



2016 Michigan Bridge Conference Workshop

Scour Plan of Action MiSIM Chapter 6



Rich Kathrens

MDOT Bridge Safety Inspection Engineer

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March 22, 2016



Michigan Office of the Auditor General REPORT SUMMARY

Performance Audit

Bridge Inspection Program

Michigan Department of Transportation (MDOT)

Report Number:
591-0169-08

Released:
May 2010



MICHIGAN

OFFICE OF THE AUDITOR GENERAL

FINDING

2. Plans of Action (POAs) for Scour Critical Bridges 2015

MDOT did not ensure that the POAs developed for scour critical bridges contained all recommended information. Comprehensive POAs would better establish specific action to take during flood events to maximize public safety and ensure the most efficient use of State and local resources.

Audit Conclusion:

We concluded that MDOT was not effective in ensuring that bridge inspections and load ratings were completed in compliance with selected State and federal requirements. We noted three material conditions (Findings 1 through 3) and one reportable condition (Finding 4).

Material Conditions:

MDOT did not complete or ensure the completion of all scour evaluations and plans of action for scour critical bridges (Finding 1).

Material Conditions: 2010

MDOT did not complete or ensure the completion of all scour evaluations and plans of action for scour critical bridges (Finding 1).

ingler, CPA, CIA
TOR GENERAL



§ 650.313 Inspection procedures.

(e) Identify bridges with FCMs, bridges requiring underwater inspection, and bridges that are scour critical.

(3) Bridges that are scour critical. Prepare a plan of action to monitor known and potential deficiencies and to address critical findings. Monitor bridges that are scour critical in accordance with the plan.



Metric #18: Inspection procedures – Scour Critical Bridges


rev 4/1/13

NBIS Reference: 23 CFR 650.313 (e) Bridges that are scour critical

Criteria

- Bridges over water have a documented evaluation of scour vulnerability.
- Bridges that are scour critical have a scour plan of action (POA) prepared to monitor known and potential deficiencies and to address scour critical findings.
- Bridges that are scour critical are monitored in accordance with the POA.



			PAGE	1	OF	11
 Michigan Department of Transportation	GUIDANCE DOCUMENT	IDENTIFIER	EFFECTIVE DATE			
		10231	06/04/14			
		SUPERSEDES	DATED			
		10231	04/30/15			
RESPONSIBLE ORGANIZATION:		Bureau of Highway Development – Design- Bridge Development				
SUBJECT:	Coding and Managing Bridges for Scour Vulnerability					

Purpose

The purpose of this policy is to identify MDOT and local agencies' responsibilities for the management of bridges vulnerable to scour. MDOT's goals for management of scour susceptible bridges are:

- Ensure the safety of individual bridges and bridge approaches crossing waterways.
 - Perform Scour Evaluations following procedures listed in HEC -18.
 - Develop and implement Plan of Actions (POA).
 - Address critical findings by initiating follow up actions such as scour monitoring, mitigation, or replacement.
- Reduce the network wide risk of bridge scour and minimize future flood damage to bridges.
 - Utilize data driven, risk-based asset management. See MDOT Scour Risk Assessment, or Local



ITEM 113 Coding: 8 Stable for assessed or calculated scour condition.

Coding Requirements for Abutments:

- The top of spread footings at abutments must either be below the total calculated scour or **have properly designed and constructed countermeasure** installed with the bottom of the countermeasure header placed below the contraction and long term scour depth.
- Rip rap used at abutments to achieve this rating must meet material specifications for durability and gradation as listed in the special provision for rip rap.
- **Countermeasures shall be designed and constructed** to the horizontal plan requirements according to HEC-23 and MDOT Design



ITEM 113 Coding: 8 Stable for assessed or calculated scour condition.

Coding Requirements for Piers:

- The top of pier footings must be below the total scour depth (combined local, contraction and long term scour depth) without accounting for the benefit of scour countermeasures in order to be eligible for a coding of 8. **Piers cannot rely on countermeasures to be coded an 8.**





ITEM 113 Coding: 7 Countermeasures have been installed....

Coding Requirements for Abutments and Piers

- Countermeasures installed at **abutments** may be coded a “7” for designed countermeasures where “As Built” plans or construction records cannot be reviewed to verify proper placement.
- Countermeasures installed at **existing piers** may be coded a “7” if designed and where “As Built” plans or construction records verify proper placement. This includes specifications on the size and type of material, placement methods, pad dimensions and header installation.



ITEM 113 Coding: 6 Scour Calculation/Evaluation has not been made.



