Federal Highway Administration

Long-Term Bridge Performance Program

Long-Term Bridge Performance Program Update

Richard Dunne, P.E.
Michael Baker International, Inc.

Southeast Bridge Preservation Partnership Meeting, March 31, 2016

Long-Term Bridge Performance Program

FHWA LTBP Program

- Intended as a 20+ year ***long-term research effort*** to improve our knowledge of "Bridge Performance"

- Funding was designated in "SAFETEA-LU" - surface transportation authorization legislation (program starts in 2008)

- "MAP-21" - Moving Ahead for Progress in the 21st Century – funding was used

- FAST – Fixing America's Surface Transportation – funding will be used for the program

Long-Term
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Long-Term Bridge Performance (LTBP) Program

- **Definition of Bridge Performance:**

  Bridge Performance Encompasses How Bridges Function and Behave Under the *Complex and Interrelated Factors* they are Subjected to Day In and Day Out:

  - Traffic Volumes
  - Loads
  - De-Icing Chemicals
  - Freeze-Thaw Cycles
  - Environment
  - Extreme Events
  - Method of Design
  - Construction Materials
  - Age
  - Maintenance History

Long-Term Bridge Performance Program

Long-Term Bridge Performance (LTBP) Program

- **Vision:** The LTBP Program will Serve as the National Platform for Strategic Long-Term Investigation of In-Service Bridge Performance.
- **Mission:** Foster Improved Bridge Performance, Health, Stewardship, and Management Through the Analysis of Data Collected Over a 20-Year Period on a Large Representative Sample of U.S. Highway Bridges. To achieve this, the Program is Designed to Produce or Support Improved Deterioration Models, Reliable Life-Cycle Cost and Forecasting Models, Design Procedures, and Decision-Making Tools.

Long-Term
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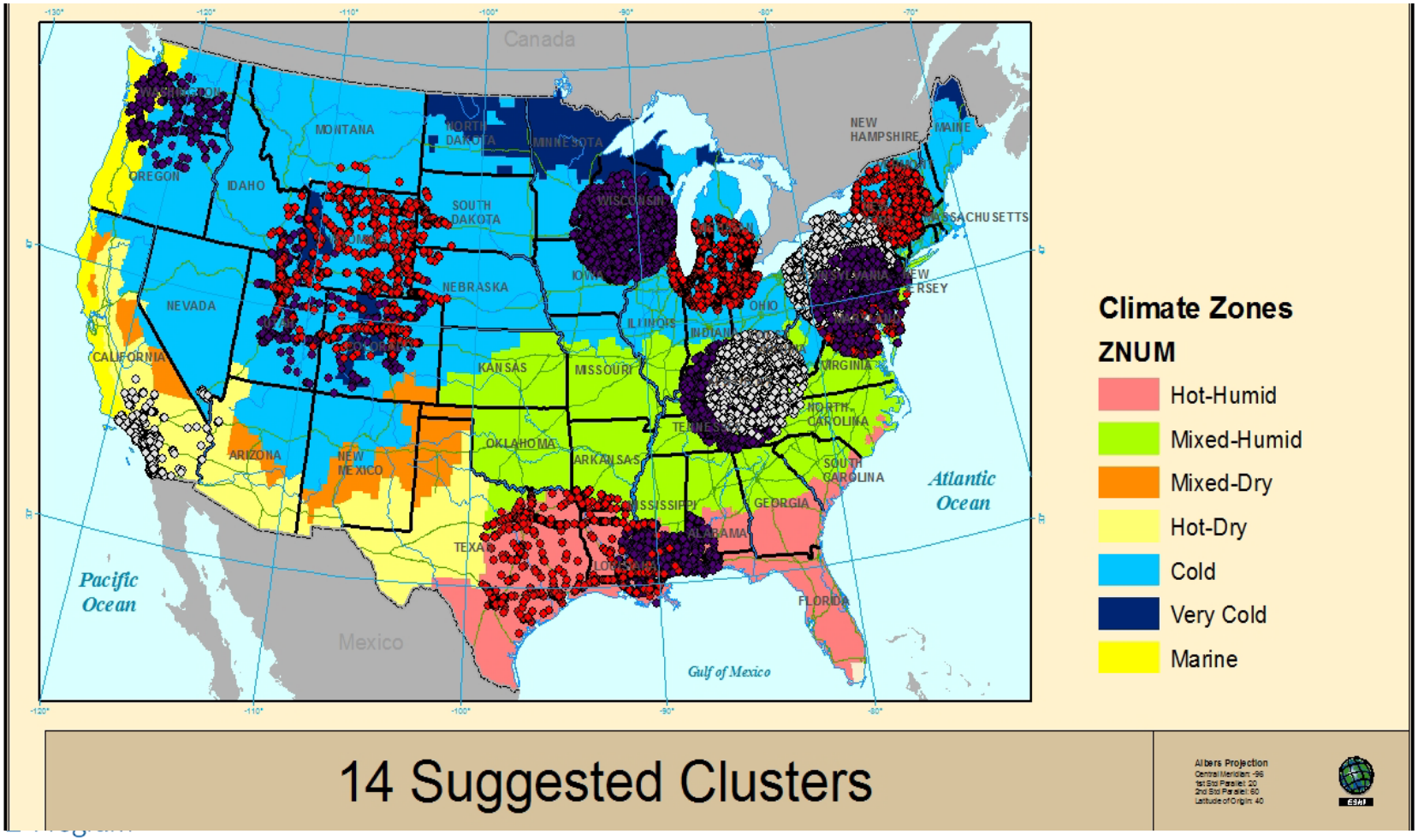
Developmental & Execution

