



Long-Term Bridge Performance Program

Status Update

Northeast Bridge Preservation Partnership

September 2016

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LTBP Program Coordinator

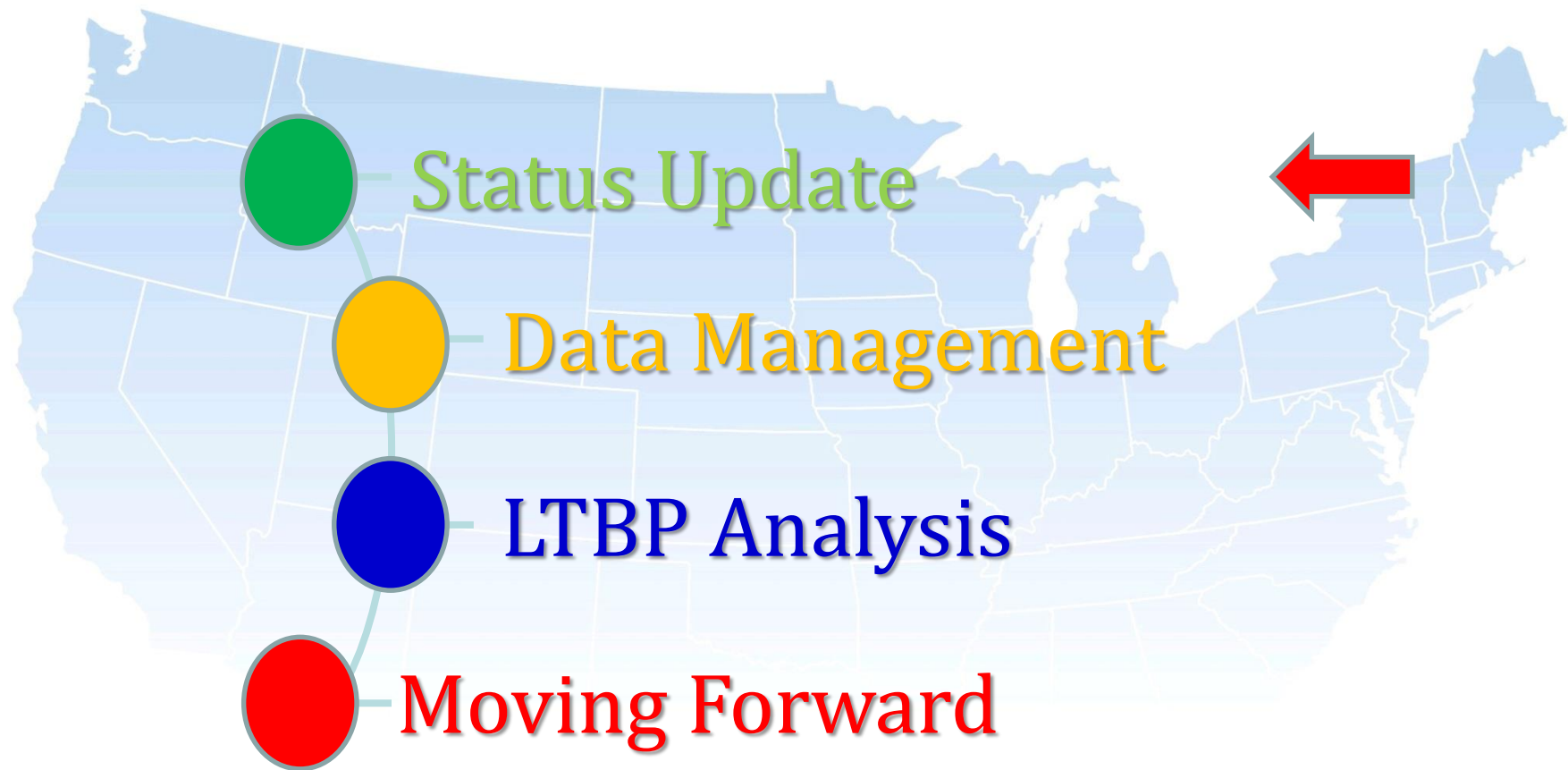
Long-Term Bridge Performance Program

Federal Highway Administration





Long-Term Bridge Performance Program





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Projects at a Glance

Rutgers

- Data-Driven Modeling
- Bridge Portal
- Field Data Collection
- Legacy Data Mining
- Other Projects – Drone

PB

- NW – SW visual inspection

Michael Baker

- Gulf Visual inspection, material sampling

PSI

- Legacy Data Mining

Pennoni

- WIM
- LTBP Performance Index
- Develop an accelerated testing bridge DB
- Website & Newsletter
- Protocol Publication
- RABIT Acquisition



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PSI -Description of Task

- Legacy Data Mining for Mid Atlantic and North East Cluster
- 415 bridges
- Data Collection and Initial Analysis Complete



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Michael Baker – Description of Task

Gulf Region Bridges 12 Steel & 12 Concrete Multi-girder Bare Concrete Decks

- Alabama – 2 Bridges (1 Reference Concrete & 1 Cluster Concrete)
- Arkansas – 4 Bridges (4 Cluster Steel)
- Florida – 2 Bridges (2 Cluster Concrete)
- Louisiana – 7 Bridges (1 Reference Steel, 3 Cluster Steel, 3 Cluster Concrete)
- Mississippi – 7 Bridges (1 Reference Steel, 3 Cluster Steel, 1 Reference Concrete, 2 Cluster Concrete)
- Texas – 2 Bridges (2 Cluster Concrete)