Metric 18: Scour

Bridges Evaluated for Scour		✓	✗	Trend*	%
Compliance Deficiencies Identified					
Has bridge been evaluated for scour?	Previously identified bridges - Item 113 = 6 or T	7,805	0	✓	100%
	Newly identified bridges*** - Item 113 = 6 or T		0		
	Previous year - Item 113 = 6 or T	7,772	33		99.577%

90 (State) / 180 (L.A.) Days to resolve the issue and update Item 113



FHWA Metric 15 Bridge Files

Waterway Data: 57%

Scour Evaluations: 84%

Metric #15: Commentary

General: As outlined in Section 2 of the AASHTO Manual (MBE) the bridge file contains a range of information applicable to bridge inspection which may be located in more than one location. The list of *applicable significant bridge file components* for Metric 15, which is a subset of the list provided in the MBE is, composed of:

- Inspection reports
- Waterway information – channel cross-sections, soundings, stream profiles
- Significant correspondence
- Special inspection procedures or requirements
- Load rating documentation, including load testing results
- Posting documentation
- Critical findings and actions taken
- Scour assessment
- Scour Plan of Action (POA)(for scour critical bridges and those with unknown foundations) and documentation of post-event inspection or follow-up
- Inventory and evaluation data and collection/verification forms



FHWA POA Template

SCOUR CRITICAL BRIDGE - PLAN OF ACTION

1. GENERAL INFORMATION

Structure number: _____ City, County, State: _____ Waterway: _____

Structure name: _____ State highway or facility carried: _____ Owner: _____

Year built: _____ Year rebuilt: _____ Bridge replacement plans (if scheduled): _____

Anticipated opening date: _____

Structure type: Bridge Culvert

Structure size and description: _____

Foundations: Known, type: _____ Depth: _____ Unknown

Subsurface soil information (check all that apply): Non-cohesive Cohesive Rock

Bridge ADT: _____ Year/ADT: _____ % Trucks: _____

Does the bridge provide service to emergency facilities and/or an evacuation route (Y/N)? _____

If so, describe: _____

2. RESPONSIBILITY FOR POA

Author(s) of POA (name, title, agency/organization, telephone, pager, email): _____

Date: _____

Concurrences on POA (name, title, agency/organization, telephone, pager, email): _____


POA updated by (name, title, agency, organization): _____ Date of update: _____

Items update: _____

POA to be updated every _____ months by (name, title, agency/organization): _____

Date of next update: _____

3. SCOUR VULNERABILITY



[Michigan.gov Home](http://Michigan.gov)

Welcome Rich Kathrens

Administration Assignments

Jurisdiction

Structure Inventory Summary	Count
Total No. of Structures	12,959
Highway (NBI) Structures greater than 20'	11,125
Highway Structures less than 20'	1,185
Rail Road Structures (X)	377
Pedestrian Structures (P)	250
Other Non-Highway Structures (V, Plaza)	22

Additional Bridge Inventory Information

Posted Structures	1,110
Closed Structures	69
Fracture Critical Structures	159
Scour Critical Structures	1,697
Scheduled/Under Construction (S, G)	105



MiBRIDGE Bridge Management and Inspection System

Michigan.gov Home | MiBRIDGE Home | Contact

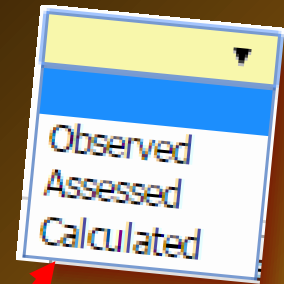
Welcome Richard Kathrens

Administration | Bridge Management | Assignments | D

STR 2002 | Information S

Facility: 187 (HENNA RD) | Latitude / Longitude: 43.1775 / -83.776

Feature: | Length / Width:



Observed
Assessed
Calculated

SCOUR EVALUATION

Item 113	Scour Criticality	3 SC - Unstable	Source of Item 113	Assessed
-----------------	--------------------------	-----------------	---------------------------	----------

Item 71	Waterway Adequacy	7 Above Minimum
Level I Assessment	Yes	
Level II Analysis	Yes	

Document Date	Document Name	Document Type
03/07/2016	MDOT Level Two Example.pdf	Level II
03/07/2016	MDOT Level One Example.pdf	Level I

Calculated Values					
Scour Analysis Frequency	25 Year	50 Year	100 Year	500 Year	Comments
Anticipated Surface Elevation (ft)	581.75	585.63	600.21	602.3	
Distance Below Bottom Chord (ft)	5.0	4.5	0.0	0.0	Pressure Flow at the 100 Year
Anticipated Flow (cubic ft/sec)	150.0	180.0	200.5	225.24	
Anticipated Pressure Flow (Y/N)	N	N	Y	Y	



Scour Evaluation File Storage

Bridges 6-49

MICHIGAN DEPARTMENT OF TRANSPORTATION
LEVEL ONE SCOUR ANALYSIS WORKSHEET

Date: May 2003 By: MJH Structure No: 1 Control Section: 81104
Job No. 48847C Route: 94 Watercourse: Icicle Creek

All references are to HEC-20, 3rd Edition.

