



## ***2019 Michigan Bridge Conference*** **FHWA Metric Oversight Background/Intent** **Sonny Jadun, P.E.**



U.S. Department of Transportation  
**Federal Highway Administration**



## 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



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

Inspection  
Frequency

- 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

### Inspection Procedures

- 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

### Inspection Procedures

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



## Bridge Inspection Metrics

### Inventory

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



# National Bridge Inspection Program



U.S. Department  
of Transportation  
**Federal Highway  
Administration**

## National Bridge Inspection Program

HIBS-30  
NBIPOT

# Compliance Review Manual

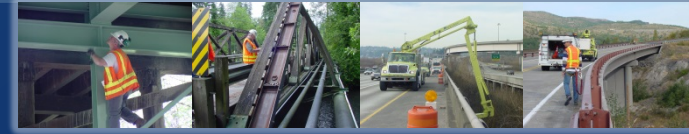


**April 1, 2018**

(Includes May 31, 2017 Metrics)

Internal Use Only

# 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: Qualifications of personnel – Program Manager		rev 5/1/17
NBIS Reference: 23 CFR 650.309 (a) – Program Manager and 650.313 (g) QC/QA		
Criteria	<p>The Program Manager (PM) must have the following qualifications:</p> <ul style="list-style-type: none"><li>• Professional engineer registration or 10 years of bridge inspection experience;</li><li>• Successful completion of FHWA approved comprehensive bridge inspection training; and</li><li>• Completion of periodic bridge inspection refresher training according to State policy.</li></ul>	
Population: The individual designated as PM.		
Compliance Levels	<p><b>Compliance (C):</b> All of the following must be met for C:</p> <ul style="list-style-type: none"><li>• The PM has the required qualifications.</li><li>• The PM has completed periodic bridge inspection refresher training according to State policy.</li></ul>	
	<p><b>Substantial Compliance (SC):</b> All of the following must be met for SC:</p> <ul style="list-style-type: none"><li>• The PM has the required qualifications, except a newly designated PM has not completed comprehensive bridge inspection training, but is scheduled to do so within 6 months after selection to the PM position.</li><li>• The PM has not completed periodic refresher training according to State policy, but is scheduled to do so within the next 12 months.</li></ul>	
	<p><b>Non-Compliance (NC):</b> One or more SC criteria are not met.</p>	
	<p><b>Conditional Compliance (CC):</b> Adhering to FHWA approved plan of corrective action (PCA).</p>	
Assessment Levels (AL)	<p><b>Minimum Assessment (Min-AL):</b> Perform all of the following:</p> <ul style="list-style-type: none"><li>• Monitor PCA if in effect.</li><li>• Assess based on previous review results, and on the reviewer's knowledge and awareness of the PM's qualifications.</li></ul>	
	<p><b>Intermediate Assessment (Int-AL):</b> In addition to the Min-AL:</p> <ul style="list-style-type: none"><li>• Verify PM's qualifications through interview of PM or PM's direct supervisor(s).</li><li>• Review PM's qualification documentation.</li></ul>	
	<p><b>In-Depth Assessment (InD-AL):</b> Perform one of the following:</p> <ul style="list-style-type: none"><li>• Division InD-AL – In addition to the Int-AL, develop guidelines for review, with concurrence from BSE, and conduct in accordance with guidelines.</li><li>• National InD-AL – conduct in accordance with national direction and guidelines.</li></ul>	

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## 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



