2019 Michigan Bridge Conference
Metric 12 – Quality Inspections
Sonny Jadun, P.E.
Presentation Summary

• Describe the intent of the metric
• Describe the process for evaluation and compliance determination
• Metric 12 National Trend
Metric Intent

- Metric 12 assesses inspection quality by evaluating each of the following:
  - Accurate condition codes
  - Deficiencies documented
  - Procedures followed
  - Qualified Team Leader
National Bridge Inspection Program

Metric 12 – Quality Inspection

Compliance Review Manual

April 1, 2018
(Includes May 31, 2017 Metrics)
Metric Intent

• This metric is where the rubber meets the road and is what the program is about – a quality inspection

• Quality inspections are the result of effective:
  – Organizational structure
  – Qualified and properly trained people
  – Procedures
  – QC/QA
Metric Intent

• Review Team
  – Include State and if appropriate local agency as part of the field review
Metric Intent

• Our field review is not a complete and thorough NBIS inspection

• Assessment of the overall quality of all recent inspections types – and how they mesh together. Have all recent inspections for each req’d types in the field.

• At this time, element level data is not being assessed in the process.
Min- AL Assessment Process

• Monitor PCA
• Sample and perform field review
  – Accurate condition codes
  – Use of MBE procedures
  – Proper documentation of condition, justifying ratings
  – Qualified TL present for all applicable inspections
Min-AL

Monitor PCA if in effect
– Still perform field review if PCA in effect

Minimum Assessment (Min-AL): Perform all of the following:
• Monitor PCA if in effect.
Min-AL

- Sample and perform field review
  - Sample size LOC 80% & MOE 15% or greater
    - Using sample size based on population (new)
    - If doing more than 80%/15%, discuss with PM before and document reasoning in FSM
    - Sampling tool now selects field review sample (new)

**Minimum Assessment (Min-AL):** Perform all of the following:
- Monitor PCA if in effect.
- Perform field reviews of bridges sampled at a LOC 80%, MOE 15% size or greater, to compare inspection reports for all appropriate inspection types with actual bridge conditions to evaluate:
1) Accurate condition codes
   – Use Field Review Form (shown in next slide)
   – Condition codes 58, 59, 60, 62 reviewed
   – Codes must be within +/- 1 of review team

NOTE: Element Level data is not being assessed at this time.

Perform field reviews of bridges sampled at a LOC 80%, MOE 15% size or greater, to compare inspection reports for all appropriate inspection types with actual bridge conditions to evaluate:

1) Accuracy of component condition codes;
Field Review Form (Draft)

**NBIP Field Review Checklist – PY 2017**

<table>
<thead>
<tr>
<th>Structure No.: 000000000005775</th>
<th>Review Date: ______________________</th>
</tr>
</thead>
</table>

**Item 1 - State:** 441-Rhode Island  
**Item 7 – Feature Carried:** RAMP AR-5  
**Item 6A – Feature Crossed:** I-95 RAMP CA  
**Item 27 - Year Built:** 2015  
**Item 90 - Most Recent NBIS Insp. Date:** February 2016

Include the review of most recent inspection reports for all applicable inspection types. This bridge is in the population (P) and being assessed at the Int-AL (Ind-AL) (shaded) for the following metrics:

<table>
<thead>
<tr>
<th>Metric</th>
<th>Quality Inspections (Circle appropriate responses)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M13</td>
<td>P</td>
</tr>
<tr>
<td>M14</td>
<td>I</td>
</tr>
<tr>
<td>M15</td>
<td>P</td>
</tr>
<tr>
<td>M16</td>
<td>P</td>
</tr>
<tr>
<td>M17</td>
<td>-</td>
</tr>
<tr>
<td>M18</td>
<td>P</td>
</tr>
<tr>
<td>M19</td>
<td>-</td>
</tr>
<tr>
<td>M21</td>
<td>-</td>
</tr>
<tr>
<td>M23</td>
<td>P</td>
</tr>
</tbody>
</table>

**Metric 12 – Quality Inspections**

<table>
<thead>
<tr>
<th>Item</th>
<th>Recorded Ratings</th>
<th>Review Team Rating</th>
<th>Notes</th>
<th>Meets Criteria? Y/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item 58 - Deck</td>
<td>7</td>
<td>NBI S&amp;A &amp; Insp rept</td>
<td>Y/N (±1 rating)</td>
<td></td>
</tr>
<tr>
<td>Item 59 - Superstr.</td>
<td>7</td>
<td></td>
<td>Y/N (±1 rating)</td>
<td></td>
</tr>
<tr>
<td>Item 60 - Substr.</td>
<td>5</td>
<td></td>
<td>Y/N (±1 rating)</td>
<td></td>
</tr>
<tr>
<td>Item 62 - Culvert</td>
<td>N</td>
<td></td>
<td>Y/N (±1 rating)</td>
<td></td>
</tr>
</tbody>
</table>
2) Use of MBE procedures

