



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



U.S. Department of Transportation
Federal Highway Administration



Presentation Summary

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

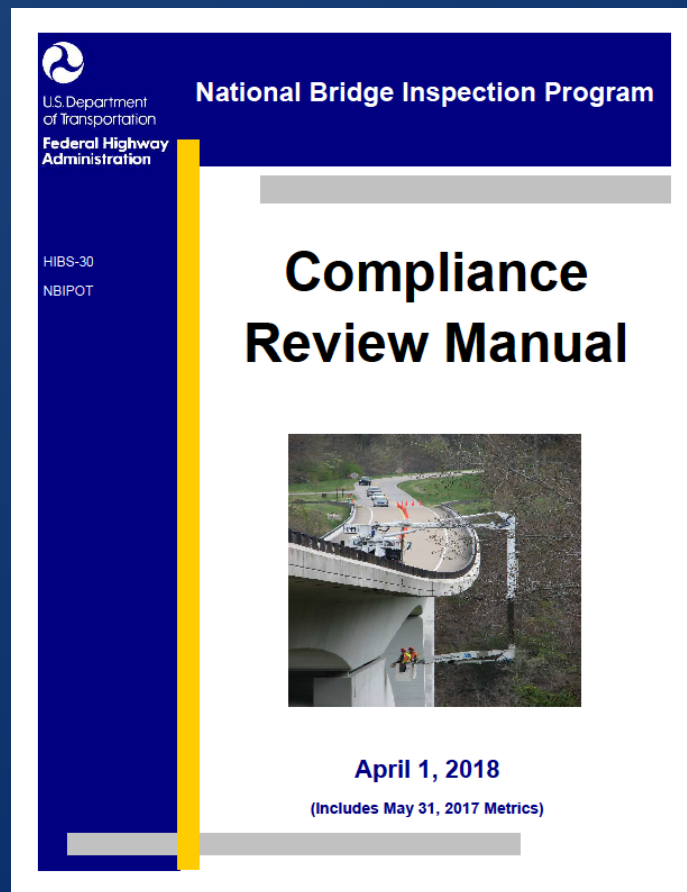


Metric Intent

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



Metric 12 – Quality Inspection



Metric #12: Inspection procedures – Quality Inspections

rev 5/1/17

NBIS Reference: 23 CFR 650.313 (a) & (b) Inspection procedures – Quality inspections

- Criteria**
- Each bridge is inspected in accordance with the *AASHTO Manual for Bridge Evaluation (MBE)*, as measured by the following criteria:
 - condition codes are within generally acceptable tolerances,
 - all notable bridge deficiencies are identified, and
 - condition codes are supported by narrative that appropriately justifies and documents the component condition rating.
 - A qualified team leader is at the bridge at all times during each initial, routine, in-depth, fracture critical member and underwater inspection.

Population: Bridges in the State or selected geographic/owner subset that are open to traffic, and have been inspected since January 1 of the previous calendar year.

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.

Conditional Compliance (CC): Adhering to FHWA approved plan of corrective action (PCA).

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 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.

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 procedures are followed.

In-Depth Assessment (InD-AL): Perform one of the following:

- Division InD-AL – In addition to the Int-AL, develop guidelines for review, with concurrence from BSE, and conduct in accordance with guidelines.
- National InD-AL – Conduct in accordance with national direction and guidelines.

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[ToC](#)



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:



Min-AL

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)

1 of 2

NBIP Field Review Checklist – PY 2017

Structure No.: 000000000005775

Review Date: _____

Item 1 - State: **441-Rhode Island**

Review Performed by: _____

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:

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

Metric 12 – Quality Inspections (Circle appropriate responses)

Condition Codes	Item	Recorded Ratings		Review Team Rating	Notes	Meets Criteria? Y/N
		NBI SI&A	Insp rept			
	Item 58 – Deck	7				Y / N (±1 rating)
	Item 59 – Superstr.	7				Y / N (±1 rating)
	Item 60 – Substr.	5				Y / N (±1 rating)
	Item 62 – Culvert	N				Y / N (±1 rating)



