



**ENGINEERING OPERATIONS COMMITTEE
MEETING MINUTES
JANUARY 21, 2020, 8:00 A.M. – 10:00 A.M.
SLEEPING BEAR CONFERENCE ROOM**

Present:	Gregg Brunner Andre' Clover Rebecca Curtis Mark Dionise	Jason Gutting Tony Kratofil Ryan Mitchell Kristin Schuster	Brandy Solak Brad Wieferrich Gorette Yung (phone) Hal Zweng
Absent:	Carol Aldrich Mark Bott	Matt Chynoweth Mark Dionise	Mark Geib Will Thompson
Guests:	Curtis Bleech Chris Brookes	Kevin Kennedy Ben Krom	

OLD BUSINESS

1. Approval of the December 5, 2019, Meeting Minutes – Tony Kratofil

ACTION: Minutes are not approved at this time. Kristin is still recirculating revisions. She will take the revised Road Design Manual (RDM) to the Transportation Conference in March for further feedback/comments. Subsequently, the revised document will be resubmitted to the Engineering Operations Committee (EOC) for final review/approval of all revisions.

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

ACTION: Information only

NEW BUSINESS

1. Safety Topic: Dangers of Drowsy Driving - Andre' Clover (for Carol Aldrich)

ACTION: Information only

2. Increase Temporary Freeway Lane Lines from Four (4) Inches to Six (6) Inches – Jason Gutting/Chris Brookes

Project Information - Increase the width of freeway temporary lane lines from four (4) inches to six (6) inches, and decrease shift marking from eight (8) inches to six (6) inches and increase gore markings from eight (8) inches to 12 inches. This request includes skip lines.

Issue(s) – In support of Automated Driving Systems, the National Committee on Uniform Traffic Control Devices has proposed several changes to the Manual on Uniform Traffic Control Devices in the area of pavement markings to benefit both human and machine vision drivers. They consider line width, ramp extensions, cycle length, and ramp cross hatching. The EOC approved the request to move to six (6)-inch wide permanent pavement markings to better support Connected Autonomous Vehicles (CAVs). This request is for temporary pavement markings to migrate from four (4) inches to six (6) inches, based on the same rationale of supporting CAVs.

Based on the background information, the immediate change the department can make is to increase the width of freeway temporary lane lines to six (6) inches, and gore areas to 12 inches, as part of the Fiscal Year 2021 construction program. Nationally, this is a trend that Departments of Transportation are either evaluating or pursuing. Many MDOT temporary pavement markings are paid based on a four (4)-inch width; making an assumption that cost would increase 33% (reflective of the increase from four (4)-inch to six (6)-inch wide pavement markings) it is expected that this enhancement would cost MDOT an additional \$1.8 million a year. This estimate is based on program costs from MDOT Trunkline jobs from 2017-2019, and assumes an increase in price of 33% for the following pay items:

- Pavt Mrkg, Cover, Type R, Black
- Pavt Mrkg, Wt Ref, Type NR, Paint, 4 inch, Yellow/White, Temp
- Pavt Mrkg, Wt Ref, Type R, Tape, 4 inch, Yellow/White, Temp

Pavt Mrkg, Cover, Type R, Black are already paid for in a six (6)-inch width, but based on the necessity for complete coverage, a 33% increase in cost is reflected here as well. The above items would need new pay items created to reflect the transition to six (6)-inch pavement markings. Gores are currently eight (8) inches wide, paid as one eight (8)-inch marking; these sections would move to a 12-inch width. In 2019 projects, this would be paid as two six (6)-inch tape thicknesses, but a specification would be created for one 12-inch thick tape for lettings thereafter in order to match existing gore widths. Shift markings are currently eight (8) inches and would decrease to six (6) inches in width to be consistent with autonomous vehicles requirements, with no ill effects noted as indicated. Increases and decreases in cost will be seen in these gore and shift areas, though they are considered to be negligible. Additional increases may be seen based on inflation and availability of product.