Identify
Bridge Performance Issues

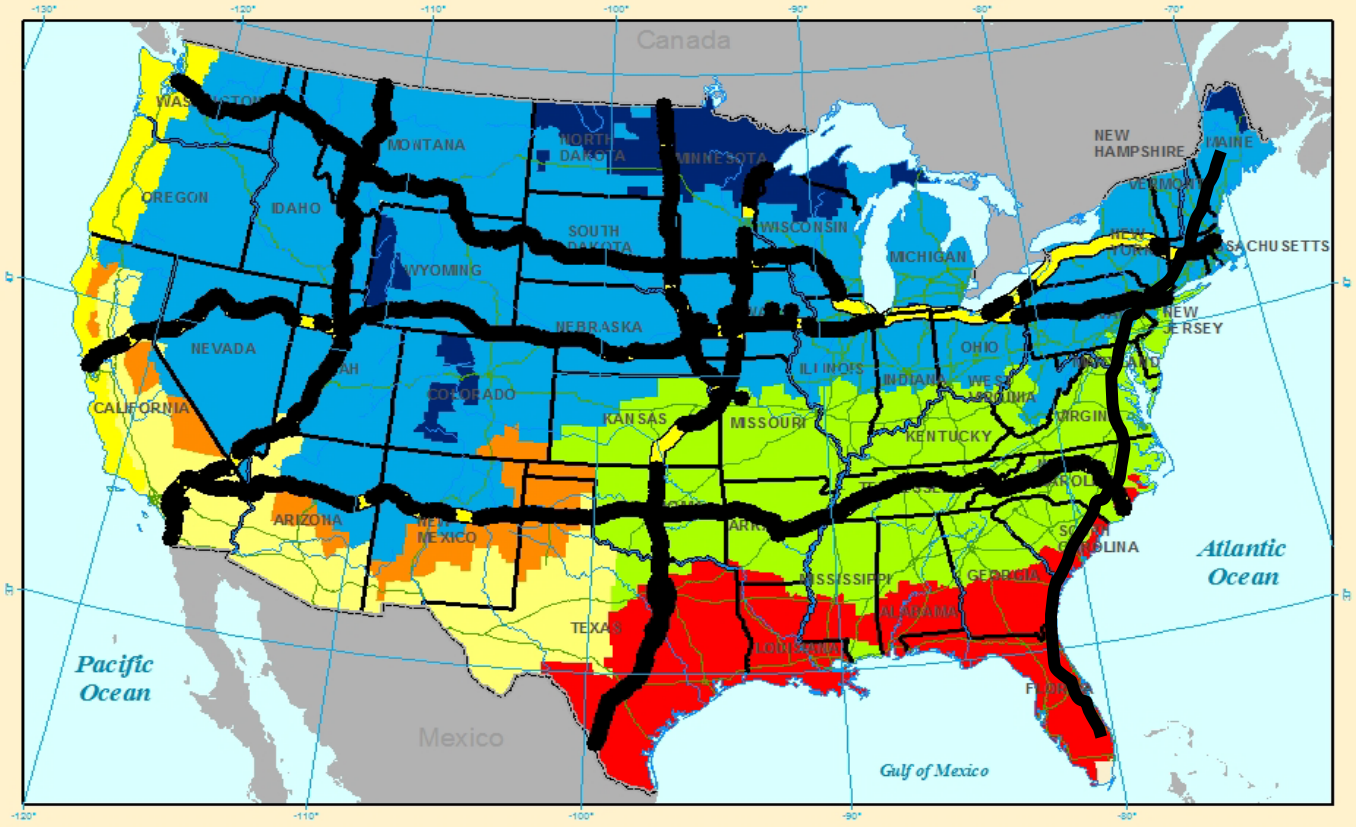
Focus Group Meetings With 15 States

Category	Issue
Decks	Untreated Concrete Bridge Decks
Decks	Treated Concrete Bridge Decks
Joints	Bridge Deck Joints
Bearings	Bridge Bearings
Steel Bridges	Coatings for Steel Superstructure Elements
Concrete Bridges	Verify Condition of Strands and Tendons

Bridge Types and Sample Size (Most Common Bridges)



10 Suggested Corridors



Corridor Candiates
4890 bridges of all types meeting other selection criteria

Albers Projection
Central Meridian -96
1st Std Parallel 20
2nd Std Parallel 60
Latitude of Origin 40

Long-Term Bridge Performance Program

East-West

I-40, I-70, I-80, I-90, I-94

North-South

I-95, I-35, I-29, I-15, I-5

LTBP Products for Research Purposes

LTBP Protocols - Created over 150 protocols for bridge infrastructure field assessment and evaluation

LTBP Bridge Portal - Developed an advanced web-based centralized data storage and retrieval application

LTBP Data-Driven Deterioration Modeling Methodology - Developed methodology for a data-driven deterioration and forecasting model to be used within the LTBP Bridge Portal

NDE Technologies - Developed, deployed, and validated a number of automated and semi-automated bridge deck assessment tools

Long-Term Bridge Performance Index - Developing, testing, and validating a data-driven bridge performance index

Bridge Practice Timelines - Creating timelines of changes in bridge practices from 1960 to the present to provide context and assistance for analyzing results obtained from field evaluations of bridges

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Field Data Collection: Untreated Bridge Decks, Joints, and Bearings

Contractor	Cluster	States
Rutgers	Mid-Atlantic Steel; Mid-Atlantic Prestressed Concrete	DE, NJ, MD, PA, VA, WV (2nd round of testing and additional bridges: July 2014)
Michael Baker	Gulf Steel; Gulf Prestressed Concrete	AL, AR, FL, LA, MS, TX
PB	NW Prestressed Concrete; SW Concrete Box	AZ, CA, NV, OR, WA