- Assess if inspection teams following procedures
  - Inspection types/methods/access
  - M12 issue inspection team not following procedures
  - M16-19 issue if procedures are not acceptable

- Perform field reviews of bridges sampled at a LOC 80%, MOE 15% size or greater, to compare inspection reports for all appropriate inspection types with actual bridge conditions to evaluate:
  1) Accuracy of component condition codes;
  2) Use of MBE procedures;
## Field Review Form

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Review Team Insp Report Assessment</th>
<th>Notes/Explanation</th>
<th>Meets Criteria?</th>
</tr>
</thead>
<tbody>
<tr>
<td>All notable deficiencies identified?</td>
<td>All/None/NA (no notable deficiencies)</td>
<td></td>
<td>Y/N</td>
</tr>
<tr>
<td>Narrative justifies cond. ratings?</td>
<td>Yes/No/NA (narrative not needed)</td>
<td></td>
<td>Y/N</td>
</tr>
<tr>
<td>FC/UW/Other required &amp; done</td>
<td>Yes/No/NA</td>
<td></td>
<td>Y/N/NA</td>
</tr>
<tr>
<td>FC/UW/Other results reflected in cond. ratings</td>
<td>Yes/No/NA</td>
<td></td>
<td>Y/N/NA</td>
</tr>
<tr>
<td>Followed MBE procedures?</td>
<td>Yes/No</td>
<td></td>
<td>Y/N</td>
</tr>
<tr>
<td>Qualified TL present during inspections?</td>
<td>Indicated by identification on report, field observation, or other indicators</td>
<td></td>
<td>Y/N</td>
</tr>
<tr>
<td>UW - Qualified Diver inspected</td>
<td></td>
<td></td>
<td>Y/N/NA</td>
</tr>
</tbody>
</table>

### Overall Field Assessment of Adequacy of this Inspection

Only circle Y (Yes) if all the dark shaded boxes above are yes (or NA).
3) Proper documentation and condition codes

- Condition code supported by verbiage

- **Notable bridge deficiencies** are those leading to NBI component ratings of 5 or less, or those requiring some kind of immediate action.

**NOTE:** Element Level inspection notes are acceptable to use as “supporting verbiage”
Assessment Process

At Min-AL:

4) Qualified Team Leader for all applicable inspection types
   – Formerly only at Int-Al, now at Min-AL

Minimum Assessment (Min-AL): Perform all of the following:
- Monitor PCA if in effect.
- Perform field reviews of bridges sampled at a LOC 80%, MOE 15% size or greater, to compare inspection reports for all appropriate inspection types with actual bridge conditions to evaluate:
  1) Accuracy of component condition codes;
  2) Use of MBE recognized procedures;
  3) Adequacy of documentation and appropriate justification of component condition ratings;
  4) Indication that a qualified team leader was present at each applicable inspection, and qualified divers for underwater inspections.
Assessment Process

• At Int-AL:

  In addition to Min-AL:
  – Field verification of 1 active Routine inspection

*Intermediate Assessment (Int-AL): In addition to the Min-AL:*
- Include field verification of one active Routine inspection to verify team leader presence and that MBE inspection procedures are followed.*
Compliance Determination

Each bridge is considered one data point for measuring compliance.

• Must meet all items identified on Field Review form
• If any one item is not acceptable, whole bridge is counted as not meeting criteria
• \% = (# bridges meeting crit.)/(# reviewed) * 100

Note: When rounding percentage round to the nearest whole number
Compliance Determination

Compliance:

1) 90% bridges meet criteria for
   – Condition codes, documentation & procedures
     • Procedures was added for PY 18

2) All bridges had Team Leader on site for each inspection

Compliance (C): All of the following must be met for C:
• At least 90% of bridges reviewed meet the criteria for component condition ratings, documentation of deficiencies, and following of applicable MBE procedures.
• All bridges reviewed had a qualified team leader on site during all most recent inspection types.
Compliance Determination

Substantial Compliance:

1) 80% bridges meet criteria for
   – Condition codes, documentation & procedures

2) All bridges had qualified inspection staff on site for each inspection (Team lead and Diver)

Substantial Compliance (SC): All of the following must be met for SC:
- At least 80% of bridges reviewed meet criteria for component condition ratings, documentation of deficiencies, and following of applicable MBE procedures.
- All bridges reviewed had a qualified team leader on site during all most recent inspection types.
Compliance Determination

Non-Compliance
– Not meeting one or more SC criteria

Compliance (C): All of the following must be met for C:
• At least 90% of bridges reviewed meet the criteria for component condition ratings, documentation of deficiencies, and following of applicable MBE procedures.
• All bridges reviewed had a qualified team leader on site during all most recent inspection types.

