



BUREAU of BRIDGES



Bridge Safety Inspection QC/AQ Program QA

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GLEG

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SGI

March 19, 2019



Overview of MDOT QA/QC Project

Overview of MDOT QC/QA Project

● Purpose

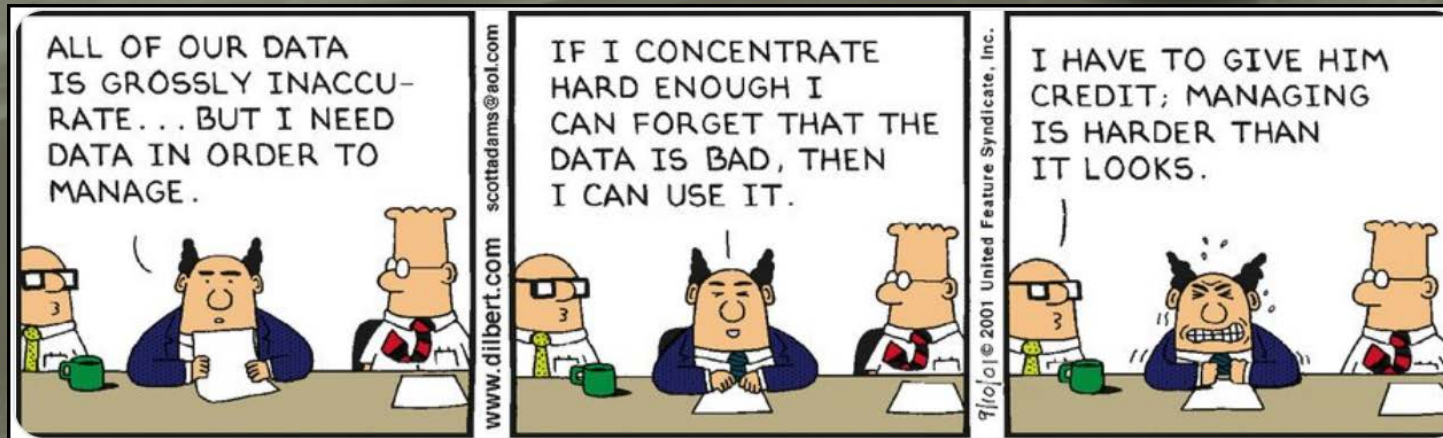
23 CFR 650.313(g) Quality Control and Quality Assurance

Requires each **state** to assure that systematic Quality Control (QC) and Quality Assurance (QA) procedures are being used to maintain a high degree of accuracy and consistency in the inspection program.



Overview of MDOT QC/QA Project

Other Reasons for QA/QC



Overview of MDOT QC/QA Project

Metric #20: Inspection procedures – QC/QA

rev 5/1/17

NBIS Reference: 23 CFR 650.313 (g) – QC/QA

Criteria

- Systematic quality control (QC) and quality assurance (QA) procedures are used to maintain a high degree of accuracy and consistency in the inspection program.
- QC/QA procedures include periodic field review of inspection teams, periodic refresher training requirements, and independent review of inspection reports and computations.

Population: None (or as determined to be appropriate by the reviewer).

Compliance Levels

Compliance (C): All of the following must be met for C:

- QC/QA procedures are established, documented, implemented, and effective.
- QC/QA procedures include periodic field review of inspection teams, periodic refresher training requirements, and independent review of inspection reports and computations.

Substantial Compliance (SC): All of the following must be met for SC:

- QC/QA procedures are established, implemented, and effective, but minor aspects of the procedures are not documented or are not being performed.
- QC/QA procedures include periodic field review of inspection teams, periodic refresher training requirements, and independent review of inspection reports and computations.

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

Overview of MDOT QC/QA Project

Metric 20– QC/QA is impacted by the findings of the following metrics:

- Metric 12 – Quality Inspections
- Metric 13 – Load Rating
- Metric 18 – Scour
- Metric 22 – Prepare and Maintain an Inventory

**ACCOUNTABILITY AND
DOCUMENTATION**

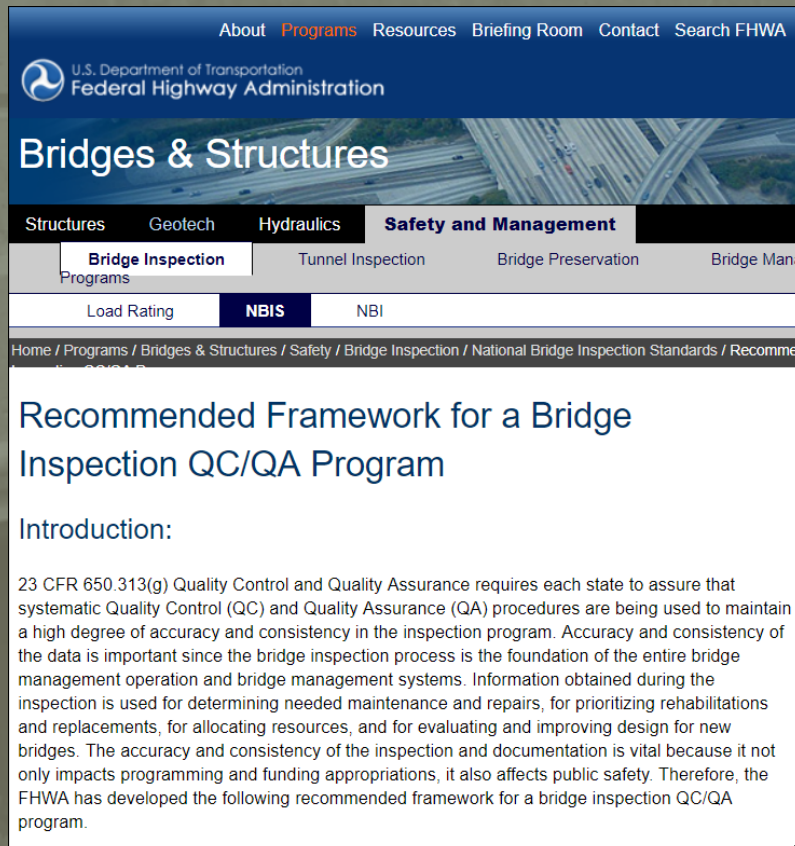
RECORD KEEPING

***IF IT'S NOT WRITTEN,
IT DIDN'T HAPPEN!***

Overview of MDOT QC/QA Project

FHWA's Recommended Framework for QC/QA

<https://www.fhwa.dot.gov/bridge/nbis/nbisframework.cfm>



The screenshot shows the FHWA website's 'Bridges & Structures' section. The navigation bar includes 'About', 'Programs', 'Resources', 'Briefing Room', 'Contact', and 'Search FHWA'. The main content area is titled 'Bridges & Structures' and features a sub-navigation menu with 'Structures', 'Geotech', 'Hydraulics', and 'Safety and Management'. Under 'Safety and Management', there are links for 'Bridge Inspection Programs', 'Tunnel Inspection', 'Bridge Preservation', and 'Bridge Management'. The 'Bridge Inspection Programs' link is selected, leading to a page titled 'Recommended Framework for a Bridge Inspection QC/QA Program'. The page includes an 'Introduction' section that states: '23 CFR 650.313(g) Quality Control and Quality Assurance requires each state to assure that systematic Quality Control (QC) and Quality Assurance (QA) procedures are being used to maintain a high degree of accuracy and consistency in the inspection program. Accuracy and consistency of the data is important since the bridge inspection process is the foundation of the entire bridge management operation and bridge management systems. Information obtained during the inspection is used for determining needed maintenance and repairs, for prioritizing rehabilitations and replacements, for allocating resources, and for evaluating and improving design for new bridges. The accuracy and consistency of the inspection and documentation is vital because it not only impacts programming and funding appropriations, it also affects public safety. Therefore, the FHWA has developed the following recommended framework for a bridge inspection QC/QA program.'

- A. Documentation of a QC/QA Program
- B. Quality Control (QC) Procedures
- C. Quality Assurance (QA) Procedures

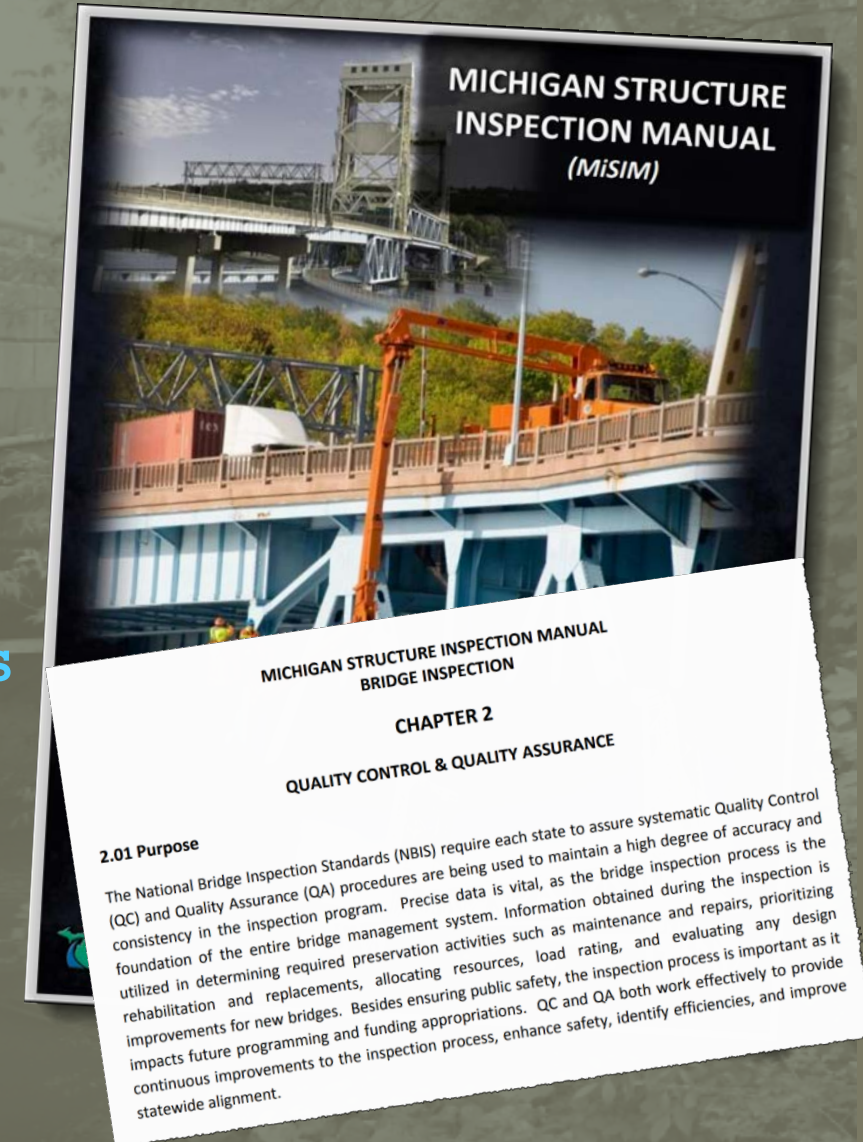
Overview of MDOT QC/QA Project

A. Documentation of a QC/QA Program

MiSIM documents the QC/QA Requirements

QC - Procedures intended to assure quality is maintained at a certain level.

QA - Methods intended to assure the effectiveness of QC and verify or measure the overall quality of the program



Overview of MDOT QC/QA Project

C. Quality Assurance Procedures (FHWA Framework)

- 1) Define and Document QA Roles and Responsibilities
- 2) Establish Frequency
- 3) Document disqualification procedures for team leaders/firms
- 4) Document re-qualification procedures
- 5) Document procedures for conducting inspections on a “control” bridge
- 6) Document procedures to validate QC Procedures.

Overview of MDOT QC/QA Project

1) Define and Document QA Roles and Responsibilities

Bridge Owner
MDOT

Responsible for QC
Responsible for QA

2) Establish Frequency

QA is (typically) completed Annually for all agencies within
a Specific MDOT Region
(+/- 5 years to complete all agencies, 20% per year)

Overview of MDOT QC/QA Project

- 3) Document disqualification procedures for team leaders/firms
- 4) Document re-qualification procedures

MICHIGAN STRUCTURE INSPECTION MANUAL BRIDGE INSPECTION – PROGRAM REQUIREMENTS

1.05 Qualifications

Minimum qualification requirements are defined in NBIS section 650.309 Qualifications. In addition NBIS section 650.313(g), *Quality control and quality assurance* requires the state to develop and implement the periodic bridge inspection recurrent training requirements.

Qualification requirements are assessed annually by FHWA for compliance with NBIS using the criteria specified in the following metrics:

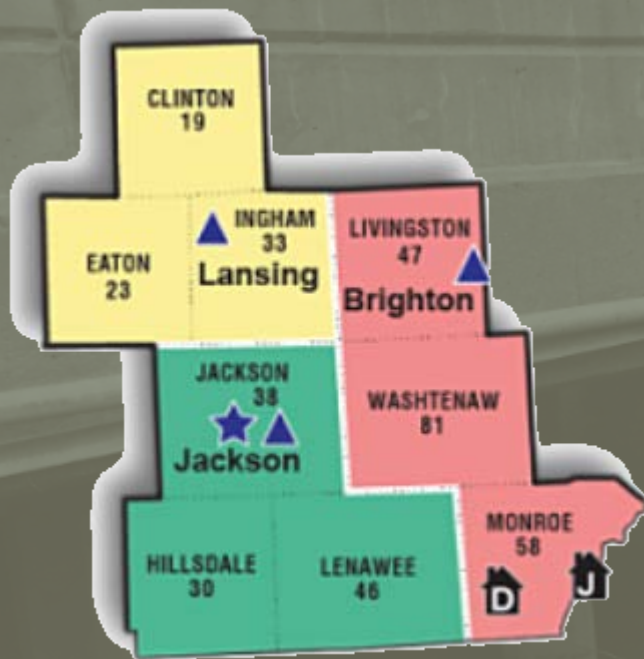
Metric 2 – Qualifications of Personnel – Program Manager	NBIS 650.309(a), 650.313(g)
Metric 3 – Qualifications of Personnel – Team Leader(s)	NBIS 650.309(b), 650.313(g)
Metric 4 – Qualifications of Personnel – Load Rating Engineer	NBIS 650.309(c)
Metric 3 – Qualifications of Personnel – Underwater Diver	NBIS 650.309(d)

Consultants interested in service contracting with the Michigan Department of Transportation (MDOT) in the classifications of Bridge Load Rating Analysis, Bridge Safety Inspection, and Underwater Bridge Inspection must be prequalified as a prerequisite to submitting proposals for contracting. See MDOT's Consultant Prequalification Application Instructions for additional staff education and experience requirements.

