



Federal Highway Administration
Long-Term Bridge Performance Program

LTBP Program Update
for South East Bridge Preservation Partnership
April 13, 2011

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LTBP Objective



- Detailed inspection, periodic evaluation and monitoring (representative sample of bridges)
- Taking advantage of legacy data and existing research activities

Desired/Anticipated Outcomes

Improved knowledge of bridge performance

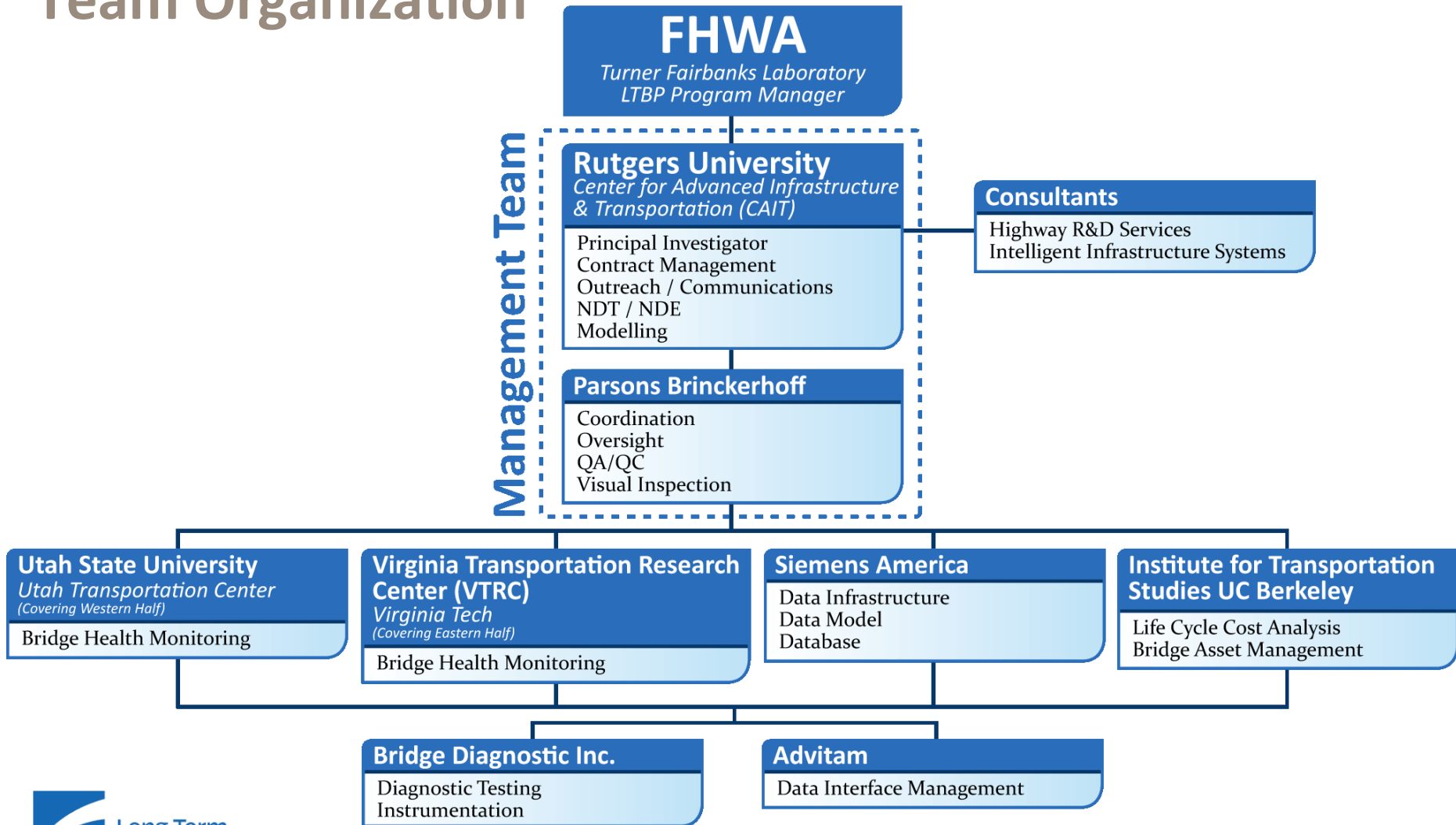
Development of improved predictive and deterioration models

Means to quantify effectiveness of various maintenance, preservation, repair and rehabilitation strategies

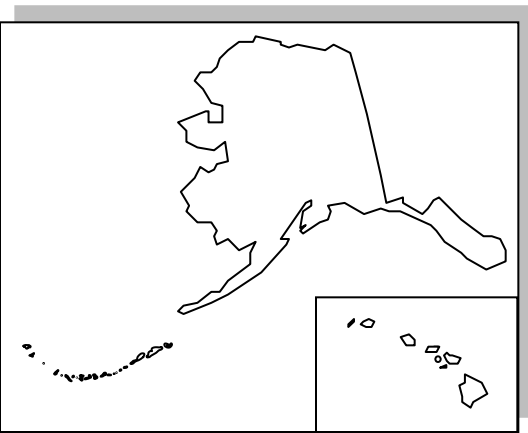
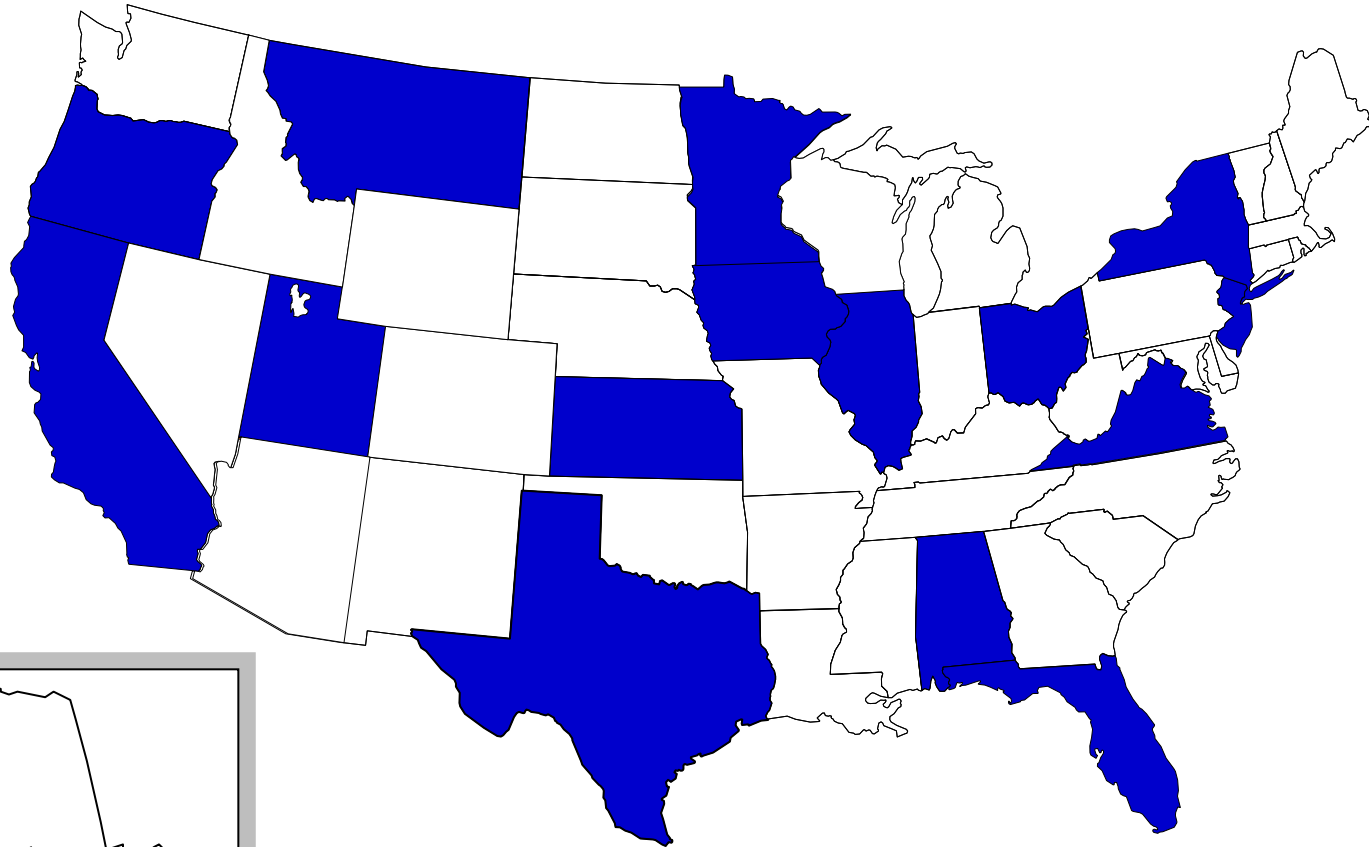
Tools for bridge management