Substantial Compliance (SC): All of the following must be met for SC:
• At least 80% of bridges reviewed meet criteria for component condition ratings, documentation of deficiencies, and following of applicable MBE procedures.
• All bridges reviewed had a qualified team leader on site during all most recent inspection types.

Non-Compliance (NC): One or more SC criteria are not met.
Metric 12 – Trend PY 2011-18
METRIC 12

INSPECTION PROCEDURES – QUALITY INSPECTIONS

Allie Nadjarian
Bridge Inspection Program Manager

March 19, 2019
NBIP Review – Results

- **Substantial Compliance**
  - Metric 03
  - Metric 06
  - Metric 07
  - Metric **12**

- **Conditional Compliance**
  - Metric 13
  - Metric 14
  - Metric 18

- **Non – Compliance**
  - Metric 15

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![National Bridge Inspection Program Status and Summary](image)

**National Bridge Inspection Program (NBIP) review Final Summary of Metrics (FSM) Assessment (AL) and Compliance (CL) Levels and review status:**

<table>
<thead>
<tr>
<th>Metric</th>
<th>Prev CL</th>
<th>AL</th>
<th>Dec 31 Complete</th>
<th>Mar 31 Complete</th>
</tr>
</thead>
<tbody>
<tr>
<td>01 - Bridge Inspection Organization</td>
<td>C</td>
<td>Min</td>
<td>C</td>
<td>✔</td>
</tr>
<tr>
<td>02 - Qualifications of Personnel - Program Manager</td>
<td>C</td>
<td>Int</td>
<td>C</td>
<td>✔</td>
</tr>
<tr>
<td>03 - Qualifications of Personnel - Team Leader(s)</td>
<td>C</td>
<td>Min</td>
<td>SC</td>
<td>✔</td>
</tr>
<tr>
<td>04 - Qualifications of Personnel - Load Rating Engineer</td>
<td>C</td>
<td>Min</td>
<td>C</td>
<td>✔</td>
</tr>
<tr>
<td>05 - Qualifications of Personnel - UW Bridge Inspection Diver</td>
<td>C</td>
<td>Min</td>
<td>C</td>
<td>✔</td>
</tr>
<tr>
<td>06 - Inspection Frequency - Routine - Lower Risk Bridges</td>
<td>SC</td>
<td>Min</td>
<td>SC</td>
<td>✔</td>
</tr>
<tr>
<td>07 - Inspection Frequency - Routine - Higher Risk Bridges</td>
<td>SC</td>
<td>Min</td>
<td>SC</td>
<td>✔</td>
</tr>
<tr>
<td>08 - Inspection Frequency - Underwater - Lower Risk Bridges</td>
<td>C</td>
<td>Min</td>
<td>C</td>
<td>✔</td>
</tr>
<tr>
<td>09 - Inspection Frequency - Underwater - Higher Risk Bridges</td>
<td>C</td>
<td>Min</td>
<td>C</td>
<td>✔</td>
</tr>
<tr>
<td>10 - Inspection Frequency - Fracture Critical Member</td>
<td>C</td>
<td>Min</td>
<td>C</td>
<td>✔</td>
</tr>
<tr>
<td>11 - Inspection Frequency - Frequency Criteria</td>
<td>C</td>
<td>Min</td>
<td>SC</td>
<td>✔</td>
</tr>
<tr>
<td>12 - Inspection Procedures - Quality Inspections</td>
<td>C</td>
<td>Min</td>
<td>SC</td>
<td>✔</td>
</tr>
<tr>
<td>13 - Inspection Procedures - Lead Ratio</td>
<td>C</td>
<td>Min</td>
<td>CC</td>
<td>✔</td>
</tr>
<tr>
<td>14 - Inspection Procedures - Post or Restrict</td>
<td>C</td>
<td>Int</td>
<td>CC</td>
<td>✔</td>
</tr>
<tr>
<td>15 - Inspection Procedures - Bridge Files</td>
<td>C</td>
<td>Int</td>
<td>NC</td>
<td>✔</td>
</tr>
<tr>
<td>16 - Inspection Procedures - Fracture Critical Members</td>
<td>C</td>
<td>Min</td>
<td>C</td>
<td>✔</td>
</tr>
<tr>
<td>17 - Inspection Procedures - Underwater</td>
<td>C</td>
<td>Min</td>
<td>C</td>
<td>✔</td>
</tr>
<tr>
<td>18 - Inspection Procedures - Scour Critical Bridges</td>
<td>C</td>
<td>Min</td>
<td>CC</td>
<td>✔</td>
</tr>
<tr>
<td>19 - Inspection Procedures - Complex Bridges</td>
<td>SC</td>
<td>Int</td>
<td>C</td>
<td>✔</td>
</tr>
<tr>
<td>20 - Inspection Procedures - QC/QA</td>
<td>C</td>
<td>Int</td>
<td>C</td>
<td>✔</td>
</tr>
<tr>
<td>21 - Inspection Procedures - Critical Findings</td>
<td>C</td>
<td>Int</td>
<td>C</td>
<td>✔</td>
</tr>
<tr>
<td>22 - Inventory - Prepare and Maintain</td>
<td>C</td>
<td>Int</td>
<td>C</td>
<td>✔</td>
</tr>
<tr>
<td>23 - Inventory - Timely Updating of Data</td>
<td>C</td>
<td>Int</td>
<td>C</td>
<td>✔</td>
</tr>
</tbody>
</table>
Metric 12: Inspection Procedures - Quality Inspections