Data Collection

SCOUR EVALUATION

Item 113 Scour Criticality 3 SC - Unstable Source of Item 113 Assessed

Item 71 Waterway Adequacy 7 Above Minimum

Level I Assessment	Yes
Level II Analysis	Yes

Document Date	Document Name	Document Type
03/07/2016	MDOT Level Two Example.pdf	Level II
03/07/2016	MDOT Level One Example.pdf	Level I

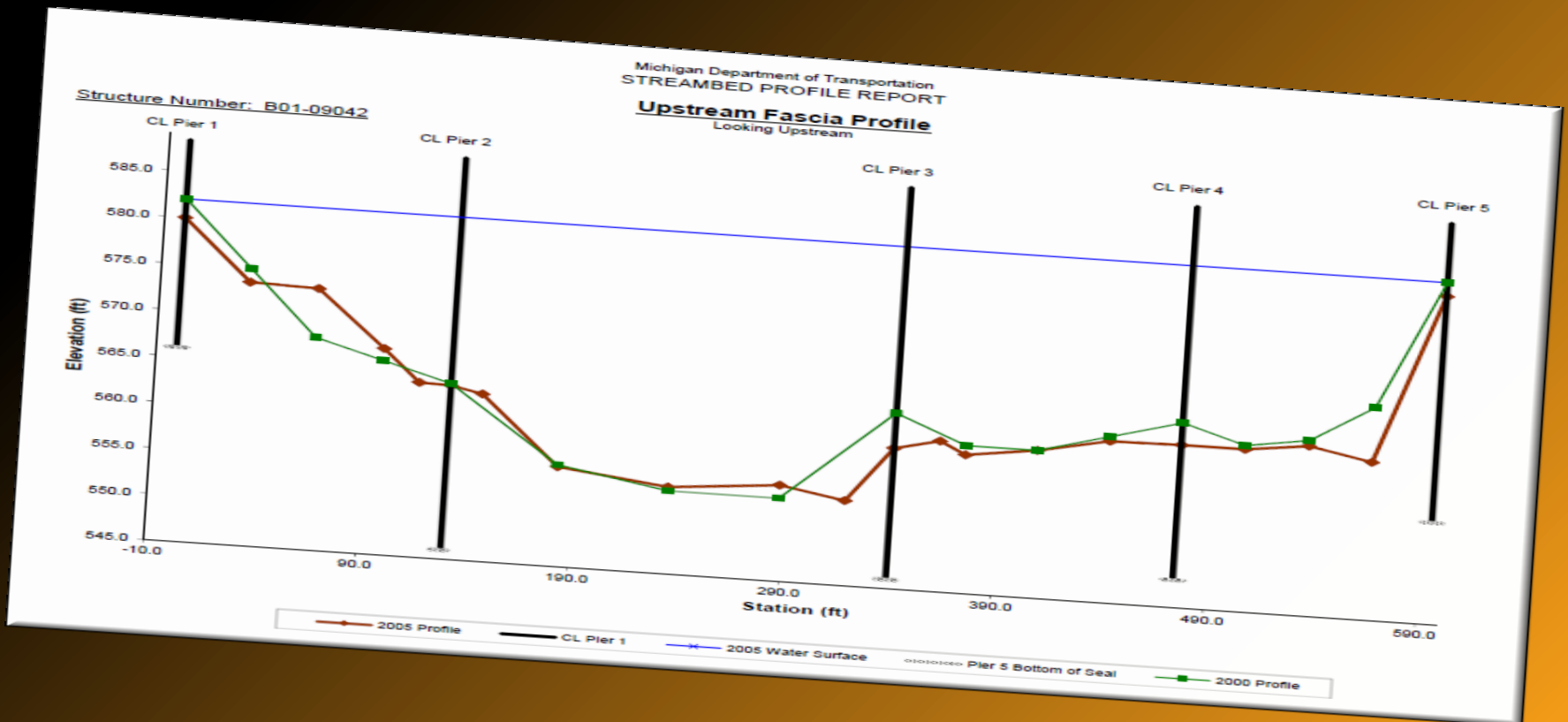
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Anticipated Flow (cubic ft/sec)	150.0	180.0	200.5	225.24	
Anticipated Pressure Flow (Y/N)	N	N	Y	Y	



