Element Level Bridge Inspection
Data and Bridge Preservation

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Overview

• Relevant legislation
• Element data, preservation, and asset management
• FHWA guidance
• Element level inspection training
• Ongoing work
Legislation – Element Level Data

• National Bridge and Tunnel Inventory and Inspection Standards
  Statutory citation(s): MAP-21 §1111; 23 USC 144
  • Each State and Federal agency – within 2 yrs. of enactment, report element level data on bridges on the NHS to the Secretary as each bridge is inspected
  • The Secretary – study cost-effectiveness, benefits, feasibility of collecting for non-NHS bridges

Fact Sheet - [http://www.fhwa.dot.gov/map21/bti.cfm](http://www.fhwa.dot.gov/map21/bti.cfm)
Legislation – Preservation

• National Highway Performance Program
  Statutory citation(s): MAP-21 § 1106(d)(2)(A); 23 USC 119
  – Funds may be obligated for:
    Construction, reconstruction, resurfacing, restoration, rehabilitation, preservation, or operational improvement of segments of the National Highway System.
Legislation – Asset Management

• National Highway Performance Program
  Statutory citation(s): MAP-21 § 1106(e)(1); 23 USC 119
  – State Performance Management:
    A State shall develop a risk-based asset management plan for the National Highway System to improve or preserve the condition of the assets and the performance of the system.
Legislation – Bridge Condition

• National Highway Performance Program
  Statutory citation(s): MAP-21 § 1106(f)(2)(A); 23 USC 119

  – Condition of NHS Bridges:
    • No more than 10% of total NHS bridge deck area may be on structurally deficient bridges for more than 3 years, otherwise
    • Funds equal to 50% of FY2009 apportionment shall be set aside for bridge projects
Legislation - Performance Goals & Measures

• National Goals and Performance Management Measures
Statutory citation(s): MAP-21 § 1203; 23 USC 150
  – FHWA shall establish performance measure for NHS bridge condition
Preservation Bridge Management Process

1. Import/Export Data
2. Review Bridge Data
3. Inspect Bridges
4. Develop Preservation Policy
5. Perform Network Analysis
6. Refine Results
7. Develop Bridge Projects
8. Perform Projects
Component vs. Element vs. Safety

**Component**
- General condition rating
- Deck, Super, Sub, Culv

**Element**
- Detailed condition descriptions
- Quantified data for all elements

**Safety**
- All other information needed to insure safety and structural integrity
  - Sketches, photos, narratives, load rating and,……
  - Critical finding follow-up procedures
Guidance

• FHWA Federal-aid Policy Guidance Center
  http://www.fhwa.dot.gov/pgc/

• Search, or browse:
  – By Discipline: Structures; then
  – By Topic: National Bridge Inspection Program
April 16, 2012 Memo

• Predates MAP-21
• Expresses FHWA’s intention to begin collecting element level inspection data
  – Justification
  – Coordination with Coding Guide effort
  – Alignment with AASHTO Guide Manual for Bridge Element Inspections
Elements

- AASHTO Manual for Bridge Element Inspection
  - National Bridge Elements (NBEs)
  - Bridge Management Elements (BMEs)
  - Agency Developed Elements (ADEs)
    - NBE or BME sub-elements
      - ADE-NBE or ADE-BME
    - ADE
  - Defects

https://bookstore.transportation.org/
Elements

- Each element has a...
  - Description
  - Classification
  - Units of measurement
  - Quantity calculation
  - Condition state definitions
  - Feasible actions
  - Element commentary
March 12, 2013 Memo

- Initial guidance on MAP-21 requirements
- Sets implementation dates:
  - October 1, 2014: Begin collecting element level data as NHS bridges are inspected
  - April 1, 2015: First submittal of NBI data to include element level data
March 12, 2013 Memo

- Sets data submittal format
  - eXtensible Markup Language (XML)
  - Separate submittal from 432-character NBI file
- Intention to refer to AASHTO Manual for Bridge Element Inspections
- Implementation flowchart:
State and Federal agency make preparation for collection of element bridge inspection data for NHS Bridges

Agency File Format is XML

Coordinate with agency database administrator

ELBI training provided to agency staff as appropriate

Commencing on or before October 1, 2014, Agency performs inspections collecting element level bridge inspection data for NHS bridges following defect condition state language contained in the AASHTO Manual for Bridge Element Inspection

State and Federal agency to provide NBI element level bridge inspection data as a supplement to April 1, 2015 annual NBI data submission

Is the inspection for NHS bridges?

