Presentation Summary

• Bridge Inspection Metrics
• Describe the development of the NBIP oversight process
• List the key characteristics of the process
• Share National Metric Trends
• Summarize the key values supported by the process
• How FHWA Michigan Division supports and implements this process.
Bridge Inspection Metrics

- Qualifications of Personnel (Metrics 2-5)
- Bridge Inspection Organization (Metric 1)
- Inspection frequency (Metrics 6-11)
- Inspection Procedures (Metrics 12-20)
- Inventory (Metrics 22-23)

23 CFR 650(C)
Bridge Inspection Metrics

Qualifications of Personnel

- Metric 2 - Program Manager
- Metric 3 - Team Leader
- Metric 4 - LR Engineer
- Metric 5 - Underwater Diver
Bridge Inspection Metrics

- Metric 6 – Routine – Lower Risk (LR)
- Metric 7 - Routine – Higher Risk (HR)
- Metric 8 - Underwater - LR
- Metric 9 – Underwater - HR
- Metric 10 – Fracture Critical Member
- Metric 11 – Frequency Criteria
Bridge Inspection Metrics

- Metric 12 – Quality Inspections
- Metric 13 - Load Rating
- Metric 14 – Post & Restrict
- Metric 15 - Bridge Files
- Metric 16 – Fracture Critical Members
- Metric 17 – Underwater
Bridge Inspection Metrics

- Metric 18 – Scour
- Metric 19 - Complex Bridges
- Metric 20 – Quality Control/Quality Assurance
- Metric 21 – Critical Finding
Bridge Inspection Metrics

- Metric 22 – Prepare & Maintain
- Metric 23 - Timely Updating of Data
Compliance Review Manual

April 1, 2018
(includes May 31, 2017 Metrics)
National Bridge Inspection Program

- NBI Components to be reviewed
- Evaluation criteria
- Compliance level
  - Action Items
  - Perf. Level
- Assessment Level
  - Min. AL
  - Int. AL
  - InD. AL
- Commentary

Metric 2
PM Qualification
Background and History

Reasons for Change

- FHWA recognized need to change (2006-2008)
- I-35W Minnesota bridge collapse (2007)
- OIG and GAO reviews (2006-2010)
- Congress directing change
- States – lack of consistency
National Bridge Inspection Program

Background and History

Early Development Efforts (2008-10)

- Compliance Team
- Division Annual Review Team (DART)
- Pilot of oversight process
Background and History

Compliance Team (2008-09)

- Makeup – Divisions, HIBS, RC
- Products:
  - 23 Metrics / Regulations
  - Compliance levels and criteria – C, SC, NC, CC
  - Risk-based, data-driven
  - Plan of Correction Action (PCA)
Background and History

DART Team (2008-09)

• Makeup – Divisions, HIBS, RC
• Products:
  – Assessment levels – depth and frequency
  – Review strategy – Baseline, 5-year cycle, Int-AL within cycle
  – Sampling
  – Definitions – data types, risk, etc.
  – Agency reporting tool (database)
Background and History

2010 Pilot of Oversight Process

• Feb-May 2010
• 12 Divisions – AL, AZ, CA, CO, FL, MO, NV, OK, RI, UT, WA, WV
• End of Pilot De-brief – June 2010
• Final Refinements – July-Oct 2010
Background and History

Full Implementation (2010-17)

- 2010-11 – Training of all Divisions
- 2011 Baseline Review – Int-AL of every metric
- CY2012 (PY13)
- PY13-PY16 – Interim review years
- PY17 – 5th year of 5-year cycle, included looking back
NBIP Oversight Process

Key Characteristics

• Data-driven
• Risk-based
• Sampling
• Measurable
• Consistent
• “Ground truthed” through site visits
Metrics Compliance Status – PY 18

Metric 1 Performance - PY18

Metric 2-5 Performance - PY18
Metrics Compliance Status – PY 18

Metric 6-11 Performance - PY18

- M6-Routine Insp Lower Risk: 90%
- M7-Routine Insp Higher Risk: 94%
- M8-Underwater Insp Lower: 94%
- M9-Underwater Insp Higher Risk: 98%
- M10-Fracture Critical Insp: 85%
- M11-Special Insp: 100%
Metrics Compliance Status – PY 18