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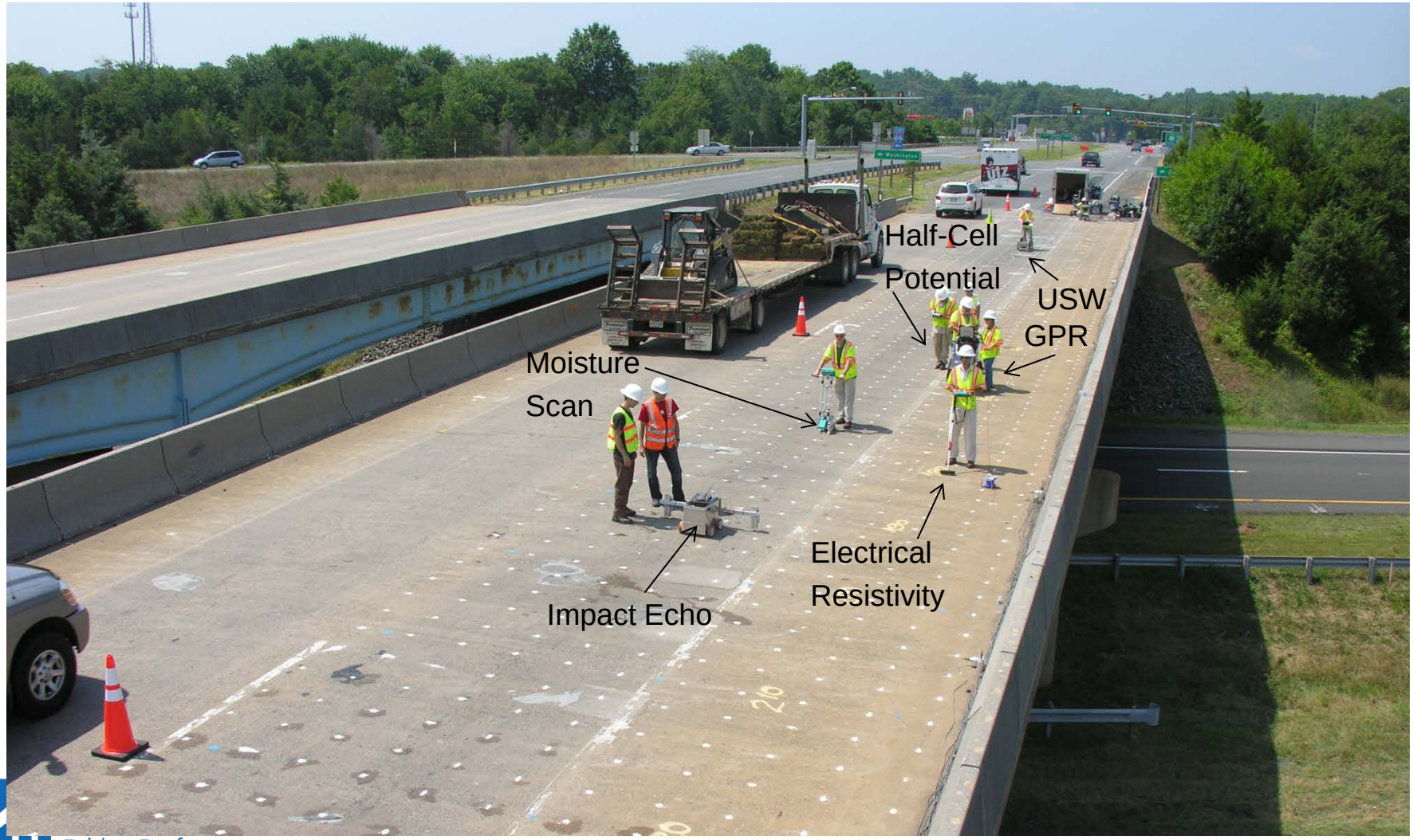
