MDOT Update

Bridge Week 2021
March 16, 2021
Matthew J. Chynoweth, P.E. MDOT Chief Bridge Engineer
• OAG Bridge Inspection Program Audit Results
• Local Agency Bridge Bundling Pilot Project
• 3D Bridge Design Pilot Project
• Ancillary Structures Asset Management Effort
• Gordie Howe International Bridge Update
• FIU Bridge Collapse – NTSB recommendations - MDOT actions
Metrics for the Oversight of the National Bridge Inspection Program

Bridge Inspection Program and Michigan Bridge Management and Inspection System (MiBRIDGE)
Michigan Department of Transportation
January 2021
FHWA 23 Metrics Review
Currently Compliant or Conditionally Compliant for all 23 Metrics
• 2 Active Improvement Plans
• 1 Active Plan of Corrective Action
• National Tunnel Inspection Standards a new risk category

OAG Audit of Inspection Program and MiBRIDGE
3 Audit Objectives
• Administration of Inspection QAQC Program – **EFFECTIVE!!**
• Compliance with Federal and State Requirements – Complied
• MiBRIDGE Administration – Moderately Effective
Local Bridges that need some help!!!!!!
Bridges of similar condition statewide in every County
Bridge Bundling Team

MDOT

HNTB
Project Development

AECOM
Preliminary Engineering

RS&H Engineering
Construction Engineering & Inspection

Local Agency Champions

Project Ombudsman

Decision Path

Advisory Path
Pilot Bridge Bundling Package

- RFQ: June 2020
- Shortlisting Proposers: August 2020
- RFP: November 2020
- One-on-one Meetings: December 2020 to January 2021
- Tech Proposals & Low Bid: February 2021
- DB Contract Award: March 2021

Summer 2020 to Early 2021

- Contract Award: March 2021
- Meetings with Local Agencies
- Final Design Work
- Construction
- Final Acceptance

Spring 2021 to Fall 2023

Open to Traffic
Pilot Bridge Bundling Procurement

• Official procurement start June 2020 with completion February 2021------8 months!

• 5 shortlisted teams; 2 teams dropped out; 3 teams submitted

• 2 one-on-one meetings held

• 183 questions asked, answered and posted

• 4 addenda issued

• 6 ATCs with the low bid accepted
Pilot Bridge Bundling

• Low bids received on February 19, 2021

• Bids were: $27.6, $25.2, with the low bid of $24.3 and within 2% of engineer’s estimate

• Low bid team of CA Hull/Anlaan with Alfred Benesch

• Expected expedited award on March 5, 2021

• PMC CEI consultant team of RS&H Engineers selected in late January with contract award expected March/April for construction administration
Future Bridge Bundling Governor’s $300 Million Proposal

Focus on closed bridges (59) initially (red)

Procurement for Design-Build packages expected to start this Spring with construction to start 2022

Next focus on serious/critical, load posted or high ADT bridges (60), dependent on funding approval (blue)

Procurement for Design-Build packages expected to start upon approvals
3D Bridge Model Delivery Pilot

- I-696 EB & WB over Rouge River, Oak Park
- Structure Replacement
- I-696 Reconstruct - I-275 to Lahser
- November 2021 Letting
Essential Details

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Items not marked in this sheet can be included data in this modal.

**Table**: Quizzes

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<td>3</td>
<td>Quiz 3</td>
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**Diagram**: Project Overview

- Elements A
- Elements B
- Elements C

**Notes**: Additional details about the project.
Information Model

Attribution
3D Bridge Model Delivery Pilot

- 2D Plans
- Tabular Design Data
- Proposal Items
- Model Views
- 3D BIM Model
Ancillary Structures Program
<table>
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<tr>
<th>Structure</th>
<th>Qty</th>
<th>Sup</th>
<th>North</th>
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<td>9</td>
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<td>Frangible Lights</td>
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<td>0</td>
<td>99</td>
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<td>10</td>
<td>6</td>
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<td>2</td>
<td>4</td>
<td>31</td>
<td>18</td>
<td>20</td>
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<td>901</td>
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<td>Culverts under 10'</td>
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<td>5,988</td>
<td>5,683</td>
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<td>45</td>
<td>39</td>
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Success workshops identified program goals –
Greater Levels of Integration