X-Section Information File Storage

CROSS SECTIONS

Document Date	Document Name
03/08/2015	2015_03 Sample X-Section.xls
05/07/2005	2005_05 Sample X-Section.xls
06/06/2000	2000_06 Sample X-Section.pdf





Waterway: Substructure Information

NAVIGATION DATA

38	Navigation Control	1 Per
39	Vertical Clearance (ft)	22.9
40	Horizontal Clearance (ft)	147.6
111	Pier Protection	2 In-P
116	Lift Brdg Vert Clearance (ft)	0.0

SIA Data

- [Type & Dims. \(Edit\)](#)
- [Insp. Data \(Edit\)](#)
- [Route ON \(Edit\)](#)
- [Route UNDER \(Edit\)](#)
- [Misc. data \(Edit\)](#)
- [Load Rating \(Edit\)](#)
- [Waterway Data \(Edit\)](#)

108A Wearing Surface

108B Membrane

108C Deck Protection

595 Footing Type

STRUCTURE DIMENSIONS

34 Skew

35 Structure Flared 1 Yes, flared 0 No

45 Number Of Main Spans

46 Number Of Approach Spans

5 Epoxy Overlay

0 None

1 Epoxy Coated Reinforci

C Footing Steel H Piles

SUBSTRUCTURE INFORMATION

Foundation	Normally in Water	Normal Water Depth (ft)	In Water (100 Yr)	Footing Type	Depth Known	Soil Type
Abutment A	N	N/A	N	A Spread Ftg Soil	Y	Non Cohesive
Abutment B	N	N/A	N	B Footing Timber Piles	Y	Non Cohesive
Pier 1	Y	5.1	Y	C Footing Steel H Piles	Y	Cohesive
Pier 2	Y	8.2	Y	H Curtain Wall	Y	Cohesive
Pier 3	Y	18.6	Y	I Spread Footing Rock	Y	Rock
Pier 4	Y	24.3	Y	M Gravity Steel H Piles	N	Rock
Pier 5	Y	12.2	Y	Q Gravity on Rock	N	Unknown
Pier 6	Y	3.5	Y	U Unknown	N	Unknown



Scour POA updates:

Summary of POA Authors

PLAN OF ACTION AUTHORS

Name	Agency	Phone	Email	Last Modified Date
.TEST LA .Bridge Owner	Saginaw County	517-322-5715	kathrensr@michigan.gov	03/07/2016
.TEST Consultant .Bridge Engineer	Consultant A	517-322-6092	kathrensr@michigan.gov	03/07/2016
.TEST MDOT .Hydraulics	MDOT Hydraulics	517-322-5717	kathrensr@michigan.gov	03/07/2016

SCOUR VULNERABILITY

Item 113	Scour Criticality	3	Source of Item 113	Calculated
Item 71	Waterway Adequacy	5		
	Level I Assessment	Y	09/29/2015	
	Level II Analysis	Y	09/29/2015	

Executive Summary Scour Evaluation

Scour calculations were performed on the 100 and 500 year events in 1990. Bridge abutments are set back from the river so there is no calculated abutment scour. Estimated scour at pier 1 is 5' +/- (EL 572'), pier 2 is 35' +/- (EL 520'), pier 3 is 36' +/- (EL 517), pier 4 is 17' +/- (EL 510), and 6' +/- (EL 570') at pier 5 in the 100 year event. Estimated scour at pier 1 is 6' +/- (EL 571'), pier 2 and 3 are 38' +/- (EL 514'), pier 4 is 18' +/- (EL 509'), and 6' +/- (EL 570') at pier 5 in the 500 year event. The bottom of footing for Pier 1 is 565, piers 2-3 is 546', pier 4 is 548' and pier 5 is 560'.



Scour Vulnerability and Substructure information is automatically populated from the Waterway data.

SCOUR VULNERABILITY

Item 113	Scour Criticality	3	Source of Item 113	Calculated
Item 71	Waterway Adequacy	5		
	Level I Assessment	Y	09/29/2015	
	Level II Analysis	Y	09/29/2015	

Executive Summary Scour Evaluation

Scour calculations were performed on the 100 and 500 year events in 1990. Bridge abutments are set back from the river so there is no calculated abutment scour. Estimated scour at pier 1 is 5' +/- (EL 572'), pier 2 is 35' +/- (EL 520'), pier 3 is 36' +/- (EL 517), pier 4 is 17' +/- (EL 510), and 6' +/- (EL 570') at pier 5 in the 100 year event. Estimated scour at pier 1 is 6' +/- (EL 571'), pier 2 and 3 are 38' +/- (EL 514'), pier 4 is 18' +/- (EL 509'), and 6' +/- (EL 570') at pier 5 in the 500 year event. The bottom of footing for Pier 1 is 565, piers 2-3 is 546', pier 4 is 548' and pier 5 is 560'.

