

Underwater Bridge Inspection



Underwater Bridge Inspection

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Underwater Bridge Inspection

- Managing
- Assigning
- Reviewing
- Assisting/witnessing

Managing

Underwater Bridge Inspection



Managing

- Plans
- Previous reports
- When to dive
- Dive team
- Underwater

Plans

- Most important
 - What is underwater
- Readily available
 - Bridge's file
 - Owner's database
 - Wisconsin DOT
 - Plans and reports online
 - http://on.dot.wi.gov/dtid_bos/extranet/structures/
 - B-38-0021

Previous Reports

- All applicable
 - Underwater inspection
 - Routine inspection
 - Structure inventory & appraisal
- Electronic files
 - MBIS/MBRS
 - Owner's database

When To Dive

- National Bridge Inspection Standards (NBIS)
 - “...cannot be inspected visually at low water by wading or probing...”
- General site conditions
 - Water depth > 4 feet
 - Swift current
 - Obstructions

Dive Team

- Trained divers
 - NBIS
 - Comprehensive or underwater bridge inspection course
 - MDOT
 - Three years' diving and reporting experience
 - Trained on equipment used
 - Underwater bridge inspection course
 - MIOSHA
 - “...assigned tasks in accordance with member’s experience or training...”

Dive Team

- Inspection Team Leader
 - NBIS
 - Five ways
 - Combination of education and years of experience
 - MIOSHA
 - Designated employee in charge

Dive Team

- Inspection Team Leader
 - MDOT
 - Three years' diving and reporting experience
 - Trained on equipment used
 - Inspection courses (National Highway Institute)
 - Safety Inspection of In-Service Bridges
 - Bridge Inspection Refresher
 - Underwater Bridge Inspection
 - Engineering Concepts for Bridge Inspectors (non PEs)

Underwater

- Diving equipment
 - SCUBA
 - Surface supplied air
- Exposure suits
 - Dry suit
 - Wet suit
 - Coveralls