Data Collection Complete

Data Validation & Data Input Complete



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PB – Description of Task

Southwest and Northwest Region Bridges 12 CIP PT Box Girders & 12 Prestressed Multi-girders

Southwest Region

Arizona – 4 Bridges (1 Reference CIP PT Box & 3 Cluster CIP PT Boxes)

Nevada – 4 Bridges (1 Reference CIP PT Box & 3 Cluster CIP PT Boxes)

California – 4 Bridges (4 Cluster CIP PT Boxes)

Northwest Region

Oregon – 6 Bridges (1 Reference Prestressed, 5 Cluster Prestressed)

Washington – 6 Bridges (1 Reference Prestressed, 5 Cluster Prestressed)

Data Field Collection: 83% Complete

Data Upload: In Progress

Final Report and Tech Brief will Follow



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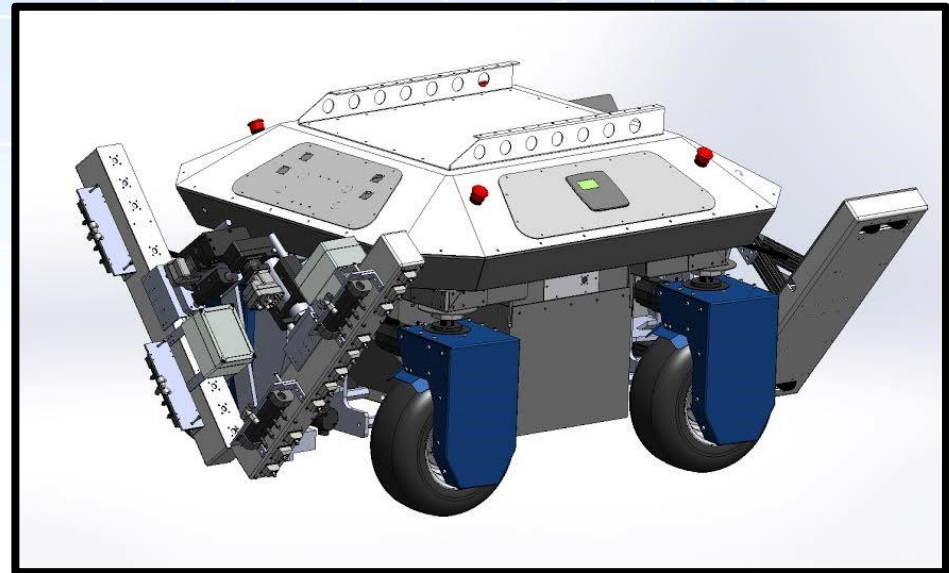
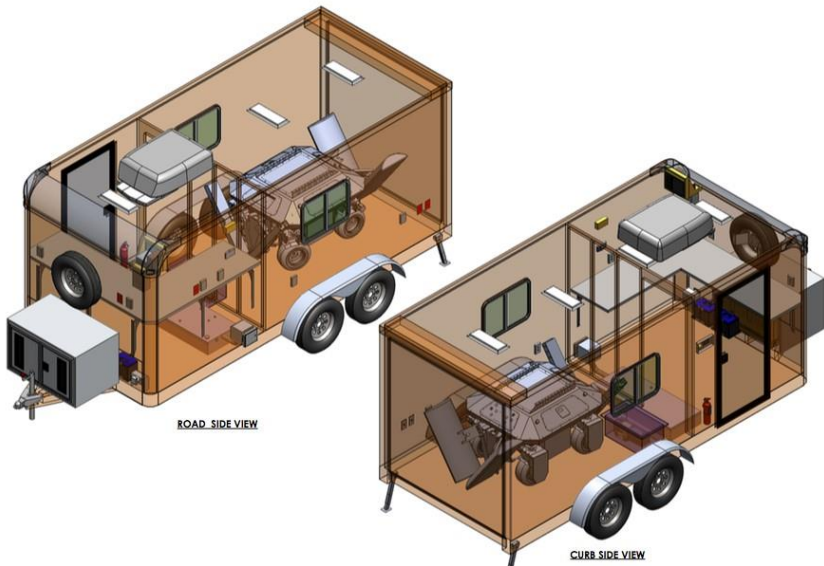
Pennoni -Description of Tasks

1. LTBP Protocols
2. Technical Assistance
3. LTBP Newsletter & Website
4. Onsite Staff
5. Validate NDT Collected Data
6. Develop Bridge Traffic DB
7. Develop an Accelerated Bridge Testing DB
8. Quarterly Progress Report
9. LTBP Research Index
10. RABIT™ Procurement

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Automated Data Collection RABIT™ Bridge Deck Assessment Tool

- Procurement of four autonomous robotic bridge deck assessment tools inclusive of training to LTBP contractors for the proper deployment of the technology in field data collection activities