Substructure Information

Foundation	Normally in Water	Normal Water Depth (ft)	In Water (100 Yr)	Footing Type	Depth Known	Soil Type
Abutment A	<input type="radio"/> Yes <input checked="" type="radio"/> No	N/A	<input type="radio"/> Yes <input type="radio"/> No		<input type="radio"/> Yes <input type="radio"/> No	Non Cohesive
Abutment B	<input type="radio"/> Yes <input checked="" type="radio"/> No	N/A	<input type="radio"/> Yes <input type="radio"/> No		<input type="radio"/> Yes <input type="radio"/> No	Non Cohesive
Pier 1	<input type="radio"/> Yes <input type="radio"/> No		<input type="radio"/> Yes <input type="radio"/> No		<input type="radio"/> Yes <input type="radio"/> No	
Pier 2	<input type="radio"/> Yes <input type="radio"/> No		<input type="radio"/> Yes <input type="radio"/> No		<input type="radio"/> Yes <input type="radio"/> No	



Countermeasure Recommendations

COUNTERMEASURE RECOMMENDATIONS

- Only Monitoring
- Structural/Hydraulic Countermeasures Considered

Estimated Cost \$

Countermeasure Comments

This structure has unknown foundations. Previous scour monitoring during high flow events and routine inspections indicate that this structure has remained stable. It is not feasible to install hydraulic or structural countermeasures due to the limited waterway opening. The structure is in relatively good condition and will be monitored for scour per the monitoring program described below.





Monitoring Program

MONITORING PROGRAM

Recommended Monitoring Requirements

Monitoring of this structures is mainly focused on the main channel near Piers 4 and 5. Flow rates can be obtained from the USGS monitor just down stream of the structure. These piers have been protected with rip rap along the shipping channel and depth measurements should be completed during and after the flood events to help verify the stability of the rip rap.

(Check all that are recommended)

Type	Frequency/ Amount	Comments
<input checked="" type="checkbox"/> Regular Inspection	24.0	Continue to wade and probe during routine inspections.
<input type="checkbox"/> Other Special Inspection		
<input checked="" type="checkbox"/> Underwater Inspection	60.0	
<input checked="" type="checkbox"/> Stream Bed Cross Sections	24.0	Update Stream Bed Cross Sections every 24 Months and after High Flow Events
<input type="checkbox"/> Monitoring Devices (Fixed, Sonar, etc.)		

Flood Monitoring - Initiate monitoring when any of the following occur

NOAA Flood Warning (This includes both Flash Flood and Flood Warnings)

Flow Information

Discharge (cfs)

Rainfall (in/hr)

WS Elevation (ft)

5.0

Measured from Top of Rail, Near Pier 3, North Side of Bridge

Pressure Flow

Debris Accumulation



Monitoring Program

Items to Watch During Monitoring

The dolphins on Pier 3 show some settlement and loose chains and collision damage. Upstream dolphin at Pier 2 appears to have been struck and has 2 broken piles and 80% of total section remaining. Pier 3 footing is exposed up to ten feet at the upstream corner channel side. Pier 2 footing is exposed up to 6ft. (2005)

Foundation	Items to Watch
Abutment A	N/A
Abutment B	N/A
Pier 1	Water will reach the Pier at the 100yr event, Monitor for
Pier 2	Use depth finder along south side during flood event to verify channel depth (see notes in file)
Pier 3	This pier has rip rap along the north side.
Pier 4	Excessive Debris accumulate around this pier during a flood, Monitor for whirlpools
Pier 5	
Pier 6	





Bridge Closure Plan



BRIDGE CLOSURE PLAN

Conditions To Consider Bridge Closure

- Water Surface Elevation ft
- Overtopping of Road or Structure
- Pressure Flow
- High Debris Accumulation
- Observed Structure Movement/Settlement
- Loss of Scour Countermeasures

Contacts Responsible for BRIDGE CLOSURE

Name	Title	Agency	Work Phone	Cell Phone
Lead Worker	Maintenance	City Village	800-321-8585	800-989-7474
Bridge Owner	Bridge Engineer	Some Agency	555-555-5555	777-777-7777

