prioritize Actions

Comparison between two preservation options
Preservation Related NDE / Monitoring

- Non Destructive Testing methods and procedures
- Preservation health monitoring
- Imbedded Sensors for corrosion, moisture, temp, etc.
- Evaluations / testing related to preservation
T11 – Research

A list of recommended NCHRP research project problem statements will be presented for approval:

#1 Development of Guidelines for Uniform Service Life Design for Bridges

#2 Design, Optimization, Fabrication, and Construction of Long-Span Precast Pretensioned Girders

#3 Promoting the Use of Effective Vibration Mitigation Devices for Traffic, Sign, and Lighting Structures in the Existing AASHTO Specification

#4 Development of Guidelines for Performance Based Seismic Design

#5 Development of Guidelines for Full and Hybrid Use of Stainless Steel for Bridge Girders

#6 Improving Processes for Characterizing Corrosion Potential of Soils and Fill Materials
T11 – Research

The following problem statement is recommended for a 20-07 project:

#1 Assessing Risk for Bridge Management

The following problem statement is recommended for a 20-05 synthesis:

#1 Expanding Limit State Definitions into Performance Requirements
T18 – Bridge Management and Evaluation

- MBE
  - Gusset plate ratings
  - Shear rating
  - Placement of loads
  - SHVs
  - Fatigue Life/ Fatigue Serviceability Index
  - Low lax strand
- Element Inspection
  - Crack size and spacing
Developing Reliability-Based Bridge Inspection Practices
NCHRP 12-82

PI: Glenn A. Washer, PhD
University of Missouri
Columbia, MO

Co-PI: Robert Connor, PhD
Purdue University
West Lafayette, IN

AASHTO T-18 Meeting
Risk-Based Bridge Inspection (RBI)

- **Current NBIS**
  - 24 month routine inspection interval for most bridges
    - 12 or less for certain bridges
    - 48 month interval for certain bridges meeting FHWA criteria (48 month policy)

- **Risk-Based Inspection (RBI)**
  - Interval from 12 to 72 months based on RBI engineering analysis
  - Increased inspection scope relative to routine inspection
  - Focus inspection based on need
Risk-Based Inspection (RBI)

• What can go wrong?
  – Identify damage modes for elements
  – Deterioration mechanisms

• How likely is it?
  – Categorization based on reliability characteristics of bridge elements

• What are the consequences?
  – How important is it?
Results

• Results for sample of 22 bridges in Oregon and 17 bridges in Texas

<table>
<thead>
<tr>
<th>State</th>
<th>Inspection Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>24 month</td>
</tr>
<tr>
<td>Oregon (Prestressed)</td>
<td>41%</td>
</tr>
<tr>
<td>Texas (Steel)</td>
<td>35%</td>
</tr>
</tbody>
</table>
Backcasting Concept

Verifying RBI Intervals

![Graph showing condition rating over years in service for 72 and 48 month intervals.](image)
Conclusions and Recommendations

- Study developed a recommended practice (Guideline for RBI) for consideration by AASHTO
- Verified the effectiveness of the methodology through case studies
- Demonstrated inspection intervals up to 72 months were suitable for certain bridges
  - Based on RBI analysis
  - Allows for reallocation of resources toward bridges where inspection needs are greatest
Conclusions And Recommendations

• Implementation of RBI methodology should be pursued
  – Guideline developed
  – Methodology verified through testing
• Methodology should be pursued for FC and atypical bridges
• Backcasting should be implement as a QC/QA tool to assist in implementation
Purpose

- Fill Voids in between debonded overlay and old hydro demolished surface
- Prevent Further Deterioration of Surface
Background

• Iowa DOT
  – First injection in 1975
  – Injected over 300 bridges since 1985
  – Adds 10 years to expected service life of shallow overlays
  – Expected service life comes from field experience
  – Quantity estimating assume 10 sft of delamination repair per gallon of epoxy.
Concept Diagram

- Injection Port
- Epoxy Resin
- Delamination
- Concrete Overlay
- Original Concrete
Ideal Candidate

- Debonded shallow overlay
- Tight surface cracks
- No spalls or very little spalling
- Light to no cracking on soffit (bottom of deck)
Bridges

- 1\textsuperscript{st} Trial Bridges
- Union Pier over I-94 Tailspans
- Refine Process
- 2\textsuperscript{nd} Trial Bridges
- I-75 over Cheeseman Rd
- Thermal Scan
- 1300 sft of delamination (7%)
The Process

- Gather Materials
- Locating Delaminations
- Preparation of the Deck
- Placement of the Ports
- Epoxy Injection
- Removal of Ports
- Check the Repair
The Materials
Locating the Delamination
Preparation of the Deck
Preparation of the Deck
Blow out Holes
Check Surface Cracks
Seal Surface Cracks
Placement of the Ports
Check the Ports
Epoxy Injection
Making Ports
Clean Up
Check the Repair
Removal of Ports
Cost

- 1300 SFT of Delamination Repair
- $34,000 for Epoxy Injection
- Life expectancy 10 years
- $42,000 for Fast Set Deck Patching
- Life expectancy 5 years
Project Duration

- 1300 SFT of Delamination Repair
- 4 days for Epoxy Injection
- 8 days for Traditional Deck Patching
Benefits

• Immediate Placement of Healer Sealer
Troubleshooting
Lessons Learned

• Mark delaminations exactly
• Sound deck regardless of thermal scan
• Place ports a minimum of 6 inches inside of delamination/edge
• Clean Port Holes Properly
• Use care when installing ports
  – Leaky ports will ruin your day
• Pump epoxy uphill

• Seal potential leaks with epoxy
  – Cracks with air coming out
  – Edges of old concrete patches
• Clean epoxy spills with thin epoxy overlay stone (chip-flint stone)
• Monitor entire deck
  – Epoxy will flow between delaminations
  – May cause “baby bumps”
  – Re-sound deck after the winter
Future

- Innovate
- Trip to Iowa Scheduled for June
- More Trials Scheduled For Summer (six)
- Develop Special Provision (in-process)
- Develop Pay Items (still in-process, maybe performance based)
  - Iowa Challenges
  - SFT Based Pay Items – Contractors Under fill Voids
  - Gallon Based Pay Items – Contractors Overfill Voids
Questions?