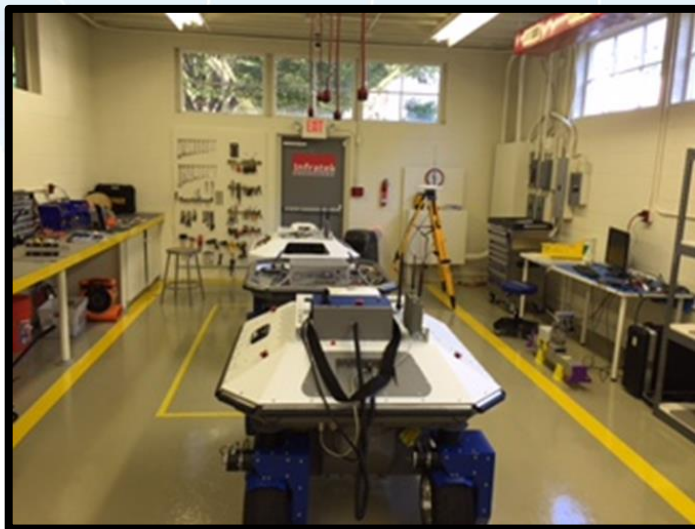


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RABIT™ Bridge Deck Assessment Tool

Status:

- Development of the software is on-going
- User Manual and Training Curriculum in development
- Validation of RABIT #1 scheduled for September – October.
- Robotic platform for RABIT #2 arrived





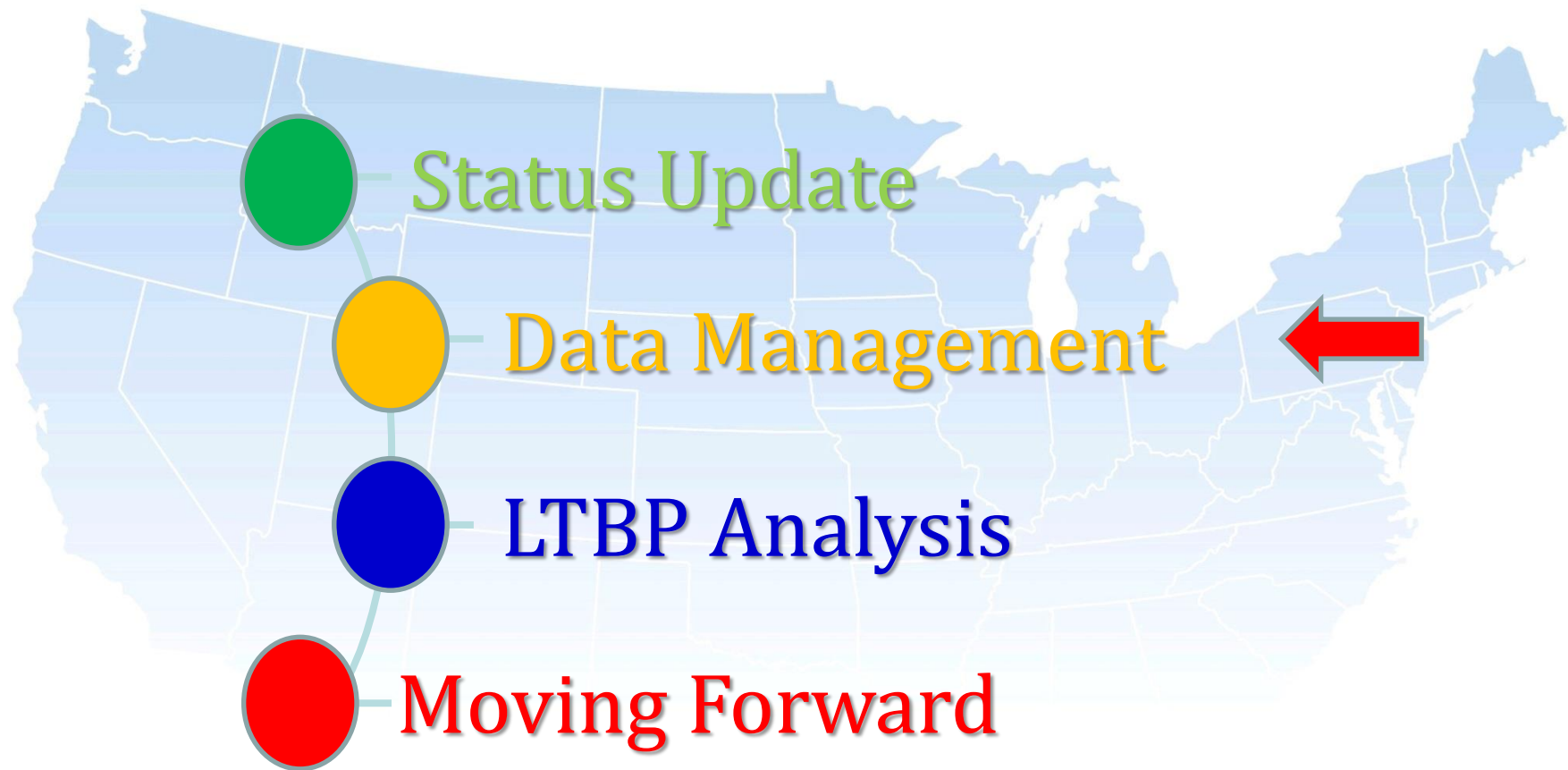
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Rutgers – Tasks Description

1. LTBP Protocols Training
2. LTBP Bridge Portal Development
3. LTBP Field Test – Mid Atlantic Cluster
 - 24 Bridges, NDT, Visual Inspection & THMPR
4. Legacy Data Mining
 - 14 Clusters and 10 Corridors (1100 Bridges)
5. Corrosion Studies
6. Quarterly Progress Reports
7. Other Special Projects
8. LTBP Advanced Deterioration and Cost Analysis Models



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Current Status:

Version 1.1 in process of being deployed on FHWA server.