NO

State and Federal agency may submit element level bridge inspection data for non-NHS Bridges, however, this is not mandatory

YES

Element level data required for all NHS bridges 23 USC 144(d)(2)

FHWA collects element level data for the NHS
Element Inventory

First step is to inventory the elements for the bridge by identifying elements and their total quantity.
December 16, 2013 Memo

• Four Attachments:
  – Specification for the National Bridge Inventory Bridge Elements (SNBIBE)
  – XML schema
  – Example XML data set
  – Frequently Asked Questions
Element Level Data Submittal

- Elements to be collected by FHWA
  - All NBEs
  - Selected BMEs:
    - Wearing Surfaces (Element 510)
    - Steel Protective Coatings (Element 515)
    - Concrete Protective Coatings (Element 521)
    - Joints (Elements 300 to 306)
  - BMEs to be collected are typical targets of preservation actions
Element Level Data Submittal

- Data items to be submitted for each element:
  - NBI State Code (Item 1) and Structure Number (Item 8)
  - Element Number (EN)
  - Element Parent Number (EPN)
  - Total Element Quantity
  - Condition State 1 Element Quantity
  - Condition State 2 Element Quantity
  - Condition State 3 Element Quantity
  - Condition State 4 Element Quantity
## Element Level Data Collection

<table>
<thead>
<tr>
<th>Element</th>
<th>Total QTY</th>
<th>CS-1 QTY</th>
<th>CS-2 QTY</th>
<th>CS-3 QTY</th>
<th>CS-4 QTY</th>
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<tr>
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<td>107 - Steel Beam/Girder (LF)</td>
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<td>1044</td>
<td>1000</td>
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<td>515 - Steel Protective Coating (SF)</td>
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<td>5628</td>
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<td>234 - RC Pier Cap (LF)</td>
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### Element Level Data Submittal

- Example Data Set for One Bridge

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<th>State Code</th>
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<th>EPN</th>
<th>Total Qty</th>
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<th>CS 2 Qty</th>
<th>CS 3 Qty</th>
<th>CS 4 Qty</th>
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<td>105</td>
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<td>15</td>
<td>0</td>
</tr>
</tbody>
</table>
Data in XML Format

For one element:

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<FHWAElemetnData>
  <State_Code>1</State_Code>
  <Structure_Number>14277</Structure_Number>
  <Element_Number>12</Element_Number>
  <Element_Total_Quantity>16217</Element_Total_Quantity>
  <Element_Quantity_CSOne>0</Element_Quantity_CSOne>
  <Element_Quantity_CSTwo>16000</Element_Quantity_CSTwo>
  <Element_Quantity_CSThree>217</Element_Quantity_CSThree>
  <Element_Quantity_CSFour>0</Element_Quantity_CSFour>
</FHWAElemetnData>
```
December 16, 2013 Memo

- Frequently Asked Questions:
  - Collection of Bridge Management Elements (BMEs)
  - Collection of element defect data
  - Extended interval inspections
  - Collection of element level data on other-than-routine inspection types
Element Level Bridge Inspection Training

• NHI Courses:
  – NHI 130055, 130054, 130053, 130101, 130101A
Element Level Bridge Inspection Training

• FHWA Resource Center training
  – Based on 2013 AASHTO Manual
  – Available in two versions:
    • 1-day (classroom only)
    • 2-day (w/field exercise)
Resource Center Element Training

- Training Completed
- Training Scheduled
- Training Requested
Ongoing Work

• Specifications for the National Bridge Inventory (SNBI)
  – Updates 1995 Coding Guide
  – Nearing completion
  – SNBIBE will be incorporated
QUESTIONS?