Standards for testing and monitoring

Team Organization



Focus Groups - Participating State DOTs



Design of experimental program

Input from Stakeholders

- Government
- Industry
- Academe

Knowledge Gaps → Sampling →

Data Mining and Analysis

- NBI data
- Pontis data
- Inspection reports
- Maintenance records
- Weather data
- Traffic data

Visual Inspection

- Non-standard
- Arms length
- Quantitative
- Conventional Tools

Global Testing

- Load Testing
- Modal Testing
- Monitoring

Pilot
Bridges

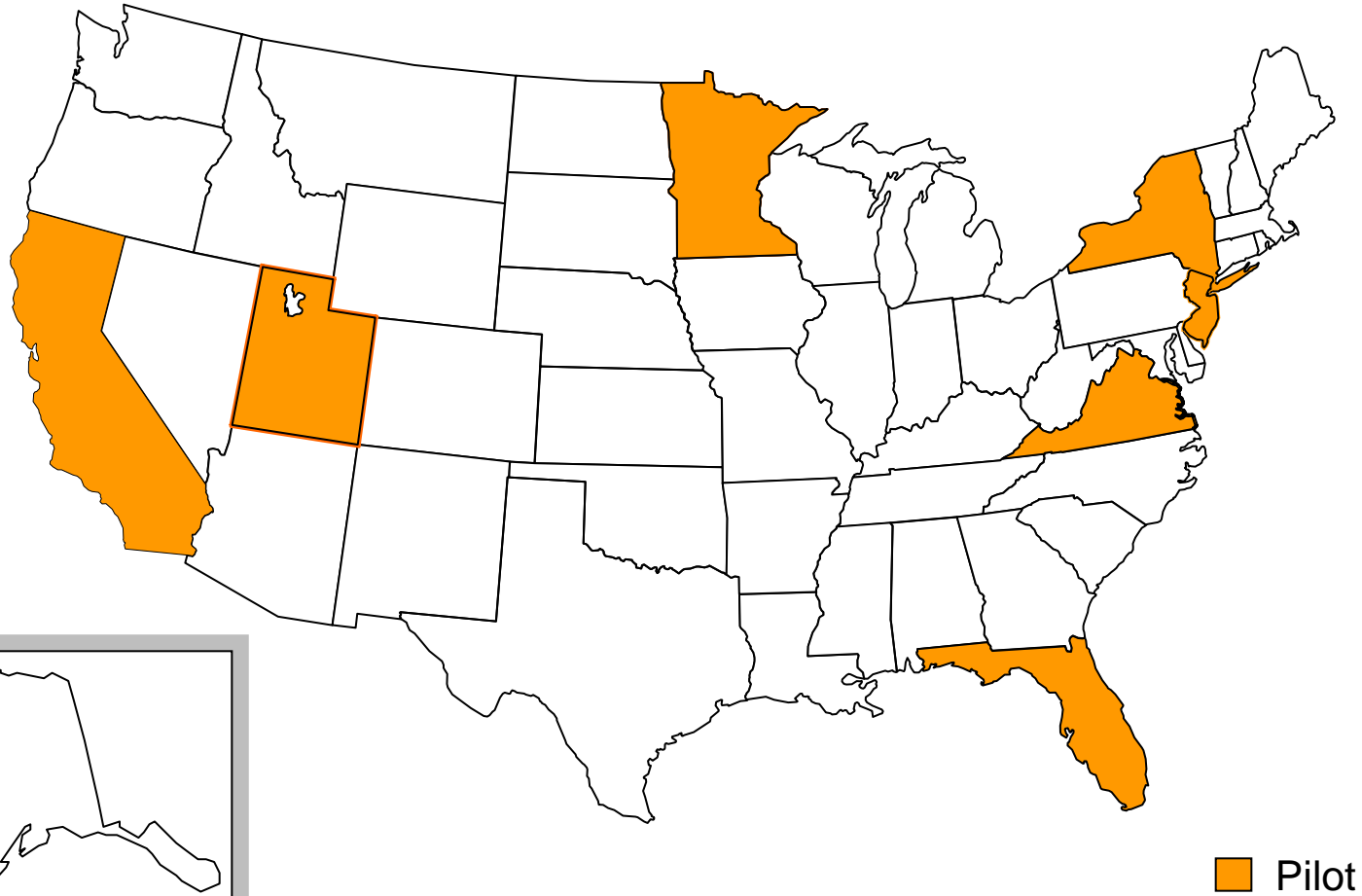
NDE

- Impact Echo
- GPR
- Ultrasonic
- Seismic
- Resistivity

Intrusive Testing

- Material Sampling
- Stiffness
- Strength