Underwater

- Diving equipment - SCUBA



Underwater

- Diving equipment – surface supplied air



Underwater

- Support equipment
 - Boat
 - Decompression chamber
 - Crane



Underwater

- Access



Underwater

- Access



Underwater

- Bridge size



Underwater

- Bridge size



Underwater

- Mackinac Bridge
 - Piers
 - Trestle bridge
 - Riprap



Underwater

- Mackinac Bridge - piers



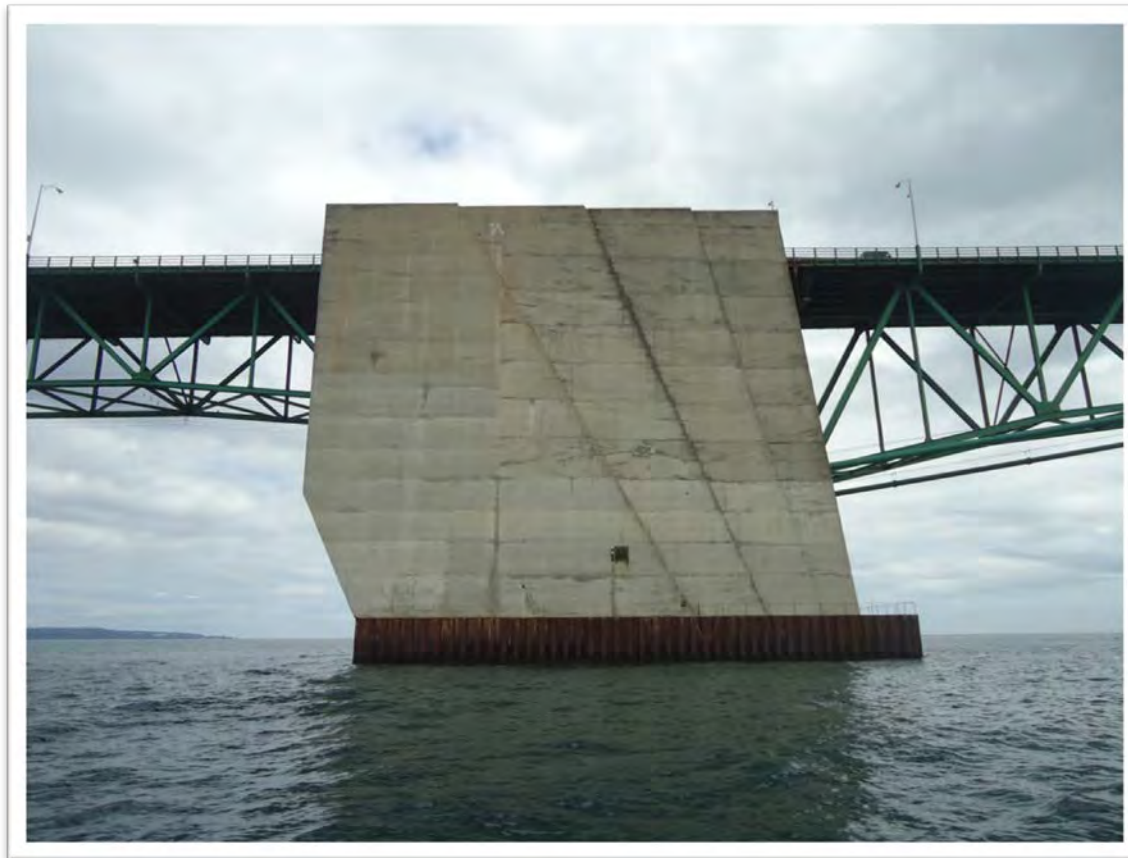
Underwater

- Mackinac Bridge - piers



Underwater

- Mackinac Bridge - piers



Underwater

- Mackinac Bridge - piers



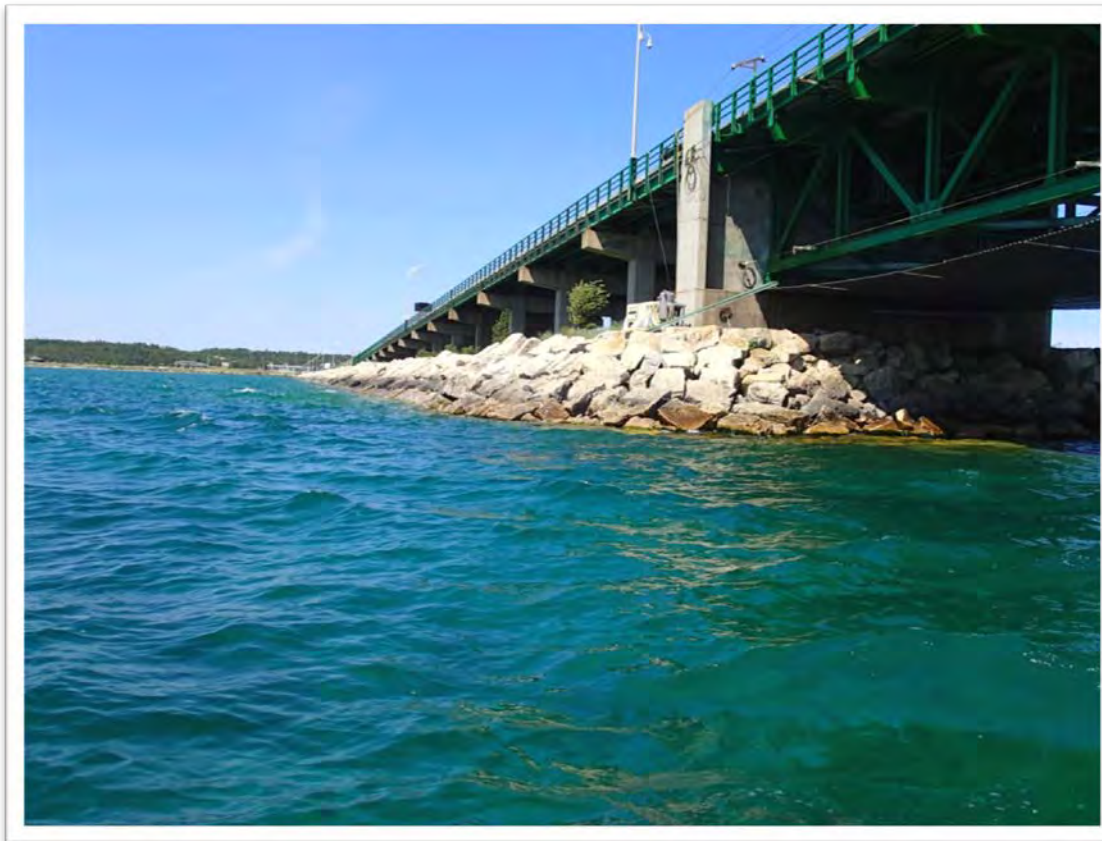
Underwater

- Mackinac Bridge - trestle



Underwater

- Mackinac Bridge - riprap



Underwater

- Mackinac Bridge
 - Typical findings
 - Concrete overspill
 - Exposed H-pile
 - Exposed aggregate