## 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 – 5<sup>th</sup> year of 5-year cycle, included looking back





## NBIP Oversight Process

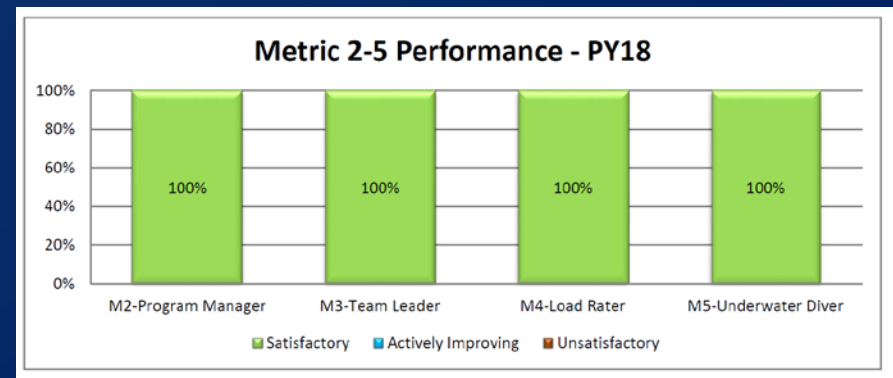
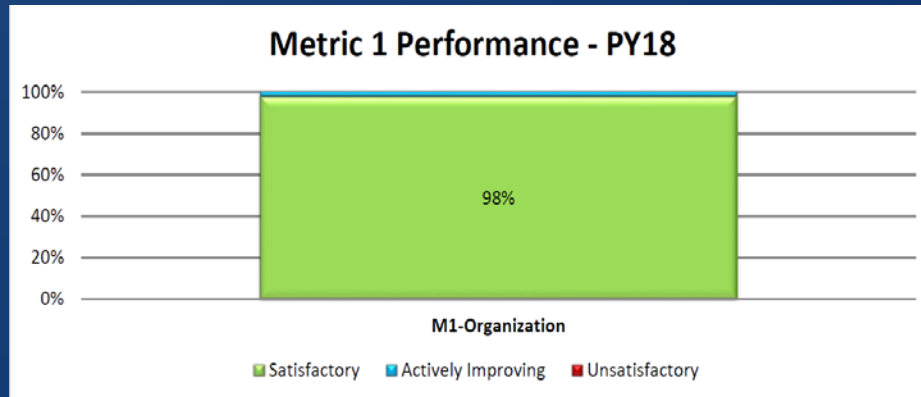
### Key Characteristics

- Data-driven
- Risk-based
- Sampling
- Measurable
- Consistent
- “Ground truthed” through site visits