- Porosity
- Chloride Content

Pilot Bridges - Participating State DOTs



US 15 over I-66 Haymarket, VA



I-195 Eastbound over Sharon Station Rd. near Allentown, NJ



I-5 over Lambert Road near Sacramento, California



Cannery Road, US 15, North of Salt Lake City, Perry, Utah

Utah Bridge



NY RTE 21 over Karr Valley Creek near Almond, New York



Trunk Highway 123 over Kettle River near Sandstone, MN

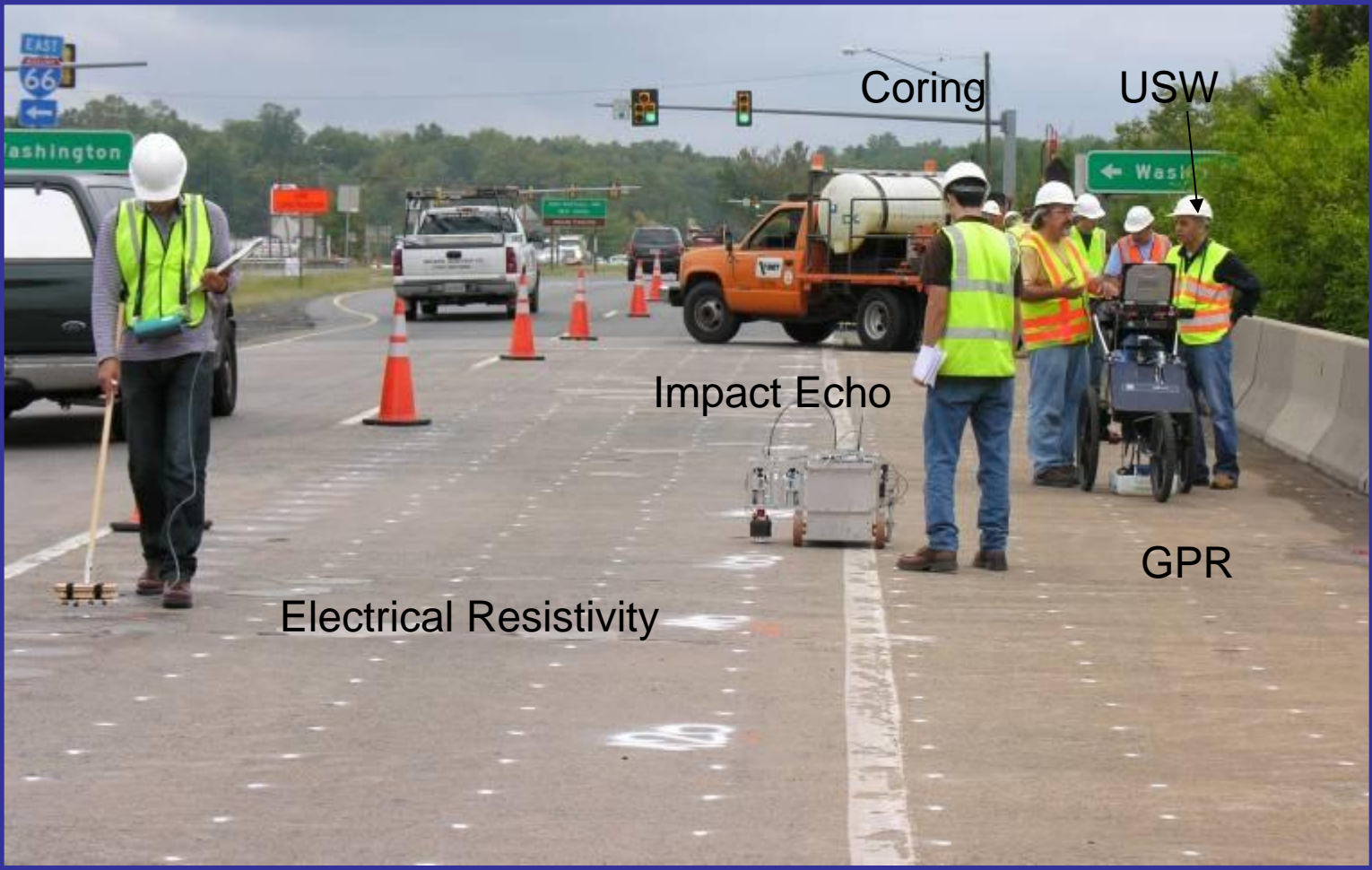


RT 430 WB over ICW Daytona, FL

Florida Bridge

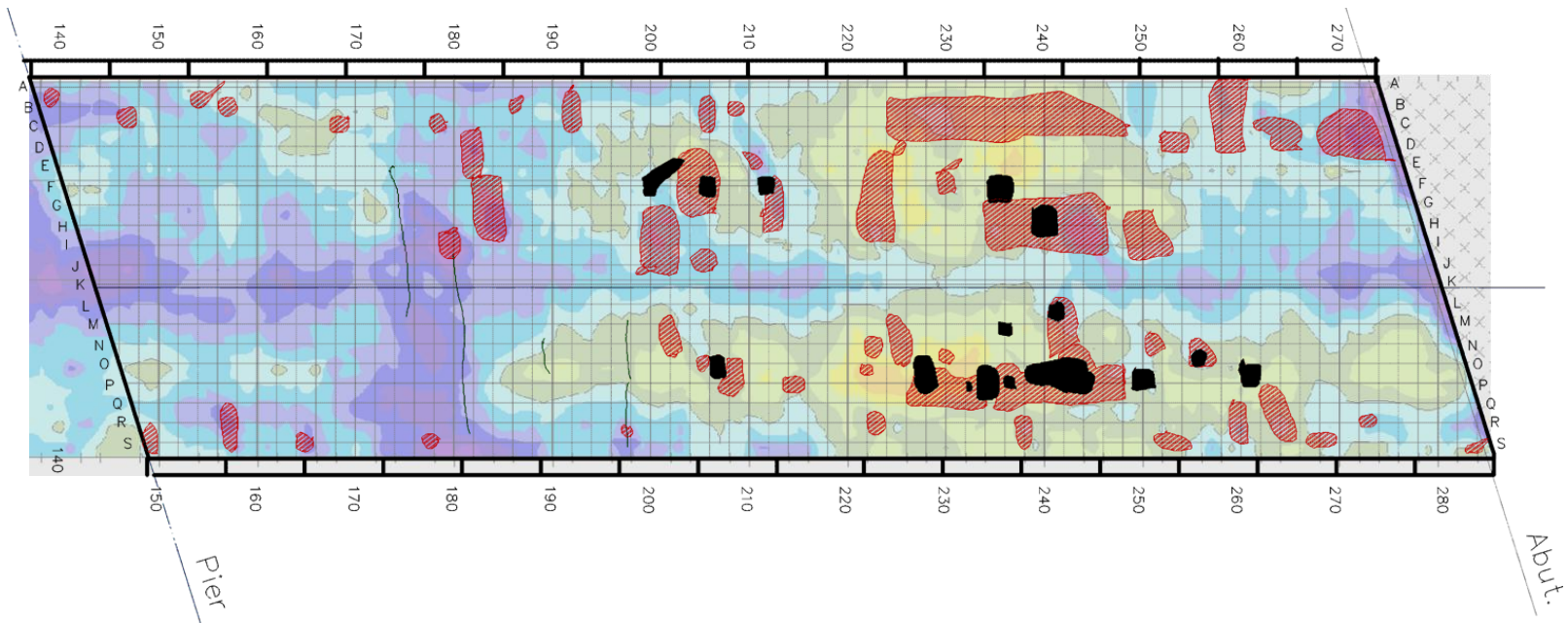


Virginia Bridge Testing



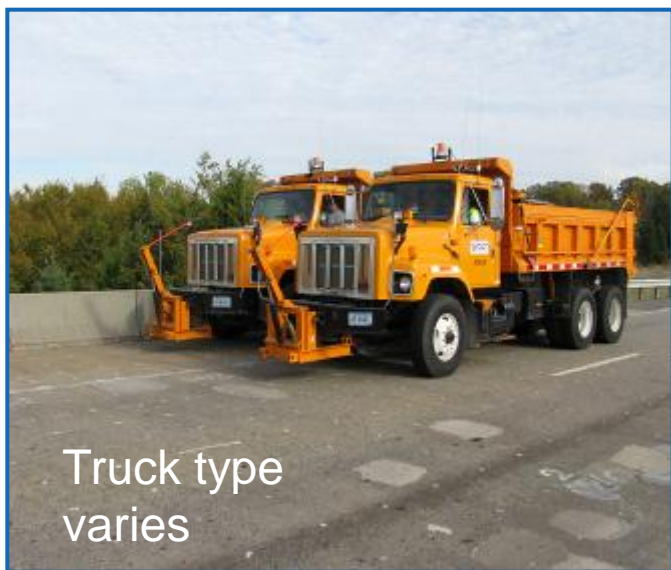
Deck Surface Damage Survey versus Cover Depth (via GPR)