Metric 12-21 Performance - PY 18

- M12 - Inspection Quality: 94%
- M13 - Load Rating: 51%
- M14 - Load Posting: 87%
- M15 - Bridge Files: 90%
- M16 - Fracture Critical Members: 92%
- M17 - Underwater Inspection: 98%
- M18 - Scour: 17%
- M19 - Complex Bridge: 98%
- M20 - CC/FOA Procedures: 96%
- M21 - Critical Findings: 94%

Satisfactory, Actively Improving, Unsatisfactory
Metrics Compliance Status – PY 18

Metric 22 - 23 Performance - PY18

- M22-Maintain Inventory: 100%
- M23-Timely Updates: 90%

Satisfactory, Actively Improving, Unsatisfactory
Metrics Compliance Status – PY 18

% SATISFACTORY IN PY 2018

- CY 2011
- Change from CY11 to PY18

- M1: 85% (85%)
- M2: 100% (100%)
- M3: 92% (88%)
- M4: 98% (90%)
- M5: 63% (60%)
- M6: 34% (50%)
- M7: 44% (31%)
- M8: 54% (27%)
- M9: 6% (27%)
- M10: 27% (60%)
- M11: 86% (60%)
- M12: 15% (75%)
- M13: 37% (81%)
- M14: 17% (38%)
- M15: 25% (52%)
- M16: 21% (73%)
- M17: 17% (73%)
- M18: 10% (73%)
- M19: 17% (73%)
- M20: 21% (73%)
- M21: 25% (73%)
- M22: 10% (73%)
- M23: 17% (73%)
National Bridge Inspection Program

NBIP Oversight Process

Key Values Supported

• Integrity – honesty, fairness, consistency
• Transparency – being clear in what we expect and how we evaluate performance
• Safety – safe bridges
• Accountability – open, timely communication, share results, honest external/internal feedback
• Performance-based – metrics & data

“IT is Safety, Accountability and Performance”
Field and File Review Sampling

**Statistical Sampling:** the selection of a subset of individuals from a population to estimate characteristics of the whole population.

**Targeted Sampling:** Strategically filtering the population for review. Findings apply only to the targeted population.

**Sample Size:** The number of individuals chosen to represent the population, determined by the desired level of confidence and margin of error. NBIP sample sizes are based on Assessment Level and Sampling Tier:

<table>
<thead>
<tr>
<th></th>
<th>Intermediate AL</th>
<th>In-Depth AL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LOC (%)</td>
<td>MOE (%)</td>
</tr>
<tr>
<td>Tier 1</td>
<td>80</td>
<td>15</td>
</tr>
<tr>
<td>Tier 2</td>
<td>80</td>
<td>10</td>
</tr>
</tbody>
</table>
File and Field Review Selection
Field Review Metric 12

---

### Field Review Checklist

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Notes</th>
<th>Method</th>
<th>Check</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Review** recent inspection reports for all applicable inspection types. Bridge is in the population [Y] excluding assessed at the NLI (shaded) for the following metrics:

**Metric 12 – Quality Inspections**

Circles all appropriate responses.

---

### Metric 12 Criteria

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Notes/Explanation</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Overall Field Assessment of Adequacy of this Inspection**

Only circle a Y if both the shaded boxes above are also Y.

---

2019 Michigan Bridge Conference

Page 3 of 2
# Field Review Metric 22

## Metric 22 – Minimum Level Review Items

<table>
<thead>
<tr>
<th>S&amp;I Item / Reference</th>
<th>Metric 22 - Minimum Level Review Items (Circle all appropriate responses)</th>
<th>NBI S&amp;I达标年</th>
<th>Review Team Code</th>
<th>Metric Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 - Bridge Posting</td>
<td></td>
<td>5</td>
<td>Y/N</td>
<td></td>
</tr>
<tr>
<td>44 - Structure Length/Max Span: ≤ 30% or 1 *</td>
<td></td>
<td>A</td>
<td>Y/N</td>
<td></td>
</tr>
<tr>
<td>48 - Structure Length/Max Span: ≤ 50% or 1 *</td>
<td></td>
<td>Y/N</td>
<td>Y/N</td>
<td></td>
</tr>
<tr>
<td>51 - Bridge Width/Curb/Curb: ≤ 1600 or 1 *</td>
<td></td>
<td>Y/N</td>
<td>Y/N</td>
<td></td>
</tr>
<tr>
<td>52 - Deck Width/Depth of Curb ≤ 1500 or 1 *</td>
<td></td>
<td>Y/N</td>
<td>Y/N</td>
<td></td>
</tr>
<tr>
<td>54 - Width × 5 degrees</td>
<td></td>
<td>37</td>
<td>Y/N</td>
<td></td>
</tr>
<tr>
<td>55 - Structure Flared</td>
<td></td>
<td>0</td>
<td>Y/N</td>
<td></td>
</tr>
<tr>
<td>10 - Inventory Short / Long ≤ 1500 or 1 *</td>
<td></td>
<td>15,500</td>
<td>Y/N</td>
<td></td>
</tr>
<tr>
<td>47 - Ins &amp; Total Force ≥ 1500 or 1 *</td>
<td></td>
<td>45,500</td>
<td>Y/N</td>
<td></td>
</tr>
<tr>
<td>50 - Annular leakage ≤ 1500 or 1 *</td>
<td></td>
<td>18,200</td>
<td>Y/N</td>
<td></td>
</tr>
</tbody>
</table>