Min AL

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

2 of 2

	Criteria	Review Team Insp Report Assessment	Notes/Explanation	Meets Criteria? Y/N
Other Metric 12 Criteria	All notable deficiencies identified?	All/None/NA (no notable deficiencies)		Y / N
	Narrative justifies cond. ratings?	Yes/No/NA (narrative not needed)		Y / N
	FC/UW/Other required & done	Yes/No/NA		Y/N/NA
	FC/UW/Other results reflected in cond. ratings	Yes/No/NA		Y/N/NA
	Followed MBE procedures?	Yes/No		Y / N
	Qualified TL present during inspections?	Indicated by identification on report, field observation, or other indicators		Y / N
	UW - Qualified Diver inspected			Y/N/NA
Overall Field Assessment of Adequacy of this Inspection Only circle Y (Yes) if all the dark shaded boxes above are yes (or NA).				Y / N



Min-AL

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”

- 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;
 - 3) Adequacy of documentation and appropriate justification of component condition ratings;





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
- $\% = (\# \text{ bridges meeting crit.}) / (\# \text{ reviewed}) * 100$

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:

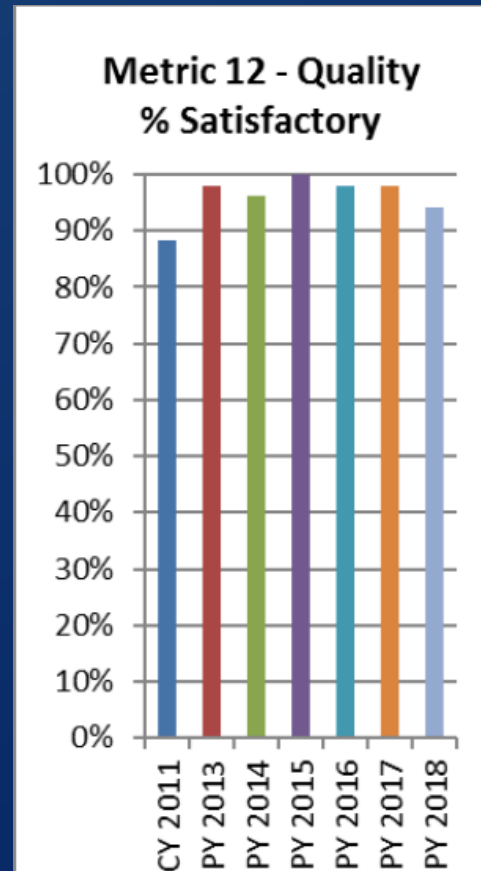
- At least 80% of bridges reviewed meet criteria for component condition ratings, documentation of deficiencies, and following of applicable MBE procedures.
- All bridges reviewed had a qualified team leader on site during all most recent inspection types.

Non-Compliance (NC): One or more SC criteria are not met.