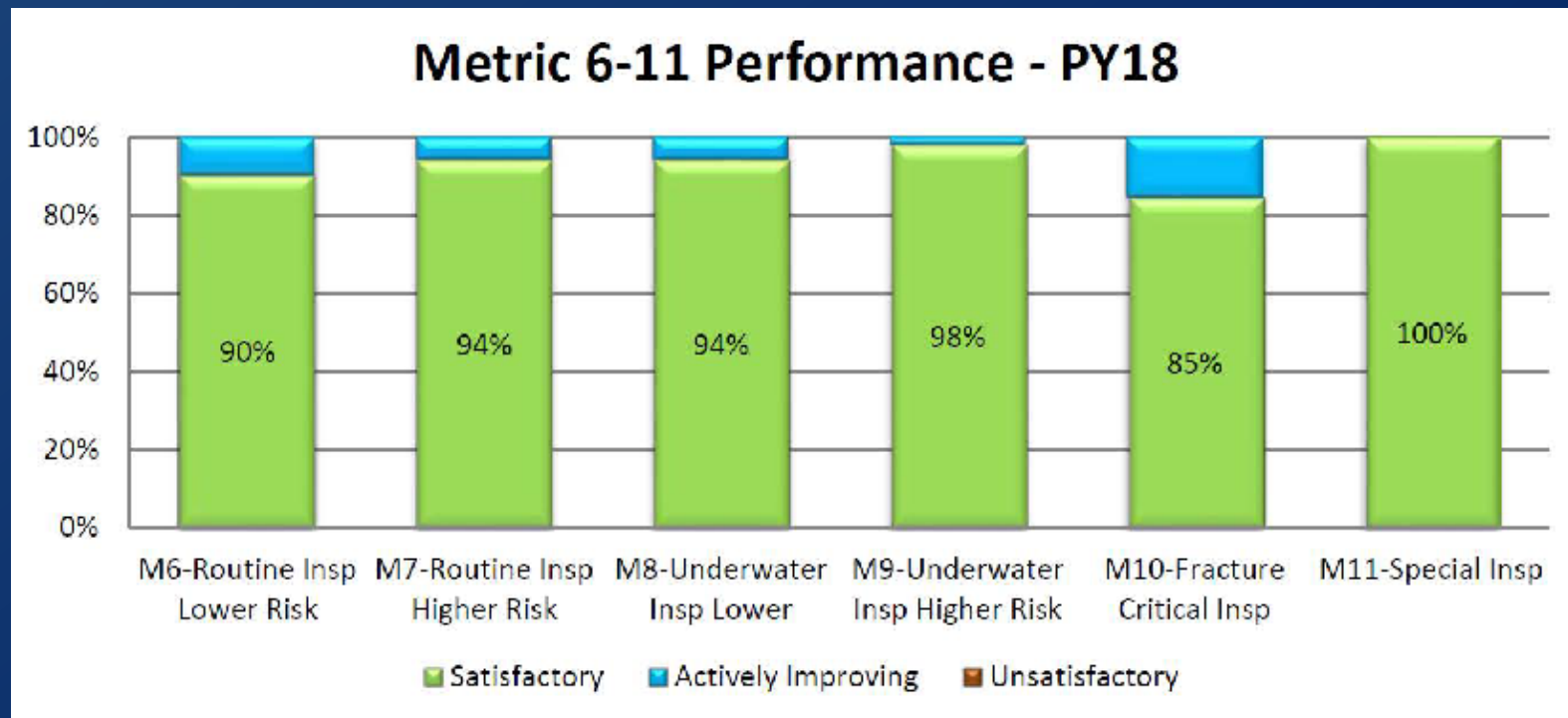


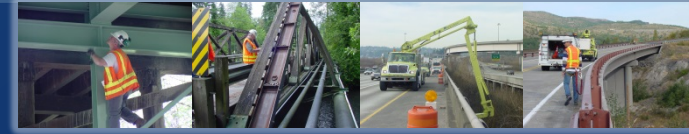
## Metrics Compliance