Background – In 2013, a Federal Highway Association (FHWA)-directed research project was published that included a focus on the safety effects of six-inch wide edge lines. This study included safety analyses of crash, roadway, and vehicle data from Michigan, Illinois, and Kansas. For two-lane, two-way roadways, the study showed that six (6)-inch wide edge lines reduce fatal and injury crashes from 15 to 38 percent. As a result of this study, the FHWA Crash Modification Factor (CMF) Clearinghouse adopted CMFs for converting four (4)-inch wide pavement markings to six (6)-inch (CMF=0.635 for all crash types in rural areas). Subsequent studies in Missouri and North Carolina have confirmed the benefits of six (6)-inch wide pavement markings that were derived from Michigan, Illinois, and Kansas data.

It is projected that by 2020, lane departure warning (LDW) technologies will be standard on 40-80% of new car sales, and that number increases to 70-99% by 2025. Similarly, by 2020, lane keep assist (LKA) technologies will be standard on 10-24% of new car sales, and 30-73% by 2025. LDW and LKA are intended to keep vehicles on the road and in their lane. These devices address roadway departure crashes which are the largest category of crashes involving highway fatalities (approximately half of all highway fatalities). Roadway departure crashes as a result of distracted and/or impaired drivers are one of the most significant safety concerns that CAVs can positively impact.

Research has demonstrated that six (6)-inch wide pavement markings consistently improve machine vision detection under adverse visibility conditions; and when combined with results from pending studies, demonstrates that six (6)-inch wide pavement markings can improve machine vision detection on high-speed roadways where potentially conflicting signals may confuse machine vision systems from detecting pavement markings. This includes areas with remnants of previously removed markings, pavement scarring due to removal activities, blackout markings, crack seal, longitudinal seams in the pavement, varying road surfaces, cracking, rutting, horizontal curves, or areas where glare is common and impacts marking visibility.

Research has also shown that six (6)-inch wide pavement markings are good for human drivers too, making for an ideal infrastructure-based solution in the “mixed-fleet” era. In 2010, the Texas A&M Transportation Institute published a study evaluating the trade-off between increased pavement marking width versus increased retro-reflectivity levels. A closed course study using metrics including vehicle lateral placement, speed, and lane-keeping glances showed that with increased pavement width, the likelihood of edge line encroachment decreased by 60 percent and the percentage of non-lane keeping glances also decreased.

Research shows a difference from four (4)-inch to six (6)-inch was substantial from a visibility and safety standpoint but going from six (6)-inch up to eight (8)-inch did not provide the same benefits. Therefore, we are recommending that we change our shift markings from eight (8)-inch to six (6)-inch. This will help with uniformity in design and construction as it is one less item to be detailed and the contractor doesn't have to supply two types of temporary tape.

This change will be reflected in the Work Zone Safety and Mobility Manual (WZSMM), section 6.01.13.B. The eight (8)-inch line was something that MDOT did that was above and beyond the requirements and the change to a six (6)-inch line will still provide the increased visibility based on current research.

Recommendation(s) – Increase freeway temporary lane line widths from four (4)-inch to six (6)-inch to the FY 2021 Program. Decrease freeway shift markings from eight (8)-inch to six (6)-inch and revise section 6.01.13.B of the WZSMM.

ACTION: Approved.

3. Updated Hot Mix Asphalt (HMA) Production Manual – Curtis Bleech/Kevin Kennedy

Issue Statement – Request approval of the updated HMA Production Manual.

Major Issue(s) – The FHWA is requiring MDOT to include bulk specific gravity (Gsb) as part of the HMA mix design approval process.

Background/History – Prior to the 2017 construction season MDOT revised its HMA acceptance specification to include Gsb verification during the Initial Production Lot. This requirement has been contested on a project resulting in a rather large contractor claim. A Dispute Resolution Board (DRB) review was requested and as such, the DRB Panel sided with the contractor. MDOT rejected the DRB panel's decision and the claim is still pending at this point. Based on the lack of clear contract language in the existing specification, the HMA Technical committee in conjunction with the FHWA concluded that the requirement for Gsb verification should be included as part of the HMA mix design approval process.

Additionally, a revised HMA acceptance specification has been approved requiring Gse monitoring during HMA production with action and suspension limits based on quality assurance test results.

Recommendation(s) – Approval the revised HMA production manual requiring Gsb verification as part of the HMA mix design approval process.