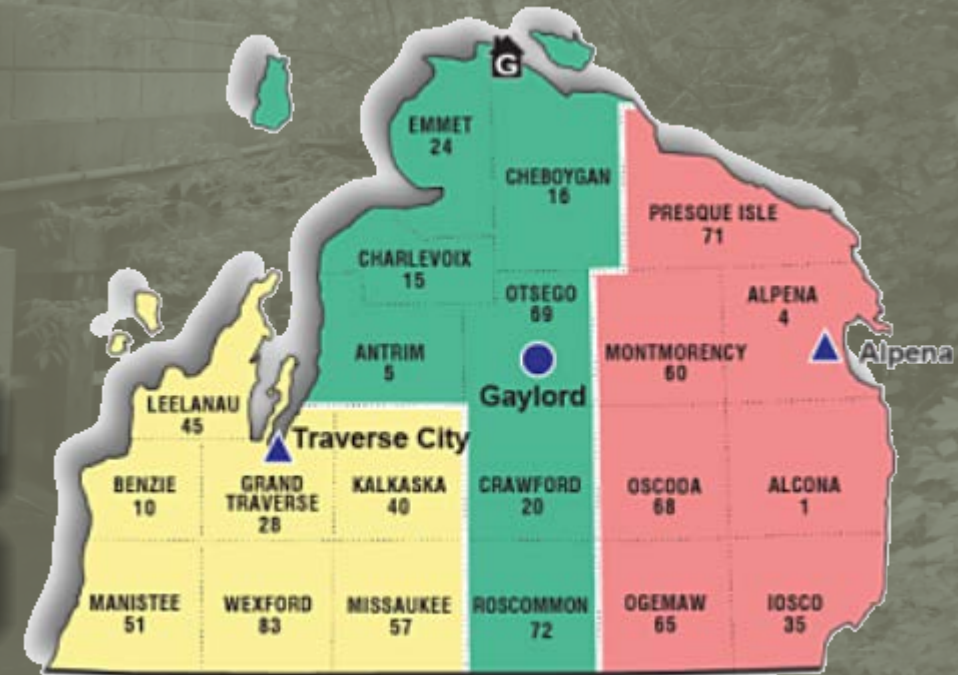
Overview of MDOT QC/QA Project

6) Document procedures to validate QC Procedures.

2018-19 Bridge Inspection and Load Rating QA/QC



University Region



North Region

Overview of MDOT QC/QA Project

QA/QC Project Scope Summary

- PRELIMINARY ACTIVITIES
 - Review Bridge Network and Select Bridges
 - Initialize Contact w/ the Bridge Owner
 - Review QC Activities

OWNER	REGION	TSC	STR NO.	BRKEY	LEGAL_CD	FACILITY	FEATINT	LAT	LONG
ALANSON	North	Gaylord	2460	244006000003B01	4	RIVER STREET	CROOKED RIVER	45.4400	84.7856
ALPENA	North	Alpena	357	044015200072B01	4	SECOND AVENUE	THUNDER BAY RIVER	45.0639	83.4306
ALPENA	North	Alpena	358	044015200081B01	4	NINTH AVENUE	THUNDER BAY RIVER	45.0709	83.4373
Alcona County	North	Alpena	9	01200001000B010	2	BAMFIELD ROAD FH08	AU SABLE RIVER	44.5606	83.8033
Alcona County	North	Alpena	10	01200001000B020	2	MIKADO GLENNIE RD	PINE RIVER	44.5904	83.4481
Alcona County	North	Alpena	11	01200001000B030	2	MIKADO ROAD	VAN ETEN CREEK	44.5910	83.4144
Alcona County	North	Alpena	12	01200006000B010	2	SHAW ROAD	BLACK RIVER	44.7509	83.3358
Alcona County	North	Alpena	13	01200010000B010	2	HURBERT ROAD	THUNDER BAY RIVER	44.8591	83.5953
Alcona County	North	Alpena	14	01200016000B010	2	HUBBARD LAKE ROAD	SUCKER CREEK	44.7739	83.5217
Alcona County	North	Alpena	15	01200018000B010	2	COUNTY HWY F41	PINE RIVER	44.5506	83.4221
Alcona County	North	Alpena	16	01200018000B020	2	COUNTY HWY F41	VAN ETEN CREEK	44.5736	83.4223
Alcona County	North	Alpena	17	01200018000B030	2	COUNTY HWY F41	VAN ETEN CREEK	44.5783	83.4223
Alcona County	North	Alpena	18	01200023000B010	2	LAKESHORE DRIVE	BLACK RIVER	44.8150	83.3026

Michigan Department of Transportation

SCOPE OF SERVICE
FOR
"AS NEEDED" DESIGN SERVICES
Bridge Inspection and Bridge Load Rating QA/QC

CONTROL SECTION(S): Various

JOB NUMBER(S): Various

PROJECT LOCATION: Statewide
Services will be performed at various locations statewide, including Local Agency and Michigan Department of Transportation (MDOT) facilities. Field review locations will be determined during preliminary activities. A list of Local Agency and MDOT Bridge Owners will be provided to the CONSULTANT during the priced proposal phase.

PROJECT DESCRIPTION:
Work involved in the design of the project consists of: Perform "as-needed" bridge inspection and bridge load rating quality assurance (QA) and quality control (QC) tasks to ensure that the quality of the National Bridge Inventory (NBI) inspections and load rating analyses are in accordance with the National Bridge Inspection Standards (NBIS) and MDOT policies and procedures.

The primary function of QA is to verify that QC procedures are being performed throughout the inspection and load rating processes, and that the QC procedures are effective in ensuring consistency and uniformity. The QC procedures, safety inspections, and load rating analyses may be performed within the bridge owner's organization (in-house) or may be completed by a consultant hired by the bridge owner.

Full time services will not be required at all times. This Scope of Service is for "as-needed" services based on the intermittent needs of MDOT. It must be noted that this is not a guarantee that MDOT will use the CONSULTANT's services.

Up to two (2) CONSULTANTS will be chosen for "as-needed" contracts of approximately \$500,000 each. The number of structures assigned to each CONSULTANT will be determined by future needs.

ANTICIPATED SERVICE START DATE:
July 2018

ANTICIPATED SERVICE COMPLETION DATE:
July 2020

This selection is for a two year period.

DBE PARTICIPATION REQUIREMENT:
NONE

Final Posted Scope: 5/14/2018

1

Overview of MDOT QC/QA Project

QA/QC Project Scope Summary

● AGENCY VISITS

- Bridge Owner and Team Leader
- Review Inspection and Load Rating QA/QC Procedures (On File?)
- Review QC Activities
- Complete File Review
- Complete Field Review

REVIEW OF AGENCY'S QUALITY CONTROL PROCESS: INSPECTION

Does the owner have an engineer or technical person performing QC? ☐ Yes ☐ No

If yes: Name: _____
Company: _____
Position: _____

Quality control measures performed by the Agency or on the Agency's behalf:

- Verify inspector credentials meet QTL requirements? ☐ Yes ☐ No
- Review diving inspector credentials? ☐ Yes ☐ No ☐ N/A
- Maintain a file for Agency and/or Consultant credentials? ☐ Yes ☐ No
- Perform periodic timeliness reviews? ☐ Yes ☐ No
When/How? _____
- Review inspection documentation? ☐ Yes ☐ No
How many? _____ When? _____
- Field review selected structures? ☐ Yes ☐ No
How many? _____ When? _____
- Document RFAs in MiBRIDGE? ☐ Yes ☐ No
- Document critical findings in MiBRIDGE? ☐ Yes ☐ No
- Maintain scour action plans in MiBRIDGE? ☐ Yes ☐ No
- Document element level inspections in MiBRIDGE? ☐ Yes ☐ No
- Maintain Agency and/or Consultant QA/QC Plan on file? ☐ Yes ☐ No
- List any other QC activities performed: _____

Is there a formal feedback process to the inspectors as an outcome of QC findings? ☐ Yes ☐ No

Describe. _____

Inspection Assessment: ☐ QA ☐ QC

Overview of MDOT QC/QA Project

QA/QC Project Scope Summary

QA vs QC (Inspection)

- 10% of Owners Inventory Selected - Bridge Review List
 - Bridge Inspection File Review, Qualification Review Timeliness Review



QA –

- 50% of the Bridge File list will have a File/Field Review Completed

QC –

- Bridge Review List, Plus (Additional Structures Subject to Review)
- 100% of the Bridge File List will have a File/Field Review Completed

Overview of MDOT QC/QA Project

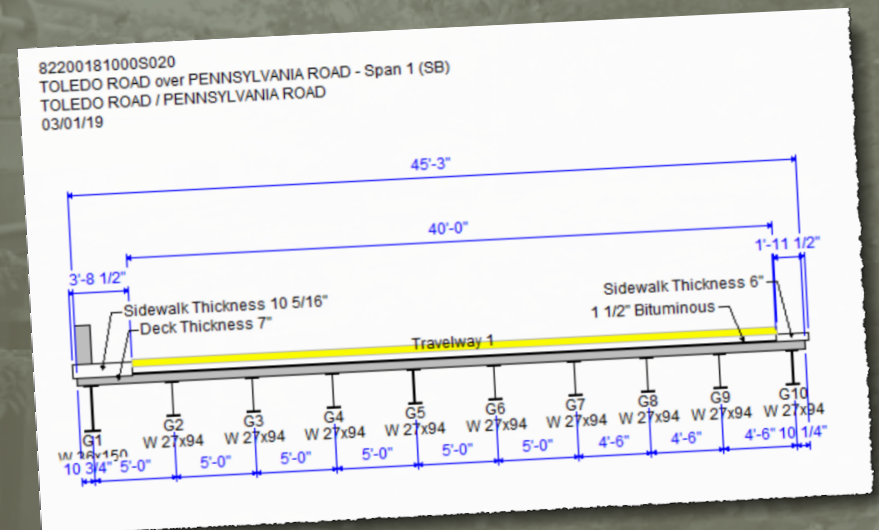
QA/QC Project Scope Summary

QA vs QC (Load Rating)

- 10% of Owners Inventory Selected - Bridge Review List


NOTE: Structures will be added to the Bridge Review List As Needed.

- 100% of the structures on the Bridge Review List will be subject to the QA/QC review.



Overview of MDOT QC/QA Project

- Bridge Owner's Feed Back
- Reference Handouts
 - Contact List
 - MiSIM Chapters
 - Frequency Guidelines
 - etc.



GUIDELINES FOR BRIDGE INSPECTION

Bridge Field Services, S

The NBIS sets the maximum frequencies for Routine, Fracture Critical, and Under fair to good condition. Evaluation of the conditions encountered during the inspection is the responsibility of the inspector. These guidelines are to be used to determine appropriate frequencies for future inspections. These guidelines are to be used to recognize that the conditions encountered are unique for each bridge.

Reduced frequencies are set to verify and ensure stability of the deficient elements between inspections.

COMPONENT OR BRIDGE TYPE	FREQUENCY ⁽¹⁾ (Months)
	≤ 6 ≤ 12 ≤ 24 ≤ 36 ≤ 48
DECK (Si&A Item 58)	
ROUTINE	
Item 58 or 58B NBI rating = 4	X
Item 58 or 58B NBI rating = 3	X
Decks containing false decking	
IN-DEPTH	
Item 58 or 58B NBI rating = 6	
Item 58 or 58B NBI rating = 4	
False decking protects < 75% of span	
False decking protects ≥ 75% of span	
SUPERSTRUCTURE (Si&A Item 59)	
CONCRETE PRIMARY MEMBERS	
Main rebar or prestressing strands exposed with section loss	X
Spall on beam end with loss of bearing	X
Longitudinal cracks in beam	X
Diagonal shear cracks in beam	X
STEEL PRIMARY MEMBERS	
Section loss (amount unknown)	
ROUTINE	
Extensive loss of section	
Fatigue cracks in redundant primary member	X
Temporary supports under beams	
Extensive loss of section	
Severe distortion of built-up members induced by pack rust	
Fatigue cracks identified within previous 4 Years	
Gusset plates exhibiting out-of-plane distortion	
FRACTURE CRITICAL	
Elements rated in poor condition	

Updated 1/6/2015

Bridge Safety Inspection QA/QC Review

Bridge Owners Feedback Form

In an effort to assess and evaluate this program, we are seeking feedback on your overall experience with your agency's review. We ask that you please take a moment to fill out the questionnaire below. This information will be used to improve the program, is confidential, and will go directly to MDOT for their evaluation.

Did you understand the intent of the QA/QC Review?

☐ Yes
☐ No
☐ Don't know

Do you believe the review will be helpful to you in meeting the requirements of the NBIS?

☐ Yes
☐ No
☐ Don't know

Was the reference material given to you helpful?

☐ Yes
☐ No
☐ Don't know

Was the QA Team performing your review professional and courteous?

☐ Yes
☐ No
☐ Don't know

How would you rate your overall experience with the QA Review Team that met with you?

☐ Good
☐ Fair
☐ Poor

What would you recommend we do to improve the process?