Status – PY 18



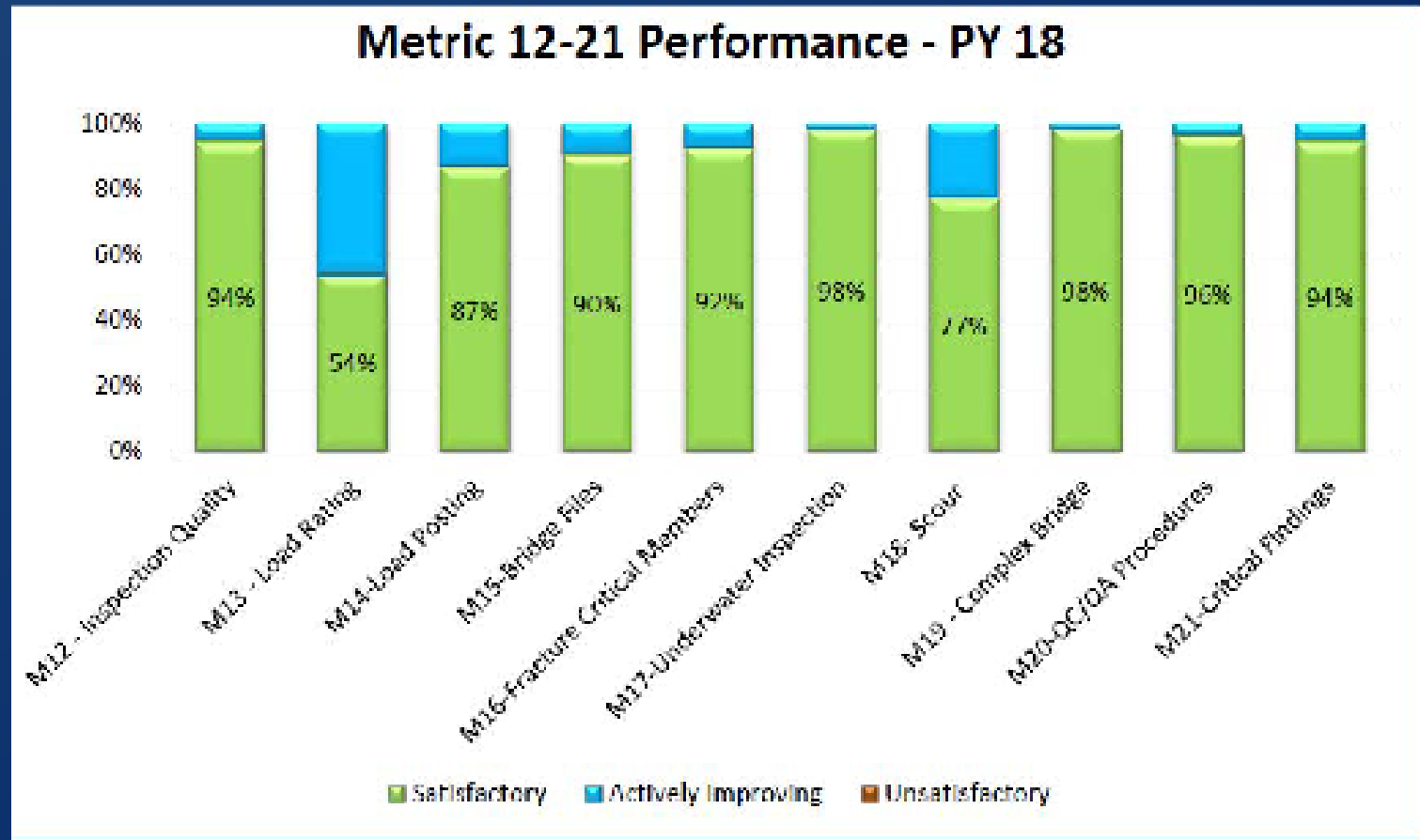


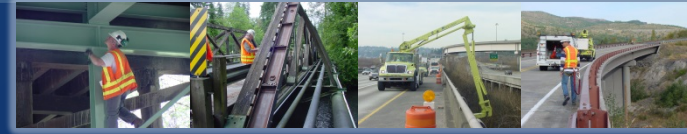