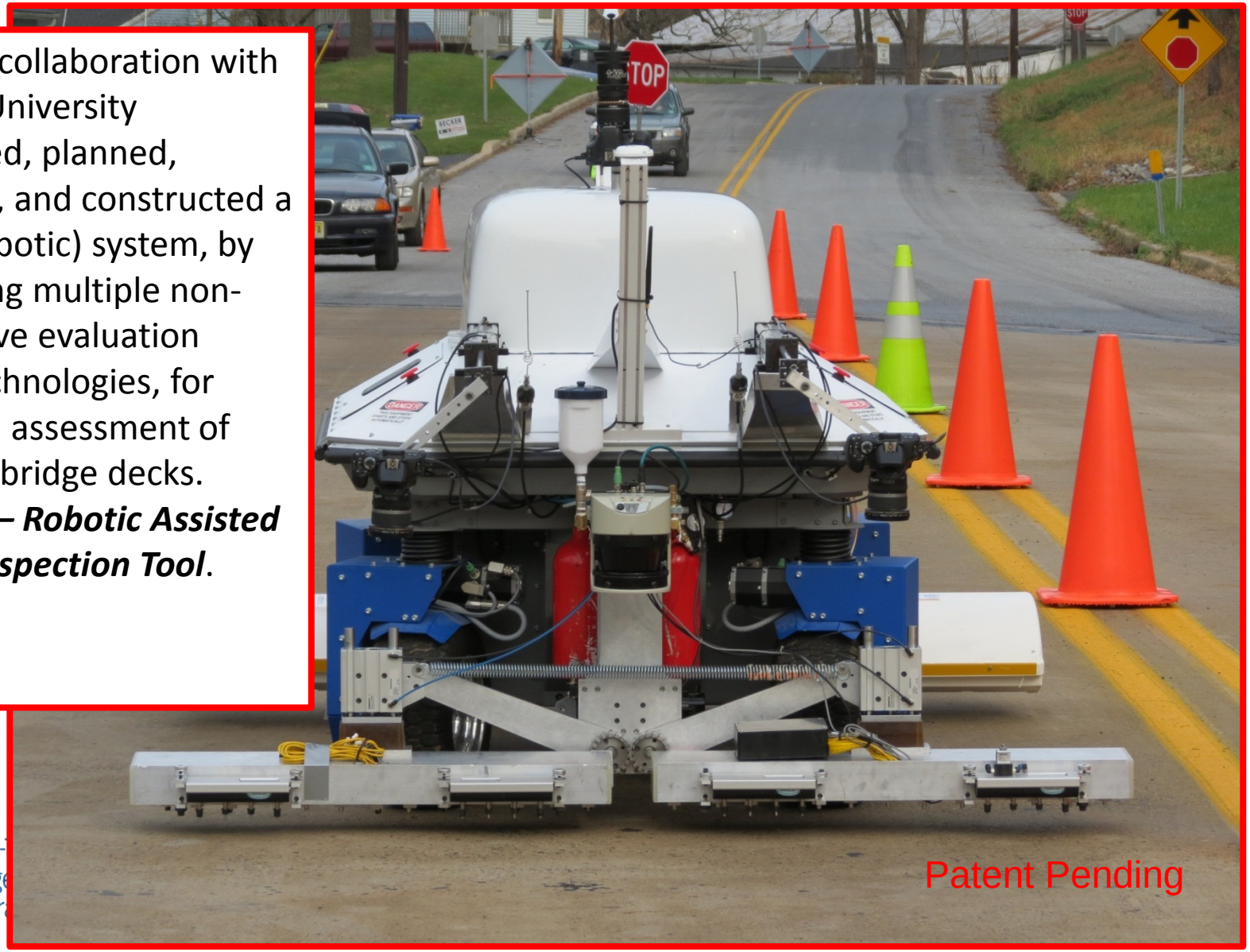
NDE Data Collection