Below is an area for you to provide your name and phone number if you contact Allie Nadjarian, P.E., Bridge Safety Inspection Engineer at (517) _____

Name _____

Phone Number _____

Comments:

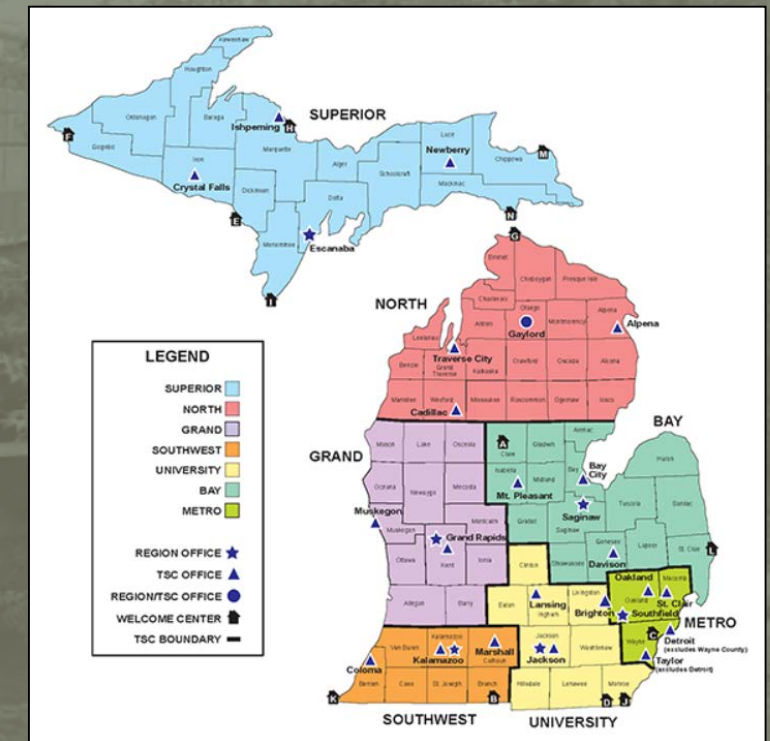
Overview of MDOT QC/QA Project

- Objectives of MDOT's QA/QC Project
 - Increase consistency and accuracy of Inspections *and* Load Rating documentation
 - Increase the awareness of the NBIS *and* MDOT Requirements
 - Work with the Bridge Owners to help them understand the minimum requirements and prepare them for future reviews.
 - Ensure that Written Documentation exists for completing the QA

Annual QA/QC Results (Findings)

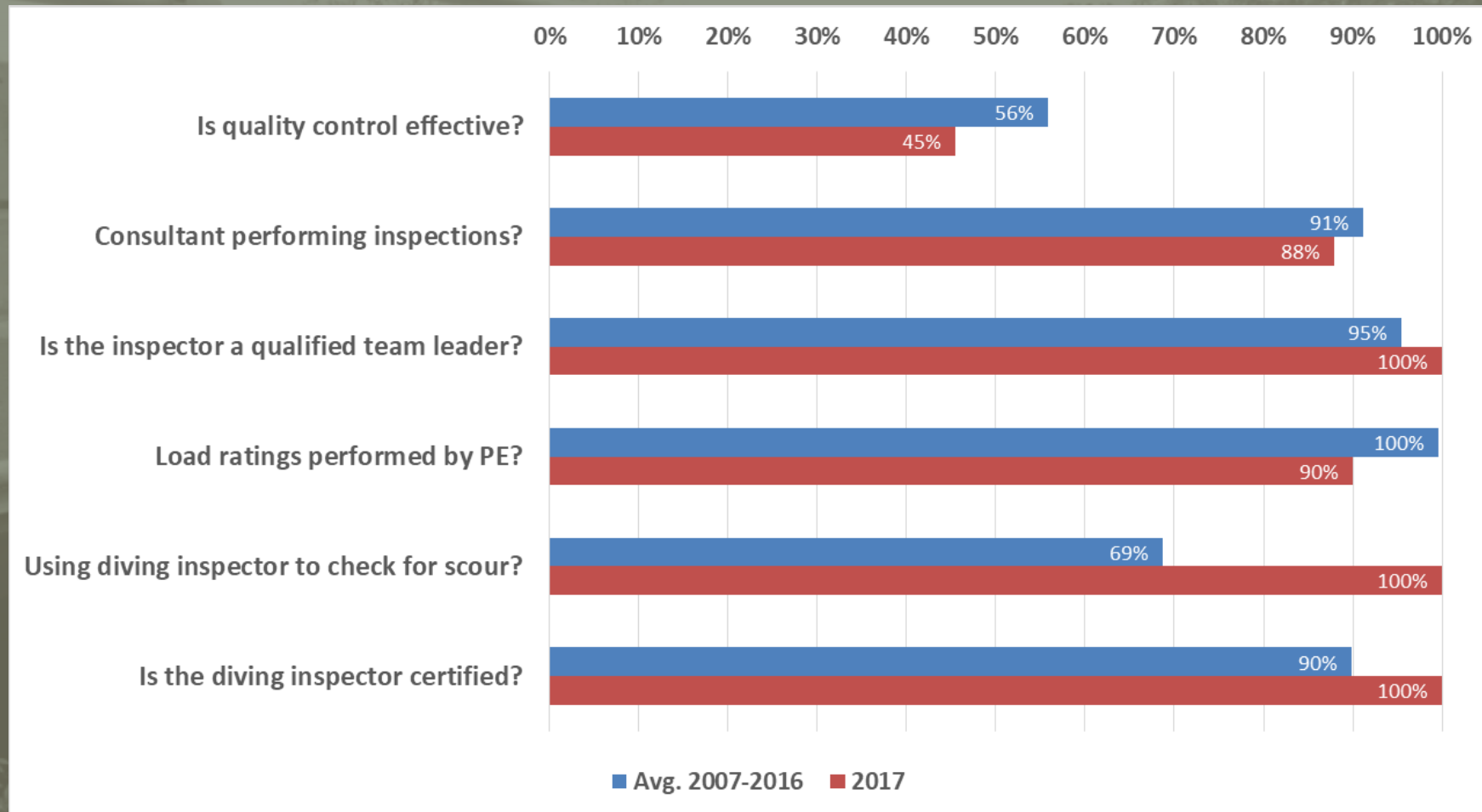
Annual QA/QC Results (Findings)

- 2017 – First time agencies were reviewed for a second time
- Selected agencies that had previous deficiencies with inspection reports or missing information in the bridge files
- 33 agencies reviewed in Southwest, Grand, Bay, University, and Metro Regions (22 cities/villages, 10 counties, Blue Water bridge)



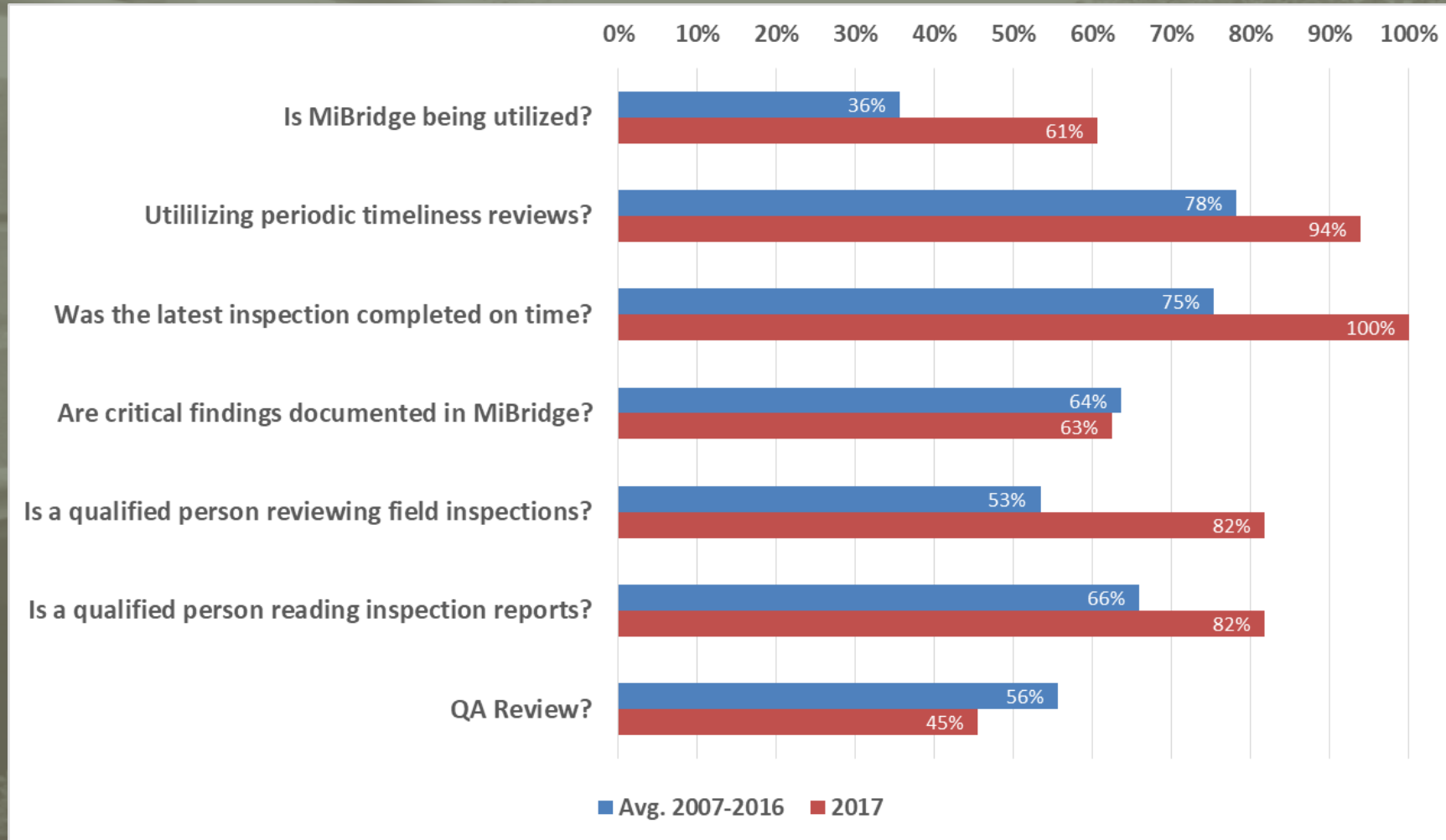
Annual QA/QC Results (Findings)

● Quality Control and Personnel Qualifications



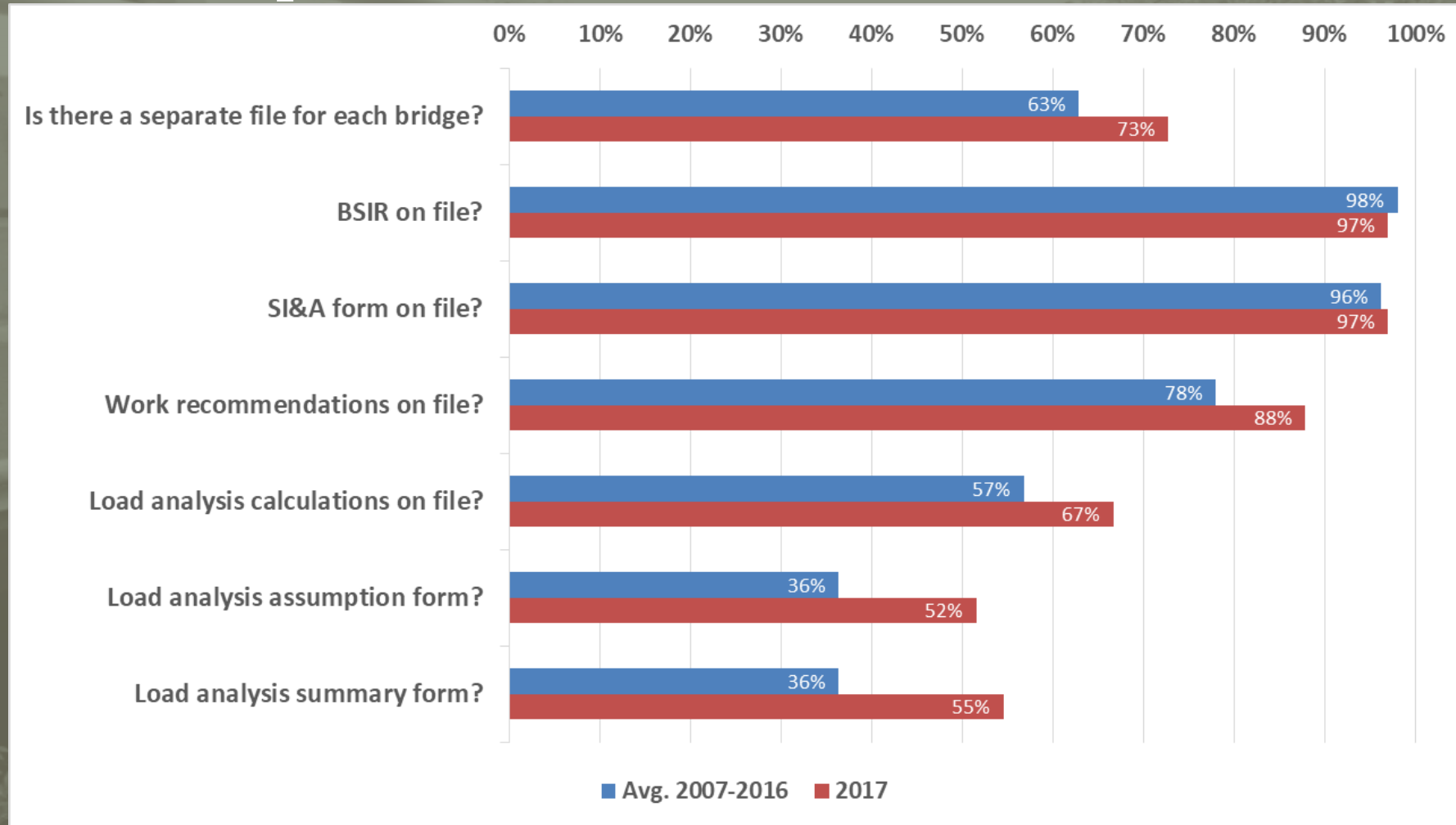
Annual QA/QC Results (Findings)

● Quality Control Process



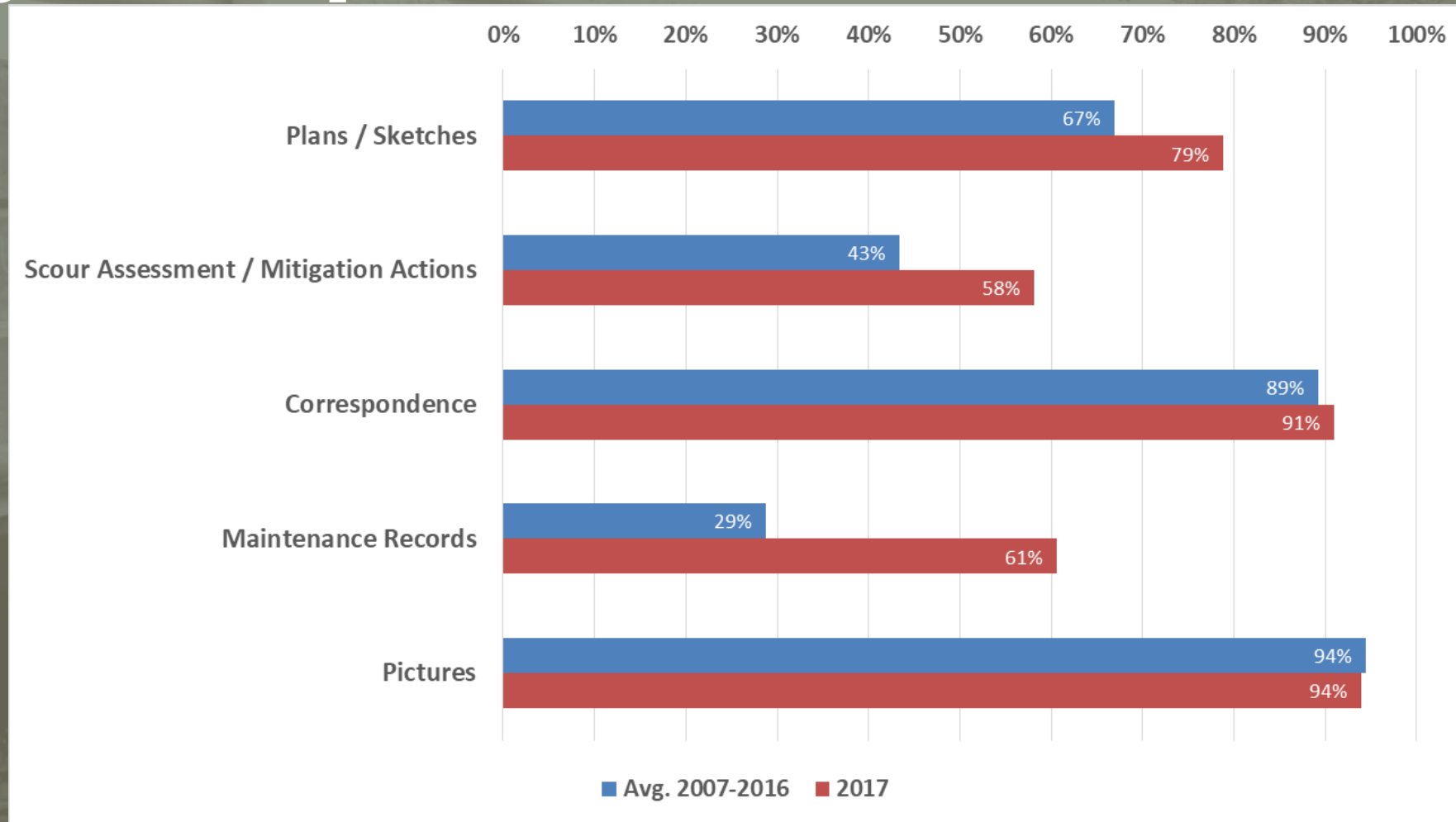
Annual QA/QC Results (Findings)