Virginia Bridge

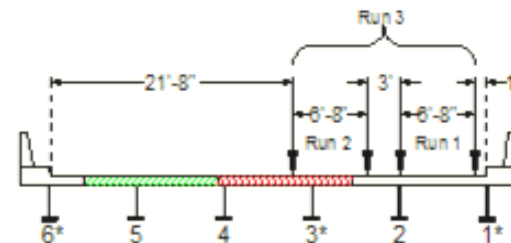


Live Load Testing

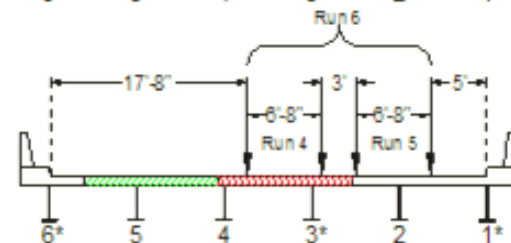
Quasi-Static Test Plan Looking in Direction of Traffic



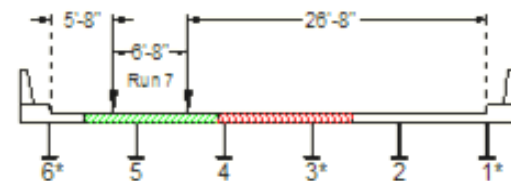
1. Maximize loading on Girder 1 and Girder 2.



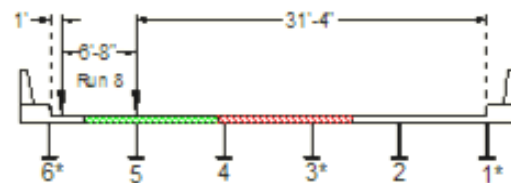
2. Maximize loading in Girder 3 given the placement of Run 4 in the center of the traffic lane.