Some of the updates and new features include:

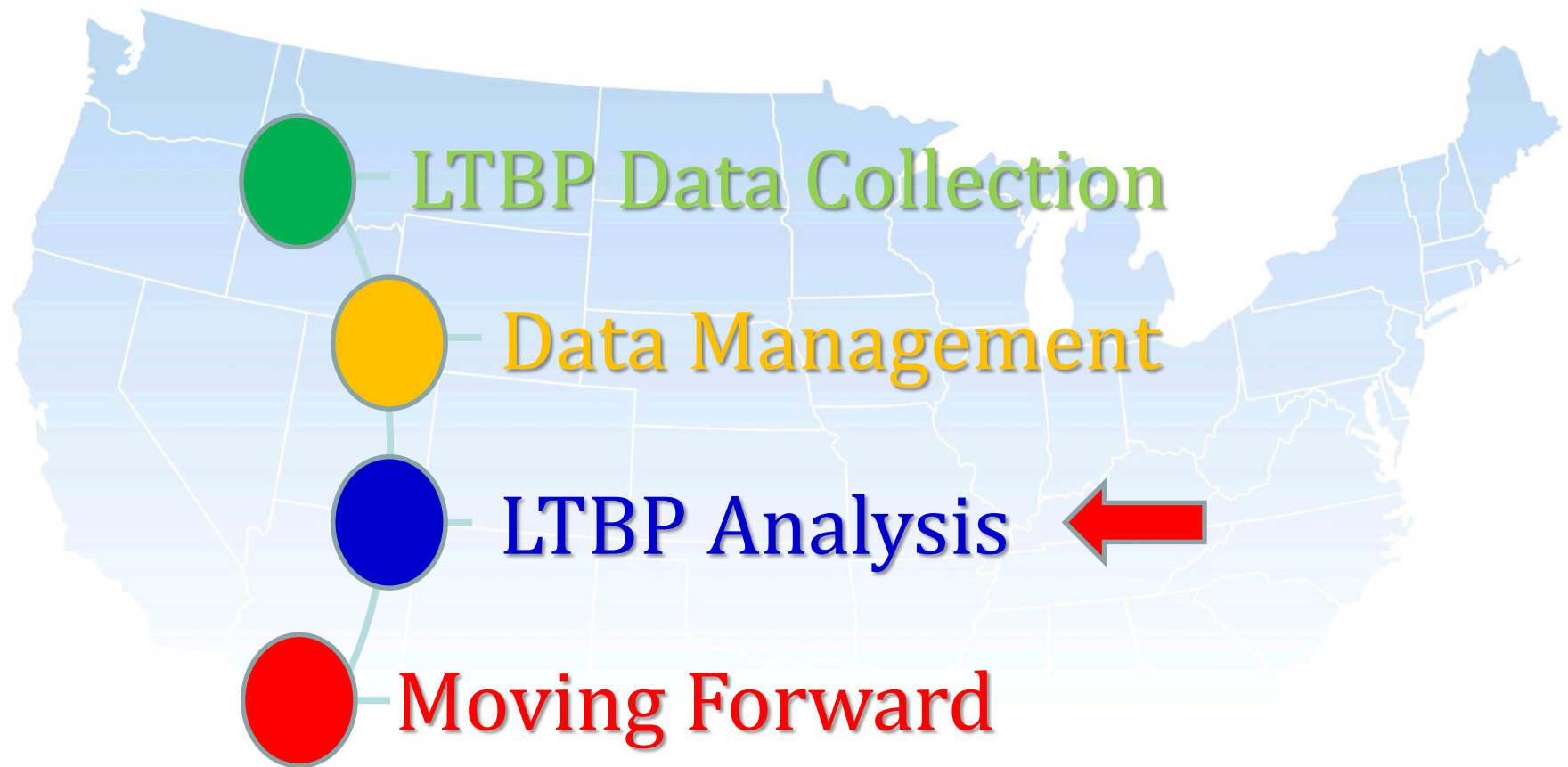
- Improved search module (Supports And/Or)
- Search using Excel file
- Complete support for NBE
- Environmental data for all bridges
- User interface enhancement
- Improvement to map page (New draw region features)
- ***Bridge location fix for owners***
- Timelines for Bridge Reinforcement
- ***History for states (State Summary Report)***
- Enhanced document and photo management

[Let's Take a Look at Version 1.1 of the LTBP Bridge Portal](#)