Underwater

- Mackinac Bridge – exposed aggregate



Underwater

- Lift Bridge
 - Access
 - Scour
 - Pier design

Underwater

- Lift Bridge - access



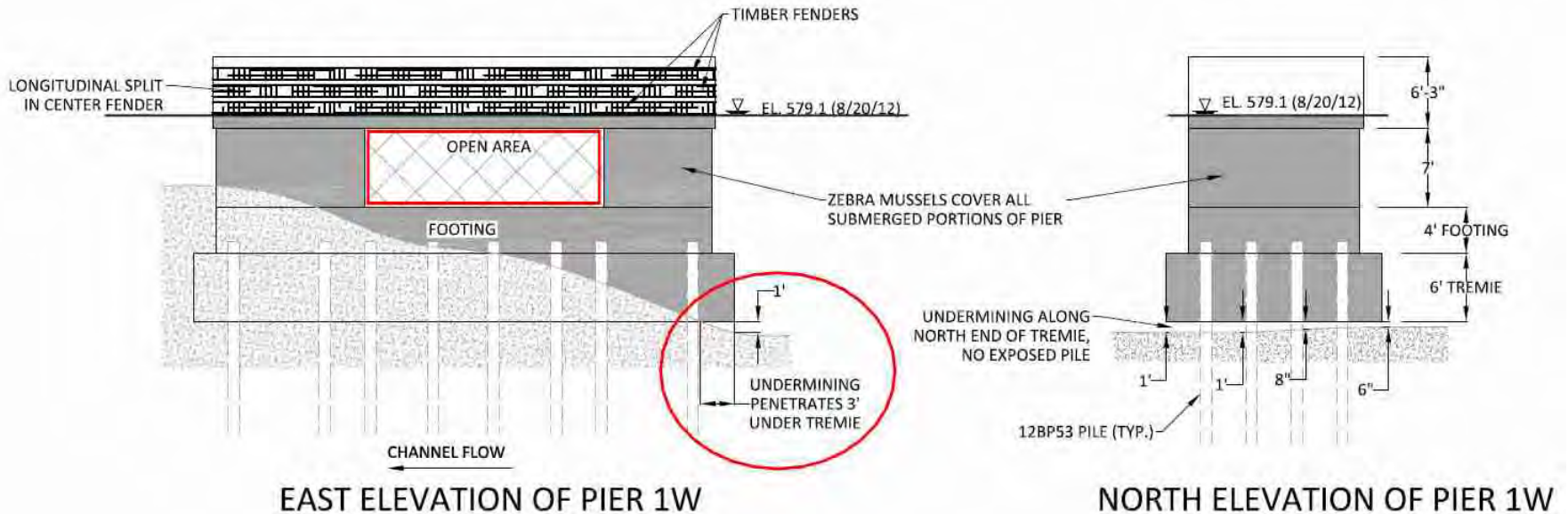
Underwater

- Lift Bridge – scour



Underwater

- Lift Bridge – scour and pier design



Underwater

- Lift Bridge – pier design



Underwater

- Other Structures – dolphins



Managing

- Plans
- Previous reports
- When to dive
- Dive team
- Underwater

Assigning Bridges

Underwater Bridge Inspection



Assigning Bridges

- Previously inspected
- Newly constructed
- Special access

Previously Inspected

- Frequency
 - 60 months
 - Same month as previous
 - Required for FHWA metrics
- Borderline structures
 - Dive again
 - Respective costs
 - Water depth
 - Quantity of substructure units

Newly Constructed

- Construction contract
 - Initial underwater inspection
- Timing
 - Prior to bridge opening
 - Before contract leaves site
- Report
 - Punch list

Newly Constructed

- Punch list
 - Recommendations from initial dive
 - Contractor addresses list before released
- Post-punch list
 - Another dive
 - Specific to punch list
 - Respective cost