ACTION: Approved

4. Update of Guidance Document 10169, Environmental Emergency Spill Response – Hal Zweng

Issue Statement – Update of Guidance Document 10169, Environmental Emergency Spill Response

Major Issue(s) – Document was last updated in 2012; updated in 2019 to reflect current organizational structure and current best practices.

Background/History – This document describes the procedure for MDOT first responders to follow when responding to an incident involving a spill or other contamination.

Recommendation(s) – Seeking approval from the EOC and the Director's signature.

ACTION: Approved.

5. Modify Permit Process for Under Clearance Buffer – Rebecca Curtis

Issue Statement – The Bureau of Bridges and Structures (BOBs) proposes to modify the permit process under clearance buffer to match the signed under clearance buffer.

Major Issue(s) – When the MDOT permitting system reviews a route submitted by a permit application, it does not apply a buffer. The permit is approved if the truck height is less than or equal to the measured under clearance. The permit document T-2 states:

Because of possible overhead obstructions on proposed routes, all applicants requesting permits in excess of 13 feet six (6) inches shall verify that the proposed route has been traveled to assure vertical clearance. However, asking the applicant to verify the proposed route has been travelled does not address the risk of transient conditions that other states indicate as reasons for applying a buffer to their permitting process.

Background/History - The legal height for vehicles is 13-ft, six (6) inches. The statutes of the State of Michigan authorize MDOT to issue special permits for the movement over state highways of vehicles or loads which exceed the size or weight limitations specified by law. single trip and extended permits are not issued for loads exceeding 15-feet in height.

MDOT policy provides a vertical under clearance sign that is two (2) inches lower than the measured clearance. This provides a buffer to account for several potential items that would cause the allowed clearance to deviate from the measured clearance, and thereby reduce the risk of over-height impacts. Under clearance signs are not required but are provided as a convenience to the trucking industry.

High Load Hits are an ongoing risk to our infrastructure, the truckers that strike the bridge, and the public that may be travelling under or over a bridge at the time of impact. While permits staff has stated that they are not aware of being notified of a high load hit on an issued permit, the majority of high load hits do not have a documented vehicle. Every High Load Hit at MDOT strains resources, both in terms of immediate response to the incident as well as short to long term repairs. MDOT and Attorney General staff time is spent attempting to recoup costs. Despite MDOT's position that the "liability" is assigned to the vehicle that struck the bridge, recovered costs are not always equal to the incurred expenses.

Survey of Other State Practices

At the 2019 American Association of Highway and Transportation Officials (AASHTO) Committee on Bridges and Structures annual meeting, states were informally surveyed on whether they had a buffer between measured and permitted under clearances, and some of the reasons behind having a buffer. The following states responded (Note: No state was aware of any other state that did not apply a buffer. Michigan appears to be the only state without a buffer):

State	Clearance Buffer
Wisconsin	3 in
Indiana	2 in
Ohio	2 in
Minnesota	6 in
Illinois	3 in
Pennsylvania	3 in
New Jersey	3 in
Mississippi	4 in
Alabama	3 in
Montana	4 in

The reasons for adding the buffer included:

- Live load deflection of the bridge over the roadway travelled by the permit truck
- Snow and/or ice buildup on roadway below the bridge
- Debris in road
- Truck suspension (bouncing)
- Pavement movement due to frost/temperature heaving
- Overlays below the bridge due to maintenance or scheduled projects
- Electronic measuring device not picking true lowest points (especially bolt heads/etc.)
- Existing, unrepaired high load impact damage resulting in flange bending and then subsequent lower under clearance

Recommendation(s) – BOBs recommends that a two (2)-inch buffer be applied to measured clearances when the permit system analyzes the allowable height of an over height permit along a route.

Status – The proposal was presented to the Region Bureau Management Team (RBMT) and was recommended to be brought forward to the EOC. There was brief discussion on whether a three (3) or four (4)-inch buffer was considered; seeing how seven out of the 10 states where “Clearance Buffer” practices were looked at were either three (3) inches or four (4) inches. Rebecca noted the two (2)-inch buffer recommended is consistent with MDOT’s practice of signing under clearances two (2) inches below the actual field measured under clearance. Motion to approve a two (2)-inch buffer.