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<tr>
<th>Definition</th>
<th>Baseline</th>
<th>Bold</th>
<th>Bolder</th>
<th>Boldest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ancillary Structures (AS) are siloed in separate records with limited, separate processes and procedures. Management of AS is reactionary to address issues as they are discovered.</td>
<td>Uniform database structure and asset attributes, inspection processes and rating schemes established. RFA process developed and facilitated through existing communication tools.</td>
<td>Integration of AS lifecycle and condition data to inform transportation asset corridor planning. Capital programming (4p, 3p, etc.), construction and O&amp;M.</td>
<td>Comprehensive AS Asset Management Program aligned with AASHTOWare BrM Pavement and other MDOT transportation programs.</td>
<td></td>
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<table>
<thead>
<tr>
<th>Benefits</th>
<th>Baseline</th>
<th>Bold</th>
<th>Bolder</th>
<th>Boldest</th>
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<tbody>
<tr>
<td>Number of assets and locations are available. Some staff can make capital investment decisions using asset data. Development and Delivery staff include AS work in projects when necessary.</td>
<td>Single source of truth for all AS types, easier access to data and consistent rating schemes to measure and compare condition of assets. Improved risk management.</td>
<td>Integrated processes across business systems so asset conditions can inform maintenance and capital needs supporting lifecycle replacement. Further reduced risk.</td>
<td>Proactive asset management of all AS types resulting in safe conditions, managed risk, cost savings, and program funding support.</td>
<td></td>
</tr>
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<table>
<thead>
<tr>
<th>Impact on Resources</th>
<th>Baseline</th>
<th>Bold</th>
<th>Bolder</th>
<th>Boldest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Majority of maintenance staff's time is spent reacting to inspect/assess individual AS issues; difficult to assess individual and overall condition of AS.</td>
<td>Reduced workloads from access and utilization of complete data sets as well as established program roles through the PMC and Region Champions.</td>
<td>Efficient staff effort to incorporate AS asset replacement or repair considerations as part of all transportation related projects.</td>
<td>Programmatic approach created to provide consistent, predictable plan for Lifecycle resource management of AS.</td>
<td></td>
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<table>
<thead>
<tr>
<th>System Performance</th>
<th>Baseline</th>
<th>Bold</th>
<th>Bolder</th>
<th>Boldest</th>
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</thead>
<tbody>
<tr>
<td>System performance metrics established for maintenance, but no performance measures. The system is largely managed on a reactive basis.</td>
<td>Establish performance metrics that relate to age and condition of assets.</td>
<td>Refine performance metrics and measures that incorporate maintenance and repair history with the age and asset conditions.</td>
<td>Dynamic performance metrics/measures that are integrated with funding support for maintenance and capital programs.</td>
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Success workshops identified program goals –
Greater Levels of Continuous Improvement

<table>
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<th></th>
<th><strong>BASELINE</strong></th>
<th><strong>BOLD</strong></th>
<th><strong>BOLDER</strong></th>
<th><strong>BOLDEST</strong></th>
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<tbody>
<tr>
<td><strong>Definition</strong></td>
<td>Maintenance actions (repair, replacement) are reactionary</td>
<td>Assets within upcoming project limits are flagged at project programming for PM to coordinate</td>
<td>System forecasts needs based on asset age, condition, excluding confirmed project replacements</td>
<td>National model for other DOT’s as a “best practice” for system definition, management, and adoption</td>
</tr>
<tr>
<td><strong>Benefits</strong></td>
<td>Varying results from data-driven maintenance planning activities and costs</td>
<td>Consistent definition across Regions for condition, required action, and exception policies</td>
<td>Clear understanding and consistent support by MDOT leadership with increased funds to maintenance</td>
<td>Public access to asset condition information with opportunity to influence funding allocation</td>
</tr>
<tr>
<td><strong>Impact on Resources</strong></td>
<td>Additional time, cost, resources needed to resolve missing or incorrect asset data</td>
<td>Enhancement or supplement to current functions to improve data collection and accuracy</td>
<td>Dedicated resource by Region, TSG to coordinate, with dedicated MDOT enterprise resource</td>
<td>Transfer coordination, maintenance risk to third-party vendor (incentive?)</td>
</tr>
<tr>
<td><strong>System Performance</strong></td>
<td>Inconsistent quality of asset location and condition ratings information.</td>
<td>Completion of all accurate asset type location and condition ratings.</td>
<td>Single platform with full access across multiple MDOT functions</td>
<td>“Smart” assets notify MDOT if they are near end of service life or damaged</td>
</tr>
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</table>
Near Term Goals

• **By Spring 2021**, Develop RFA process for Priority Ancillary Structures
• By end of 2021, Ensure Ancillary Structure Designs meet updated AASHTO LRFD standards
• **By Spring 2021**, Develop inventory collection and condition ratings for Priority Ancillary Structures
• **By Spring 2021**, Commence field inventory and condition inspection of Priority Ancillary Structures
• **By Spring 2021**, Develop initial performance metrics for Priority Ancillary Structures
Project Components
Canadian Bridge Site

BEFORE: 2016

CURRENT: 2020
U.S. Bridge Site
U.S. Bridge Site
U.S. Bridge Site
Much has been done, but we have a long way to go...