● Bridge File Components



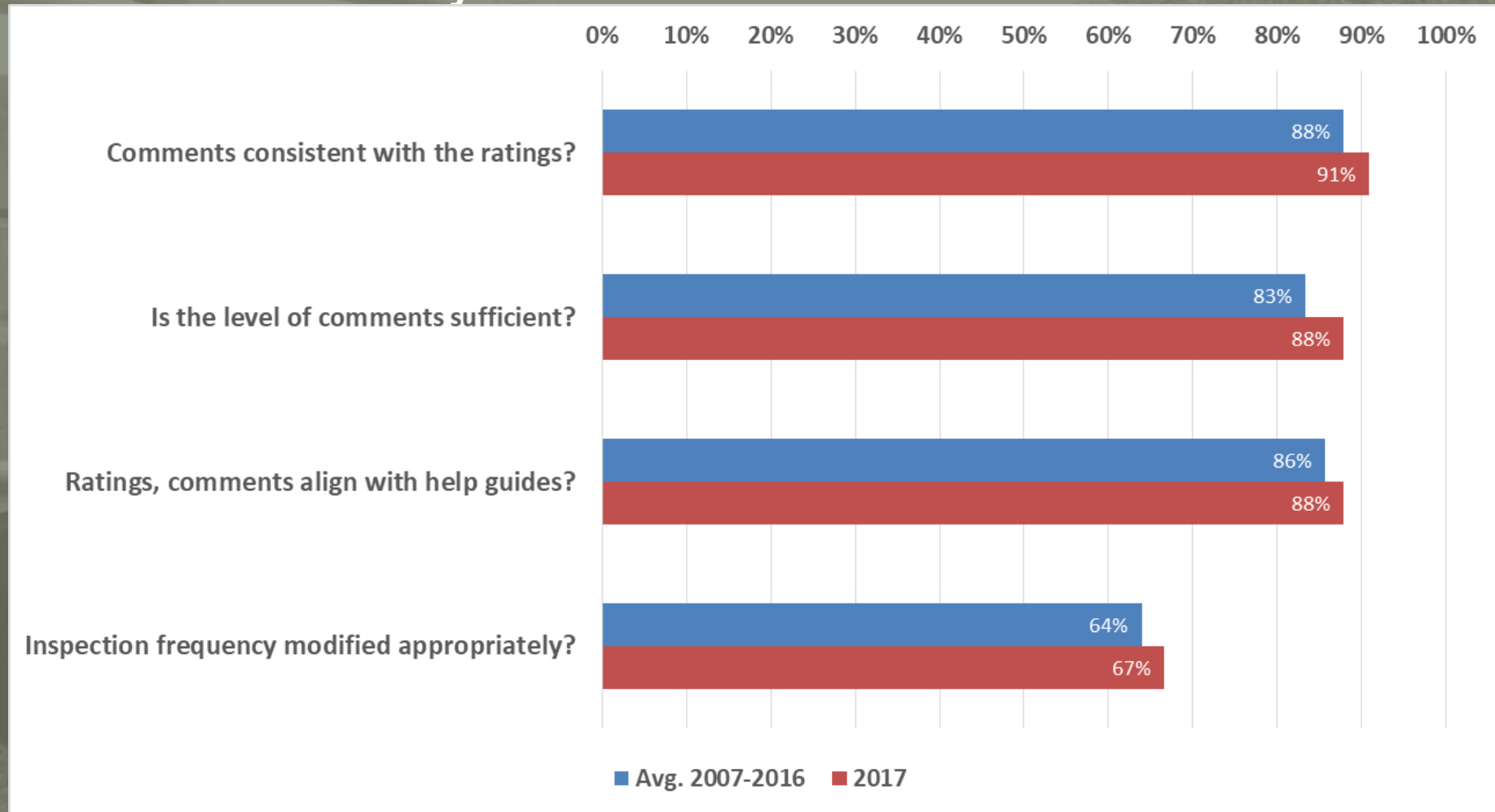
Annual QA/QC Results (Findings)

- Bridge File Components



Annual QA/QC Results (Findings)

- Inspection Consistency with Established Criteria



The Perfect Review

● File Review (Owner)

- Quality control plan
- Inspector credentials
- Documentation of file and field QC
- Separate file for each structure
- Current inspection report
- Load analysis with assumption and summary forms
- Scour assessment
- Plans, correspondence, maintenance records, photos

● Field Review (Inspector)

- Ratings in alignment with MDOT NBI Rating Guidelines
- Comments consistent with ratings
- As ratings decrease level of comments increase
- Inspection frequency modified appropriately
- Report Critical Findings with RFA's
- Request Detailed Inspection, Load Ratings, Underwater Inspections as needed

***Refer to Michigan Structure Inspection Manual (MiSIM)
Chapter 2 “Quality Assurance and Quality Control”**

Improvements to Program Reviews due to QA/QC Program

Improvements to Program Reviews due to QA/QC Program

www.Michigan.gov/BridgeInspect



Request For Action (RFA) Summary

Total No. of Incomplete RFAs	260
Total No. of Complete RFAs	0
RFAs Submitted by Me	0
Incomplete RFAs Assigned to Me	0
Complete RFAs Assigned to Me	19
Critical Findings	

Intermediate Action Type


Action Type	Complete	In Progress	Reviewed	Not Reviewed
Detailed Inspection	21	2	4	2
Damage Inspection	6	0	2	0
Scour Evaluation	12	7	9	4
Schedule Special Inspection	12	4	3	2
False Decking R&R	1	2	0	0
Load Rating	42	1	0	0
Load Reduction < 20%	0	0	10	12
Temporary Supports	44	20	8	4
PRJ Installation	10	9	6	25
Steel Repairs	25	26	9	16
Concrete Repairs	35	22	9	4
Beam End Repairs	3	4	0	1
Scour Repairs	3	2	1	3
Scale Concrete	93	4	6	12
Other Actions	41	12	8	13
Program Project	14	15	3	4
Joint Repair	3	5	1	5
Railing Repair	5	6	2	0
Sign Repair	0	1	1	0

Priority Level

Priority Level	In Progress	Complete
Level 1	3	8
Level 2	29	13
Level 3	48	30
Level 4	27	3

Critical Finding

Critical Finding	Count
Close Bridge	0
Close Lane	0
Close Shoulder	0
Load Reduction	0



MiBRIDGE Bridge Management and Inspection System

[Michigan.gov Home](#) | [MiBRIDGE Home](#) | [Contact MiBRIDGE](#) | [Feedback](#) | [Help](#)

Welcome Bridge Mdotqa

Administration

Assignments

Dashboards

Reports

Report Assignment Dashboard

Jurisdiction

LA County

County

Display

NBI Filter

All

NHS Filter

All

Report Type	Total	Past Due	Assigned	Not Assigned	Due Next 3 Months
Routine	217	0	188	29	137
Fracture Critical	0	0	0	0	0
Fatigue Sensitive	0	0	0	0	0
Underwater	0	0	0	0	0
Other Special	0	0	0	0	0
Scour Actions	42		2	40	

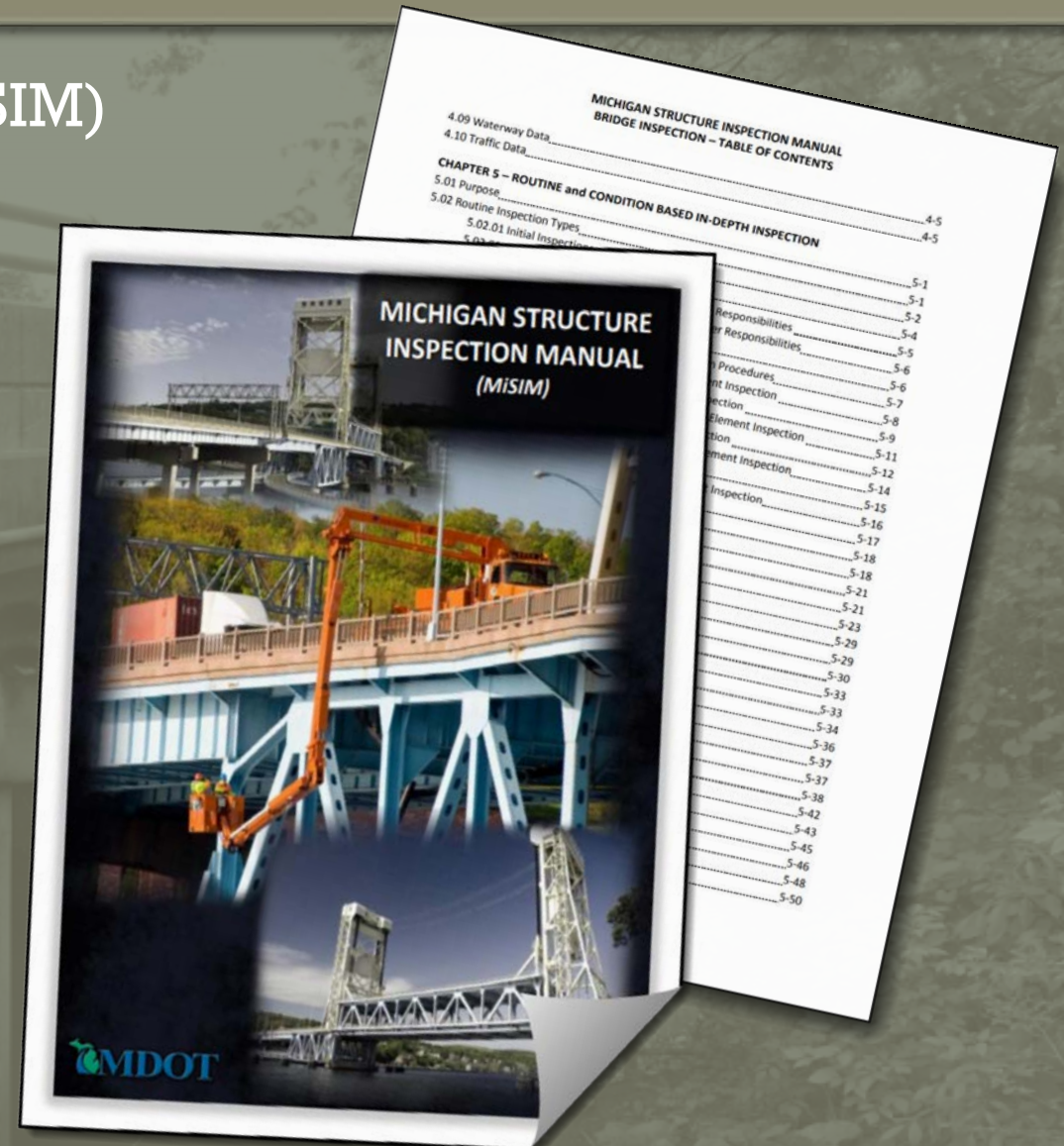
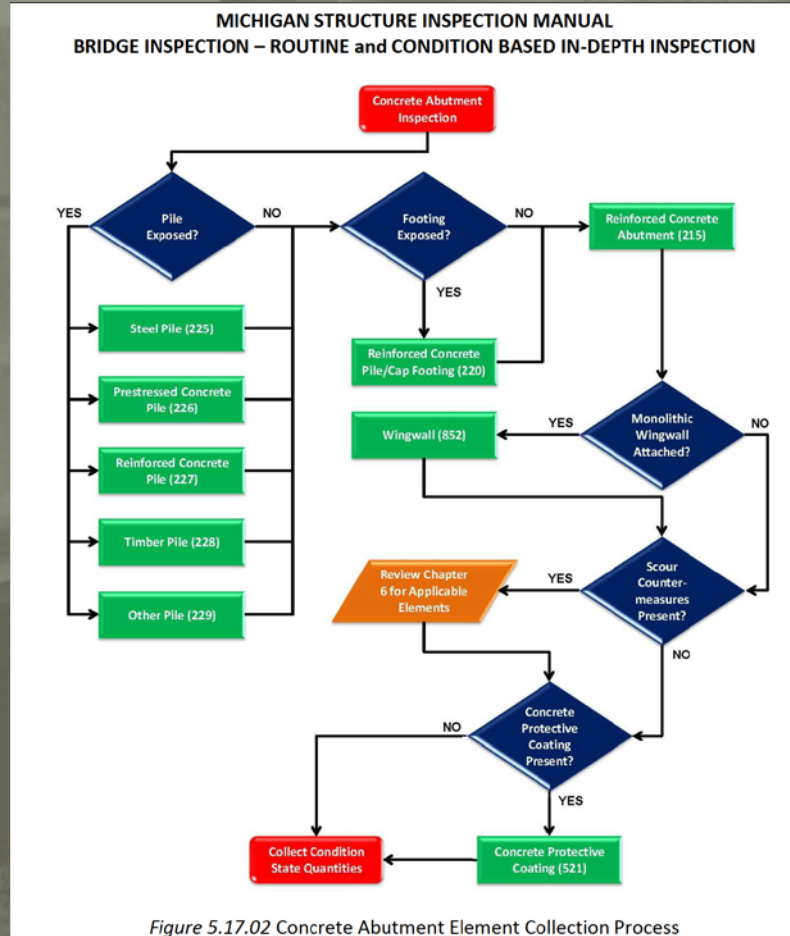
Routine Inspections