Metric 12 – Trend PY 2011-18





2019 Michigan Bridge Conference Workshop

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

National Bridge Inspection Program Status and Summary						
National Bridge Inspection Program (NBIP) review Final Summary of Metrics (FSM) Assessment (AL) and Compliance (CL) Levels and review status:						
Metric	Prev CL	AL	Dec 31 CL	Complete	Mar 31 CL	Complete
01 - Bridge Inspection Organization	C	Min	C	✓		
02 - Qualifications of Personnel - Program Manager	C	Int	C	✓		
03 - Qualifications of Personnel - Team Leader(s)	C	Min	SC	✓		
04 - Qualifications of Personnel - Load Rating Engineer	C	Min	C	✓		
05 - Qualifications of Personnel - UW Bridge Inspection Diver	C	Min	C	✓		
06 - Inspection Frequency - Routine - Lower Risk Bridges	SC	Min	SC	✓		
07 - Inspection Frequency - Routine - Higher Risk Bridges	SC	Min	SC	✓		
08 - Inspection Frequency - Underwater - Lower Risk Bridges	C	Min	C	✓		
09 - Inspection Frequency - Underwater - Higher Risk Bridges	C	Min	C	✓		
10 - Inspection Frequency - Fracture Critical Member	C	Min	C	✓		
11 - Inspection Frequency - Frequency Criteria	C	Min	C	✓		
12 - Inspection Procedures - Quality Inspections	C	Min	SC	✓		
13 - Inspection Procedures - Load Rating	CC	Min	CC	✓		
14 - Inspection Procedures - Post or Restrict	CC	Min	CC	✓		
15 - Inspection Procedures - Bridge Files	CC	Int	NC	✓		
16 - Inspection Procedures - Fracture Critical Members	C	Min	C	✓		
17 - Inspection Procedures - Underwater	C	Int	C	✓		
18 - Inspection Procedures - Scour Critical Bridges	CC	Min	CC	✓		
19 - Inspection Procedures - Complex Bridges	SC	Int	C	✓		
20 - Inspection Procedures - QC/QA	C	Min	C	✓		
21 - Inspection Procedures - Critical Findings	C	Min	C	✓		
22 - Inventory - Prepare and Maintain	C	Int	C	✓		
23 - Inventory - Timely Updating of Data	C	Min	C	✓		

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*



2019 Michigan Bridge Conference Work

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*



2019 Michigan Bridge Conference Work

Metric 12: Inspection Procedures - Quality Inspections

- Recurrent Training (MDOT)
 - 24 hours approved bridge inspection training
 - 5 year period



2019 Michigan Bridge Conference Work

Metric 12: Inspection Procedures - Quality Inspections

■ AASHTO Manual for Bridge Evaluation

are within
ances

www.michigan.gov/bridgeoperations

MDOT Home Contact Organization FA

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Safety Inspection

The safety inspection program is managed within the Office of Structure Preservation and Management of the Bureau of Bridges and Structures. The program ensures compliance with the National Bridge Inspection Standards (NBIS) through comprehensive performance of inspection timeliness verifications, annual FHWA NBIS Metric evaluations, inspection team leader qualification appraisals, and quality assurance reviews. The Office of Structure Preservation and Management also develops inspection procedures, responds directly to the FHWA Michigan Division Bridge Engineer, and serves as the recognized resource for all inspection related inquiries.

Contact:
Allie Nadjarian
517-331-6602
NadjarianA@michigan.gov

Resource Links

MDOT Bridge Advisories
Bridge Safety Report
NBIS Recurrent Training
NHI Training
National Bridge Inspection Standards
AASHTO Bridge Publications
Federal Highway Administration
Prequalified Service Vendors

FHWA Compliance

Manuals

Guides

RFA Priority Level Guidelines

Coding and Managing Bridges for Scour Vulnerability

Michigan Structure Inventory and Appraisal of Bridges

MDOT NBI Rating Guidelines

Guidelines for Bridge Inspection Frequencies

MiBRIDGE Application Development

Inspection Questions

Forms

MDOT Home Contact Organization FAQ

Search

Office of Structure Preservation and Management. The program ensures compliance with the National Bridge Inspection Standards (NBIS) through comprehensive performance of inspection timeliness verifications, annual FHWA NBIS Metric evaluations, inspection team leader qualification appraisals, and quality assurance reviews. The Office of Structure Preservation and Management also develops inspection procedures, responds directly to the FHWA Michigan Division Bridge Engineer, and serves as the recognized resource for all inspection related inquiries.

The Bridge Load Rating Unit. The unit is responsible for verifying their safe load rating of bridges. The unit performs load rating evaluations of complex bridges, truss bridges, and other bridges within the state-owned inventory. The unit also performs load rating evaluations of bridges owned by local governments.

Developed by the Office of Structure Preservation and Management. The unit is responsible for verifying their safe load rating of bridges. The unit performs load rating evaluations of complex bridges, truss bridges, and other bridges within the state-owned inventory. The unit also performs load rating evaluations of bridges owned by local governments.