3. Run 7 centers a truck in the left hand lane.

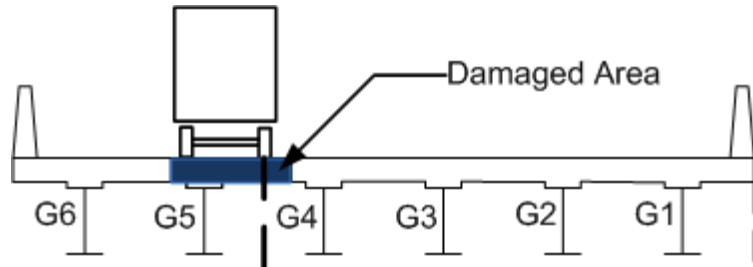


4. Maximize loading on Girder 6 while observing the required traffic control restrictions

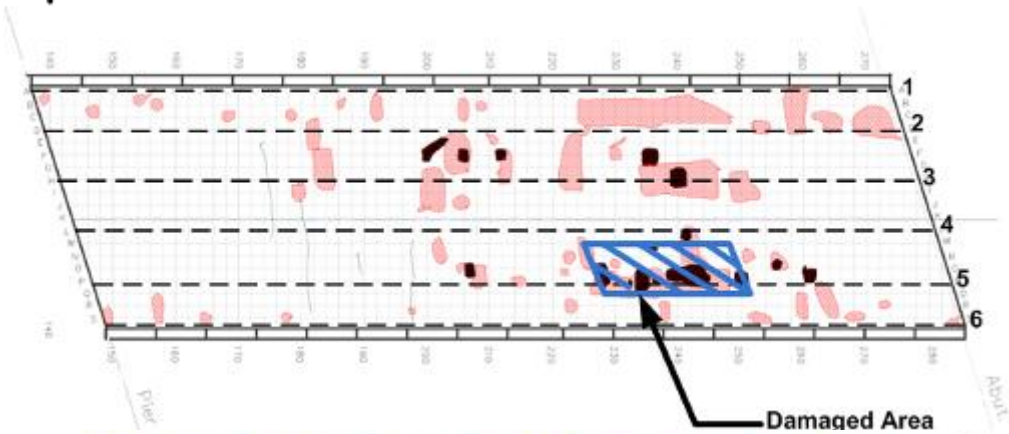


Modeling Deterioration

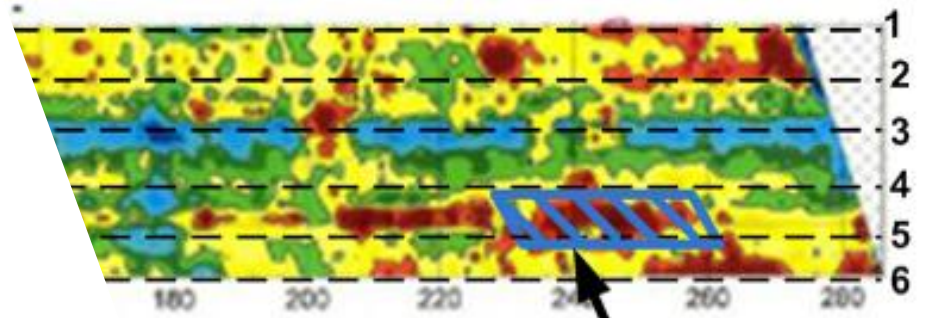
Virginia Bridge



Visual Inspection:
light red - delaminations
dark red - patches

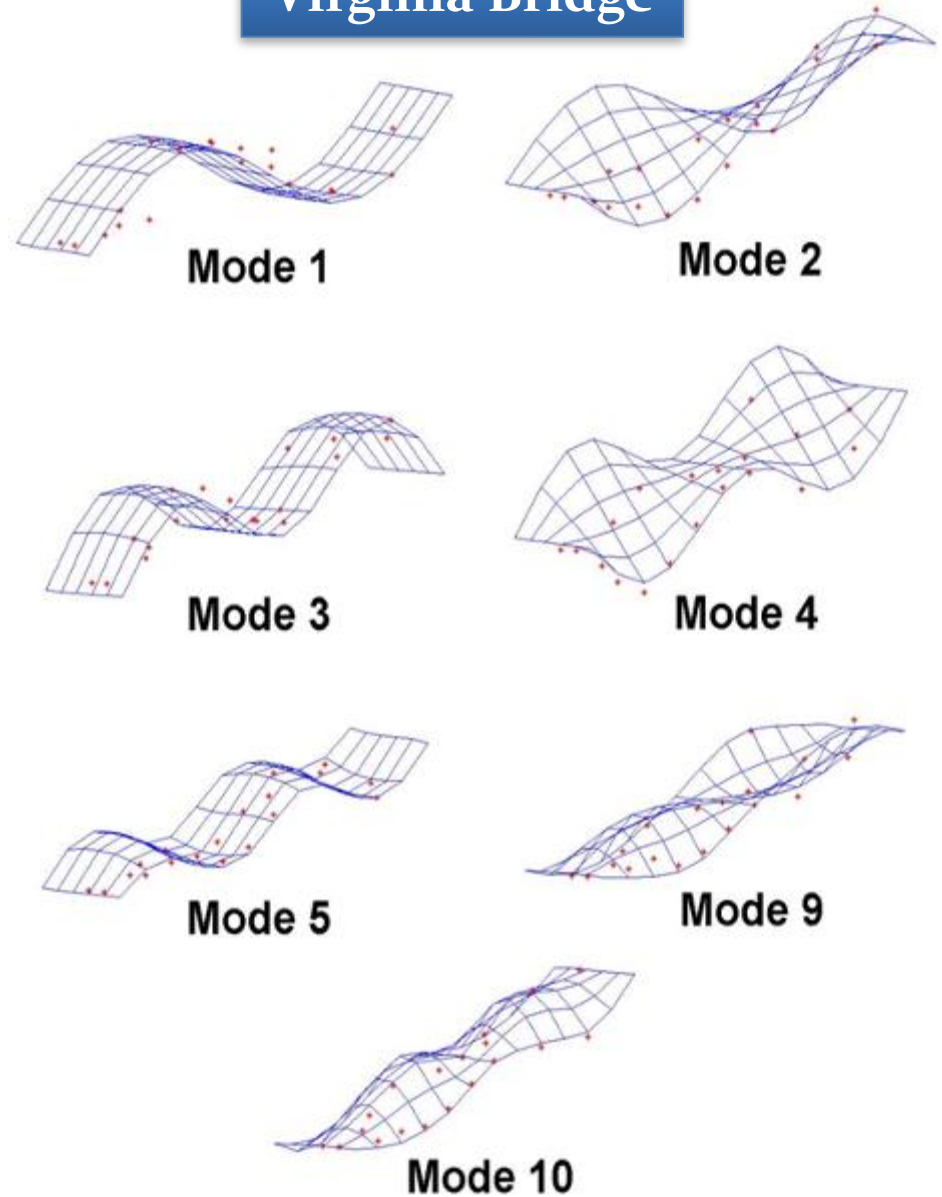


GPR Condition Map:
yellow - poor
red - serious



Dynamic Testing

Virginia Bridge



LTBP Pilot Study Status

Activity	VA	UT	CA	NJ	MN	NY	FL
Bridge Selection	✓	✓	✓	✓	✓	✓	✓
Finite Element Model	✓	✓	✓	✓	✓	✓	🕒
Live Load Testing	✓	✓	✓	✓	✓	✓	🕒
Visual Inspection	✓	✓	✓	✓	✓	✓	✓
NDE Deck Survey	✓	✓	✓	✓	✓	✓	✓
Coring & Physical Testing	✓	✓	✓	✓	✓	✓	🕒
Analysis of Results	🕒	🕒	🕒	🕒	🕒	🕒	📌

Initial testing on all pilot bridges to be done by 9/30/2011

Data Infrastructure

Data Collection

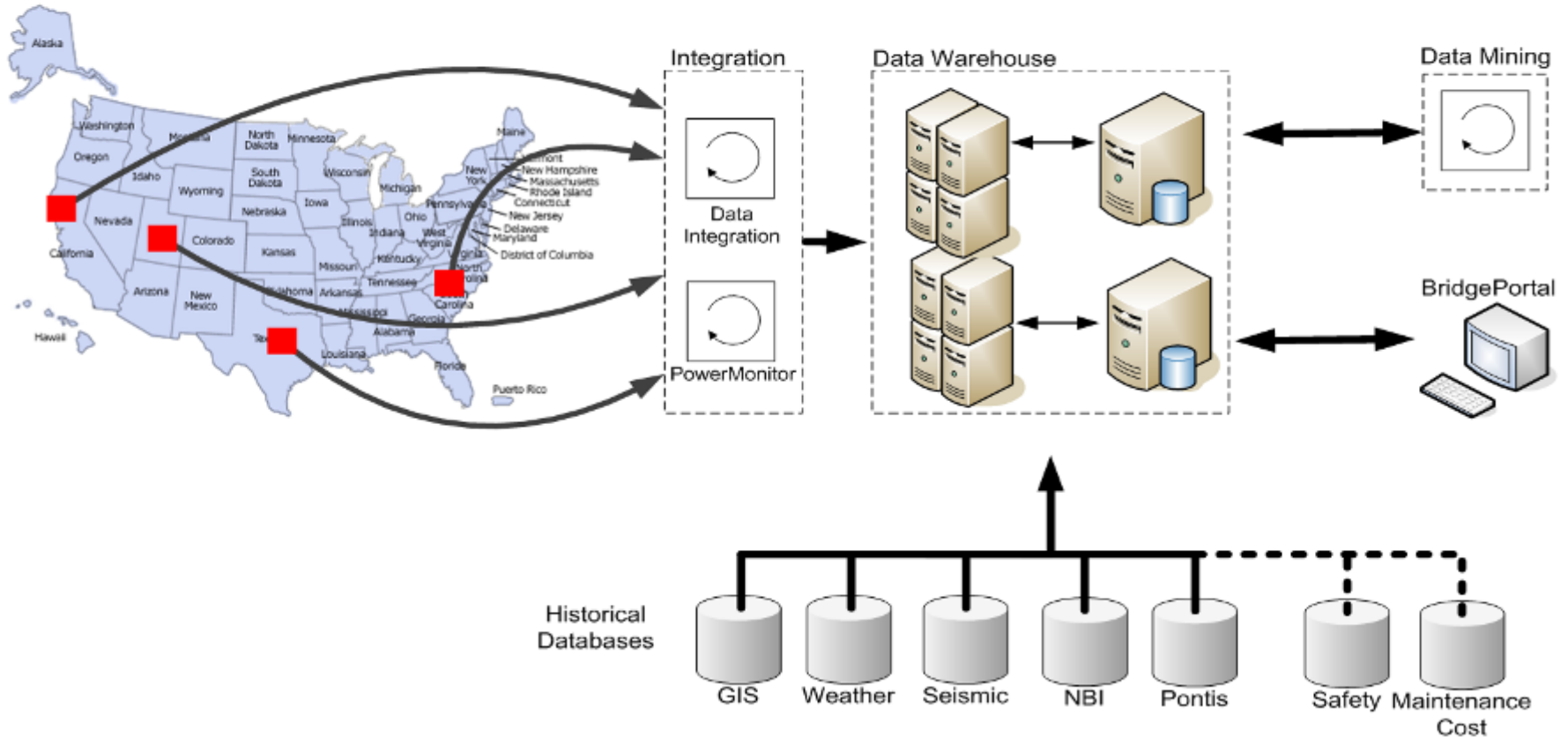
- Inspection Reports
- Temperature
- Strain Gauge
- Traffic
- Wind
- NDE/NDT