Open

Select	Struct. Nbr.	Bridge ID	Facility Carried	Features Intersected	Structure Name	Item 41	NBI	NHS	Current Inspection		
									Freq.	Date	End
<input type="checkbox"/>	10039	79322H00003B010	ROSSMAN ROAD	S. O. DRAIN		P	Y	N	24	04/12/2017	04/2
<input type="checkbox"/>	10477	79200122000B010	DICKERSON ROAD	ALLEN DRAIN		A	Y	N	24	04/12/2017	05/0
<input type="checkbox"/>	10459	79200062000B010	BEVENS ROAD	BUTTERNUT CRE		A	Y	N	24	04/12/2017	04/1
<input type="checkbox"/>	10665	79322H00044B010	MURRAY ROAD	SUCKER CREEK		A	Y	N	24	04/12/2017	04/2

Improvements to Program Reviews due to QA/QC Program

Michigan Structure Inspection Manual (MiSIM)

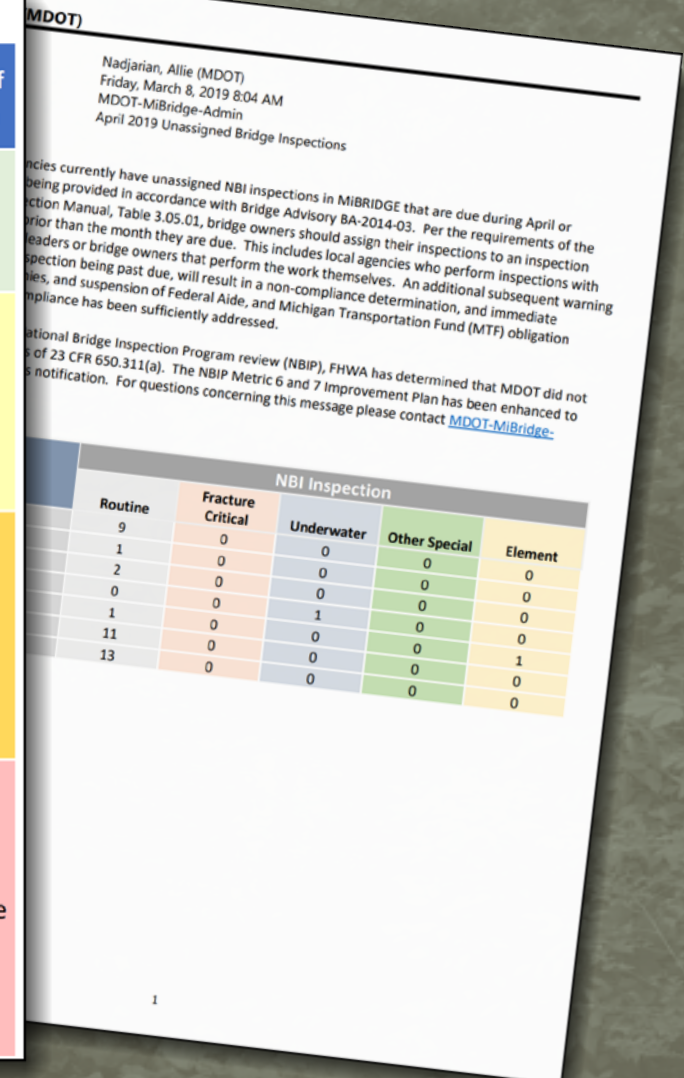


Improvements to Program Reviews due to QA/QC Program

Numerous Timeliness and Data Checks

Table 3.05.01 Inspection Timeliness and Non-Compliance Process

Period Relative to NBI Inspection Due Date	Central Office Activities to Mitigate Late Bridge Inspections	TSC Manager Activities to Prevent Withholding of Funding from Local Agencies	Consequence of Late Inspection
3 Months Prior	Automated email notification provided to Bridge Owners registered with MiBRIDGE for all bridge inspections that are due within 90 days in their jurisdiction.	No action is necessary.	None
1 Month Prior	Table of unassigned bridge inspections manually drafted and emailed to all Consultants registered in MiBRIDGE. FHWA, Bureau of Bridges and Structures Director, and TSC Managers with agencies in the their jurisdiction included on correspondence.	No action is absolutely necessary; however, contacting the local agency to ensure their management is aware of the upcoming inspection(s) is beneficial. Notify the Bureau of Bridges and Structures if a position related to bridge management responsibilities at the agency has been vacated or if a	None
Greater than 1 Month Past Due	Bureau of Bridges and Structures will contact the agencies with inspections that are greater than one month past due and provide notification that reports must be entered in MiBRIDGE by the beginning of the following calendar month. Bureau of Bridges and Structures Director, TSC Manager, and most recent bridge inspector included on correspondence.	Communicate directly with proper local agency staff to ensure they are aware that the agency is currently in non-compliance, and that action must be taken to avoid funding restrictions.	Warning
Greater than 2 Months Past Due	Bureau of Bridges and Structures will email a letter to the Bridge Owner stating that the local agency is in non-compliance with the National Bridge Inspection Standards. The Development Services Division Local Agency Programs Section will follow internal processes to notify Bureau Management. The determination to restrict funding will be made at the Bureau Management level according to present action being undertaken by the agency.	Communicate that transportation related funds are going to be withheld, and new projects may not be obligated. Work with the agency to ensure action is taken. Provide regular status updates to Bridge Field Services and the Local Agency Programs Section regarding progress to complete the work.	Non-Compliance



Enhancement to MDOT QA Process Load Ratings

Load Rating Changes

- MDOT has a Plan of Corrective Action (PCA) with FHWA for:
 - Metric 13: Inspection Procedures– Load Rating
 - Metric 14: Inspection Procedures– Post or Restrict

MDOT
Michigan Department of Transportation

FY 2018 NBIP Review
Plan of Correction Action
Metric 13

PCA No: PCA_MDOT_2018_M13

SUBJECT: METRIC 13 – Inspection Procedures, Load Rating

ISSUED BY: Creightyn McMunn, Load Rating Program Manager

REVIEWED BY: Rebecca Curtis, Bridge Management Engineer

Metric 13: Inspection Procedures - Load Rating, 23 CFR 650.313(c)
As a result of the 2018 National Bridge Inspection Program (NBIP) review, FHWA has determined that MDOT did not meet the requirements of 23 CFR 650.313(c).

Compliance deficiencies were noted in four of the nineteen files reviewed. The deficiencies noted include: valid load rating calculations unavailable, improper use of a judgment rating and/or judgment rating inadequately documented, and incorrect coding in the National Bridge Inventory (NBI).

GOAL
To ensure that all bridges are rated for their safe load carrying capacity and are correctly coded in the

MDOT
Michigan Department of Transportation

FY 2018 NBIP Review
Plan of Correction Action
Metric 14

PCA No: PCA_MDOT_2018_M14

SUBJECT: METRIC 14 – Inspection Procedures, Post or Restrict

ISSUED BY: Creightyn McMunn, Load Rating Program Manager

REVIEWED BY: Rebecca Curtis, Bridge Management Engineer

Metric 14: Inspection Frequency - Post or Restrict, 23 CFR 650.313(c)
As a result of the 2018 National Bridge Inspection Program (NBIP) review, FHWA has determined that MDOT did not meet the requirements of 23 CFR 650.313(c).

Compliance deficiencies were noted in eight of the eighteen file reviews conducted and field verified. The deficiencies noted include: valid load rating calculations unavailable to support posting justification, posting confirmation missing from bridge file, incorrect coding in the National Bridge Inventory (NBI), posting sign missing, and weight limits left blank on the posting sign.

GOAL

Load Rating Changes

- Metric 13: Inspection Procedures– Load Rating Deficiencies include
 - Valid Load Rating Calculation unavailable
 - Improper use of a Judgement Rating and/or Judgement Rating inadequately documented
 - Incorrect Coding in the NBI

Load Rating Changes

- Metric 14: Inspection Frequency – Post or Restrict Deficiencies include
 - Valid load rating calculations unavailable to support posting justification
 - Posting confirmation missing from bridge file
 - Incorrect Coding in the NBI
 - Posting sign missing at bridge (BA-2018-01)
 - Weight limits left blank on the posting sign

Load Rating Changes

- Improper use of Judgement Rating

Feature	Length / Width / Spans	Owner	Critical Condition(2)
	36.7 / 19.4 / 1		
Location	Built / Recon. / Paint / Ovly.	TSC	Operational Status
	1921 / / / 1997		P Posted for load(15NNNN)
Region / County	Material / Design	Last NBI Inspection	Scour Evaluation
	3 Steel / 02 Multi Str Non Comp	09/12/2018 / 5K8H	3 SC - Unstable

Compliance Issue: None
Compliance Verified: No
The above structure was analyzed using: Other
Version or Other: Engineering Judgement
Rating Considers Field Condition of Members: Yes
Controlling component and failure mode: Steel beam in flexure
Inspection Date: 09/24/2014

Steel Beams

NEW INVENTORY CODING

NBI Item 63 - Operating Rating Method	0 Judgment in Rtg Factor
NBI Item 64F - Federal Operating Rating	0.42
MDOT Item 64MA - Michigan Operating Method	0 Judgment in Rtg Factor
MDOT Item 64MB - Michigan Operating Rating	0.55
MDOT Item 64MC - Michigan Operating Truck	3
NBI Item 65 - Inventory Rating Method	0 Judgment in Rtg Factor
NBI Item 66 - Federal Inventory Rating	0.25
NBI Item 41 - Structure Open Posted Closed	P P Posted for load
NBI Item 70 - Bridge Posting	0 0 - 59% or less
Posted By	Gross Load
MDOT Item 141 - Posted Loading	15NNNN

Judgement Rating


Sample Sign

WEIGHT

Load Rating Changes

● Incorrect Coding in the NBI

MICHIGAN DEPARTMENT OF TRANSPORTATION

STR [REDACTED] LOAD RATING SUMMARY			
Facility [REDACTED]	Latitude / Longitude [REDACTED]	MDOT Structure ID [REDACTED]	Structure Condition Fair Condition(6) 
Feature [REDACTED]	Length / Width / Spans 109.9 / 31.8 / 2	Owner [REDACTED]	
Location [REDACTED]	Built / Recon. / Paint / Ovly. 1962 / / /	TSC [REDACTED]	Operational Status A Open, no restriction(A)
Region / County [REDACTED]	Material / Design 5 Prestressed Concrete / 05 Box Bm/Gird- Multiple	Last NBI Inspection 09/06/2017 / F4UO	Scour Evaluation 5 Stable w/in footing

A full load rating summary is not available for bridge key [REDACTED]

NEW INVENTORY CODING	
NBI Item 63- Operating Rating Method	1 LFR in US tons
NBI Item 64F- Federal Operating Rating	56.5
MDOT Item 64MB- Michigan Operating Rating	76.0
NBI Item 65- Inventory Rating Method	1 LFR in US tons
NBI Item 66- Federal Inventory Rating	34.0
NBI Item 41- Structure Open Posted Closed	A A Open, no restriction
NBI Item 70- Bridge Posting	5 5 - 100% or more
NBI Item 141- Posted Loading	
MDOT Item 193A- Michigan Overload Class	
MDOT Item 193C- Overload Status	

Item 64MB is less than MI legal loads, yet the structure is not posted. Load rating must be updated.

Load Rating Changes

- Incorrect Posting/Coding



MICHIGAN DEPARTMENT OF TRANSPORTATION

STR	LOAD RATING SUMMARY	
Facility	Latitude / Longitude	MDOT Structure
Feature	Length / Width / Spans	Owner
Location	Built / Recon. / Paint / Ovly.	TSC
Region / County	Material / Design	Last NBI Inspect
	5 Prestressed Concrete / 05 Box Bm/Gird- Multiple	09/06/2017 / C

A full load rating summary is not available for bridge k

NEW INVENTORY CODING

NBI Item 63- Operating Rating Method	1 LFR in US tons
NBI Item 64F- Federal Operating Rating	48.0
MDOT Item 64MB- Michigan Operating Rating	68.0
NBI Item 65- Inventory Rating Method	1 LFR in US tons
NBI Item 66- Federal Inventory Rating	28.8
NBI Item 41- Structure Open Posted Closed	P P Posted for load
NBI Item 70- Bridge Posting	3 3 - 89% - 80%
NBI Item 141- Posted Loading	NN64NN
MDOT Item 193A- Michigan Overload Class	
MDOT Item 193C- Overload Status	

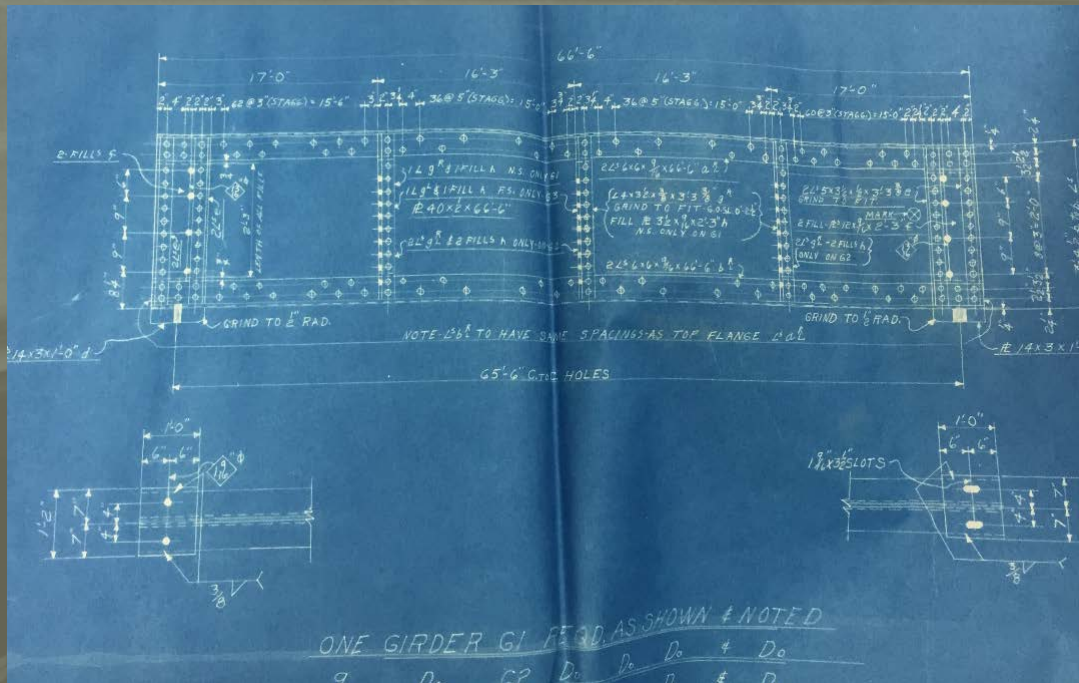
The Maximum Allowable Gross Posting is 42 tons.
Additionally, recommend 3 truck posting.