Conference Work

Metric 12: Inspection Procedures - Quality Inspections

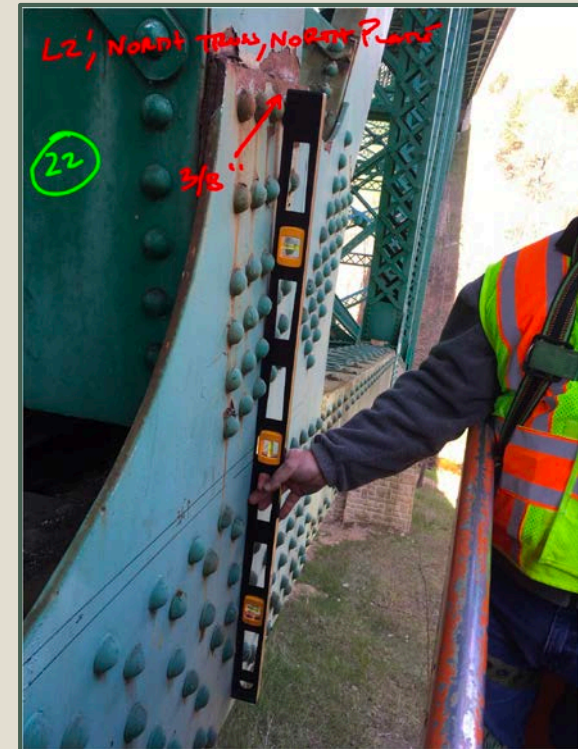
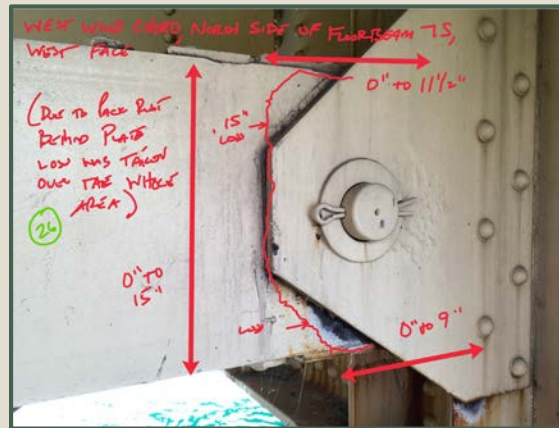
- AASHTO Manual for Bridge Evaluation (MBE)
 - *Condition Codes are supported by narrative that justifies and documents the component condition rating*



2019 Michigan Bridge Conference Work

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*




2019 Michigan Bridge Conference Work

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


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Welcome Allie Nadjarian | Jurisdiction: MDOT - Region - Statewide

Administration | Bridge Management | Assignments | Dashboards | Reports

STR 13262 | Information Summary and Current Status | **C03-79052**



Facility M-24	Latitude / Longitude 43.5163 / -83.4455	MDOT Structure ID 79179052000C030	Structure Condition Good Condition(7)
Feature WISCOGGIN DRAIN	Length / Width / Spans 16 / 104 / 1	Owner Region: Bay(4)	
Location JUST EAST OF GRAF RD	Built / Recon. / Paint / Ovly. 1995 / / /	TSC Huron(28)	
Region / County Bay(4) / Tuscola(79)	Material / Design 1 Concrete / 19 Culvert	Last NBI Inspection 01/03/2017 / ZQAD	
			Operational Status A Open, no restriction(A)
			Scour Evaluation 6 Calcs not made

Inventory & Appraisal | Inspections / Reports | Load Ratings | Outstanding Work | Work History | Documents

Special Inspections Required: ☐ Fracture Critical (92A) ☐ Underwater (92B) ☐ Other Special (92C) ☐ Fatigue Sensitive (92D) ☐ Scour Critical

Inspection Data: (select from folders below) Print Print All

Request for Action

Add New

Fatigue Sensitive

Underwater

Other Special

Damage

Scour Action Plan

REQUEST FOR ACTION

Submitted By: Allie Nadjarian

Agency / Company Name: MDOT Load Rating

RFA #: 13262-03142019

* RFA Date: 03/14/2019

Problems/Comments

Delete Request For Action

IMMEDIATE ACTION (Add)

INTERMEDIATE ACTION REQUESTED (Add)

FINAL ACTION COMPLETED

Comment

RFA Complete

STR 13262

Information Summary and Current Status

C03-79052



Facility

M-24

Feature

WISCOGIN DRAIN

Location

JUST EAST OF GRAF RD

Region / County

Bay(4) / Tuscola(79)

Latitude / Longitude

43.5163 / -83.4455

Length / Width / Spans

16 / 104 / 1

Built / Recon. / Paint / Ovly.