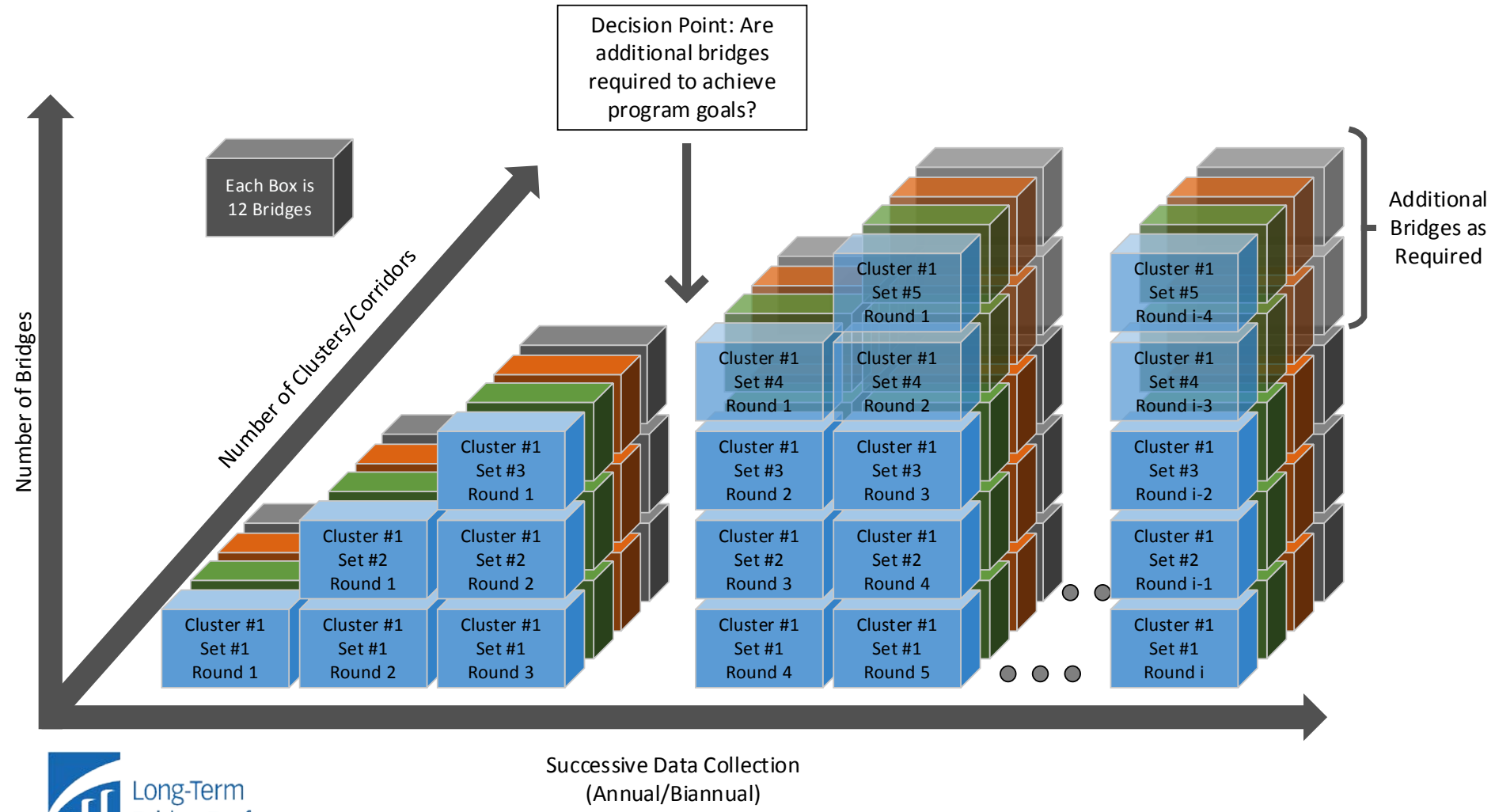
Bridge Performance Program

Need For Automated Data Collection

FHWA in collaboration with Rutgers University envisioned, planned, designed, and constructed a novel (robotic) system, by integrating multiple non-destructive evaluation (NDE) technologies, for condition