



**ENGINEERING OPERATIONS COMMITTEE
MEETING MINUTES
DECEMBER 6, 2018, 9:00 A.M. – 11:00 A.M.
MULTI-MODAL CONFERENCE ROOMS**

Present: Tony Kratofil
Carol Aldrich
Kim Avery
Mark Bott
Matt Chynoweth

Mark Geib
Jason Gutting
Dee Parker
Kristin Schuster
Brandy Solak

Greg Losch
Brad Wieferich
Ted Burch

Absent: Gorette Yung

Hal Zweng

Guests: Michael Eacker
Adnan Iftikhar

Justin Schenkel
Carlos Torres

Brad Wagner

OLD BUSINESS

1. Approval of the November 1, 2018, Meeting Minutes

ACTION: Approved

NEW BUSINESS

1. Michigan Department of Transportation (MDOT) New Materials and Products – Jason Gutting

Issue Statement – The MDOT receives numerous submittals of new materials and products. This process is meant to streamline the procedure and provide a review of submittals by the appropriate subject matter experts. Previous management suggestions are part of this draft procedure.

Background/History - In 2012, a new materials process and steering team were created, but not implemented. The submitted procedure streamlines submittals into specific focus areas that will review and provide recommendations on new material submittals.

Construction Field Services (CFS) has begun to share a new materials status report at each Engineering Operations Committee (EOC) meeting. This listing will provide the status of each new material submittal in a two-year rolling report.

Recommendation - Review, provide feedback, and eventual approval of the submitted new product evaluation procedure Guidance Document. Review and discussion of the new

materials status report and formatting. This report will be provided to EOC members one week prior to all EOC meetings.

ACTION: CFS provided the New Materials Evaluation Status report to all committee members prior to the meeting. CFS is working with DTMB to revise the report to include which new materials subcommittee is reviewing each submittal. The status report will continue to be submitted to all committee members prior to each meeting.

2. Bridge Railing Action Plan – Carlos Torres

Subject/Issue – Bridge railing action plan for selection of bridge railings on projects let after 12/31/19.

Major Issue(s)/Potential Complication(s) – The Manual for Assessing Safety Hardware (MASH)-compliant permanent bridge railings must be used for new installations on the National Highway System (NHS) on construction projects let after 12/31/19. To date, the Federal Highway Association (FHWA) and the American Association of State Highway and Transportation Officials (AASHTO) have not granted an extension to the 12/31/19 sunset date for bridge railings.

The potential issues with state transportation agencies trying to meet the 12/31/19 sunset date for bridge railings are:

- A. Limited number of non-proprietary, MASH-compliant bridge railings (with FHWA Eligibility Letters) that are suitable replacements for MDOT's current bridge railings
- B. Need to rely on findings and recommendations in NCHRP 20-07, Task 395 Report and other supporting documentation
- C. Need to adopt MASH, TL-3 bridge railings if an equivalent MASH, TL-4 option is unavailable
- D. Need to continue using NCHRP 350-compliant bridge railings if suitable and equivalent MASH-compliant bridge railings are unavailable
- E. MASH design loads for bridge railings have not been formally adopted by AASHTO
- F. Current AASHTO guidelines only require 42" tall (minimum) bridge railings along shared pedestrian-bicycle facilities, but MDOT prefers 54" tall bridge railings along shared pedestrian-bicycle facilities
- G. No known MASH-compliant bridge railings with fencing

Refer to the document titled *MDOT Draft Action Plan for Bridge Railings on Projects Let after December 31, 2019*, dated November 20, 2018, for more information and detailed explanations on the issues associated with bridge railings.

Background – MASH was published in 2009 as an updated crash testing standard to supersede the National Cooperative Highway Research Program Report 350 (NCHRP 350). In addition, MASH crash testing was required for new or revised roadside safety devices tested after January 1, 2011. In 2016, AASHTO adopted an updated version of MASH,

called MASH 2016, and MASH 2016 crash testing will be required for new or revised roadside safety devices tested after December 31, 2016. To avoid any confusion, the original version of MASH, published in 2009, will be known as MASH 2009. The biggest change between MASH 2009 and MASH 2016 involves the addition of several test matrices for cable barrier systems. As a result, most roadside safety devices, with the exception of cable barrier systems, that successfully passed MASH 2009 crash testing will be grandfathered into MASH 2016 without further testing.