## Metric 22 – Intermediate Level Additional Review Items

<table>
<thead>
<tr>
<th>S&amp;I Item / Reference</th>
<th>Metric 22 - Intermediate Level Additional Review Items (Circle all appropriate responses)</th>
<th>NBI S&amp;I达标年</th>
<th>Review Team Code</th>
<th>Metric Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>37 - Year Built / 15 yrs</td>
<td></td>
<td>1968</td>
<td>Y/N</td>
<td></td>
</tr>
<tr>
<td>38 - Adjacent / N/A</td>
<td></td>
<td>3-10-20</td>
<td>Y/N</td>
<td></td>
</tr>
<tr>
<td>48 - Type of Service / N/A</td>
<td></td>
<td>1</td>
<td>Y/N</td>
<td></td>
</tr>
<tr>
<td>54A - Reference Feature / N/A</td>
<td></td>
<td>1</td>
<td>Y/N</td>
<td></td>
</tr>
<tr>
<td>148 - Min Vert Depth / 45</td>
<td></td>
<td>16,4</td>
<td>Y/N</td>
<td></td>
</tr>
<tr>
<td>360 - Stream / N/A</td>
<td></td>
<td>0</td>
<td>Y/N</td>
<td></td>
</tr>
<tr>
<td>365 - Width Reconstructed / 15 yrs</td>
<td></td>
<td>0</td>
<td>Y/N</td>
<td></td>
</tr>
<tr>
<td>367 - Deck Structure Type / N/A</td>
<td></td>
<td>2-CIP</td>
<td>Y/N</td>
<td></td>
</tr>
<tr>
<td>380A - Type of Bearing / N/A</td>
<td></td>
<td>4-Lamina</td>
<td>Y/N</td>
<td></td>
</tr>
<tr>
<td>380B - Designated Nut / N/A</td>
<td></td>
<td>3-1/2</td>
<td>Y/N</td>
<td></td>
</tr>
</tbody>
</table>

**Additional Notes:**

**NBIP PY2019 Field Review Form (deck) (v1.0) generated: 05/10/2019 Page 2 of 2**
## File Review

### File Review Checklist

**State:** Michigan  
**Feature Carried:** M-89  
**Feature Crowned:** M-89  
**Year Built:** 2013  
**Location:** M-89 over N BR THUNDER BAY RIVER  
**Inspection Date:** 9/6/2014  
**Owner:** State DOT  
**Review:**  

<table>
<thead>
<tr>
<th>Metric</th>
<th>M15</th>
<th>M16</th>
<th>M17</th>
<th>M18</th>
<th>M19</th>
<th>M20</th>
<th>M21</th>
<th>M22</th>
</tr>
</thead>
<tbody>
<tr>
<td>Review</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
</tbody>
</table>

### Metric 15 – Inspection Procedures, Bridge Files

**File Components Present – (Y/N/Referenced/NA)**

- Inspection Reports
- Waterway Information - channel cross-sections, soundings, stream profiles
- Special inspection procedures or requirements
- Load rating documentation
- Posting documentation
- Critical Findings and actions taken
- Scour assessment
- Scour PDA and documentation of post-event inspection or follow-up
- Inventory and evaluation data and collection/verification forms
- Significant Correspondences
- Maintenance records

### Metric 15 Notes

Assessment – Does this bridge meet the metric criteria (Y/N)?