Newly Constructed

- 03023-B04, M-89 over Kalamazoo River



Newly Constructed

- 03023-B04, M-89 over Kalamazoo River



Special Access

- GCRC 2703, Silver Road over Lobdell Lake

- Upstream profile



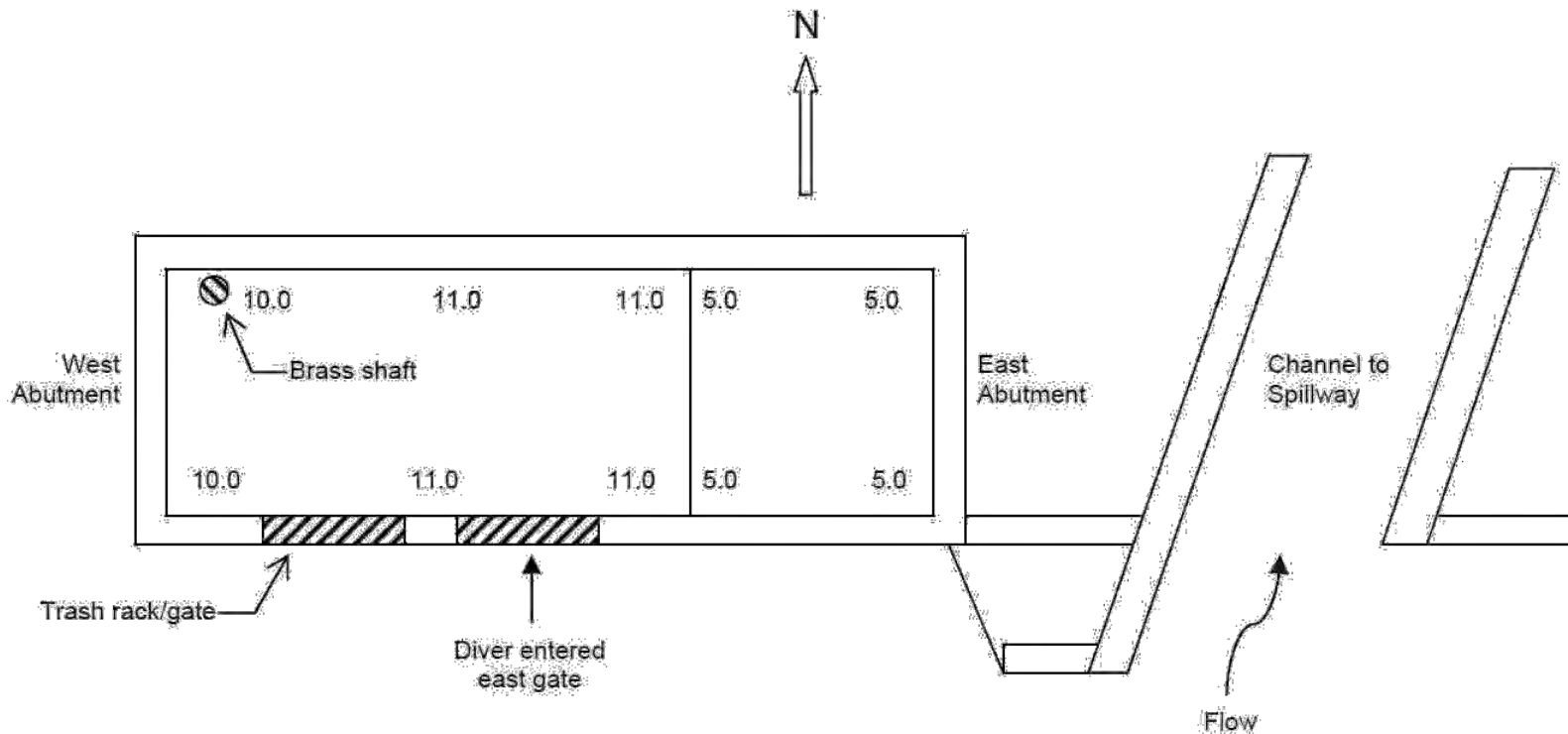
Special Access

- GCRC 2703, Silver Road over Lobdell Lake



Special Access

- GCRC 2703, Silver Road over Lobdell Lake



SITE PLAN



Special Access

- GCRC 2703, Silver Road over Lobdell Lake
 - Access
 - Upstream gates opened
 - Surface-supplied air
 - Inspection types
 - Underwater
 - Routine
 - Dive every 24 months

Assigning Bridges

- Previously inspected
- Newly constructed
- Special access

Report Review

Underwater Bridge Inspection



Report Review

- General Appearance
- Complete Statements
- History
- Exercise

General Appearance

- Bound appropriately
- Minimal contents
 - Table of contents
 - Photo Log
 - MBIS Report
 - Sounding / Notes Plan
 - Streambed Profiles

General Appearance

- Other Information
 - Hydrographic Survey
 - Current depths
 - Change in depth
 - Underwater video
 - Timeline
 - Other?

Time	Description
04:11 – 05:48	North side spillway
04:35 – 05:35	Typical concrete condition below water
05:36 – 05:48	Log located on channel bottom

Complete Statements

- Correct grammar
- Consistency
 - Abbreviations
 - Dimensions
- Make sense
 - 39102-B01, M-89 Over Gull Creek
 - Recommendation: recheck softness of concrete piles in next underwater inspection