Contacts Responsible for OPENING Bridge

Name	Title	Agency	Work Phone	Cell Phone
Bridge Owner	Bridge Engineer	Some Agency	555-555-5555	777-777-7777



SCOUR ACTION HIGH FLOW EVENT

KATHRENS

Inspector Name	Agency / Company Name	Monitored Date	Monitored Time
Richard Kathrens	MDOT - Bridge Field Services	05/14/2013	12:00 AM

EVENT DETAILS

Storm Duration(hrs):	<input type="text" value="24"/>	Estimated Total Rainfall(in):	<input type="text" value="4"/>
High Water Distance From Chord(ft):	<input type="text" value="2"/>	Estimated USGS Flow Discharge(cu ft/sec):	<input type="text" value="15346"/>

EVENT NARRATIVE

Whirlpools Observed

Whirlpools were observed near the north side of pier 5

Debris Accumulation

Several logs and debris has collected near east side of pier 4

Action Taken / Closure

Detailed depth measurements to be completed. (See Scour Inspection for Details)

Comments

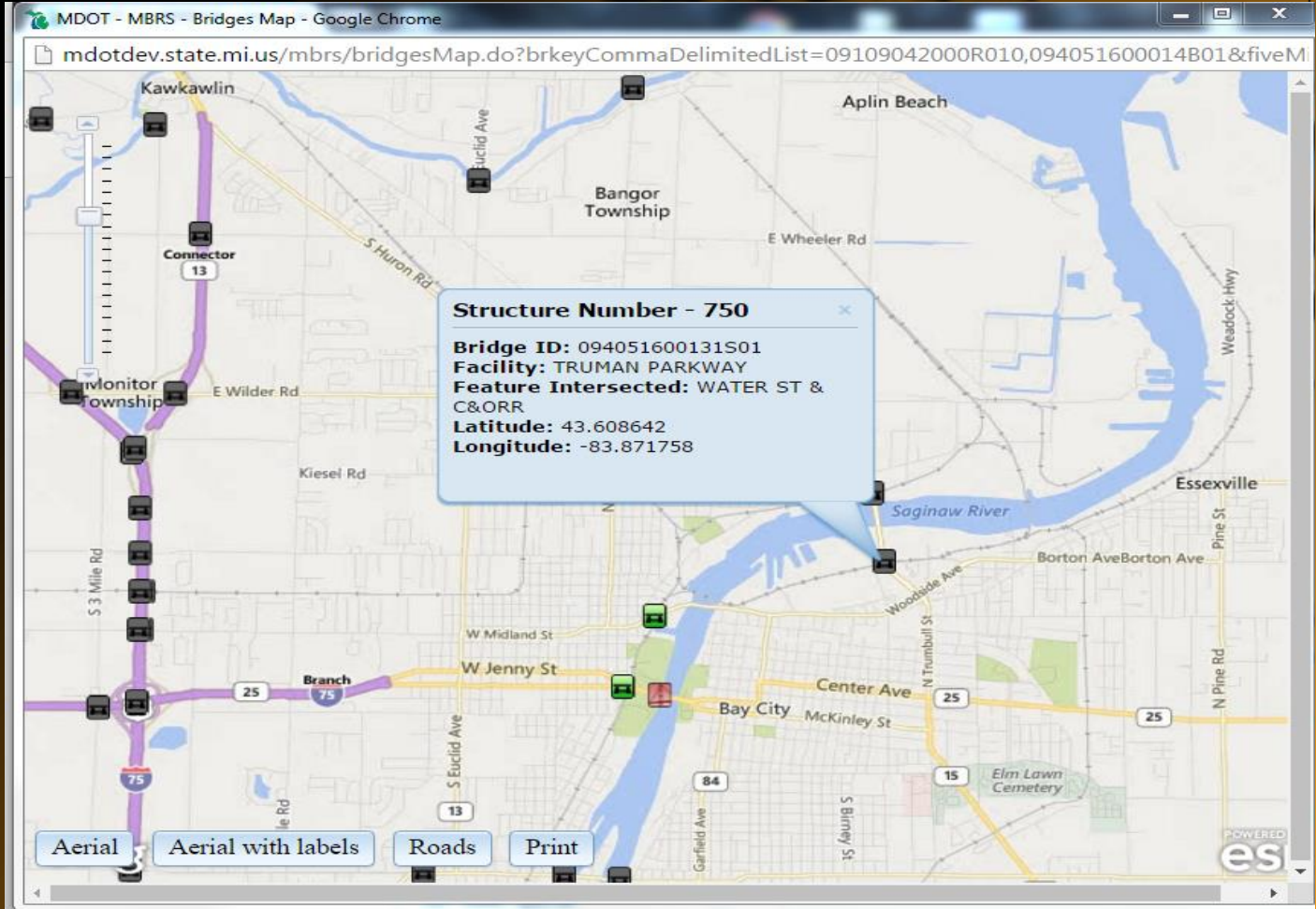
Rainfall total is estimated from Weather Underground for the days of April 10-April 21. The closest USGS active guage was USGS 04157000 SAGINAW RIVER AT SAGINAW, MI and the flow was recorded at 24,300 on 4/21/13