assessment of concrete bridge decks. ***RABIT™ – Robotic Assisted Bridge Inspection Tool***.



Path Forward



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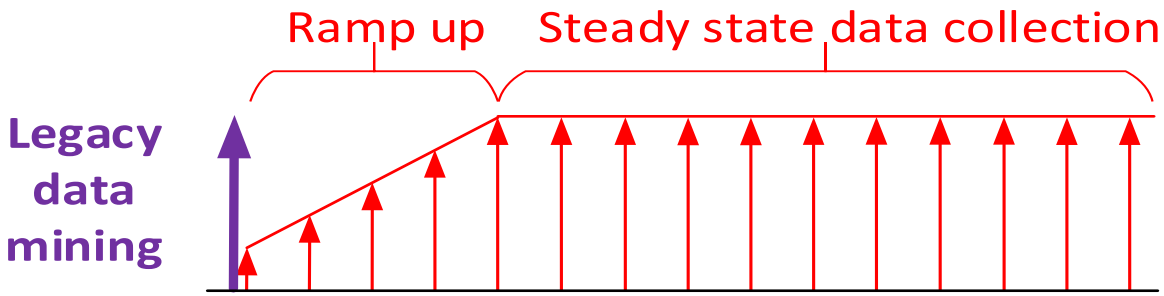
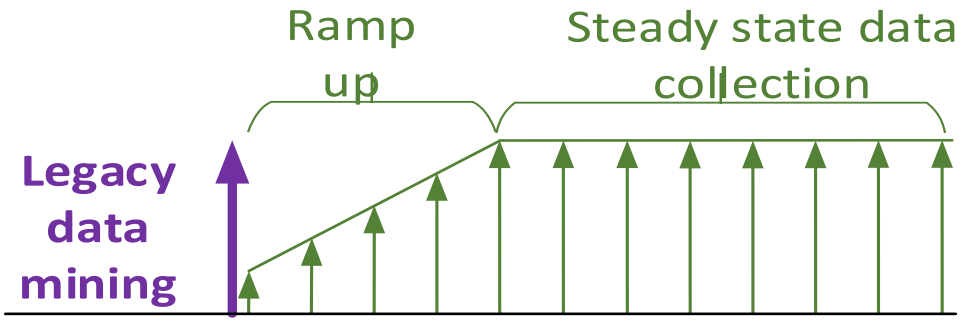
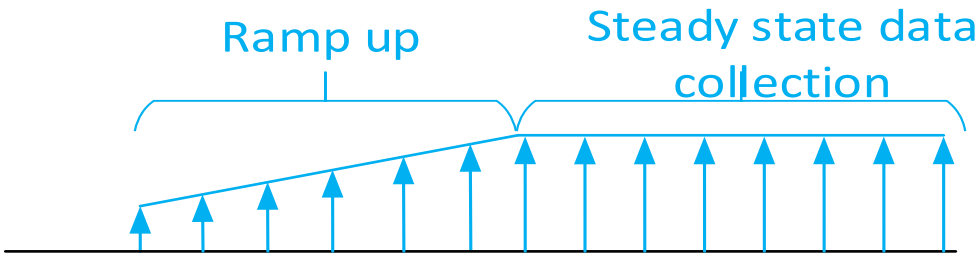
Growing the Program