Complete Statements

- 39102-B01, M-89 Over Gull Creek



Complete Statements

- 39102-B01, M-89 Over Gull Creek



History

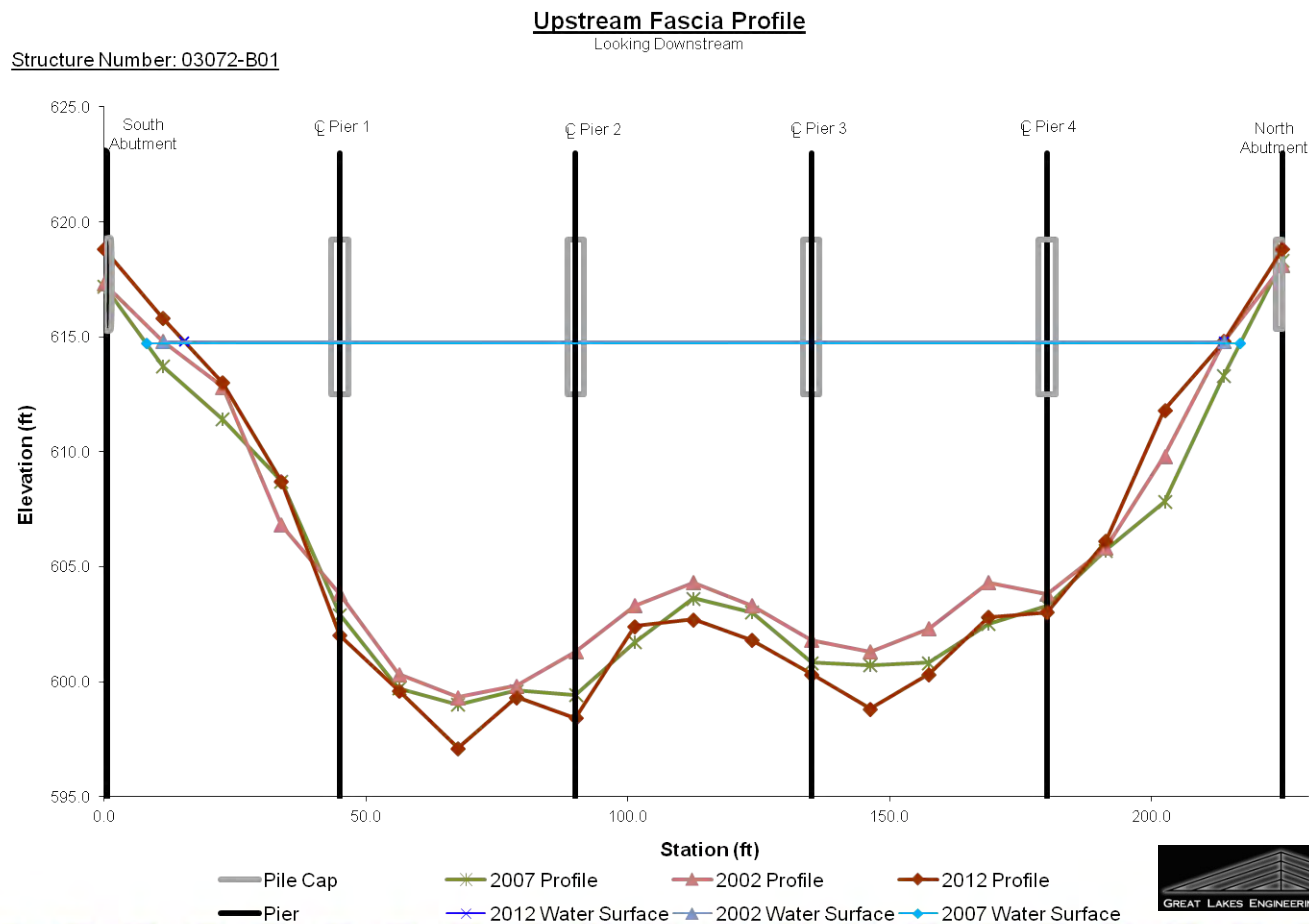
- Deficiencies
 - Previous vs. current
 - Identify new deficiencies
- Recommendations
 - Action taken on previous?
 - New recommendations with reasoning

History

- Streambed profiles
 - Longest history possible
 - Simple (spreadsheet)
 - Detailed (CADD)

History

- Streambed profiles



Exercise

- Fill in the blank
- Handouts
 - Groups A and B
- Mingle
- Complete reports
 - Fill in the blanks

Report Review

- General Appearance
- Complete Statements
- History
- Exercise

Assist / Witness

Underwater Bridge Inspection



Assist / Witness

- Safety
- Field Schedule
- Optimize opportunity

Safety

- Coordination
 - Other staff
 - Dive team
 - Location
 - Time
- Identify training
 - First Aid / CPR
 - Diver
 - Boat operator

Safety

- Make yourself comfortable
 - Afraid of water
= no boat
 - Appropriate clothing



Safety

- Not in harm's way
 - Where to sit in the boat
 - Proximity to equipment

Safety

- Not in harm's way



Safety

- Personal Protective Equipment
 - Life vest
 - Hard hat
 - Safety glasses
 - Steel-toed footwear

Field Schedule

- Window of time
 - Sun up to sun down
 - Part of a day
- Number of bridges
 - 1 bridge for many days
 - Multiple bridges in 1 day

Optimize Opportunity

- Underwater photos/video
 - Obtain
 - Review
- Assist with field report
 - Fill in notes
 - Take measurements
- Ask questions!