The current FHWA-AASHTO joint implementation agreement requires MASH 2016-compliant devices to be used for new installations on contracts involving NHS roadways with a letting date after the dates below:

- December 31, 2017: Guardrail systems and cast-in-place concrete barriers
- June 30, 2018: Tangent, single-sided guardrail terminals
- December 31, 2018: Crash cushions (impact attenuators)
- December 31, 2019: Cable barriers and cable terminals, double-sided guardrail terminals, flared guardrail terminals, bridge railings, transitions, temporary work zone devices, all other longitudinal barriers (including portable barriers installed permanently), all other terminals, sign supports, and all other breakaway hardware

Recommendation(s) – An ad hoc group consisting of members of MDOT’s Barrier Advisory Committee (BAC) and MDOT’s Bridge Committee recommends approving the action plan described in the document titled MDOT Draft Action Plan for Bridge Railings on Projects Let after December 31, 2019 and dated November 20, 2018.

A summary of the recommendations is outlined below. In addition, a bridge railing action plan matrix was developed (see Table 1 from the document titled *MDOT Draft Action Plan for Bridge Railings on Projects Let After December 31, 2019*) identifying the various bridge railing types and recommendations for each railing type. Refer to the document titled MDOT Draft Action Plan for Bridge Railings on Projects Let after December 31, 2019 for more information.

If the EOC approves the recommended action plan, it is recommended that work commence on revising existing standard plans, developing new standard plans, and writing new special provisions as needed to implement the proposed action plan. New and revised standard plans and related information will be shared with MITA for review and commentary. Lastly, prior to implementation, this information will be shared with EOC at a future meeting for review and approval.

Summary of Bridge Railing Recommendations

A. 42-inch tall, single-slope bridge railing (replacement for MDOT Type 4 bridge railing: Standard Plan B-17-Series)

- Modified version of New Mexico DOT’s 42” tall single-slope bridge railing.
- MASH, TL-4 based on information contained in HCHRP 20-07, Task 395 Report, titled *MASH Equivalency of NCHRP Report 350 Approved Bridge Railings and Dated November 2017*.

- B. 36-inch tall, single-slope bridge railing (replacement for MDOT Type 5 bridge railing: Standard Plan B-20-Series)
- Modified version of Texas DOT's 36" tall SSTR single-slope bridge railing.
 - MASH, TL-4 based on information in TTI Report Number 9-1002-5, titled *Determination of Minimum Height and Lateral Design Load for MASH test Level 4 Bridge Rails and dated October 2011*.
- C. MDOT Aesthetic Parapet Tube Bridge Railing (Standard Plan B-25-Series)
- Retain current aesthetic parapet tube bridge railing design.
 - MDOT would need to self-certify this design as MASH, TL-4 compliant.
- D. MDOT Two-Tube Bridge Railing (Standard Plan B-21-Series)
- Retain current two-tube bridge railing design.
 - MASH, TL-3 based on information contained in NCHRP 20-07, 395 Report, titled *MASH Equivalency of NCHRP Report 350 Approved Bridge Railings and dated November 2017*.
 - Develop guidelines by which MDOT Region Offices would approve the use of the current two-tube railing.
 - If a MASH, TL-4 compliant, two-tube bridge railing becomes available in the future, MDOT should review and consider adopting a TL-4 railing in lieu of the current two-tube railing.
- E. MDOT Four-Tube Bicycle/Pedestrian Bridge Railing (Standard Plan B-26-Series)
- Retain the current four-tube bridge railing designs (Standard Plan B-26-Series) until suitable MASH-compliant alternatives become available.
- F. MDOT Three-Tube with Pickets Bridge Railing (Standard Plan B-27-Series)
- Retain the current three-tube with pickets bridge railing (Standard Plan B-27-Series) until it is determined that the Massachusetts S3-TL4 bridge railing is MASH, TL-4 compliant, or suitable MASH-compliant alternatives become available.
- G. MDOT Thrie-Beam Retrofits (Standard Plans B-22-Series and B-23-Series)
- Retain the current thrie-beam retrofit designs (Standard Plans B-22-Series and B-23-Series) until suitable MASH-compliant alternatives become available.
 - Use would be limited to locations where a concrete block retrofit would be undesirable.
- H. Concrete Block Retrofit (New MDOT Standard Plan)
- Concrete block retrofit is NCHRP 350, TL-4 compliant.
 - Adopt a modified version of the concrete block retrofit design for use at locations where a bridge railing retrofit is required, and the concrete block retrofit is deemed acceptable.
 - MASH, TL-3 based on information contained in NCHRP 20-07, Task 395 Report, titled *MASH equivalency of NCHRP Report 350 Approved Bridge Railings and dated November 2017*.
 - Global equivalency matrix (Table 3.11 from NCHRP 20-07, Task 395 Report) indicates that a solid concrete parapet railing that is at least 24" tall and is NCHRP 350, TL-4 compliant may be considered acceptable under MASH TL-3.