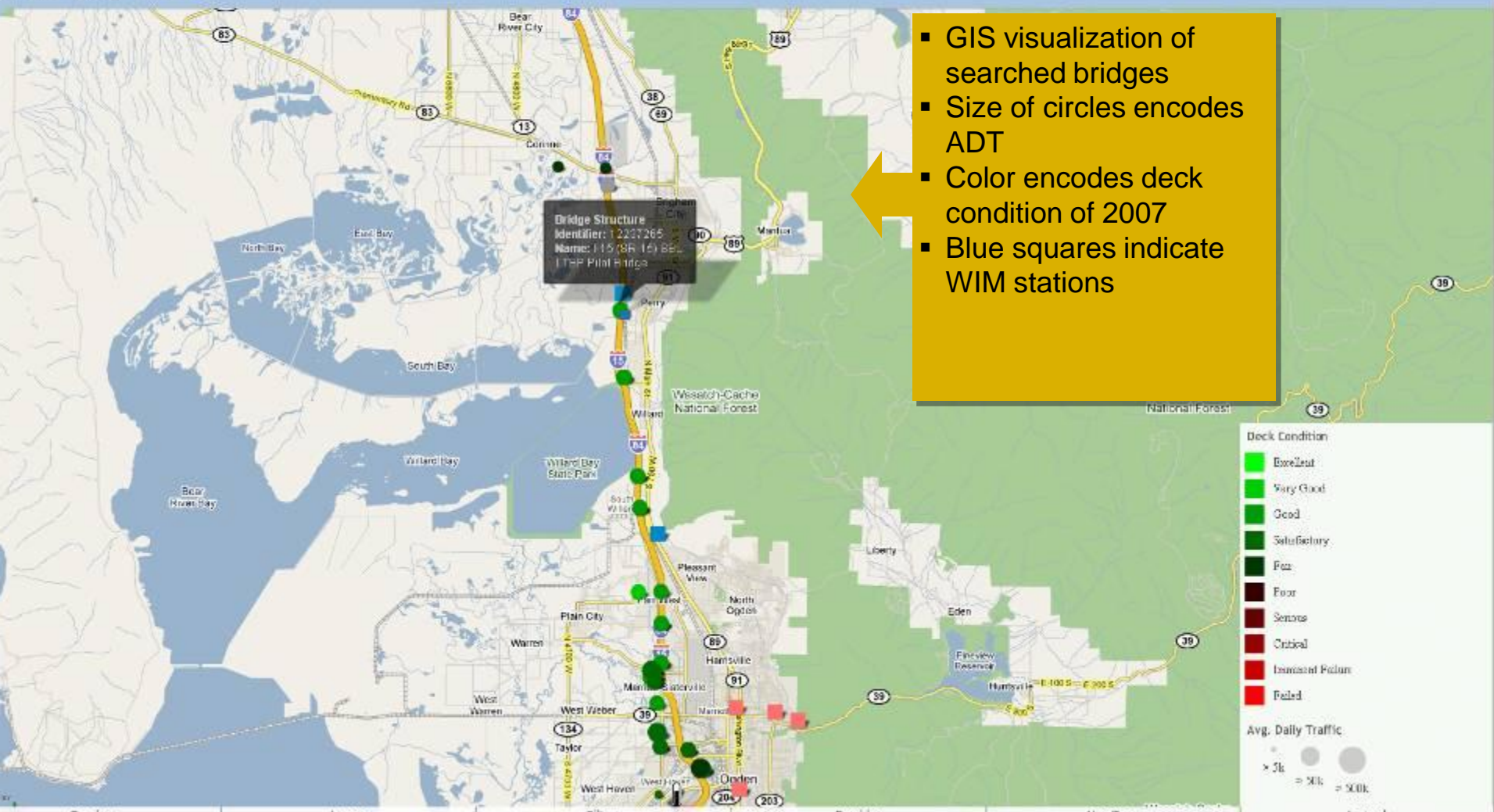
Data Management

- Online Monitoring
- Data Mining
- Data Integration

Data Access

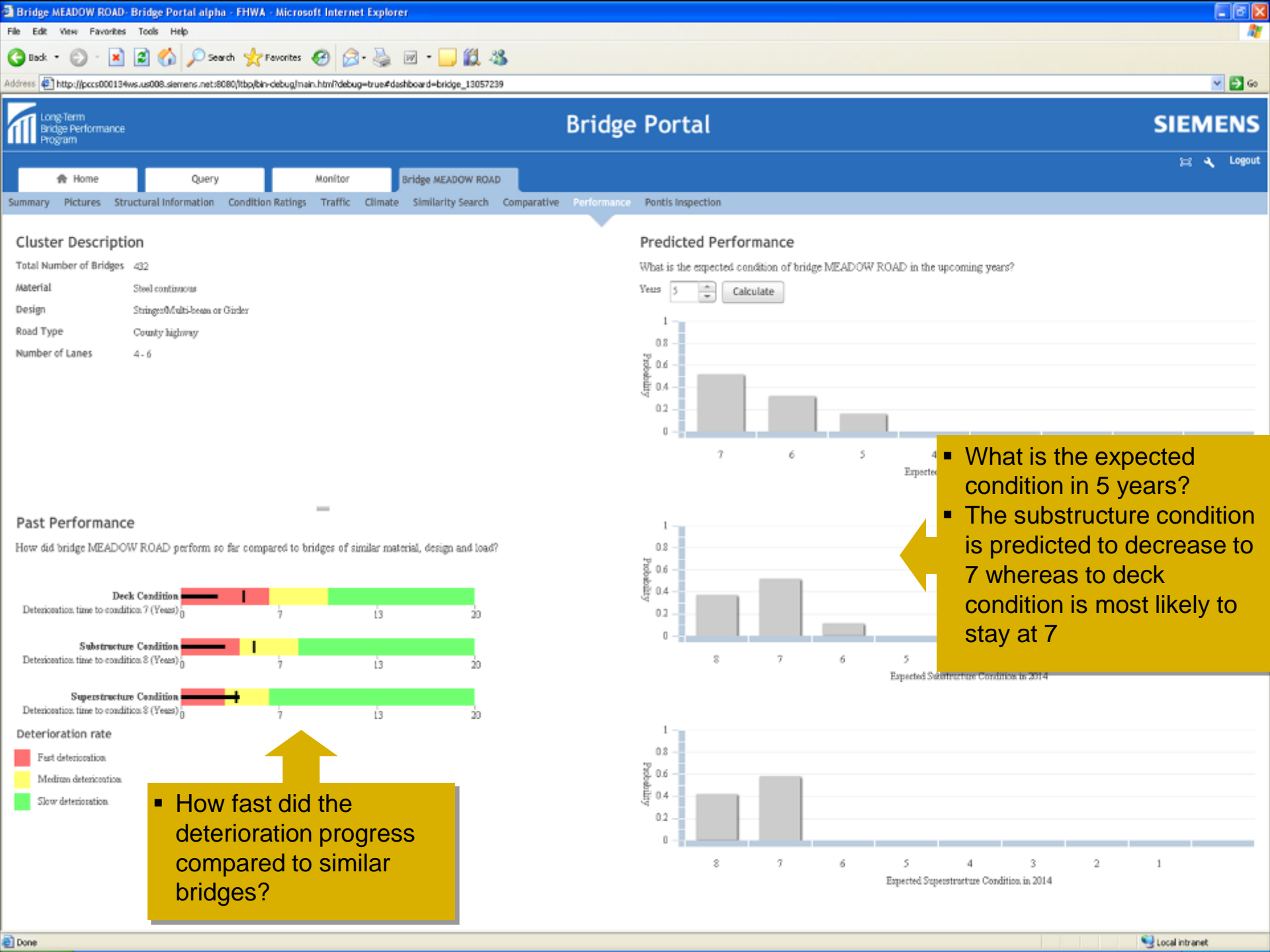
- Data Access
- Visualization
- Query





- GIS visualization of searched bridges
- Size of circles encodes ADT
- Color encodes deck condition of 2007
- Blue squares indicate WIM stations





Bridge Portal



- Home
- Query
- Monitor
- Bridge MEADOW ROAD
- Summary
- Pictures
- Structural Information
- Condition Ratings
- Traffic
- Climate
- Similarity Search
- Comparative
- Performance
- Pontis Inspection