U.S. Bridge Site
FIU Bridge Collapse NTSB Actions Implemented by MDOT

**NTSB Recommendations for Bridge Community:**

- Ensure qualified independent design reviews for complex bridges
- Create alignment in understanding of bridge owner responsibility and authority to close bridge, or traffic below when structural issues are discovered
- Ensure bridge community understands all standards and provide additional oversight on complex bridges
- Add discussions and emphasis on redundancy to all structures manuals and design guidelines
OFFICE MEMORANDUM

MDOT Actions

DATE: July 1, 2020

TO: Region Engineers
Region Construction
Region Bridge Engineers

FROM: Matthew J. Chynoweth, P.E.
Bureau of Bridges and Structures
Chief Bridge Engineer
Rebecca Curtis, P.E.
Bureau of Bridges and Structures
Deputy Chief Bridge Engineer

SUBJECT: Authority for Bridge Closures

This memo serves to establish the technical basis for the closure of bridges to traffic or the closure of roadways below bridges to traffic. In general, the provisions below cover all bridges in Michigan, whether in-service, closed, or under construction.

Information regarding responsibilities and procedures for bridge closures during the National Bridge Inspection Standards (NBIS) inspection process, occur determinations, or other operational aspects of in-service bridges can be found in the Michigan Department of Transportation (MDOT) Structure Inspection Manual (SISM), Chapter 10.

Bridge construction activities are often complex, requiring specific erection procedures and analyses for complex bridges, and careful thought on element erection, material and equipment placement, and sequencing of work activities.

As part of the National Transportation Safety Board (NTSB) investigation and final report of the Florida International University Pedestrian Bridge Collapse (NTSB HRT/02); the NTSB made several recommendations to bridge owner agencies, one of which as outlined below:

- TO THE FLORIDA DEPARTMENT OF TRANSPORTATION: Revise local agency program agreements to specify that when structural cracks are initially detected during bridge construction, the engineer of record, construction engineering inspector, design-build firm, or local agency that owns or is responsible for the bridge construction must immediately close the bridge to construction personnel and close the road underneath; fully support the entire bridge weight using construction techniques that do not require placing workers on or directly under the bridge during installation; and restrict all pedestrian, vehicular, and construction traffic on the bridge until the complete support is in place and inspected.
MDOT Actions

MICHIGAN DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISION FOR COMPLEX STEEL ERECTION, SHORING AND FALSEWORK

a. Description. This work consists of furnishing the design, erection plans for the erection of straight or curved steel girders and other bridge elements in various structural configurations, including but not limited to temporary foundations, tie-downs, counterweights, bracing, falsework or shoring required to ensure global static equilibrium, and allowable element stresses at all phases of erection. Provide all work and materials for installing, maintaining, modifying, or adjusting, and removing temporary foundations, tie-downs, counterweights, bracing, falsework or shoring in accordance with section 707 of the Standard Specifications for Construction, the AASHTO LRFD Bridge Design Specifications (hereafter referred to as AASHTO Design), and the AASHTO Guide Design Specifications for Bridge Temporary Works, except as modified herein.

Provide all elements in accordance with subsections 194.02 and 706.03 of the Standard Specifications for Construction and as specified herein.

b. Definitions.

Falsework. Any temporary construction work used to support the permanent structure until it becomes self-supporting. Falsework may include, steel or timber beams, girders, columns, piles and foundations, and any proprietary equipment including modular shoring frames, post shores, and adjustable horizontal shoring. Shoring is a component of falsework such as horizontal, vertical, or inclined support members.

Temporary Support. A component of falsework, typically a steel column and timber/steel plate footing arrangement similar to the “Detail of Temporary Supports from Below” as provided in the MDOT Bridge Design Manual.

Primary Members. Structural elements that are designed to carry live load and act as primary load paths. Examples include beams, girders, columns, truss chords, rigid frames, bearing stiffeners, and falsework which carry live load. Additionally, lateral connections such as gusset plates and curved-girder cross-frames are considered primary members. Primary member is considered synonymous with the term “main member”.

Secondary Members. Structural elements which do not carry primary stress or act as a primary load path.

c. Submittals.

1. Erection Plan. Submit erection plans and design calculations, foundation support plans and design calculations to the Engineer for review and approval a minimum of 21 calendar days prior to beginning work, including shop drawings for all temporary shoring, retractor must take into account such items as:

- temporary foundation effects on global stability of adjacent features,
- settlement for temporary foundations,
- temporary working load on primary members,
- soil borings to support design of temporary foundations,
- primary members, and
- post construction and roll.

m connections, piles or slabs.

The completed work, as described, will be measured as a contract price using the following pay item:

Pay Unit

in (Structure Identification) ........................................ Lump Sum

structure (Identification) includes designing and detailing the erection and erecting the girders or other elements.

structure (Identification) also includes all costs associated with temporary crowns prior to obtaining Engineer's approval are included in the payment. No additional compensation will be made for delays caused by modifications or rework in the submitted documents prior to obtaining approval by the Engineer.
MDOT Update

Questions?