Detour Route

Bridges/Culverts on Detour Route		
Detour Strc#	Feature Intersected	Load Limitations
649	CM RR	
747	SAGINAW RIVER AND MCRR	

Map Detour Bridges Show all possible bridges / culverts (within 5 mile radius)



MDOT - MBRS - Bridges Map - Google Chrome

Structure Number - 750

Bridge ID: 094051600131S01
 Facility: TRUMAN PARKWAY
 Feature Intersected: WATER ST & C&ORR
 Latitude: 43.608642
 Longitude: -83.871758

Map controls: Aerial, Aerial with labels, Roads, Print



Scour Inspection Documentation

SUBSTRUCTURE		
Item	Rating	Comments
* 13. Abutments (SIA-60)	<input type="text" value="03/15 - 2"/> Prev. Comment	
* 14. Piers (SIA-60)	<input type="text" value="03/15 - 2"/> Prev. Comment	
15. Slope Protection	<input type="text" value="03/15 - 2"/> Prev. Comment	
* 16. Channel (SIA-61)	<input type="text" value="03/15 - 2"/> Prev. Comment	
* 17. Scour Inspection	<input type="text" value="03/15 -"/> Prev. Comment	

Bridge Safety Inspection Report (BSIR)

NBI INSPECTION		
Item	Rating	Comments
* 1. Culvert (SIA-62)	<input type="text" value="01/15 - 7"/> Prev. Comment	Culvert comments should... late Culvert Element below
* 2. Channel (SIA-61)	<input type="text" value="01/15 -"/> Prev. Comment	
* 3. Scour Inspection	<input type="text" value="01/15 -"/> Prev. Comment	

Culvert Safety Inspection Report (CSIR)



MDOT Bridge Safety Inspection NBI Rating Guidelines

BSIR #17 / CSIR #3 SCOUR INSPECTION


Code	Condition	Material	Description
9	NEW		New scour protection, No Scour.
8	GOOD		No Scour noted. Scour Protection (if installed) is in good condition.
7	GOOD		Insignificant to minor scour along substructures. Scour Protection (if installed) is in good condition.
6	FAIR		Minor scour or erosion exists in scattered areas along substructure. No exposure of the footing or piles. Scour Protection (if installed) is substantially effective with minor defects noted.
5	FAIR		Minor to Moderate Scour exists with no exposure of footings or piles. All substructures are structurally sound. Protection (if installed) is substantially effective with minor defects noted.
4	POOR		POOR CONDITION – Extensive advanced scour with or without isolated major scour. More frequent monitoring or corrective actions are typically needed to address scour conditions. Footings are exposed, Scour Protection (if installed) has limited effectiveness at protecting substructure for scour, significant defects noted.

BSIR #17 / CSIR #3 SCOUR INSPECTION

This item is to be used for evaluating the scour that represents the “observed” or measured scour condition from the inspection of all scour susceptible substructure units or culvert footings. The inspector should note the factors that influenced the rating, especially when the rating for this item is not in alignment with the coding definitions. Refer to [Mis](#) Section 6.04 for inspection procedures.



STR 646 Information Summary



Facility
M-25

Feature
SAGINAW RIVER & JFK DR

Location
IN BAY CITY

Region / County
Bay(4) / Bay(9)

Latitude / Longitude
43.5965 / -83.8947

Length / Width
854 / 67.59

Built / Recon. / Paint / Overlay
1958 / 2005 / 1993 / 2005

Material / Design
3 Steel / 16 Movable-Bas

Inventory & Appraisal | Inspections / Reports | Load Ratings | Work Recommendations | Work

Special Inspections Required: Fracture Critical

Inspection Data: (select from folders below)

- Routine - BSIR
- Element
- Request for Action
- Fracture Critical
- Fatigue Sensitive
- Underwater
- Other Special
- Damage
- Scour Action Plan
 - Action Plan (Edit)
 - (Add) Scour Insp.
 - (Add) H.F. Event
 - 03/14/2014 SI
 - 05/14/2013 SI
 - 05/14/2013 HF (Edit)
 - 01/05/2012 HF
 - 12/16/2011 SI
 - 08/13/2010 SI