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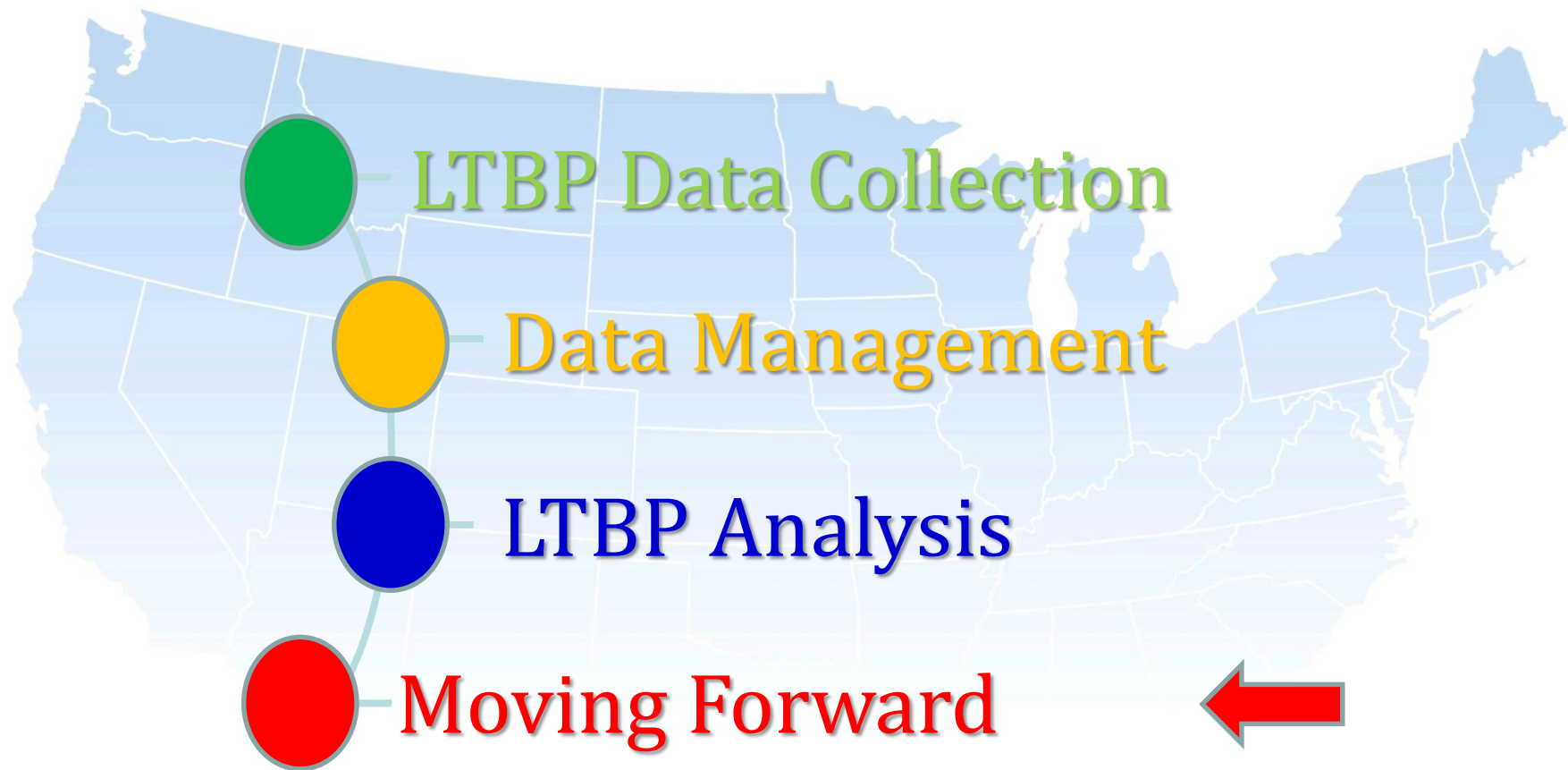
Refined Data Analysis, Modeling, and Interpretation Framework

Utilizes 2-Pronged Approach for Deterioration Modeling

- Top Down Approach -- Incorporate both deterministic and probabilistic approaches concurrently
- Bottom Up Approach – refinement of forecasted deterioration using LTBP NDE data



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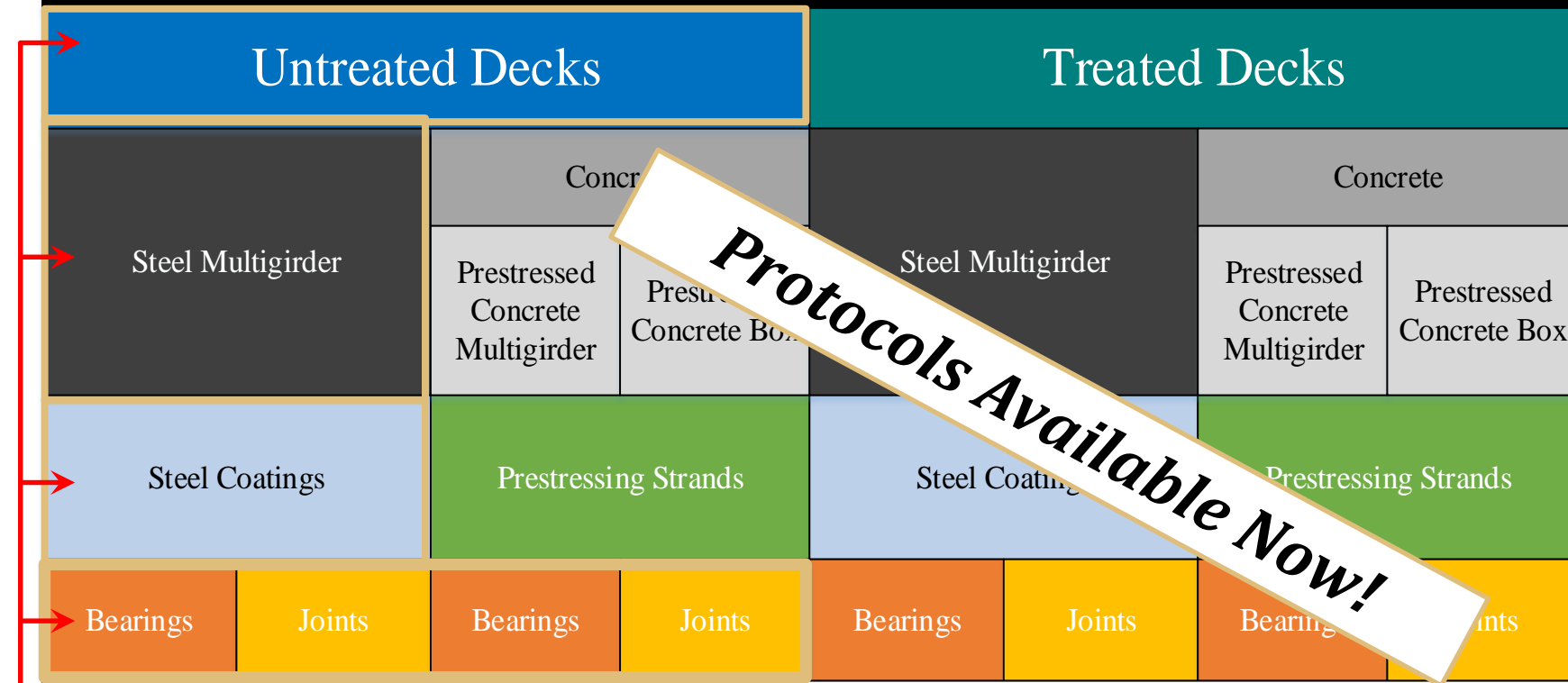