ACTION: Approved

6. Road Design Manual Update for Design Errors/Omissions Notification Process – Kristin Schuster

Subject/Issue - Design errors process.

Issue Statement - Process required to be developed based on past the Office of the Auditor General (OAG) audit and State Transportation Commission (STC) policy.

Major Issue(s) – In a 2002 OAG audit, Design Division received finding including a recommendation that MDOT develop procedures to ensure that the Division is notified of design errors noted during project construction. Additionally, process was required to be compliant with STC policy.

MDOT works with alignment teams and including the project manager on notifications of contract mods in construction was a partial solution to this finding.

Background/History – From the 2002 OAG Audit:

MDOT uses an administrative review process for authorizing cost overruns and extra costs on construction projects. According to MDOT management, this process is also used to identify projects with potential design errors. During our audit, we determined that this method of identifying projects with potential design errors did not ensure that project design errors noted during construction were brought to the Division's attention for possible recovery of added construction costs or improvement in its own design work effort. Our review of 21 construction project files disclosed that 4 consultant-designed projects had some type of design error or omission that resulted in added construction costs. We did not find any documentation that the Division was notified of these errors or omissions. We could not identify the specific added costs attributed to these design errors; however, we did determine that the final project cost exceeded the original bid price for these 4 projects by a total of \$3.6 million, ranging from \$14,000 to \$2.9 million per project. Although our review did not disclose any MDOT-designed projects with design errors or omissions, it is essential that field staff notify the Division of all projects with design errors or omissions to allow MDOT to take appropriate action.

Design errors and/or omissions can result in added costs to construction projects. MDOT requires all design consultants providing design services to provide \$1 million of liability insurance in the event that the plans they develop contain errors or omissions. If these design errors or omissions result in added expense to MDOT, actions may be brought against the design consultant to recover the added costs from its liability insurance if the Division is made aware of the errors. Field staff notification of design errors noted during project construction may result in recovery of added costs caused by consultant design errors and/or omissions. In addition, notifying the Division of errors and/or omissions of in-house designed projects would allow it to take appropriate action to improve its own work.

Other ways MDOT has addressed the findings include alignment teams, for design and construction regularly meet to collaborate and design project managers are automatically notified when a contract mod is processed on a construction project.

Recommendation(s) – Please approve the draft process for inclusion in the Road Design Manual (RDM). The process outlined in the draft RDM fully addresses the OAG finding. It has been reviewed by the region system manager, Statewide Design Alignment Team, Construction Field Services, Transportation Service Center Manager Peer Group, RBMT and Office of Commission Audit (OCA).

ACTION: Approved.

7. I-69 Design-Bid-Build Reconstruction Project in St. Clair County – Ryan Mitchell

Project Information: I-69 Design-Bid-Build reconstruction project in St. Clair County, Bay Region

Route/Location: I-69 from Cox Doty Drain to M-19

Job Number: 130024

Control Section: 77024

Letting Date: March 2021

Est. Const. Cost: \$51.4M

Issue(s) – Use of Alternate Pavement Bidding (APB) on the I-69 Design-Bid-Build project.

Construction Field Services (CFS) coordinated with the project office and calculated a preliminary life cycle costs analysis on this project and determined that the difference between the pavement options was 17%. HMA was the low-cost alternative. While the computed the Life Cycle Cost Analysis (LCCA) exceeds the typical APB threshold, after consideration of a number of factors, it is in the best interest of the department and the public to provide the opportunity for increased competition in this instance.

Both pavement alternates are expected to have similar environmental, right of way, drainage, and utility impacts along with similar maintaining traffic concepts. Paving is the controlling operation for the construction schedule.

Background – The project has been selected by MDOT leadership for APB and appears to meet the criteria for APB.

Recommendation(s) – The Innovative Contracting Committee recommends approval of the use of Alternate Pavement Bidding on this Design-Bid-Build project.

ACTION: Approved.

8. Update to Alternate Pavement Bidding Process Document – Ryan Mitchell

Subject/Issue – Update to the Alternate Pavement Bidding (APB) Process Document

Major Issue(s) – MDOT staff have updated the APB guidelines to account for the latest requirements and procedures.