I. Fencing on Bridge Railings (Standard Plans B-32-Series through B-41-Series)

- Use current materials and methods for attaching fencing to bridge railings.
- Revise existing standard plans and develop new standard plans as needed.
- This would apply to new bridge railings that are recommended as part of this action plan (with the exception of the concrete block retrofit).

It is also recommended that the action plan remain subject to change at any time and for any Reason, MDOT's EOC will review and approve changes to the action plan. Changes may be due to events, including but not limited to industry-wide material shortages, sunset date extensions/revisions by FHWA and AASHTO, changes in eligibility for federal aid reimbursement for certain bridge railings, new information/research related to bridge railings, etc.

ACTION: Tabled until next EOC meeting.

3. Use of Mechanistic-Empirical Design Method – Mike Eacker

Subject/Issue – Use of the Mechanistic-Empirical design method for pavement thickness design

Issue Statement – In March 2015, MDOT began using the mechanistic-empirical pavement design software, Pavement ME Design version 2.0 (ME), to design the required thickness for reconstruct projects going through a life-cycle cost analysis. In late 2015, it was discovered that version 2.0 had errors in the concrete design module that version 2.2 corrected. However, concrete thicknesses went down significantly with version 2.2. It was decided at the March 2016 meeting to suspend use of the software pending further investigation.

Major Issue(s) – Which pavement design method should be used for thickness design of reconstruct projects going through a life-cycle cost analysis.

Background – A research project was started to investigate differences between versions 2.0, 2.2, and 2.3, and recalibrate the concrete models within the ME software. Michigan State University (MSU), who had conducted the original calibration of version 2.0, was the selected vendor. MSU found that the concrete design models had changed from 2.0 to 2.2, but there were no changes from 2.2 to 2.3. The Hot Mixed Asphalt (HMA) design models were the same across all three versions. This resulted in the need to recalibrate the concrete models, but the original HMA calibration is still valid.

After new concrete calibration coefficients were delivered, the Pavement Management Section, analyzed the results by re-running previous ME designs to judge the impact to actual project designs. 26 designs from 11 projects that had previously been designed with ME, were re-run with different versions of the software and calibration coefficients. The results from the following designs were compared:

- AASHTO 93 (current design method and the initial design used in ME)

- ME version 2.0 using the original 2014 calibration coefficients
- ME version 2.3 using the original 2014 calibration coefficients
- ME version 2.3 using the new 2018 calibration coefficients
- ME version 2.3 using the new 2018 calibration coefficients with new estimated curl values
- ME version 2.3 using the nationally calibrated global coefficients

A summary document of the research project results and our analysis of the listed designs, including charts of the design results was provided. After reviewing the results, the Pavement Management Section staff felt that the using the global coefficients provided the most reasonable results. This recommendation was presented to the Region Soils Engineers, and representatives of the Asphalt Pavement Association of Michigan (APAM) and the Michigan Concrete Association (MCA). At that meeting, the Region, APAM, and MCA representatives agreed that our recommendation was the best choice to begin using ME again.

Recommendation(s) – Begin using version 2.3 of the ME software, Pavement ME Design, for design of reconstruct projects that are going through a life-cycle cost analysis. The global calibration coefficients that come with version 2.3 of the software will be used for the concrete designs. The original Michigan calibration coefficients from 2014 will be used for the HMA designs.