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LTBP Bridge Breakdown

Draft Business Plan

LTBP Program



Field Efforts

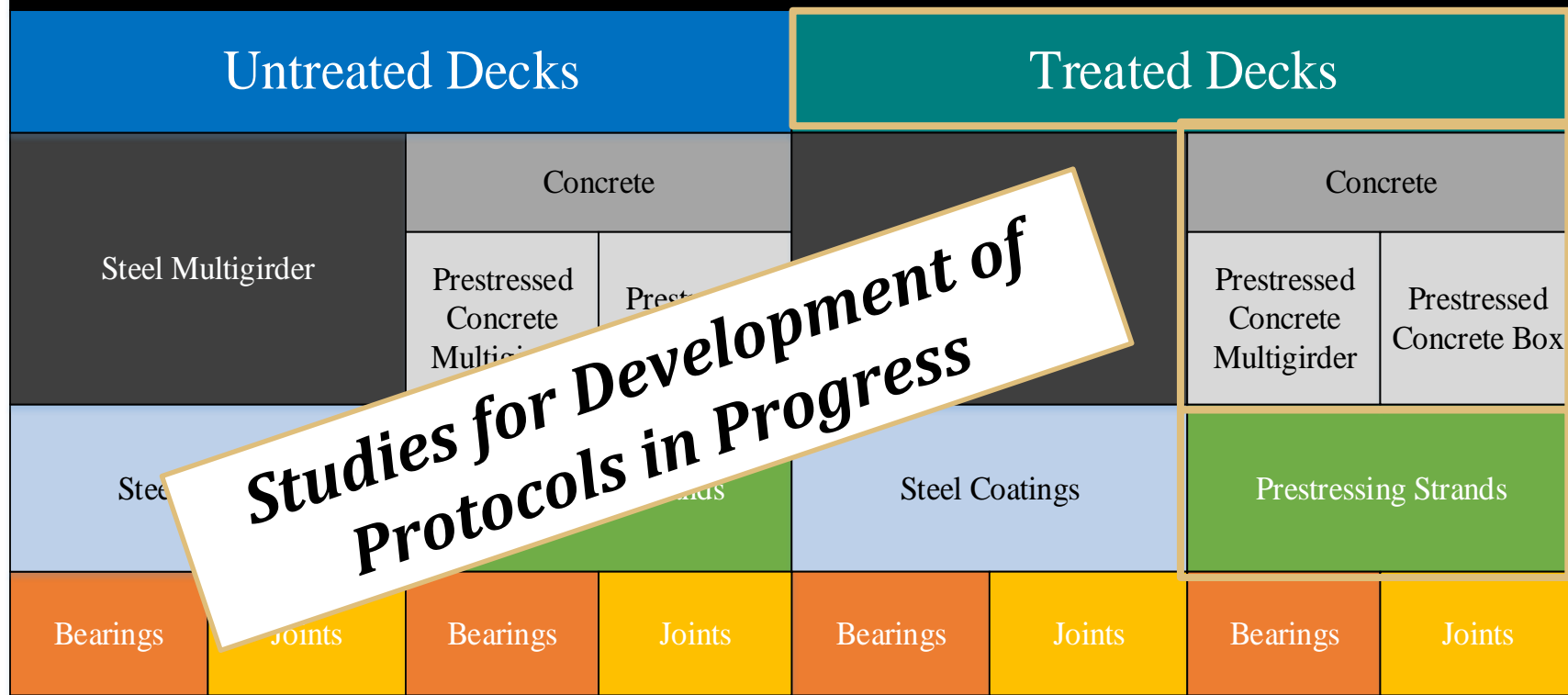


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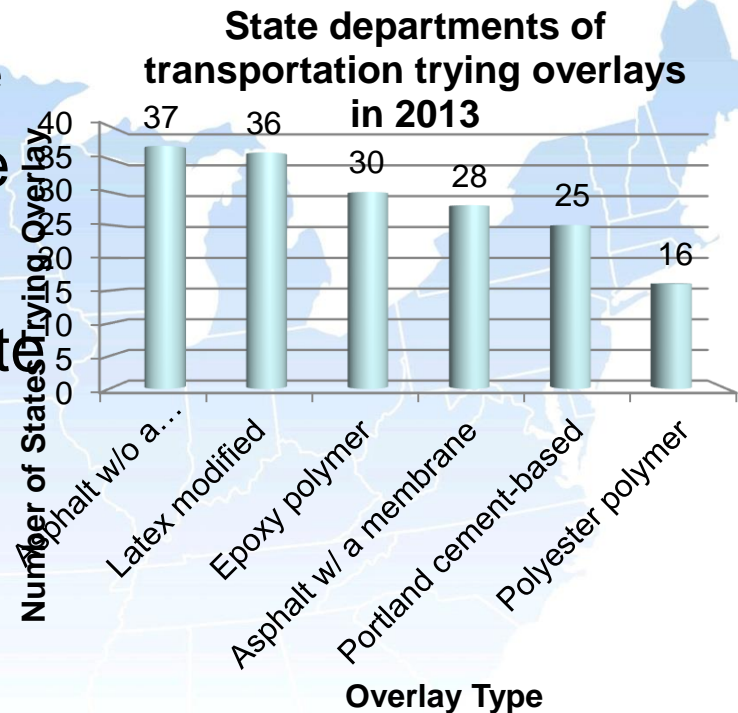
LTBP Bridge Breakdown





Seven main types of deck overlays

- asphalt with a liquid membrane
- asphalt with a fabric membrane
- asphalt without a membrane
- Portland cement-based concrete
- latex modified concrete
- epoxy polymer concrete
- polyester polymer concrete