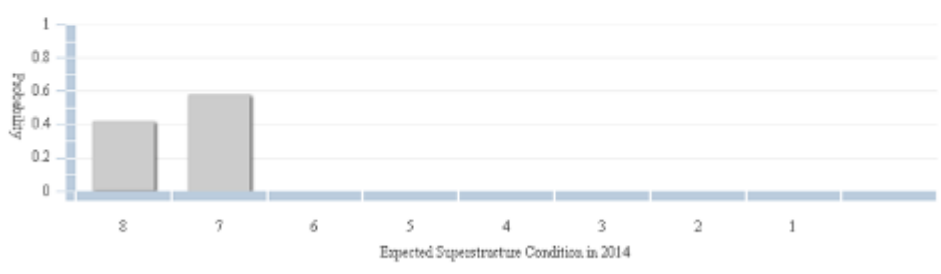
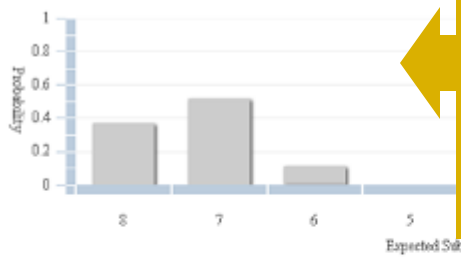
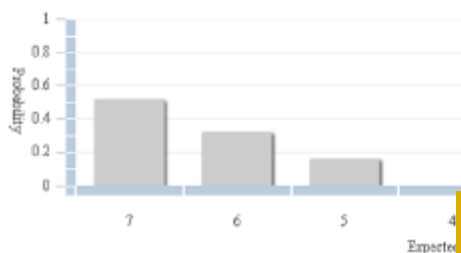
Cluster Description

Total Number of Bridges	432
Material	Steel continuous
Design	Stringer/Girder-beam or Girder
Road Type	County highway
Number of Lanes	4 - 6

Predicted Performance

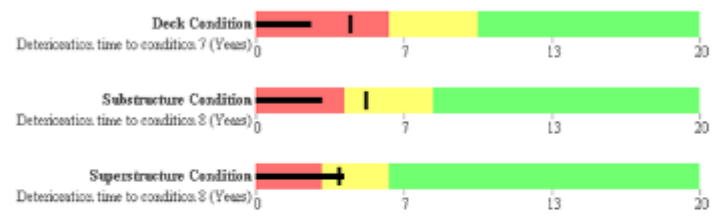
What is the expected condition of bridge MEADOW ROAD in the upcoming years?

Years



Past Performance

How did bridge MEADOW ROAD perform so far compared to bridges of similar material, design and load?



Deterioration rate

- Fast deterioration (Red)
- Medium deterioration (Yellow)
- Slow deterioration (Green)

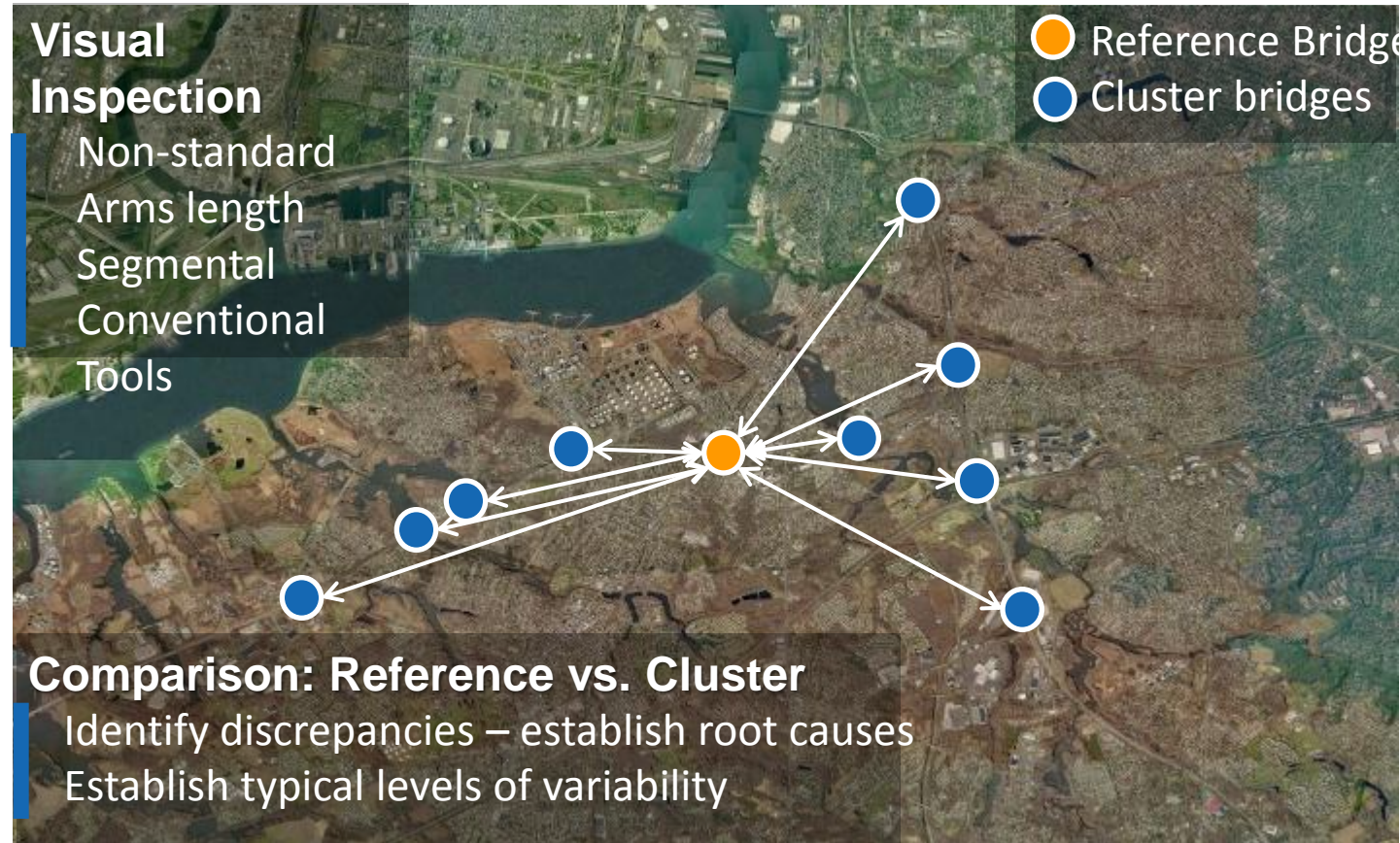
How fast did the deterioration progress compared to similar bridges?