Load Rating Changes

- Guidance for common load rating issues
 - Michigan Structure Inventory and Appraisal of Bridges
 - MDOT Bridge Advisory BA-2012-02
 - MDOT Bridge Advisory BA-2016-01
 - MDOT Bridge Advisory BA-2016-03
 - MDOT Bridge Advisory BA-2018-01

Load Rating Changes

- Specific changes for 2019 Load Rating Reviews
 - Agencies will need to provide a copy of the load rating calculations and bridge plans



DEAD LOADS:

- UNIFORM LOADS:

$$\begin{aligned} \text{CONCRETE DECK} &= (48.25) \left(\frac{7}{12} \right) (150) = 4221.9 \text{ PLF} \\ &= 2 \left(\frac{1}{2} (36) \left(\frac{7}{12} \right) \right) (150) = 1125.0 \text{ PLF} \end{aligned}$$

$$\begin{aligned} \text{SIDEWALKS} &= \left((6.21) \left(\frac{11.5}{12} \right) - \frac{1}{2} (5) \left(\frac{11.5}{12} \right) \right) (150) = 834.2 \text{ PLF} \\ &= \left((6.46) \left(\frac{11.5}{12} \right) - \frac{1}{2} (5) \left(\frac{11.5}{12} \right) \right) (150) = 869.4 \text{ PLF} \end{aligned}$$

$$\text{BARRIERS} = 2 (390) = 780.0 \text{ PLF}$$

$$\text{1/2" TOPPING} = \left(\frac{1.5}{12} \right) (36) (150) = 675.0 \text{ PLF}$$

$$\text{SUBTOTAL} = \frac{8505.5 \text{ PLF}}{11 \text{ BEAMS}} = 773.2 \text{ PLF/BEAM}$$

- STEEL GIRDERS:

$$40' \times 1/2" \text{ AEB PLATE} = \left(\frac{40}{12} \right) \left(\frac{1}{2} \right) (490) = 68.1 \text{ PLF}$$

$$6' \times 6' \times 7/8" \text{ ANGLES} = 4 (21.9) = 87.6 \text{ PLF}$$

$$\text{SUBTOTAL} = 155.7 \text{ PLF/BEAM}$$

$$\text{TOTAL} = 773.2 + 155.7 = 928.9 \text{ PLF/BEAM}$$

- CONCENTRATED LOADS (DIAPHRAGMS)

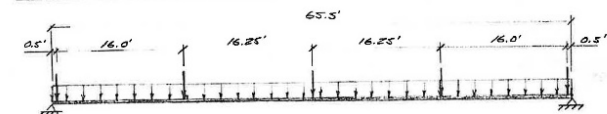
$$4 \times 3 \frac{1}{2} \times \frac{3}{8} \times 3' \times 3 \frac{1}{2}'' = 2 (9.1) (4.3125) = 78.5$$

$$2 \times 3 \times \frac{3}{8} \times 4' \times 3 \frac{1}{2}'' = 2 (7.2) (4.3125) = 62.1$$

$$2 \times 27 \times \frac{3}{8} \times 4' \times 3 \frac{1}{4}'' = \left(\frac{27}{12} \right) \left(\frac{3}{8} \right) (4.3125) (490) = 148.6$$

$$\text{TOTAL} = 289.2 \text{ PLF}$$

MAXIMUM DEAD LOAD MOMENT:



$$M_{max} = \frac{(928.9)(65.5)^2}{8} + (289.2)(0.5) + (289.2)(16.5) + \frac{(289.2)(65.5)}{4}$$

$$= 498,152 + 145 + 4772 + 4736$$

$$= 507,805 \text{ ft-lb}$$

$$= 507.8 \text{ ft-k} = 688.6 \text{ kN-m}$$

Load Rating Changes

- Specific changes for 2019 Load Rating Reviews
 - If the load rating was performed in Virtis/BrR, a copy of the XML file, as well as the plans will be required.



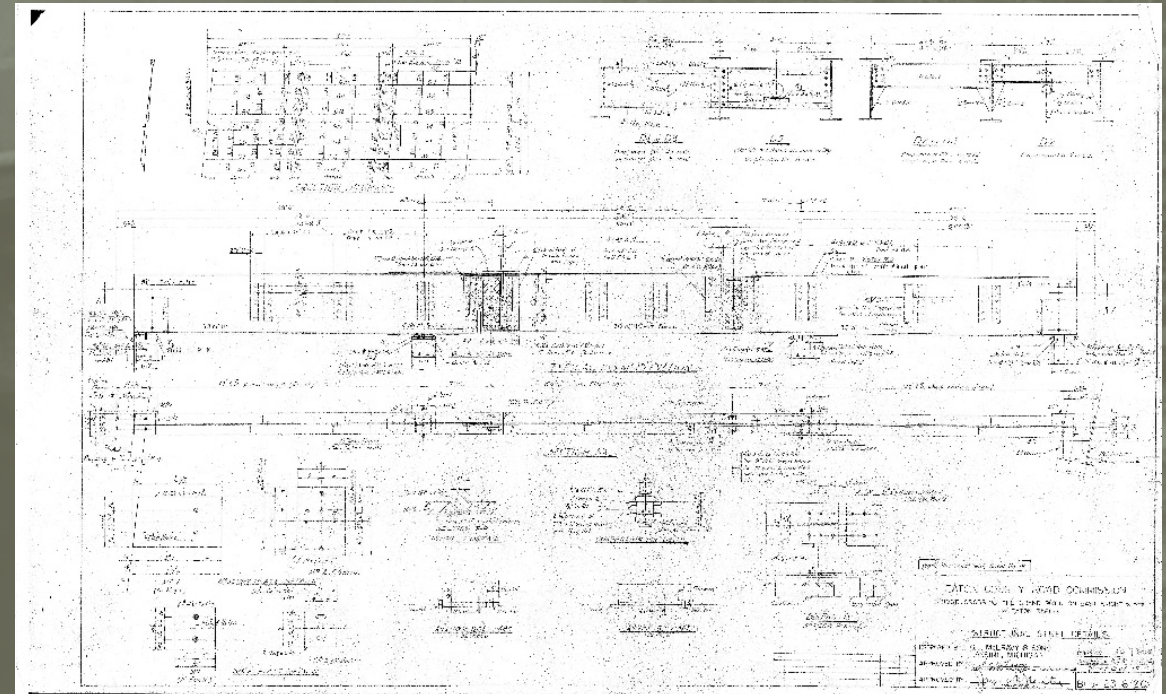
Bridge Rating - (Bridge Explorer (41 Bridge Rating bridges retrieved for the current folder, all rows retrieved))

File Edit View Bridge Tools Window Help

US Customs

All Bridges
Templates
Deleted Bridges

BID	Bridge ID	Bridge Name	District	County	Facility	Location	Route	Feature Intersected	Mile/Km Post (mi)	Owner	Maintain	Area	Length (ft)	Year Built
1	TrainingBridge1	Training Bridge 1(LRFD)	Unknown	Unknown	SR 605	Pittsburg	0051	SR 605	17.00	State	State High	Unkn	151.00	1999
2	TrainingBridge2	Training Bridge 2(LRFD)	Unknown	Unknown	N/A	N/A	-1	N/A	Unknown	Unknown	Unknown	Unknown	Unknown	1996
3	TrainingBridge3	Training Bridge 3(LRFD)	Unknown	Unknown	I-79	Pittsburg	0079	Ohio River	125.00	State	State High	Unkn	455.00	1999
4	PCITrainingBridge1	PCI Training Bridge 1(LRFD)	Unknown	Unknown			-1		Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
5	PCITrainingBridge2	PCI Training Bridge 2(LRFD)	Unknown	Unknown			-1		Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
6	PCITrainingBridge3	PCI Training Bridge 3(LRFD)	Unknown	Unknown			-1		Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
7	PCITrainingBridge4	PCI Training Bridge 4(LRFD)	Unknown	Unknown			-1		Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
8	PCITrainingBridge5	PCI Training Bridge 5(LRFD)	Unknown	Unknown			-1		Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
9	PCITrainingBridge6	PCI Training Bridge 6(LRFD)	Unknown	Unknown			-1		Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
10	Example7	Example 7 PS (LRFD)	Unknown	Unknown			-1		Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
11	RC Training Bridge 1	RC Training Bridge 1(LRFD)	Unknown	Unknown			-1		Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
12	Timber Training Bridge 1	Timber Tr. Bridge 1 (ASD)	Unknown	Unknown			-1		Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
13	F Sys GF S Training Bridge 1	FloorSystem GF S Training Bridge 1	Unknown	Unknown	Nu-Turn	NuCity	-1		Unknown	Unknown	Unknown	Unknown	Unknown	2002
14	F Sys FS Training Bridge 2	FloorSystem FS Training Bridge 2	Unknown	Unknown	I-95	NYC	-1		Unknown	Unknown	Unknown	Unknown	Unknown	1998
15	F Sys GF Training Bridge 3	FloorSystem GF Training Bridge 3	Unknown	Unknown	I-95	ATL	-1		Unknown	Unknown	Unknown	Unknown	Unknown	1998
16	F Line GF S Training Bridge 1	FloorLine GF S Training Bridge 1	Unknown	Unknown	I-75	JAX	-1		Unknown	Unknown	Unknown	Unknown	Unknown	2001
17	F Line FS Training Bridge 2	FloorLine FS Training Bridge 2	Unknown	Unknown	I-75	GNV	-1		Unknown	Unknown	Unknown	Unknown	Unknown	2000
18	F Line GF Training Bridge 3	FloorLine GF Training Bridge 3	Unknown	Unknown	I-95	NY	15		2200.00	Count	Unknown	Unknown	Unknown	1999
19	Truss Training Example	Truss Training Example	Unknown	Unknown			5		Unknown	Unknown	Unknown	Unknown	Unknown	1930
20	LRFD Substructure Example 1	LRFD Substructure Example 1	Unknown	Unknown			-1		Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
21	LRFD Substructure Example 2	LRFD Substructure Example 2	Unknown	Unknown	SR 403	ERIC C	4034	FOUR MILE CREEK	8.12			Unknown	1096.8	2002
22	LRFD Substructure Example 3	LRFD Substructure Example 3	Unknown	Unknown			-1		Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
23	LRFD Substructure Example 4	LRFD Substructure Example 4 (BR Ha	Unknown	Unknown			-1		Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
24	Visual Reference 1	Visual Reference 1	Unknown	Unknown	I-76	WATSF	176	MAD RIVER	1199.26	State	State High	Unkn	168.00	1938
25	Culvert Example 1	Culvert Example 1	Unknown	Unknown			-1		Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
26	UFD Curved Guide Spec	UFD Curved Guide Spec Example	Unknown	Unknown			-1		Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
27	Multi-Cell Box Examples	Multi-Cell Box Examples	Unknown	Unknown			100		Unknown	Unknown	Unknown	Unknown	Unknown	2014
28	Gustaf Plate Example	Gustaf Plate Example	Unknown	Unknown			-1		Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
29	Splice Example	Splice Example	Unknown	Unknown			-1		Unknown	Unknown	Unknown	Unknown	Unknown	2004
30	Simple DL Cont LL Splice	Simple DL Splice	Unknown	Unknown	N/A	N/A	-1	N/A	Unknown	Unknown	Unknown	Unknown	Unknown	1996
31	SR 4541	East Ganson Street	Unknown	Unknown	East G	400 E of		Grand River	35.400	Unkn	Unkn	Unkn	Unkn	1956
32	SR 13593	Second Lake Rd over Second Lake	Unknown	Unknown	Second	0101A		Second Lake	36.000	Unkn	Unkn	Unkn	Unkn	1996
33	SR 12684	Manor Road	Unknown	Unknown	Manor	0203A		Rouge River	23.000	Unkn	Unkn	Unkn	Unkn	1987
34	SR 1261	Muskrat Road over Blumfield Creek	Unknown	Unknown					22.610	Unkn	Unkn	Unkn	Unkn	1968
35	5831H000150010	SHERMAN RD at Saline River	Unknown	Unknown	SHER	0.1 MI E	00000	SALINE RIVER	2.81	Count	County Hel	Unkn	120.00	1961
36	5831H00026010	PLATT RD at Bear Swamp Creek	Unknown	Unknown	PLATT	0.7 MI S	00000	BEAR SWAMP CREEK	1.87	Count	County Hel	Unkn	30.807	1950
37	6217	26 Mile Road	Unknown	Unknown	26 Mile	Macomb		Coon Creek	Unkn	Unkn	Unkn	Unkn	Unkn	1993
38	6214	Jefferson Ave	Unknown	Unknown	Jefferson	Macomb		Coon Creek	Unkn	Unkn	Unkn	Unkn	Unkn	1993
39	6372	29 Mile Road	Unknown	Unknown	29 Mile	Macomb		Coon Creek	Unkn	Unkn	Unkn	Unkn	Unkn	1972
40	6237	Ryan Road	Unknown	Unknown	Ryan R	Macomb		Clinton River	Unkn	Unkn	Unkn	Unkn	Unkn	1964
41	6263	Cattens Rd	Unknown	Unknown	Cattens	Macomb		Fish Creek	Unkn	Unkn	Unkn	Unkn	Unkn	1954

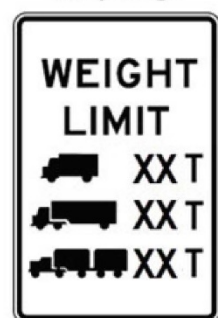


Load Rating Changes

- Calculations will be reviewed for accuracy and verified for the following:
- Analyzed by and Reviewed by separate individuals