ACTION: Approved

4. Roadway Weather Information Station Project – Greg Losch/Robert Marz/Jenean Robbins

Subject/Issue/Issue Statement - Roadway Weather Information Station (RWIS) Project and Installation of multiple Environmental Sensor Stations (ESS) along the freeways in Bay and Metro Regions.

Major Issue(s) – Current funding is based on the FY 2020 target for the Intelligent Transportation Systems (ITS) template for RWIS in the Bay Region, there is an opportunity to advance and construct with Metro Region RWIS project.

Background/History – Bay and Metro Regions contacted the Innovative Contracting Unit (ICU) requesting assistance in determining if design build was the best delivery method to allow for the utilization of ITS funds recently made available. All involved (ICU, Bay, Metro, ITS Program Office) agreed that Design Build was the best delivery option, and considering the similar scopes of work, shared regional boundaries, and timeframes associated with funding, it also made sense to combine into a single contract.

Similar RWIS/ESS projects have been delivered via design build in the past. The ICU has copies of the books, Request for Proposal, examples and lessons learned from those contracts.

Recommendation(s) – The Innovative Contracting Committee recommends approval for bundling Bay and Metro’s projects into one Design Build project to maximize efficiencies.

ACTION: Approved

5. Pavement Selection Manual – Jason Gutting/Kim Avery (Walk-on)

Subject/Issue/Issue Statement – The Bureau of Field Services (BFS) has reviewed Appendix C of the Pavement Selection Manual. The entire appendix should be reviewed and incorporated into the Work Zone Safety and Mobility (WZSM) manual.

Major Issue(s) – There are two primary issues. The first issue is the Pavement Selection Manual provides maintenance of traffic guidance in Appendix C. All maintaining traffic guidance should be placed in the WZSM manual. This provides one unified location for all guidance to MDOT staff. This will ensure enhanced consistency and alignment as only one location will need to be reviewed and updated.

The second issue is the specific lateral safety buffer as identified in the Pavement Selection Manual on page C-1 of Appendix C. The BFS is proposing the elimination of the lateral safety buffer as this buffer is not typically placed on any MDOT projects. Existing geometrics, pavement width, topography, budget considerations, right-of-way, and project scheduling inhibit the use of this later safety buffer. BFS staff analyzed all work zone crash reports for 2017. In 2017 the search options were enhanced as was the UD-10 report to allow an analysis of specific work zone issues. There were 79 work zone intrusions and only 2 crashes out of more than 2,000 crashes that could possibly be attributed to a lateral safety buffer area. One crash was on a concrete pavement project and one crash was on a hot mixed asphalt pavement project.

Background/History – Maintenance of traffic details and the lateral safety buffer was developed numerous years ago to address a no work area in our work zones. Regions base their project specific maintaining traffic plans on existing conditions, dimensions, and traffic volumes and in most cases the lateral safety buffer is not available to implement nor is it needed.

Recommendation(s) – There are two recommendations:

1. The first recommendation is to remove all maintaining traffic guidance from the Pavement Selection Manual and place the guidance in the Work Zone Safety & Mobility Manual (WZSM). The guidance will be reviewed for current applicability while being incorporated. Language will be placed in the Pavement Selection Manual to follow maintaining traffic guidance in the WZSM. The current manual provides an exception request process for lane widths with an associated form. Incorporation into the WZSM will provide a more consistent approach to maintaining traffic on MDOT projects.

2. The second recommendation is the elimination of the lateral safety buffer. This buffer is not currently designed into projects nor is it typically used in the field. An analysis of all work zone crash data from 2017 noted that the lateral safety buffer was not a factor in any work zone crashes.

Status – New submittal.

ACTION: Approved first recommendation and continue analysis with Work Zone Committee on recommendation number 2.

Carol Aldrich, Secretary
Engineering Operations Committee

RA:lrb

cc: EOC Members	M. DeLong	D. DeGraaf (MCA)
Meeting Guests	D. Jones	J. Becsey (APAM)
P. Ajegba	C. Libiran	D. Needham (MAA)
L. Mester	R. Jorgenson (FHWA)	M. Ackerson-Ware (MRPA)
D. Wresinski	R. Brenke (ACEC Michigan)	
Region Engineers	G. Bukoski (MITA)	
Assoc. Region Engineers		
TSC Managers		