What is the expected condition in 5 years?
 The substructure condition is predicted to decrease to 7 whereas to deck condition is most likely to stay at 7

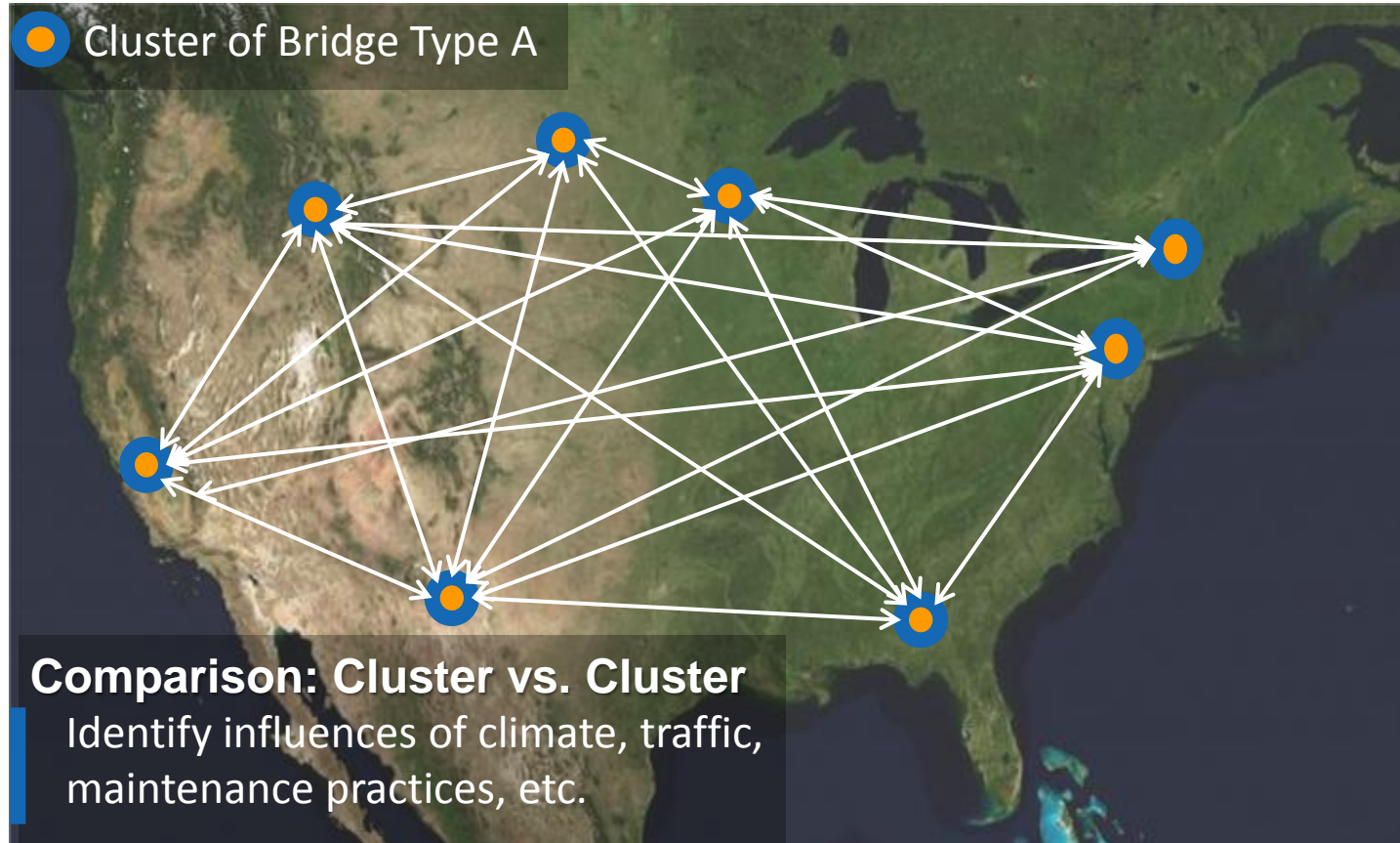
Reference Bridge – Data Collection



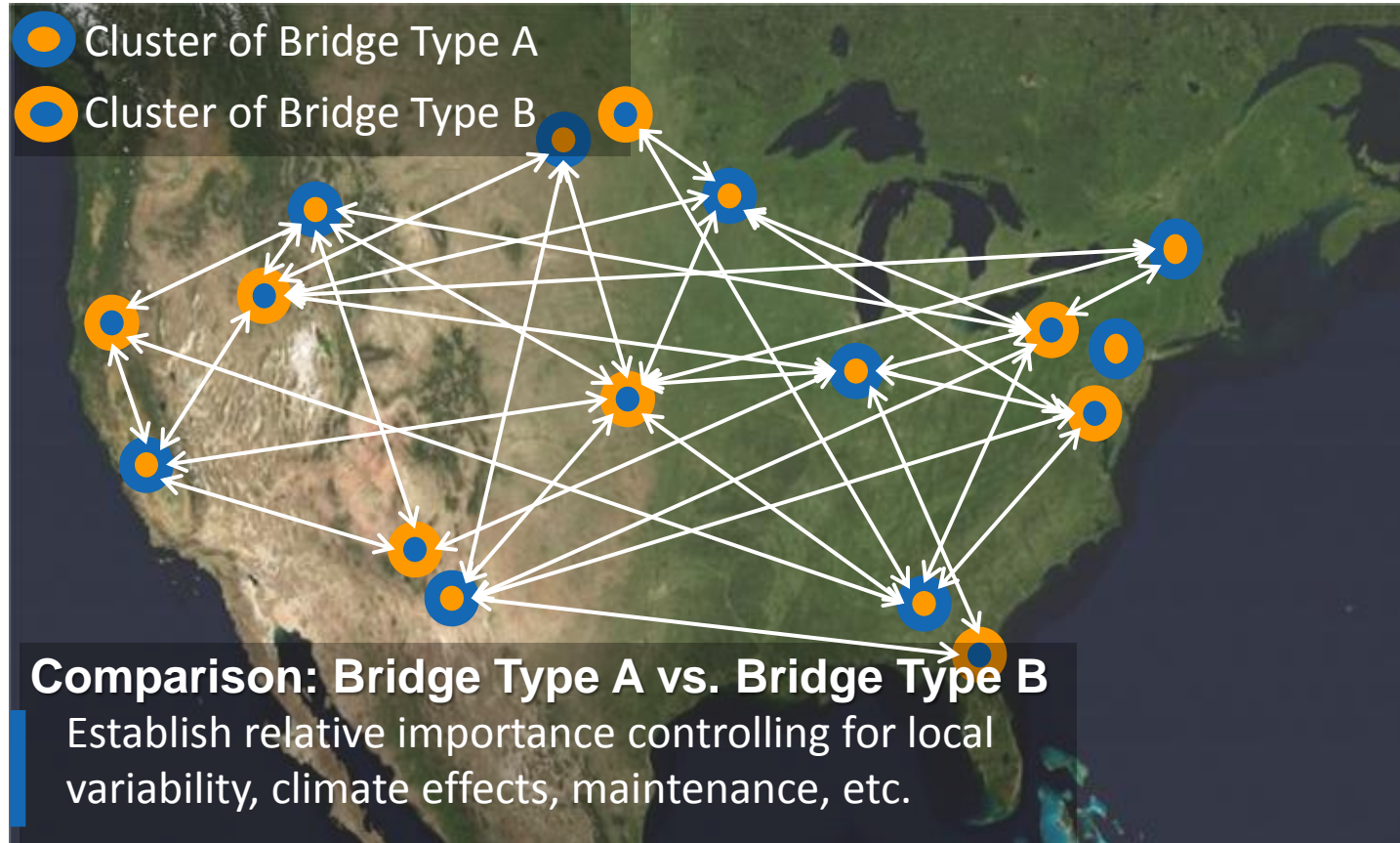
Reference Bridge and Supporting Cluster



Multiple Clusters of Similar Bridges



Clusters of Different Bridge Types



Program Timeline

May	2008	Development phase commences
August	2008	Focus Groups – 15 DOTs through December 2009
August	2009	Pilot phase commences – VA pilot bridge
March	2010	Workshop on Performance Issues related to geotechnology
Dec	2010	Bridge Portal deployment
Spring	2011	TRB LTBP Advisory Board meeting (tentative)
August	2011	Planned completion of the pilot phase
Fall	2011	LTBP State Coordinators Group meeting (tentative)

LTBP Program Information

LTBP Program Website

<http://www.tfhrc.gov/lbtp>

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