Jason DeRuyver, P.E.
(517) 242-2988
Louisiana Historic Bridge Program

David Miller. PE, Structures and Facilities
Maintenance Administrator
Amy Squitieri, Consultant Project Manager
July 29, 2014
Purpose and benefits

- Comply with federal historic preservation regulations
- Identify bridges eligible for listing in the National Register
- Identify bridges that are good candidates for future preservation
- Develop Programmatic Agreement (PA) to streamline project development
Project steps

1. 2012: Historic context study
2. 2013: Organize and analyze bridges
3. 2014: Conduct field survey
4. 2014: Evaluate National Register eligibility
5. 2014: Identify bridges with preservation potential

Public involvement and consultation
Historic bridges

4,579 Total Bridges

3% Determined Eligible or Listed in National Register
97% Determined Not Eligible

150 Bridges
4,429 Bridges
Historic bridge types

- 7 Pony
- 10 Through

150 TOTAL BRIDGES
28 Excluded

- Concrete Arch
- Concrete Slab, Beam & Girder
- Concrete Rigid Frame
- Culvert Pre-1946
- Movable
- Post-1945 Common Types
- Steel Beam & Girder
- Truss

- Bascule
- Lift - Span & Span Tower
- Lift Tower
- Pontoon Swing
- Swing - Cable Stayed
- Swing - Pony Truss
- Swing - Through Truss
- Swing - Plate Girder
Identify Preservation Priority bridges

- Develop and apply methodology
- Categorize historic bridges
  - **Preservation Priority**: Commitment to maintain and rehabilitate
  - **Preservation Candidate**: Maintain when prudent and feasible
  - **Non-Priority**: Can remove and replace when needed
Preservation prioritization methodology overview
Condition score

- Comparative tool
- Indicator of preservation potential
- Isolates factors that typically determine whether preservation is prudent and feasible
- Sort condition scores (high to low)
Apply Additional Considerations

Condition Score ≥ 40, Apply Additional Considerations

Check if Bridge Can Meet These Considerations:

- **Rehabilitation**: Good potential for rehabilitation that follows Secretary of the Interior’s Standards or rehabilitation not anticipated
- **Geometrics**: Meets AASHTO low volume standards (where ADT ≤ 400) or Louisiana Minimum Design Guidelines (where ADT > 400) or satisfactory geometrics
- **Load**: Within 90% (or better) of acceptable live load capacity
- **Detour**: Acceptable detour for load posted bridge (< 10 miles)
- **Navigation Control and Restrictions**: Navigation control required and clearances adequate (if applicable) and no restrictive factors
Additional Consideration 1 - Rehabilitation
Additional Consideration 1 - Rehabilitation
Additional Consideration 2 - Geometrics
Additional Consideration 3 - Load
Additional Consideration 4 - Detour
Additional Consideration 5 – Navigation Control and Restrictions
Additional Consideration 5 – Navigation Control and Restrictions
Bridge Preservation Results

- **122** total bridges
- **59** bridges are Preservation Priority
- **30** bridges are Preservation Candidates
- **33** bridges are Non-Priority
Preservation Priority
Bridge Examples
Preservation Priority
Preservation Priority

Vertical Lift - 1964

Recall No. 009460

Vermillion Parish

Facility Carried: LA0014BY

Facility Crossed: Vermillion River/Abbeville
Preservation Priority

✓ Consideration 1 - Rehabilitation

✓ Consideration 2 - Geometrics

✓ Consideration 3 - Load

✓ Consideration 4 - Detour

✓ Consideration 5 - Navigation Control and Restrictions
Preservation Candidate
Bridge Examples
Preservation Candidate
Preservation Candidate

Through truss – 1952

Recall No. 012548

Bossier Parish

Facility Carried: LA0002

Facility Crossed: Red River – Miller’s Bluff
Preservation Candidate

- Consideration 1 - Rehabilitation
- Consideration 2 - Geometrics
- Consideration 3 - Load
- Consideration 4 - Detour
- Consideration 5 - Navigation Control and Restrictions
Non-Priority Bridge Examples
Non-Priority
Non-Priority

Swing Plate Girder – 1935

Recall No. 002830

St. Charles Parish

Facility Carried: LA0631

Facility Crossed: Bayou Des Allemands
Non-Priority

Consideration 1 - Rehabilitation

Consideration 2 - Geometrics

Consideration 3 - Load

✓ Consideration 4 - Detour

Consideration 5 - Navigation

Control and Restrictions
Programmatic Agreement Streamlining Benefits
Maintenance considerations

- Funding set aside for Priority Bridges
- Management plan will outline maintenance and rehabilitation needs for each bridge
- Maintenance can be conducted without SHPO review
Questions or Comments?

Email: LAHistoricBridges@la.gov

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Organization</th>
<th>Phone</th>
<th>E-mail Address</th>
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**E-Mail Address**

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<th>AASHTO Subcommittee on Maintenance</th>
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<td>AL Hogan</td>
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