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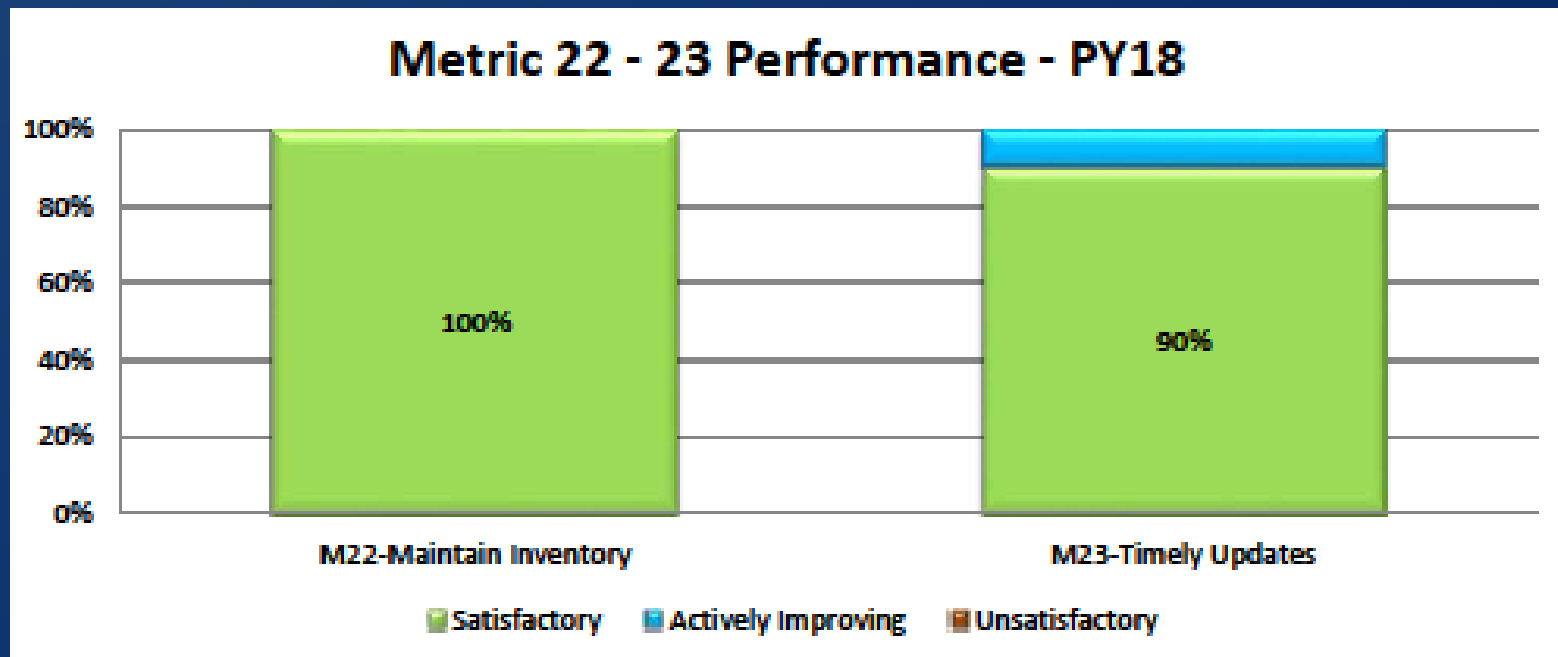