Background – A guide for APB projects was developed as part of a Technical Agenda and approved by the EOC on 09/1/2011. After suggestions and recommendations from the EOC on 6/10/2014, staff from the Innovative Contracting Unit (ICU) and CFS have reviewed the existing guidelines over the years and have updated several areas to reflect previous recommendations and current practice. These areas include:

- APB on Design-Build projects regardless of the LCCA Equivalent Uniform Annual Cost differential, if all other APB selection criteria are met
- The use of only a single set of plans
- Guidelines for setting up a project in AASHTOWare and ProjectWise
- Design considerations based on recent experience
- Direction on requesting to use APB on projects outside of the selection criteria
- Direction for requesting to not use APB on projects that meet the criteria, but have components that may not lend the project to an APB procurement

The existing guide is located at:

[https://stateofmichigan.sharepoint.com/sites/mdot/Organizational/development/plan-dev/Shared%20Documents/Alternate%20Pavement%20Bidding%20\(APB\)%20Process.pdf](https://stateofmichigan.sharepoint.com/sites/mdot/Organizational/development/plan-dev/Shared%20Documents/Alternate%20Pavement%20Bidding%20(APB)%20Process.pdf)

Recommendation(s) – The ICU and CFS staff are seeking approval of the updated guidelines from the EOC in order to provide a final approved process document for upcoming APB jobs.

ACTION: Approved.

9. Early Design Services for a Temporary Modular Bridge, US-131 – Ryan Mitchell

Subject/Issue – A request for proposal requesting design services for a temporary modular bridge has been posted. The selected vendor will develop shop drawings which will be packaged with MDOT plans for railroad review and approval. Once approved, the temporary modular bridge will be included in the low-bid construction contract by special provisions to maintain US-131 traffic over KL Avenue and a railroad track during reconstruction of the bridges. The project is in Kalamazoo County, three (3) miles north of the I-94/US-131 interchange.

Major Issue(s) – The railroad requires a full set of plans including the temporary modular bridge before they will start their review. The railroad will not commit to any time frames

other than 30-day minimum review, with no maximum review times. Design iterations in response to railroad comments will restart the review durations. Competitively selecting the temporary bridge design/fabrication vendor in advance of final design and letting, to allow for advance railroad review and approval, allows the department to manage the risk and cost associated with Railroad coordination and review.

Background – This area of US-131 has an annual daily traffic of 56,000 vehicles and maintaining traffic during construction is of high importance to the Southwest Region. One bound will be constructed at a time and traffic will be crossed over to the temporary bridge built in the median. The temporary modular bridge will reduce construction duration and cost. A portion of the cost is covered by an emerging technology fund that MDOT BOBS sets aside for new technologies. The temporary bridge substructure must be outside of the Railroad ROW. In order to achieve this, the temporary bridge will have to span 200 feet with an overall length of 350 feet. A public interest finding was required for this approach and was approved by the FHWA.

Recommendation(s) – This project has received Innovative Contracting Council approval as a multi-phase procurement. We have departed from the multi-phase procurement method in favor of simply using Special Provisions to move the temporary bridge design/fabrication vendor into a sub-contract with the Contractor. This approach will reduce the number of construction contracts MDOT manages and the risk that comes with managing and coordinating two construction contracts. During the design phase the cost of the temporary modular bridge and field assistances will be negotiated and assigned to the contract as fixed price. The special provision will address coordination, furnishing the temporary bridge, and field assistance when erecting the temporary modular bridge. This contract will be similar to the early procurement contracts for structural steel.

ACTION: For information only.

Carol Aldrich, Secretary
Engineering Operations Committee

RA:lrb

cc: EOC Members	D. Jones (MDOT)	G. Bukoski (MITA)
Meeting Guests	C. Libiran (MDOT)	D. DeGraaf (MCA)
Region Engineers (MDOT)	L. Mester (MDOT)	C. Mills (APAM)
Assoc. Region Engineers (MDOT)	T. Schafer (MDOT)	D. Needham (MAA)
TSC Managers (MDOT)	R. Jorgenson (FHWA)	M. Ackerson-Ware (MRPA)
L. Doyle (MDOT)	R. Brenke (ACEC)	