LOAD RATING SUMMARY			
STR [REDACTED]	Facility	Latitude / Longitude	MDOT Structure ID
	Feature	Length / Width / Spans	Owner
	Location	65 / 45.6 / 1	TSC
	Region / County	Built / Recon. / Paint / Ovly.	Last NBI Inspection
		1979 / / /	08/01/2018 / LQPH
		Material / Design	Operational Status
		5 Prestressed Concrete / 05	P Posted for load(426676)
		Box Bm/Gird- Multiple	Scour Evaluation
			8 Stable Above Footing
Compliance Issue:		None	
Compliance Verified:		No	
The above structure was analyzed using:		Hand Calcs	
Version or Other:		Mathcad	
Rating Considers Field Condition of Members:		Yes	Inspection Date: 08/21/2017
Controlling component and failure mode:			
Bending moment of box beams at mid-span.			
NEW INVENTORY CODING			
NBI Item 63 - Operating Rating Method	6 LFR in Rating Factor		
NBI Item 64F - Federal Operating Rating	1.55		
MDOT Item 64MA - Michigan Operating Method	6 LFR in Rating Factor		
MDOT Item 64MB - Michigan Operating Rating	0.93		
MDOT Item 64MC - Michigan Operating Truck	18		
NBI Item 65 - Inventory Rating Method	6 LFR in Rating Factor		
NBI Item 66 - Federal Inventory Rating	0.93		
NBI Item 41 - Structure Open Posted Closed	P P Posted for load		
NBI Item 70 - Bridge Posting	3 3 - 89% - 80%		
Posted By	Truck Type		
MDOT Item 141 - Posted Loading	426676		
MDOT Item 193A - Michigan Overload Class			
MDOT Item 193C - Overload Status	N-No Restriction		

Sample Sign



R12-5

Analyzed By: EJR

Checked By: EJR

Date: 10/03/2017

Date: 10/04/2017

Load Rating Changes

- Analyzed Appropriate assumptions including material strengths

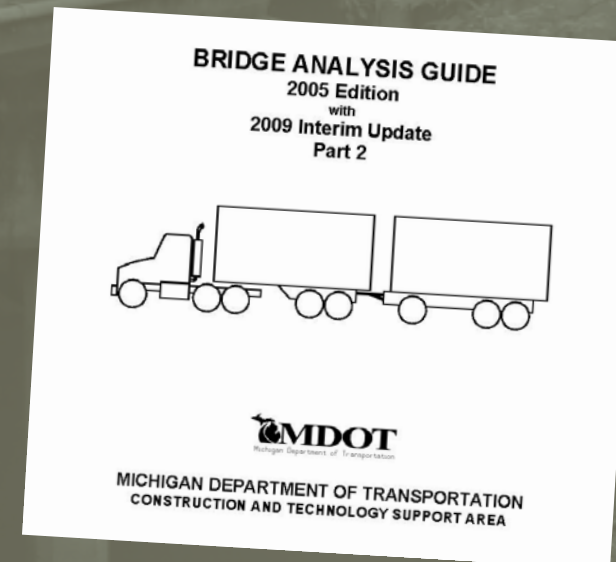
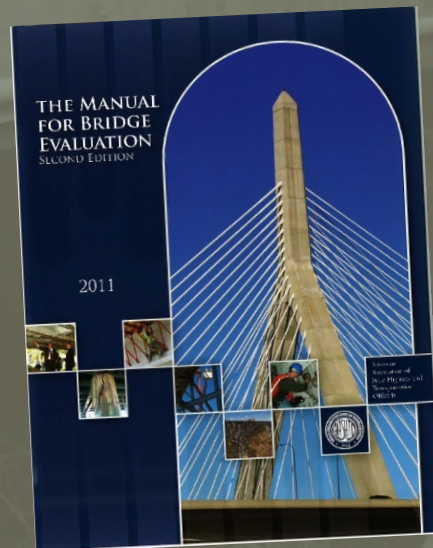
Material	Period Built (approx.)	Year of MDOT Spec.	ASTM Specification	Ultimate Stress Min. fu (psi)	Yield Stress Min. fy (psi)	ALLOWABLE STRESS METHOD ONLY			
						INVENTORY RATING		OPERATING RATING	
						Gross Section 0.55fy (psi)	Net Section 0.50fu (psi)	Gross Section 0.75fy (psi)	Net Section 0.67fu (psi)
STRUCTURAL STEEL	1873-89		Wrought Iron	46,000	26,000	14,500	23,000	19,500	30,820
	<1905	1890	Soft Steel	52,000-62,000	26,000	14,500	26,000-31,000	19,500	34,840-41,540
	1905-1923	1901	A-7, OH	52,000-62,000	1/2 Tensile Stress	16,500	26,000-31,000	22,500	34,840-41,540
	1924-1932	1924	A-7	55,000-65,000	30,000	16,500	27,500-32,500	22,500	36,850-43,550
	1933-1962	1933 T	A-7	60,000-72,000	33,000	18,000	30,000-36,000	24,500	40,200-48,240
	1957-1962	1954	A-373	58,000-75,000	32,000	18,000	29,000-37,500	24,500	38,860-50,250
	1963-	1960	A-36	60,000-80,000	36,000	20,000	30,000-40,000	27,000	40,200-53,600
	1946-1962	1941 T	A-242, or						
	1963-	1960	A-441 3/4" thick	70,000	50,000	27,500	35,000	37,500	46,900
			A-441 3/4"-1.5" thick	67,000	46,000	25,000	33,500	34,500	44,890
			A-441 1.5"-4" thick	63,000	42,000	23,000	31,500	31,500	42,210
	1929-1954	1954	A-94 Sil. <=1 1/8"	80,000-95,000	45,000	24,500	40,000-47,500	33,500	53,600-63,650
	1965-1979	1968	A-588 <=4"	70,000	50,000	27,500	35,000	37,500	46,900
	>1979								
	>1980	1979	A-572 Grade 50 <=2"	65,000	50,000	27,500	32,500	37,500	43,550
PIPE	1996	1996 (Metric)	AASHTO M270 Gr. 250	65,000	50,000	27,500	32,500	37,500	43,550
	1996	1996 (Metric)	AASHTO M270 Gr. 345	65,000	50,000	27,500	32,500	37,500	43,550
		1951	A-53 Grade B	60,000	35,000	19,500	30,000	26,000	40,200
		1951	A-53 Grade A	48,000	30,000	16,500	24,000	22,500	32,160

TABLE 10.25
Structural Steel

MICHIGAN DEPARTMENT OF TRANSPORTATION
BRIDGE ANALYSIS GUIDE

Load Rating Changes

- Is the correct load rating methodology used (BA-2012-02, BA-2016-01, BA-2016-03)
- Are judgement ratings used appropriately and documented according to BA-2012-02
- Are the current codes and guidelines being used, i.e. 2005 Bridge Analysis Guide, AASHTO MBE



Load Rating Changes

- Do the load ratings reflect the current field conditions?



Load Rating Changes

- Do the load ratings reflect the current field conditions?



Load Rating Changes

- Do the load ratings reflect the current field conditions?



Load Rating Changes

- Do the load ratings reflect the current field conditions?



Load Rating Changes

- Do the load ratings reflect the current field conditions?



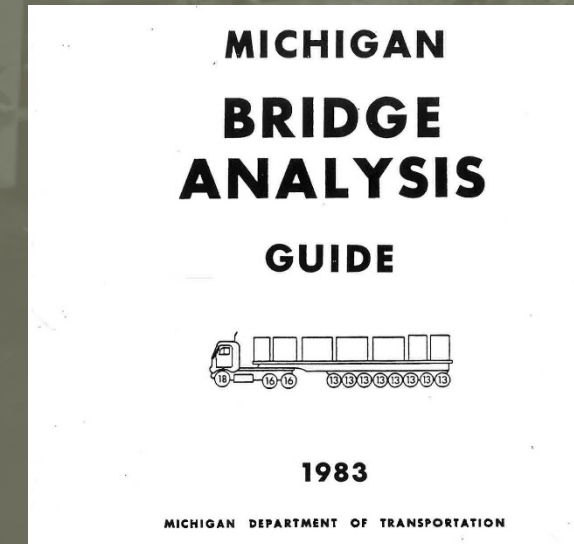
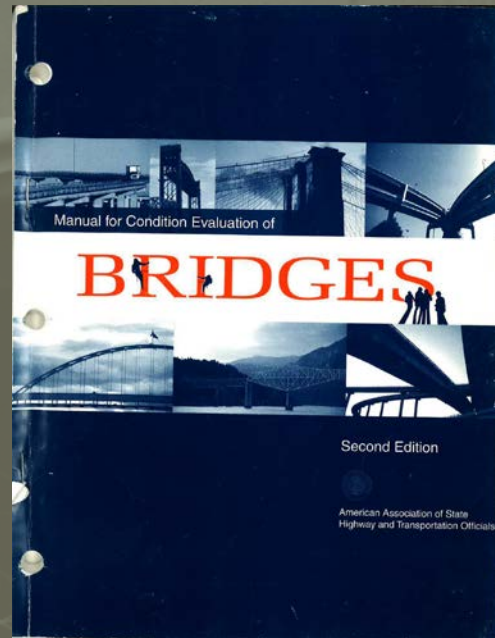
Load Rating Changes

- Do the load ratings reflect the current field conditions?



Load Rating Changes

- Verify if load rating needs to be updated for changes in dead loads, i.e. new HMA/concrete overlays, new railings, etc. This is very COMMON issue.
- Load ratings are a snapshot in time in regards to current guidelines, codes and condition.



Load Rating Changes

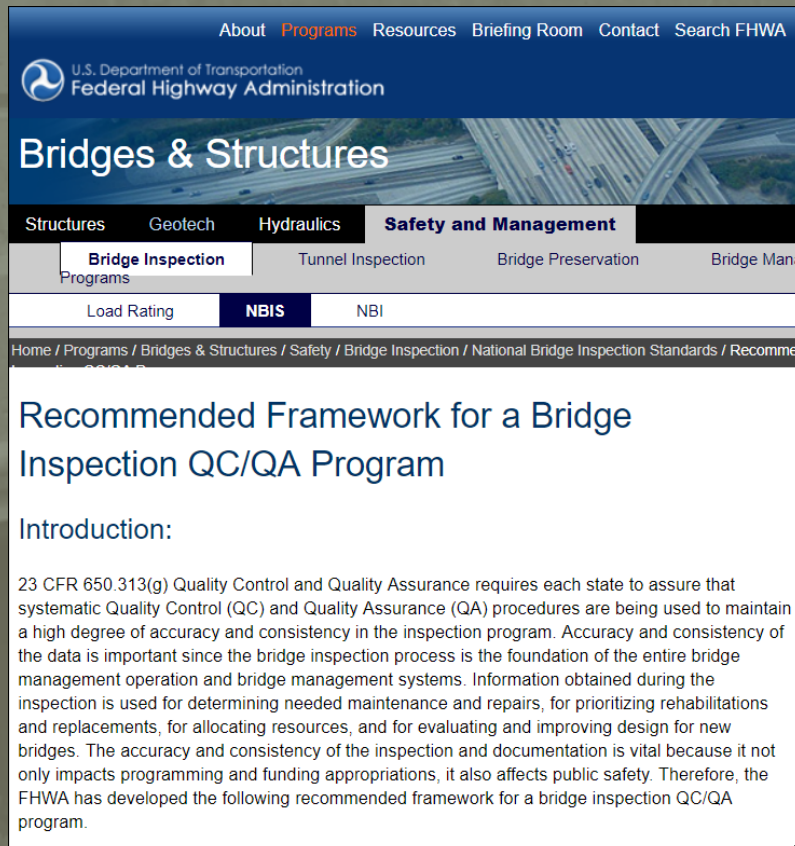
- During the QAQC review process in previous years, load rating deficiencies were simply noted and the agency/consultant was made aware of the issues
- During the 2019 QAQC reviews, load rating deficiencies will be viewed as a compliance issue and will need to be corrected within a timeframe dictated by MDOT

QC Plan and Documentation

QC Plan and Documentation

FHWA's Recommended Framework for QC/QA

<https://www.fhwa.dot.gov/bridge/nbis/nbisframework.cfm>



The screenshot shows the FHWA website's 'Bridges & Structures' section. The navigation menu includes 'Structures', 'Geotech', 'Hydraulics', and 'Safety and Management'. Under 'Safety and Management', there are links for 'Bridge Inspection Programs', 'Tunnel Inspection', 'Bridge Preservation', and 'Bridge Management'. The 'Bridge Inspection Programs' link is selected, leading to a page titled 'Recommended Framework for a Bridge Inspection QC/QA Program'. The page content includes an introduction stating that 23 CFR 650.313(g) requires states to ensure systematic QC and QA procedures for bridge inspection data accuracy and consistency.

Home / Programs / Bridges & Structures / Safety / Bridge Inspection / National Bridge Inspection Standards / Recommended Framework for a Bridge Inspection QC/QA Program

Recommended Framework for a Bridge Inspection QC/QA Program

Introduction:

23 CFR 650.313(g) Quality Control and Quality Assurance requires each state to assure that systematic Quality Control (QC) and Quality Assurance (QA) procedures are being used to maintain a high degree of accuracy and consistency in the inspection program. Accuracy and consistency of the data is important since the bridge inspection process is the foundation of the entire bridge management operation and bridge management systems. Information obtained during the inspection is used for determining needed maintenance and repairs, for prioritizing rehabilitations and replacements, for allocating resources, and for evaluating and improving design for new bridges. The accuracy and consistency of the inspection and documentation is vital because it not only impacts programming and funding appropriations, it also affects public safety. Therefore, the FHWA has developed the following recommended framework for a bridge inspection QC/QA program.

- A. Documentation of a QC/QA Program
- B. Quality Control (QC) Procedures
- C. Quality Assurance (QA) Procedures

QC Plan and Documentation

FHWA's QC Framework includes documenting:

1. QC Roles and Responsibilities
2. Qualifications
3. Process for tracking how qualifications are met.
4. Required refresher training.
5. Special skills, training, and equipment needs for specific types of inspections
6. Procedures for review and validation of inspection reports and data
7. Procedures for identification and resolution of data errors, omissions and / or changes.

QC Plan and Documentation

MiSIM Chapter 2

- Maintain a File w/ QC Procedures
- Documentation that QC Procedures are being completed.
- QC Checks completed by Independent Team Leader / Engineer

Each agency must complete QC file reviews on at least 5 percent of the inspections and load ratings performed by each individual per year. Further action will occur with conducted field reviews on at least 50 percent of the files selected. The agency completing the QC must have a method to document that QC procedures are being followed. If QC procedures cannot be verified or deficiencies are discovered during the QA process the QC file review will be increased to 10 percent until the next review.