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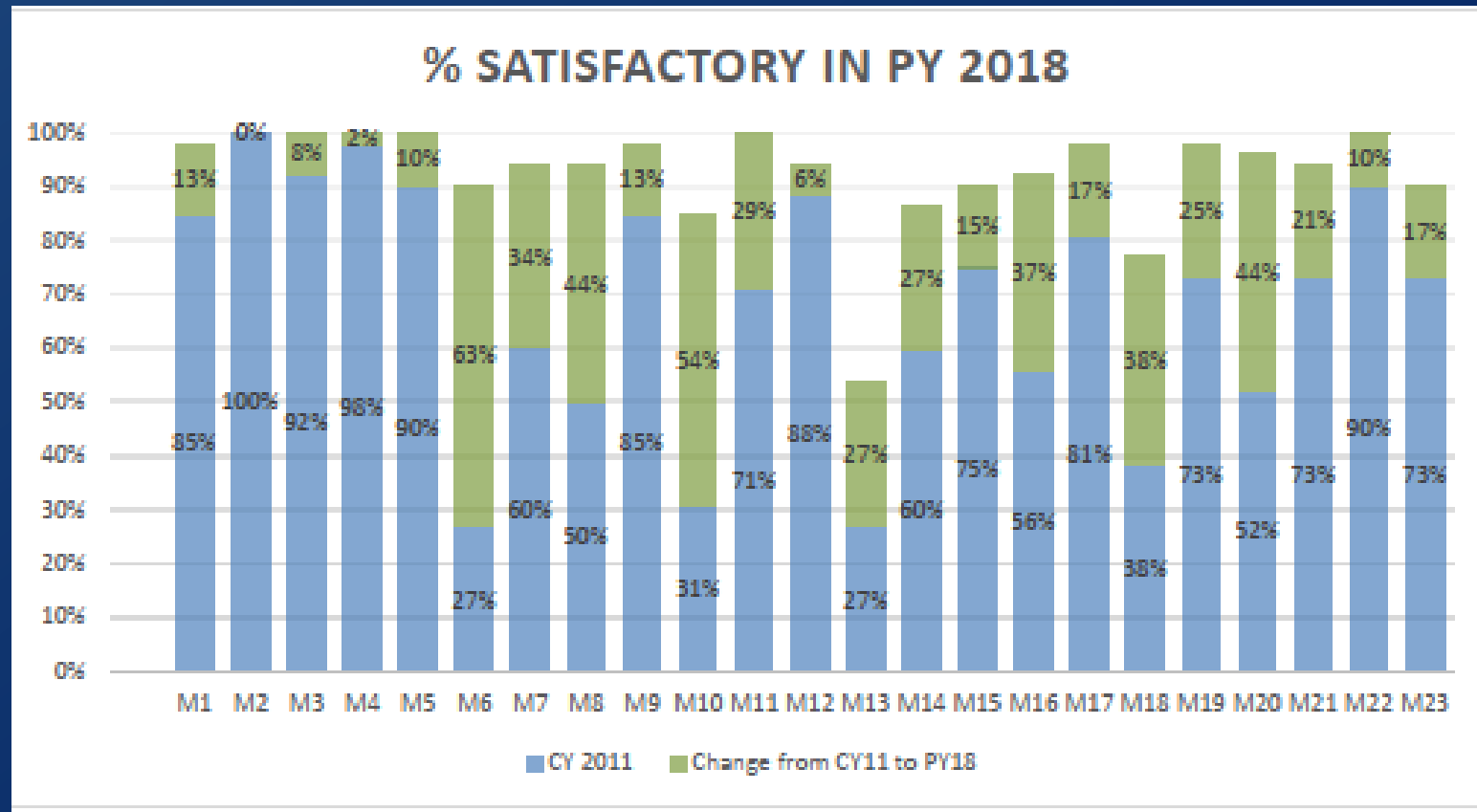


## Metrics Compliance Status – PY 18





## Metrics Compliance Status – PY 18





## 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:

	Intermediate AL		In-Depth AL	
	LOC (%)	MOE (%)	LOC (%)	MOE (%)
Tier 1	80	15	90	15
Tier 2	80	10	90	10