- A qualified team leader (QTL) is at the bridge at all times

- Qualified Team Leader (NBIS)
  - FHWA approved inspection course, and...
  - Education + Experience Criteria
Metric 12: Inspection Procedures - Quality Inspections

- Education + Experience
  - Professional Engineer
  - (5) Years bridge inspection experience
  - Bachelor’s degree + FE exam + (2) years bridge inspection experience
  - Certified as Level III or IV Bridge Safety Inspector
  - Associate’s degree + (4) years of bridge inspection experience
Metric 12: Inspection Procedures - Quality Inspections

- Recurrent Training (MDOT)
  - 24 hours approved bridge inspection training
  - 5 year period
Metric 12: Inspection Procedures - Quality Inspections

- AASHTO Manual for Bridge Evaluation
  - Condition Codes are within generally acceptable tolerances

www.michigan.gov/bridgeoperations
Metric 12: Inspection Procedures - Quality Inspections

- AASHTO Manual for Bridge Evaluation (MBE)
  - *Condition Codes are supported by narrative that justifies and documents the component condition rating*
Metric 12: Inspection Procedures - Quality Inspections

- AASHTO Manual for Bridge Evaluation (MBE)
  - All notable bridge deficiencies are identified
Critical Findings

- **NBIS 650.305**: A structural or safety related deficiency that requires immediate follow-up inspection or action

- **MDOT**
  - Bridge Closure
  - Lane Closure
  - Shoulder Closure
Critical Findings - Examples

- Immediate Work - Fracture Critical Members
- Immediate Correction – Scour
- Critical Condition Rating – Item 58, 59, 60, 62
- Load Capacity Reduction > 20%
Critical Findings – Reporting

MiBRIDGE - Bridge Management and Inspection System

Welcome Allie Nadjarian

Bridge Management | Assignments | Dashboards | Reports

STR 13262

Facility: M-24
Feature: WISCONSIN CRAN
Location: JUST EAST OF GRAF RD
Region / County: Bay(4) / Tuscola(79)

Latitude / Longitude: 43.5163 / 84.4309
Length / Width / Spans: 10 / 104 / 1
MDOT Structure ID: 79176020000C00
Owner Region: Bay(4)

Material / Design: 1 Concrete / 19 Culvert
MDOB Structure ID: 79176020000C00
Structure Condition: Good Condition(7)
Operational Status: A - Open, no restriction(A)
Scour Evaluation: 6 Calcs not made

Last NBI Inspection: 01/03/2017 / 2Q20

Special Inspections Required:
Fracture Critical (R2A) Underwater (R2B) Other Special (R2C) Fatigue Sensitive (R2D) Scour Critical

REQUEST FOR ACTION

Submitted By: Allie Nadjarian
Agency / Company Name: MDOB Load Rating
RFA # 13262-03142019
RFA Date: 03/14/2015

Problems/Comments:

IMMEDIATE ACTION (A44)
INTERMEDIATE ACTION REQUESTED (A89)
FINAL ACTION COMPLETED

Comment:

2019 Michigan Bridge Conference Work
Critical Findings – Reporting

2019 Michigan Bridge Conference Work

[Image of a computer screen showing a software interface for bridge management.]
Critical Findings – Corrective Action & Repairs

- Bridge Owner Responsibility
  - Schedule Inspection
    - Other, Special
    - Update Routine
  - Verify SI&A data
Critical Findings – Compliance

■ Request for Action (RFA) report
  – Immediate Action

■ Bridge Owner Responsibility
  – Notify MDOT Bureau of Bridges and Structures of the critical finding

■ MDOT Responsibility
  – Notify FHWA
IF YOU COULD ASK QUESTIONS
THAT WOULD BE GREAT