QC Plan and Documentation

Bridge Owner's Role

- Maintain a File w/ QC Procedures.
- Maintain a File w/ Qualifications and PE Certification
- Maintain Completeness of Bridge File Information
- Document Owner's Role in the QC Process

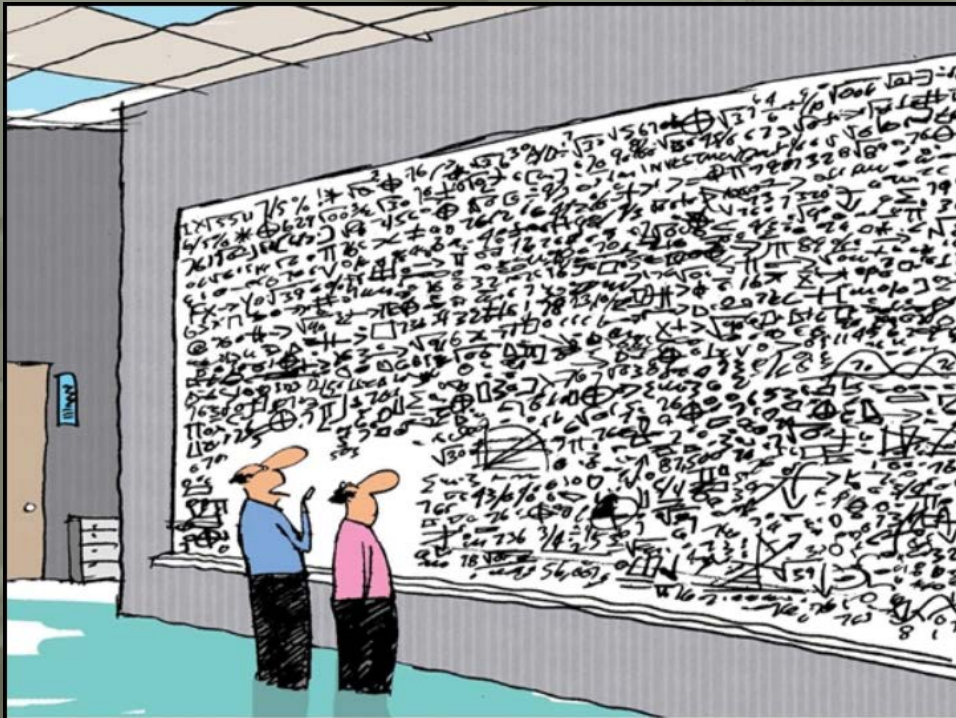


QC Plan and Documentation

Team Leader's Role

- Ensure QC Procedures are Documented
- Ensure that QC is being performed on work completed.
- Maintain a File w/ Qualifications and PE Certification
- Maintain a record showing 5% File and 2.5% Field checks have been completed.

QC Plan and Documentation



"... And that, in a nutshell, is our Quality Control Plan.
Any Questions?"

BRIDGE QUALITY ASSURANCE/QUALITY CONTROL REVIEW: LOAD RATING

Bridge Number: _____

- **LOAD RATING FILE REVIEW**
 - Is there a signed Assumptions Form on file? ☐ Yes ☐ No Date: _____
 - Is there a signed Summary Form on file? ☐ Yes ☐ No Date: _____
 - Is there a load Rating model and/or analysis on file? ☐ Yes ☐ No Date: _____
 - Are all plans necessary to recreate the load rating on file? ☐ Yes ☐ No
 - Is MIBRIDGE coded correctly for the calculations on file? ☐ Yes ☐ No
- **VERIFICATION OF LOAD RATER CREDENTIALS**
 - Load Rating Analyzed By: _____ Date: _____ PE #: _____
 - Is the person performing the load rating analysis a Michigan PE? ☐ Yes ☐ No
 - Is the load rating reviewed by an independent engineer? ☐ Yes ☐ No
 - Load Rating Reviewed By: _____ Date: _____ PE #: _____
 - Is the person reviewing the load rating analysis a Michigan PE? ☐ Yes ☐ No
- **VERIFICATION OF LOAD POSTING**
 - Is the bridge load posted, or load restricted? ☐ Yes ☐ No ☐ N/A
 - Are the signs in place? ☐ Yes ☐ No ☐ N/A
 - Do the signs match Item 141 and the calculations on file? ☐ Yes ☐ No ☐ N/A
 - Are photos of the load posting signs in the file? ☐ Yes ☐ No ☐ N/A
- **LOAD RATING ANALYSIS REVIEW**
 - Are the assumptions appropriate? ☐ Yes ☐ No
 - Are the correct material strengths used? ☐ Yes ☐ No
 - Is the correct load rating methodology used? ☐ Yes ☐ No
 - Allowable Stress Rating (ASR) is only applicable for timber or masonry structures. Load and Resistance Factor Rating (LRFR) must be used for structures built/rebuilt after 2010. ☐ Yes ☐ No ☐ N/A
 - Do judgment ratings meet the requirements? ☐ Yes ☐ No ☐ N/A
 - See MDOT Bridge Advisory BA-2012-02, Guidance for the use of "Field Evaluation and Documented Engineering Judgment Ratings"
 - Do assigned ratings meet the requirements? ☐ Yes ☐ No ☐ N/A
 - See MDOT Bridge Advisory BA-2016-01, Load Rating updates to MIBRIDGE
 - Are the most current codes and guidelines used in the analysis? ☐ Yes ☐ No
 - 2005 Bridge Analysis Guide? ☐ Yes ☐ No
 - AASHTO Manual for Bridge Evaluation (MBE)? ☐ Yes ☐ No
 - Does the load rating analysis reflect the current field condition? ☐ Yes ☐ No
 - Is there an in-depth inspection report on file? ☐ Yes ☐ No
 - Condition Rating and Comments, SIA Item 60: _____ ☐ Yes ☐ No
 - Are all changes in dead or live load incorporated? ☐ Yes ☐ No
 - Design and maintenance projects should be reviewed for any increases in dead load, such as adding an overlay, and/or increases in live load, such as removing a brush block or sidewalk. ☐ Yes ☐ No ☐ N/A
 - After reviewing scour comments, can the structure remain open without restriction? ☐ Yes ☐ No ☐ N/A
 - Does the load rating analysis need to be updated? ☐ Yes ☐ No
 - Comments: _____

MOVABLE BRIDGE INSPECTION CHECKLIST

Bridge specific inspection procedures to MDOT-BridgesInspection@michigan.gov

Bridge Owner: _____ MDOT Structure ID: _____

Feature: _____ Material/Design: _____

Under meets requirements of NBIS section 650.309? ☐ YES ☐ NO ☐ N/A

Professional Engineer in the State of Michigan? ☐ YES ☐ NO ☐ N/A

Critical Inspection Techniques for Steel Bridges? ☐ YES ☐ NO ☐ N/A

Maintenance, or design experience required? ☐ YES ☐ NO ☐ N/A

Michigan Structure Inspection Manual? ☐ YES ☐ NO ☐ N/A

Required for fracture critical? ☐ YES ☐ NO ☐ N/A

Testing or testing required? ☐ YES ☐ NO ☐ N/A

Seismic, location(s), and frequency? ☐ YES ☐ NO ☐ N/A

Members should be included or location referenced? ☐ YES ☐ NO ☐ N/A

Equipment described? ☐ YES ☐ NO ☐ N/A

That are vital for operation, capacity, or safety? ☐ YES ☐ NO ☐ N/A

Performed during every third inspection cycle? ☐ YES ☐ NO ☐ N/A

Equipment malfunction or due to poor condition? ☐ YES ☐ NO ☐ N/A

Technical, electrical repairs provided? ☐ YES ☐ NO ☐ N/A

In-house personnel? ☐ YES ☐ NO ☐ N/A

Described? ☐ YES ☐ NO ☐ N/A

Findings notifications? ☐ YES ☐ NO ☐ N/A

Fracture Critical Inspection ☐ YES ☐ NO ☐ N/A

Bridge specific inspection procedures were reviewed ☐ YES ☐ NO ☐ N/A

Bridge Specific Procedures Last Modified Date: _____

QC Plan and Documentation

Item No.	Item to Review	
1	QTL/Consultant/Inspector is qualified to perform inspection	
2	Inspection was completed within the required frequency	
3	Ratings of 4 or less for Items 58, 59, 60, or 61 have been (photos, notes, sketches, etc.)	
4	Critical Deficiencies properly handled – Request For Action	
5	Maintenance and repair items reflective of noted deficiencies	
	Bridge Files Completeness:	
	a. BSIR/CSIR	<input type="checkbox"/> Yes
	b. SI&A	<input type="checkbox"/> Yes
	c. CoRe Element Inspection	<input type="checkbox"/> Yes
	d. Work Recommendation Report	<input type="checkbox"/> Yes
	e. Elevation Photos	<input type="checkbox"/> Yes
	f. Deck Photos	<input type="checkbox"/> Yes
	g. Approach Photos	<input type="checkbox"/> Yes

Do comments provided sufficiently justify the ratings	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No		
Are comments clear and thorough?	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No		
Do ratings follow MDOT Guidelines	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No		
Do CoRe Element states correlate with BSIR Ratings?	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No		
Is SI&A coded correctly	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No		
Is the work recommendation report filled out?	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No		
Are RFA's adequately documented?	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>	N/A
Are RFA's logged into FRA Spreadsheet?	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>	N/A
Is the status of RFA's documented?	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>	N/A

	Item to Review	Ratings Level (0 -9)		Quality Control Reviewer Concurs*	
QC No.		Previous Rating	Current Rating	Yes	No
1	Item 58: Deck			<input type="checkbox"/>	<input type="checkbox"/>
2	Item 59: Superstructure			<input type="checkbox"/>	<input type="checkbox"/>
3	Item 60: Substructure			<input type="checkbox"/>	<input type="checkbox"/>
4	Item 61: Culvert			<input type="checkbox"/>	<input type="checkbox"/>
5	Item 113A: Scour Critical Bridge			<input type="checkbox"/>	<input type="checkbox"/>

* The Quality Control Reviewer shall provide concurrence for all item coded a 4 or less, or a change of two or more from the previous inspection. If no ratings are 4 or less, a minimum of one item is to be concurred with.

QC Plan and Documentation

- Access not an Excuse



BEARINGS – (5) Fair Condition, Minor Section Loss



Table 5.13.14 Recommended Condition Based In-Depth Inspection Guidelines for Superstructures

NBI Item 59	Schedule Initial In-depth Within	In-Depth Frequency	Applicable Superstructure Materials		
6	12 Months	48 Months	Concrete	Steel	Timber
≤ 4	6 Months	24 Months	Concrete	Steel	Timber

QC Plan and Documentation

Document QC

2018 Routine Bridge Inspections

1/1/2018 to 12/31/2018

Inspector	No. Completed	10% File	5% Field
Inspector A	23	3	2
Inspector B	16	2	1
Inspector C	51	6	3

Success comes from
what you do,
not from what you
SAY you are going
to do.



GREAT LAKES ENGINEERING GROUP, LLC

May 4, 2018

RE: Great Lakes Engineering Group Bridge Inspection Quality Control

Dear Agency Bridge Owner:

Great Lakes Engineering Group (GLEG) is committed to providing quality bridge inspection services to agencies throughout Michigan. Because of this commitment, GLEG firmly believes in use of Quality Control (QC) to constantly improve our bridge inspection processes. Additionally, the National Bridge Inspection Standards mandate that QC must be performed and that States must define the requirements of their QC policy.

The Michigan Department of Transportation (MDOT) has defined its QC policy in Chapter 2 of the Michigan Structure Inspection Manual.

Number	Facility Carried	Features Intersected	Inspector Name	Bridge Owner	File Quality Control			Field Quality Control		
					Review By	Date	Revisions Made	Review By	Date	Revisions Made
Rev	CLARK ROAD	DEER CREEK	Eric Rickert	Highland County DNR		1/30/2018	ALT 3/19/2018			
8149	OPDYKE RD	CLINTON RIVER	Eric Rickert	Highland County DNR					1/23/2018	ALT 3/19/2018
6959	SMITHS CROSSING RD	WEEKS DRAIN	Eric Rickert	Highland County DNR					2/7/2018	N/A
6978	POSEYVILLE ROAD	WRIGHT DRAIN	Eric Rickert	Highland County DNR		1/23/2018	N/A			
6980	SCHREIBER ROAD	WEEKS DRAIN	Eric Rickert	Highland County DNR					2/7/2018	N/A
6968	ALAMANDO ROAD	SALT RIVER	Eric Rickert	Highland County DNR		1/23/2018	N/A			
10665	MURRAY ROAD	SUCKER CREEK DRAIN	Eric Rickert	Highland County DNR		1/23/2018	N/A			
10642	SWAFFER ROAD	COLTS CREEK	Eric Rickert	Highland County DNR					2/7/2018	CIC 3/9/2018
10452	MILLINGTON ROAD	DEAD CREEK	Eric Rickert	Highland County DNR					2/7/2018	N/A
10637	PHILLIPS ROAD	WHITE CREEK I/C DRAIN	Eric Rickert	Highland County DNR		1/23/2018	N/A			
6381	31 MILE ROAD	TUPPER BROOK DRAIN	Eric Rickert	Highland County DNR		1/30/2018	2/20/2018			
13061	EAST VIEW DRIVE	GLODE DRAIN	Eric Rickert	Highland County DNR					1/23/2018	N/A
6361	TILCH RD	DUNN-BANISTER DRAIN	Eric Rickert	Highland County DNR					1/23/2018	N/A
6200	WB METRO PARKWAY	CLINTON RIVER SPILLWAY	Eric Rickert	Highland County DNR		1/30/2018	2/20/2018			
6300	ROMEO PLANK ROAD	NEWLAND DRAIN	Eric Rickert	Highland County DNR		1/30/2018	N/A			
6952	MERIDIAN ROAD	PRAIRIE CREEK	Eric Rickert	Highland County DNR		1/30/2018	N/A			
7230	DEERFIELD RD	RIVER RAISIN	Eric Rickert	Highland County DNR		1/30/2018	N/A			
8183	HATCHERY ROAD	CLINTON RIVER	Eric Rickert	Highland County DNR					1/23/2018	2/20/2018
10190	RYNN ROAD	O'LOUGHLIN DRAIN	Eric Rickert	Highland County DNR		1/30/2018	N/A			
10476	DICKERSON ROAD	SOUTHGATE DRAIN	Eric Rickert	Highland County DNR		1/30/2018	N/A			
10983	PLYMOUTH ROAD	FLEMING CREEK	Eric Rickert	Highland County DNR					1/23/2018	N/A
10984	FORD ROAD	FLEMING CREEK	Eric Rickert	Highland County DNR					1/23/2018	N/A
10999	MAIN ST-WHITMORE	HORSESHOE LAKE OUTLET	Eric Rickert	Highland County DNR					1/26/2018	2/20/2018
10975	HURON RIVER DRIVE	PITTSFIELD ANN ARBOR DRN	Eric Rickert	Highland County DNR		1/30/2018	N/A			

Questions and Discussion