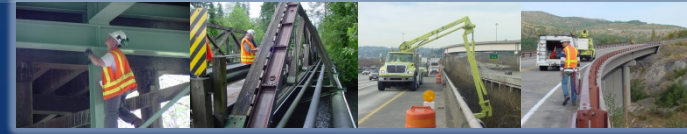
# National Bridge Inspection Program



## File and Field Review Selection

2019 Sampling Tool											Michigan		6/22/2018	
Data File: I:\BRIDGE\NBIS\NBIP\2019\NBIP Data\2018\yrbuly_26_0101201820180509154901.txt											Date: 05/09/18		Size: 6,498,972	
Total Population:		10,999	1,133	11,001	120	373	7,960	25	180	6,434	Field Rev	Tier 1 LOC 80 MOE 15	File Reviews - Int or InD Sample Type	Total Sample Size
Sample Type:		Min		Int T1	Min	Int T1	Min	Int T1	Min	Min				
Required Sample Size:		0	0	19	0	18	0	11	0	0				
Sample Selected:		0	0	19	0	18	0	11	0	0				
Locked	Field Population:	6,396	838		84	233	4,722	21	140		6,434			
Target Field Sample Size:		0	0	NA	0	4	0	2	2	NA	19			
Selected for Field Review:		18	7		4	5	15	2	2		19	45	53	
Rnd Num	Str Num	M13	M14	M15	M16	M17	M18	M19	M21	M23	M12/22	FileRev	TotSam	
0.000019	000000000008629	P	-	I	-	-	P	-	-	-	-	1	1	
0.000065	000000000006871	P	-	I	-	-	P	-	-	P	F	1	2	
0.000154	000000000003769	P	-	I	P	-	-	-	-	P	F	1	2	
0.000497	000000000000327	P	-	I	-	-	P	-	-	-	-	1	1	
0.000630	0000000000008159	P	-	I	-	-	P	-	-	-	-	1	1	
0.000853	000000000002788	P	-	I	-	-	P	-	-	-	-	1	1	
0.001011	0000000000013980	P	-	I	-	-	P	-	-	P	-	1	1	
0.001044	0000000000009082	P	-	I	-	-	P	-	-	P	F	1	2	
0.001163	0000000000013912	P	P	I	-	-	-	-	-	-	-	1	1	
0.001351	0000000000008321	P	-	I	-	-	P	-	-	-	-	1	1	
0.001498	000000000007022	P	-	I	-	-	P	-	-	P	F	1	2	
0.001530	0000000000013669	P	-	I	-	-	P	-	-	-	-	1	1	
0.001737	0000000000010911	P	-	I	-	-	-	-	-	-	-	1	1	
0.001806	0000000000000440	P	-	I	-	-	P	-	-	-	-	1	1	
0.001832	000000000001997	P	P	I	-	-	P	-	-	P	F	1	2	
0.001977	0000000000005651	P	-	I	-	-	P	-	-	P	F	1	2	
0.002152	0000000000002043	P	-	I	-	-	-	-	-	-	-	1	1	

# National Bridge Inspection Program



## Field Review Metric 12

### Field Review Checklist

PY2019

NBIP Review

SpaNo: 00000000000427

M-33 over I-75

RevDate:

State(1): 265-Michigan InspDate(90): Feb-17 Lat(16)/Long(17): 44.131667, -84.131156  
 Deck(107): 1-CIPConcr Main(43): 5-PSConcr / 2-Str-MultGdr Span(48)/Len(49): 73' / 381'  
 Owner(22): 01-StateDOT Built(27)/Recon(106): 1968/ ScourCrt(113): N - Not Applicable  
 Ormeth(63): 1-LF OR(64): 90.1 T IR(66): 54.0 T ADT(29)/Yr(30): 4,124 (07)  
 Review Team:

Review most recent inspection reports for all applicable inspection types. Bridge is in the population (P) and being assessed at the Int-AL (shaded) for the following metrics:

M13	M14	M16	M17	M18	M19	M21
P	-	-	-	-	-	-

### Metric 12 – Quality Inspections (Circle all appropriate responses)

Condition Codes	Item	Recorded Ratings M13 Insp M14 SRA	Review Team Rating	Notes	Meets Criteria?
	58 - Deck	6			
59 - Super	6				Y/N (±1 rating)
60 - Sub	6				Y/N (±1 rating)
62 - Culvert	N				Y/N (±1 rating)

Criteria	Review Team Insp Report Assessment	Notes/Explanation	Meets Criteria?
All notable deficiencies identified?	All/None/NA (no notable deficiencies)		
Narrative justifies cond. ratings?	Yes/No/NA (narrative not needed)		
FC/UW/Complex required & properly done	Yes/No/NA		
FC/UW/Complex Report results reflected in condition ratings	Yes/No/NA		
Followed MBE procedures?	Yes/No		
Qualified TL present during inspection(s)?	Indicated by identification on report, field observation, or other indicators	TL:	
UW - Qualified Diver(s)		Diver(s):	
Overall Field Assessment of Adequacy of this Inspection Only circle Y (Yes) if all the dark shaded boxes above are Yes or NA.			