1995 / / /

Material / Design

1 Concrete / 19 Culvert

MDOT Structure ID

79179052000C030

Owner

Region: Bay(4)

TSC

Huron(28)

Last NBI Inspection

01/03/2017 / ZQAD

Structure Condition

Good Condition(7)



Operational Status

A Open, no restriction(A)

Scour Evaluation

6 Calcs not made

Inventory & Appraisal

Inspections / Reports

Load Ratings

Outstanding Work

Work History

Documents

Special Inspections Required:

☐ Fracture Critical (92A)☐ Underwater (92B)☐ Other Special (92C)☐ Fatigue Sensitive (92D)☐ Scour Critical

Inspection Data: (select from folders below)

Print

Print All

Routine - CSIR

Element

Request for Action

[Add New](#)

Fracture Critical

Fatigue Sensitive

Underwater

Other Special

Damage

Scour Action Plan

IMMEDIATE ACTION

Recommended Action

Requested By

Completed By

Completed Date

Comments

Date Traffic Restored / Signs Installed Traffic Restoration / Sign Installation Comments

Remove Immediate Action

INTERMEDIATE ACTION REQUESTED [\(Add\)](#)

FINAL ACTION COMPLETED

Comment

RFA Complete

☐

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*

Notify MDOT Bureau of Bridges & Structures

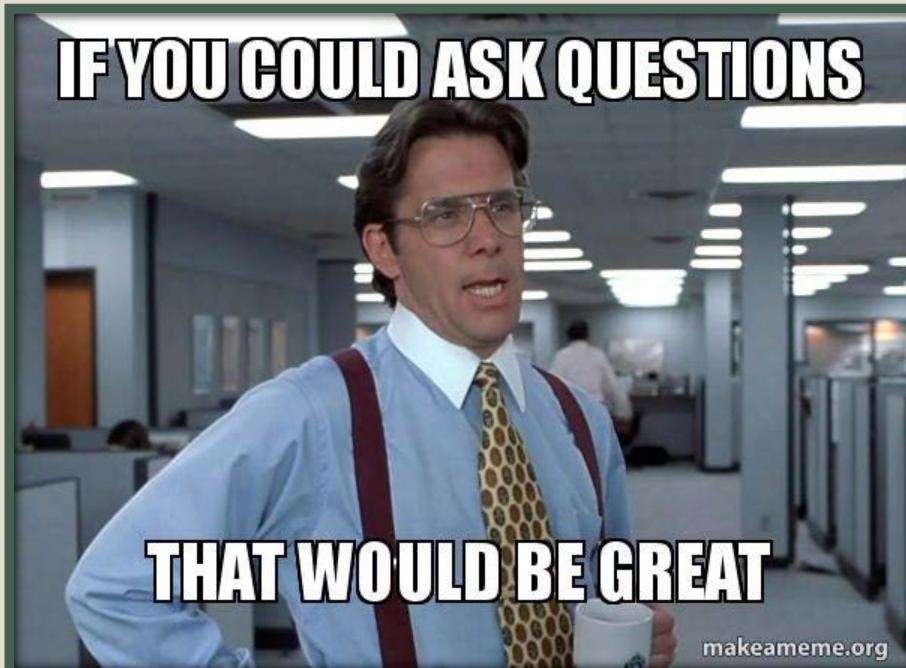
Allie Nadjarian
517.331.6602

NadjarianA@Michigan.gov

Andrew Bouvy
517.242.1164

BouvyA@Michigan.gov

IF YOU COULD ASK QUESTIONS



THAT WOULD BE GREAT

makeameme.org