SCOUR ACTION INSPECTION		KATHRENSR
Inspector Name	Richard Kathrens	Inspection Date 05/14/2013
OBSERVED SCOUR		
Agency / Company Name	MDOT - Bridge Field Services	
Comments	Scour Inspection completed under Contract. Depth measurements were collected using Multi-Beam Echo sounders to produce a channel bottom surface. This data was used to evaluate scour conditions and to develop cross sections.	
Action(s) Taken		
RECOMMENDATIONS & ACTION ITEMS		
Recommendation Type	Priority	Description
Other	M	Continue to monitor channel bottom during highflow events and during routine underwater inspections.



Scour Inspection Summary

Inspection Summary					
Type	Latest Date Completed	Current Frequency	Inspector	Agency	
Routine	05/22/2015	15	.Bridge Inspector	MDOT - Bridge Field Services	
Underwater	08/13/2015	60	.Bridge Inspector	MDOT Bridge Inspector	
Scour Inspection	03/14/2014		.TEST MDOT .Brid	MDOT Bridge Inspector	
High Flow Monitoring	05/14/2013		.Bridge Inspector	MDOT - Bridge Field Services	

SCOUR INSPECTIONS

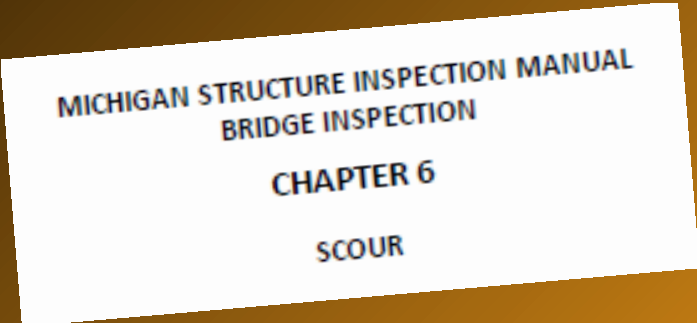
Date	Type	Freq	Inspector	Agency
08/13/2010	UNDERWATER	60	Amy Trahey	great lakes engineering group, ILC
Comments	There is scour occurring at the upstream ends of Piers 4w and 5w, and along the footing of the channel side of the pier units. The vertical exposure of the footing and tremie seal varies between 3 feet up to 9 feet. There was no undermining discovered. There was minor riprap observed at pier 2w at the south end.			
08/13/2010	SCOUR		Rich Kathrens	MDOT - Bridge Field Services
Comments	Inspection was completed during UW inspection. There is scour occurring at the upstream ends of Piers 4w and 5w, and along the footing of the channel side of the pier units. The vertical exposure of the footing and tremie seal varies between 3 feet up to 9 feet. There was no undermining discovered.			
Recommendations	Other	Medium	Continue to monitor channel bottom during highflow events and during routine underwater inspections.	
05/14/2013	SCOUR		Rich Kathrens	MDOT - Bridge Field Services
Comments	Scour Inspeiton completed under Contract. Depth measurements were collected using Multi-Beam Echo sounders to produce a channel bottom surface. This data was used to evaluate scour conditions and to develop cross sections.			
Recommendations	Other	Medium	Continue to monitor channel bottom during highflow events and during routine underwater inspections.	
08/11/2015	ROUTINE	15	Rich Kathrens	MDOT - Bridge Field Services
Comments	Waded and probed along pier to check scour depths, Pier 6 has undermining occurring along north end.			
Recommendations	Detailed Insp.	High	Evaluate placing "Healer Sealer" on approach span sidewalks.	
	Slope Repair	High	Repair erosion of slope and undermining of sidewalk at SW quadrant	
	Railing Repair	High	Repair small tube railing at east end of bridge (bent).	
	Other	Medium	Repair steel plate section and enclosure at all quadrants of Machinery Room.	



Updated Scour Plan of Action implementation Activities:

- Update MiSIM and MDOT NBI Rating Guidelines
- Update Waterway Data
- Review and Update existing POA's
- Scour Evaluation Upload (Minimum LEVEL 1 Assessment
- Upload Cross Section Data

*Estimated Timeframe for Review and Updates: **Within Next two Inspections***

A white rectangular graphic tilted slightly to the right, containing text that mimics a manual cover. The text is in a bold, blue, sans-serif font.

MICHIGAN STRUCTURE INSPECTION MANUAL
BRIDGE INSPECTION
CHAPTER 6
SCOUR