## Field Review Metric 22

### Field Review Checklist

SI&A: 00000000000427

PY2019

M-33 over I-75

NBIP Review

866.0000

#### Metric 22 – Minimum Level Review Items (Circle all appropriate responses)

SI&A Item / Tolerance (* whichever is greater)	NBI SI&A (English units)	Review Team Code (Explain differences; use Notes section if needed)	Meets Accuracy?
70 - BRIDGE POSTING	5		Y/N
41 - STRUCTURE OPEN, POSTED OR CLOSED	A		Y/N
113 - SCOUR CRITICAL BRIDGES	N		Y/N
48 - LENGTH OF MAX SPAN/ $\pm 10\%$ or 1' *	73'		Y/N
49 - STRUCTURE LENGTH/ $\pm 10\%$ or 1' *	381'		Y/N
50A - CURB OR SIDEWALK: LEFT/ $\pm 10\%$ or 1' *	0.7'		Y/N
50B - CURB OR SIDEWALK: RIGHT/ $\pm 10\%$ or 1' *	0.7'		Y/N
51 - BR RDWY WIDTH CURB-CURB/ $\pm 10\%$ or 1' *	45.9'		Y/N
52 - DECK WIDTH OUT TO OUT/ $\pm 10\%$ or 1' *	48.2'		Y/N
32 - APPR RDWY WIDTH (W/SHLDERS)/ $\pm 5'$	54'		Y/N
33 - BRIDGE MEDIAN	0		Y/N
34 - SKEW/ $\pm 10$ degrees	27		Y/N
35 - STRUCTURE FLARED	0		Y/N
10 - INVENTORY ROUTE MIN VERT CLEAR/ $\pm 1'$	16.50'		Y/N
47 - INV RTE TOTAL HORIZ CLR/ $\pm 10\%$ or 1' *	45.9'		Y/N
56 - MIN LATERAL UNDCLR - LEFT/ $\pm 10\%$ or 1' *	18.7'		Y/N

#### Metric 22 – Intermediate Level Additional Review Items

SI&A Item / Tolerance (* whichever is greater)	NBI SI&A (English units)	Review Team Code (Explain differences; use Notes section if needed)	Meets Accuracy?
Item 27 - Year Built / $\pm 5$ yrs	1968		Y/N
Item 31 - Design Load / N/A	5-HS20		Y/N
Item 42A - Type of Service On / N/A	1		Y/N
Item 54A - Reference Feature / N/A	H		Y/N
Item 54B - Min Vert Underclt / $\pm 1'$	16.4'		Y/N
Item 100 - STRAHNET Designation / N/A	0		Y/N
Item 106 - Year Reconstructed / $\pm 5$ yrs	0		Y/N
Item 107 - Deck Structure Type / N/A	1-CIP Concr		Y/N
Item 108A - Type of Wearing Surf / N/A	3-Latex Concr		Y/N
Item 110 - Designated Nat'l Netwk / N/A	1-On Netwk		Y/N

Additional Notes:

# National Bridge Inspection Program



## File Review

File Review Checklist PY2019 NBIP Review  
Sta./No.: 000000000000327 M-65 over N BR THUNDER BAY RIVER 86% Data:

State (1): 265-Michigan Review by: Owner: 01-StateDOT  
Feature Carried (7): M-65  
Feature Crossed (6A): N BR THUNDER BAY RIVER  
Year Built (27): 2013/ Inspection Date (90): Jul-16

Metrics assessed in Int-AL file  
review show as dark shaded I:

M13	M14	M15	M16	M17	M18	M19	M21	M23
P	-	I	-	-	P	-	-	-

<b>Metric 15 – Inspection Procedures, Bridge Files</b>	
<b>File Components Present – (Y/N/Referenced/NA)</b>	
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 POA and documentation of post-event inspection or follow-up:	
Inventory and evaluation data and collection/verification forms:	
Significant Correspondence:	
Maintenance records:	
Assessment – Does this bridge meet the metric criteria (Y/N)?	

Metric 15 Notes: