Long-Term Bridge Performance (LTBP) Program

AASHTO SCOBS General Session
June 26, 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
## Developmental & Execution Phases

*Identify Bridge Performance Issues*  

*Focus Group Meetings*

<table>
<thead>
<tr>
<th>Category</th>
<th>Issue</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Decks</strong></td>
<td>Untreated Concrete Bridge Decks</td>
</tr>
<tr>
<td><strong>Decks</strong></td>
<td>Treated Concrete Bridge Decks</td>
</tr>
<tr>
<td><strong>Joints</strong></td>
<td>Bridge Deck Joints</td>
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<tr>
<td><strong>Bearings</strong></td>
<td>Bridge Bearings</td>
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<tr>
<td><strong>Steel Bridges</strong></td>
<td>Coatings for Steel Superstructure Elements</td>
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<tr>
<td><strong>Concrete Bridges</strong></td>
<td>Verify Condition of Strands and Tendons</td>
</tr>
</tbody>
</table>
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 m ≤ Max Span Length ≤ 50m
• Maximum of 4 lanes on bridge
• ADT ≤ 50,000 VPD
• Built after 1960
Bridge Types and Sample Size
(Most Common Bridges)

Minimum of 65 Bridges in Each Cluster

14 Suggested Clusters
On-Site Meeting Dates

Northeast: CT, MA, ME, NH, NY, RI, VT
Mid-Atlantic: DC, DE, MD, NJ, PA, VA, WV
East Central: IN, KY, OH, TN, NC
Mid West (Central): IA, IL, MI, MN, WI
Gulf Coast: AL, AR, FL, LA, MS, TX
Rocky Mountains: CO, ID, MT, NE, SD, UT, WY
NW: OR, WA
SW: AZ, CA, NV
Corridor: GA, KS, OK, MO, ND, NM, SC

States on-site meetings to be scheduled
LTBP Contractors and Tasks

- **Rutgers University**
  - Bridge Sampling, Data Collection, Analysis, Protocols, Data Management

- **Pennoni Associates, Inc.**
  - Data Collection and Validation, Protocols, Technical Support

- **Michael Baker Jr., Inc.**
  - Data Collection

- **Professional Service Industries, Inc. (PSI)**
  - Data Analysis, Legacy Data, Bridge Documentation Data Collection

- **Parsons Brinckerhoff, Inc.**
  - Under Negotiation
## Data Collection: Untreated Bridge Decks, Joints, and Bearings

<table>
<thead>
<tr>
<th>Contractor</th>
<th>Cluster</th>
<th>States</th>
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<tbody>
<tr>
<td>Rutgers</td>
<td>Mid-Atlantic Steel; Mid-Atlantic Prestressed Concrete</td>
<td>DE, NJ, MD, PA, VA, WV (2nd round of testing and additional bridges: July 2014)</td>
</tr>
<tr>
<td>Michael Baker</td>
<td>Gulf Steel; Gulf Prestressed Concrete</td>
<td>AL, AR, FL, LA, MS, TX (August 2014)</td>
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<tr>
<td>PSI</td>
<td>Mid-Atlantic Steel, Mid-Atlantic Prestressed Concrete; Mid-Atlantic Concrete Box; NE Steel</td>
<td>CT, DC, DE, MA, MD, ME, NH, NJ, NY, PA, RI, VA, VT, WV (August 2014)</td>
</tr>
<tr>
<td>Contractor</td>
<td>NW Prestressed Concrete; SW Concrete Box</td>
<td>AZ, CA, NV, OR, WA (August 2014)</td>
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</table>
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
LTBP Bridge Portal

Status Update

• IRB (Investment Review Board) 2-Phase Process

  ➢ COMPLETED

• Transfer of Bridge Portal to FHWA Server for Deployment

  ➢ INITIATED

• Prior to Deployment, Rutgers will Assist with Beta Testing

• Estimate Beta Testing to Begin Prior to EOY 2014
## Research Protocols—Identification and Publishing

<table>
<thead>
<tr>
<th>Protocol Designation</th>
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<tbody>
<tr>
<td>FLD-DC-VI-001</td>
<td>Visual Inspection—Steel Superstructure Deterioration—General</td>
</tr>
<tr>
<td>FLD-DC-VI-002</td>
<td>Visual Inspection—Concrete Deterioration—General</td>
</tr>
<tr>
<td>FLD-DC-VI-003</td>
<td>Visual Inspection—Substructure (General Condition Survey)</td>
</tr>
<tr>
<td>FLD-DC-VI-004</td>
<td>Visual Inspection—Elastomeric Bearings</td>
</tr>
<tr>
<td>FLD-DC-VI-005</td>
<td>Visual Inspection—Pot Bearings</td>
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<tr>
<td>FLD-DC-VI-006</td>
<td>Visual Inspection—Rocker Bearings</td>
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<tr>
<td>FLD-DC-VI-007</td>
<td>Visual Inspection—Expansion Joints</td>
</tr>
<tr>
<td>FLD-DC-VI-008</td>
<td>Visual Inspection—Steel Superstructure—Corrosion</td>
</tr>
<tr>
<td>FLD-DC-VI-009</td>
<td>Visual Inspection—Steel Superstructure—Section Loss</td>
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<tr>
<td>FLD-DC-VI-010</td>
<td>Visual Inspection—Concrete—Abrasion</td>
</tr>
<tr>
<td>FLD-DC-VI-011</td>
<td>Visual Inspection—Concrete—Cracking</td>
</tr>
<tr>
<td>FLD-DC-VI-012</td>
<td>Visual Inspection—Concrete—Spalls and Delamination</td>
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<td>FLD-DC-VI-013</td>
<td>Visual Inspection—Condition Assessment of Asphalt Overlays</td>
</tr>
<tr>
<td>FLD-DC-VI-014</td>
<td>Visual Inspection—Moisture and Efflorescence</td>
</tr>
<tr>
<td>FLD-DC-VI-015</td>
<td>Visual Inspection—Sulfate Attack of Concrete</td>
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<tr>
<td>FLD-DC-VI-016</td>
<td>Visual Inspection—Drainage System on Bridge Deck and Approach Slabs</td>
</tr>
<tr>
<td>FLD-DC-VI-017</td>
<td>Visual Inspection—Chain Drag (Deck Delamination Survey)</td>
</tr>
<tr>
<td>FLD-DC-ND-001</td>
<td>NDE—Electrical Resistivity Testing</td>
</tr>
<tr>
<td>FLD-DC-ND-002</td>
<td>NDE—Ground Penetrating Radar Testing for Bridge Decks</td>
</tr>
<tr>
<td>FLD-DC-ND-003</td>
<td>NDE—Half Cell Potential Testing</td>
</tr>
<tr>
<td>FLD-DC-ND-004</td>
<td>NDE—Impact Echo Testing</td>
</tr>
<tr>
<td>FLD-DC-ND-005</td>
<td>NDE—Linear Polarization Resistance</td>
</tr>
<tr>
<td>FLD-DC-ND-006</td>
<td>NDE—Dye Penetrant Testing</td>
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<tr>
<td>FLD-DC-ND-007</td>
<td>NDE—Ultrasonic Surface Wave Testing (Concrete)</td>
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<td>NDE—Ultrasonic Testing—Steel Fatigue Cracking</td>
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<tr>
<td>FLD-DC-MS-001</td>
<td>Physical/Material Testing—Wet Coring (Field Sampling) of Concrete Decks</td>
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<td>FLD-DC-MS-002</td>
<td>Physical/Material Testing—Strength and Static and Dynamic Elastic Moduli of Concrete Cores</td>
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<tr>
<td>FLD-DC-MS-003</td>
<td>Physical/Material Testing—Resistance to Chloride Penetration (Permeability)</td>
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<tr>
<td>FLD-DC-MS-004</td>
<td>Physical/Material Testing—Sampling and Testing for Chloride Profiles</td>
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Bridge Practices Timelines

• Beginning with Timelines On:
  ➢ Types of Rebar Used in Concrete Members
  ➢ Changes in Composition of Structural Steel

• Working with Steel Industry to Develop National Steel Bridge Practices Timeline—Draft Completed

• Working with Concrete Industry to Develop National Concrete Bridge Practices Timeline—Draft Completed

• Working with Each State to Create Their Bridge Practices Timeline
LTBP Products - Publications

LTBP Documents Published:

• TechBriefs:
  ➢ *FHWA LTBP Workshop to Identify Bridge Substructure Performance Issues (Web and Print)*
  ➢ *LTBP Bridge Performance Primer (Web and Print)*
  ➢ *FHWA LTBP Industry Day (Web and Print)*

• Newsletters:
  ➢ *Newsletters #1, #2, and #3 Published and Online*
LTBP Products - Publications

Coming in Summer 2014:

- Report:
  - FHWA LTBP High Priority Bridge Performance Issues (Web and Print)

- TechBrief:
  - FHWA LTBP High Priority Bridge Performance Issues (Web and Print)

- Newsletter:
  - Newsletter #4 (Web and Print)
Pennsylvania DOT Demonstration - June 11 & 12

Coraopolis, PA
Built in 1987
6 Miles East of Pittsburgh Airport
152 ft Two-Span Simple Supported Steel Construction
Deck Condition = 6
ADT of 1500, with 5% Trucks

LTBP Cluster Bridge
Pennsylvania DOT Demonstration - June 11 & 12

Heidelberg Fire Hall
Carnegie, PA

Scott Christie
Deputy Secretary
PennDOT

Tom Macioce
Chief Bridge Engineer
PennDOT

Louis Ruzzi
Bridge Engineer
District 11
PennDOT
Pennsylvania DOT Demonstration - June 11 & 12
Pennsylvania DOT Demonstration - June 11 & 12
RABIT™ Bridge Deck Assessment Tool

Commercialization

• Infratek
• 5 RABIT™ Bridge Deck Assessment Tools
• Plan Demonstration to States in Conjunction with Data Collection
Thank You! Questions?