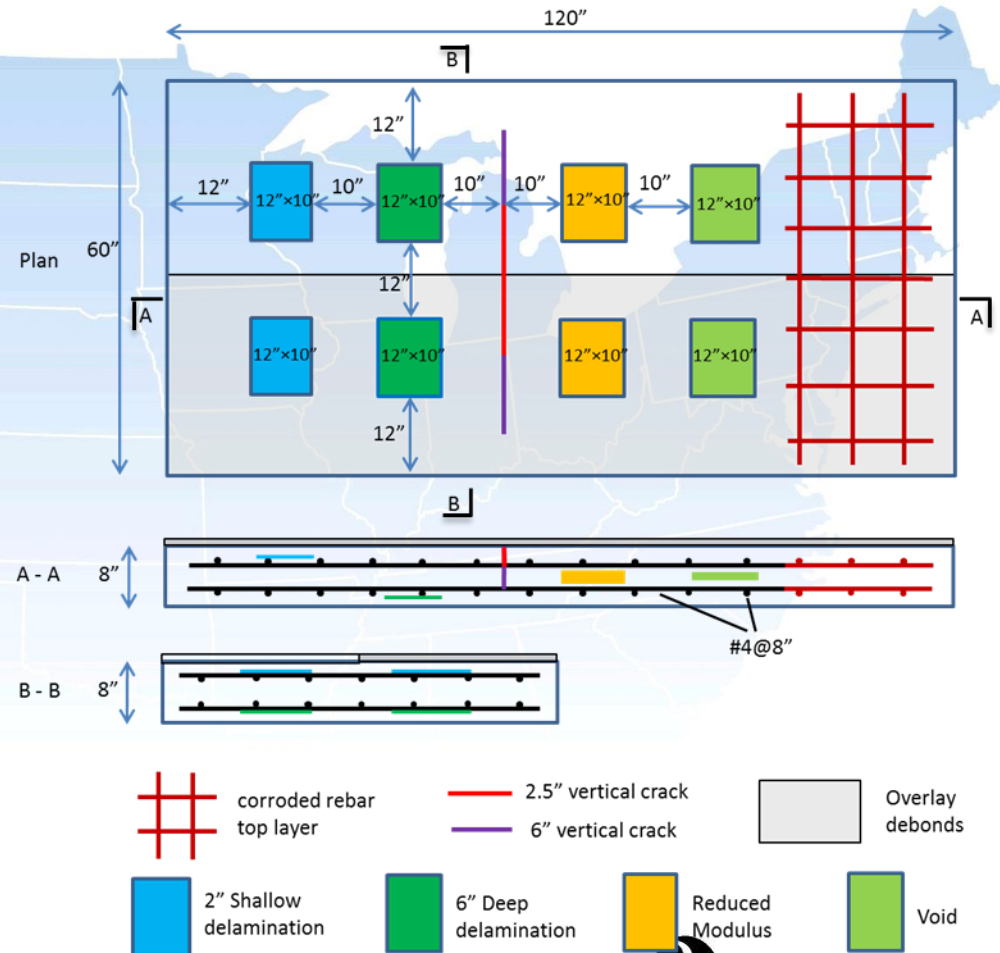




Validation of NDE techniques in lab

Design of validation decks

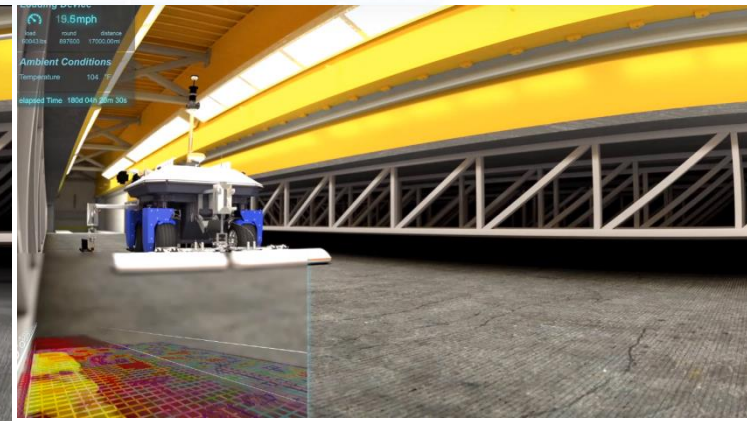
- Seven identical decks: one deck for each type of overlay
- Each deck has the same defects: debonding, delamination, void, honeycomb, cracking, and corrosion.





Large-Scale Specimen Testing

Consideration: BEAST

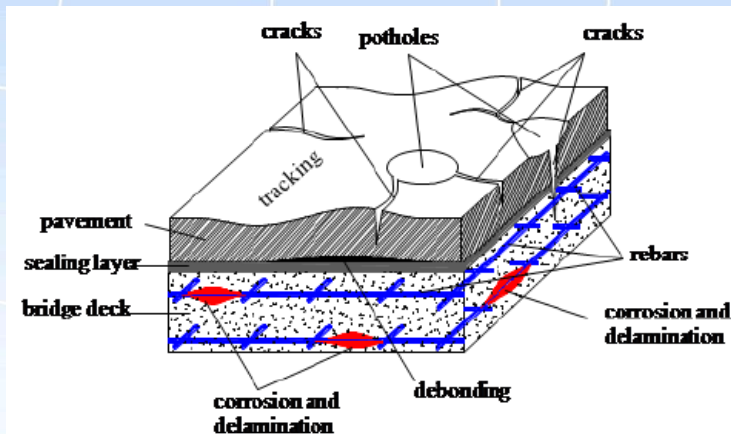
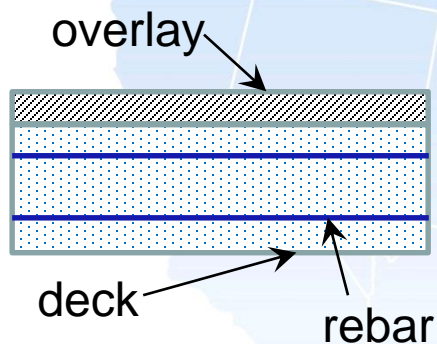


Large-Scale Specimen Testing

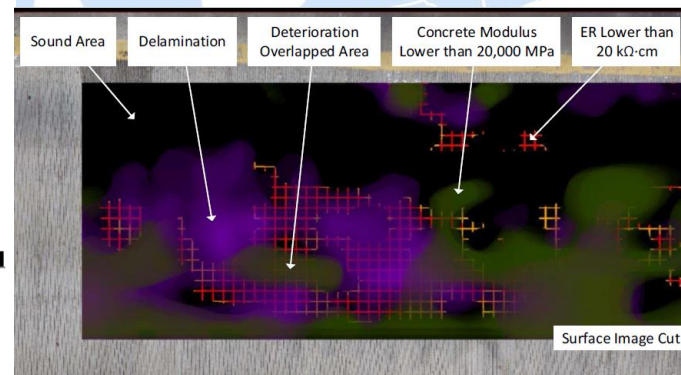
Design full-scale
decks with overlays

Accelerated
deterioration in BEAST

Nondestructive
evaluation



(Birken et al. 2012)



(Kim et al. 2015)



Selection of actual bridge decks with overlays

- Asphalt with a liquid membrane
Project name: 7 Miles of Asphalt Concrete Milling and Resurfacing on I-84 , Dutchess County, NY
- Asphalt with a fabric (preformed sheet) membrane
Project name: I-39 Kishwaukee River Bridge, Rockford, IL
- Asphalt without a membrane
 1. I-85 Northbound lane over Route 629, La Crosse, VA
 2. Span 22 eastbound and westbound lanes of the Norris Bridge on State Route 3 over the Rappahannock River





Selection of actual bridge decks with overlays

- Portland cement-based concrete
 - Three bridges on I-95 south of Emporia, Virginia
- Latex modified concrete
 1. Three bridges on I-95 south of Emporia, Virginia
 2. A bridge in the heart of Baltimore (Maryland) between I-695 and the Ft. McHenry Tunnel
 3. 18 bridges on I-695 and Route 702 in Baltimore County, Maryland
- Epoxy polymer concrete
 - Four bridges on I-81.
- Polyester polymer concrete
 - Rte 340, Rte 99, and Rte. 629 in Virginia.





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Moving Forward →

- Rutgers Contract Ends (Fall 2017)
- Current IDIQ contract has reached Ceiling – No ability to add new tasks

For Continuity of Work → Two New Contracts:

- Technical Support Services Contract (TSSC) – to be awarded Fall 2016
- Data Collection Contract – Synopsis recently posted on FedBizOps - to be awarded Summer 2017

Critical items (requiring continued funding or initiating of new work):

- Portal (Continue)
- Gap analysis (Initiate)
- Strategic Research Matrices (Initiate)
- Data collection steel coatings (Initiate)
- Data Collection untreated decks (Initiate)
- Deterioration and Cost Analysis Modeling (Continue)



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Questions?

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