Bridges with Untreated Decks



Bridges with Treated Decks



Corridor Bridges

Long-Term Bridge Performance Program

LTBP Bridge Breakdown

<table>
<tr><th colspan="4">Untreated Decks</th><th colspan="4">Treated Decks</th></tr>
<tr><td colspan="2" rowspan="2">Steel Multigirder</td><td colspan="2">Concrete</td><td colspan="2" rowspan="2">Steel Multigirder</td><td colspan="2">Concrete</td></tr>
<tr><td>Prestressed Concrete Multigirder</td><td>Prestressed Concrete Box</td><td>Prestressed Concrete Multigirder</td><td>Prestressed Concrete Box</td></tr>
<tr><td colspan="2">Steel Coatings</td><td colspan="2">Prestressing Strands</td><td colspan="2">Steel Coatings</td><td colspan="2">Prestressing Strands</td></tr>
<tr><td>Bearings</td><td>Joints</td><td>Bearings</td><td>Joints</td><td>Bearings</td><td>Joints</td><td>Bearings</td><td>Joints</td></tr>
</table>

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FHWA LTBP Program
Gulf Region – Data Collection

- States – Alabama, Arkansas, Florida, Louisiana, Mississippi & Texas

- Contractor- Michael Baker International
  PM - Richard Dunne; richard.dunne@mbakerintl.com;)
  Field Mgr. – Juan Rocha; jrocha@mbakerintl.com;

- Bare Concrete Decks – Steel Girder & Concrete Girder bridges
  Alabama - 1Concrete Reference Bridge & 1 Concrete Cluster Bridge
  Arkansas - 4 Steel Cluster Bridges
  Florida – 2 Concrete Cluster Bridges
  Louisiana – 1 Steel Reference Bridge, 3 Steel & 3 Concrete Cluster Bridges
  Mississippi – 1 Steel Reference Bridge, 1 Concrete Reference Bridge and
  3 Steel & 3 Concrete Cluster Bridges
  Texas – 2 Concrete Cluster Bridges

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FHWA LTBP Program
Gulf Region – Data Collection

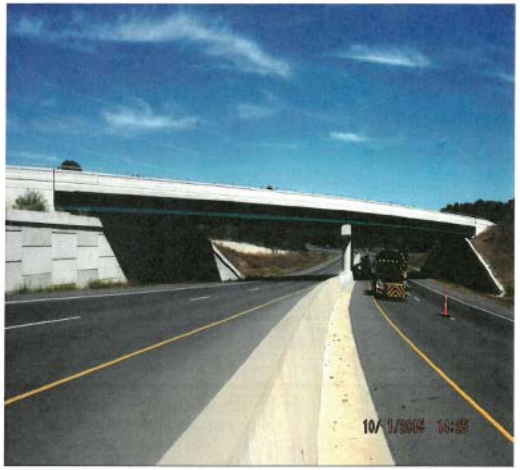
BRIDGE NO.: AR-7076
LTBP Inspection Summary

BRIDGE NAME: E SHORT HILLSBORO STREET OVER US 167
STRUCTURE TYPE: STEEL
STATE: ARKANSAS
STRUCTURE LENGTH: 243.5'
ROUTE NO.: 26440

Michael Baker
INTERNATIONAL

INSPECTION DATE: OCTOBER 1 & 2, 2015

Long-Term Bridge Performance Program
Structure No. 000000000007076
Visual Inspection (Defect level)



From 10/1/2015 to 10/2/2015
Team Name - Michael Baker International

Generated by LTBP Portal

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Key Contacts—LTBP Program

- **Website: http://www.fhwa.dot.gov/research/tfhrc/programs/infrastructure/structures/ltbp/**
- **Federal Highway Administration:**
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Thank You!

Questions?

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