



**ENGINEERING OPERATIONS COMMITTEE  
MEETING MINUTES  
JUNE 2, 2016 – 9:00 A.M.  
MULTI-MODAL CONFERENCE ROOM**

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Present: M. Geib R. Ranck C. Rogers  
R. VanPortfliet B. Wieferich J. Gutting  
S. Bower K. Schuster M. Bott  
T. Marshall (FHWA) H. Zweng M. Sweeney

Absent: M. Van Port Fleet

Guests: B. Krom M. Eacker J. Pittman J. Forster (FHWA)  
C. Torres M. Bellgowan S. Greene D. Drdla (FHWA)

OLD BUSINESS

1. Approval of the April 14, 2016 Meeting Minutes – B. Wieferich

*ACTION: Approved with minor revisions*

NEW BUSINESS

1. Reinstatement of ET-Plus Guardrail Approach Terminal – C. Torres

Since early 2013, MDOT's Barrier Advisory Committee (BAC) has been examining issues pertaining to the ET-Plus, a proprietary guardrail terminal manufactured by Trinity Industries, and allegations that the latest version of the ET-Plus (typically referred to as ET-Plus, Version 2 or ET-Plus (v2) by MDOT staff) was prone to jamming and malfunction during an impact.

In October 2014, the ET-Plus was removed from MDOT's list of approved guardrail terminals as a result of (1) a federal lawsuit against Trinity Industries resulting in a verdict that found Trinity Industries guilty of violating the False Claims Act, and (2) FHWA's decision requiring Trinity Industries to perform additional crash testing of the ET-Plus under specific requirements set forth by the FHWA.

Per FHWA requirements, the ET-Plus (version 2), with a 4-inch wide guide channel, was subjected to eight crash tests under NCHRP 350 criteria in December 2014 and January 2015 at an independent testing facility (Southwest Research Institute). Based on the findings of the independent testing facility, FHWA, and an independent expert retained by FHWA, it was concluded that the ET-Plus successfully met the crash performance evaluation under NCHRP 350 and remains eligible for Federal-aid reimbursement.

FHWA and AASHTO formed two joint task force groups to study specific topics related to the ET-Plus:

#### Task Force #1 (Variances in Impact Head Dimensions)

Claims were made that there were multiple versions of the ET-Plus with large variances in impact head dimensions. As a result, FHWA engineers collected measurements of 1,048 ET-Plus devices installed in five states—Arizona, California, Illinois, South Carolina and Texas—to identify any variances in system dimensions. A review by the FHWA-AASHTO task force (Task Force #1) concluded that there is no evidence to suggest there are multiple versions of the ET-Plus. Task Force #1 also concluded that the ET-Plus devices crash tested at the Southwest Research Institute in December 2014 and January 2015 were within the design tolerance dimensions.

#### Task Force #2 (Performance Limitations with ET-Plus, Version 2)

The primary objective of Task Force #2 was to determine whether there is any evidence of unique performance limitations with the ET-Plus-Version 2 (with 4-inch wide guide channel) guardrail terminal, and the degree to which any such performance limitations extend to other extruding w-beam guardrail terminals. It should be noted that other guardrail terminals were also included as part of the effort undertaken by Task Force #2.

The report prepared by Task Force #2 did not make any conclusions to suggest that the ET-Plus (v2) terminal was prone to jamming and malfunction. Furthermore, Task Force #2 did not identify any flaws or limitations associated with specific guardrail terminals. Therefore, the performance limitations identified by the group are not limited to the ET-Plus terminal, and would be applicable to other guardrail terminals.

Performance limitations were broken down by two categories; impact conditions and site/installation conditions. Impact conditions identified as performance limitations were (1) side impacts, (2) head-on/shallow-angle corner impacts, and (3) head-on/shallow-angle high energy impacts. Multiple site/installation conditions were identified as performance limitations including, but not limited to, (1) improper hardware installation/maintenance/repair, (2) grading issues, (3) the presence of curbs or other roadside features, and (4) terminal placement not conforming to accepted guidelines and practices.

As indicated previously, the performance limitations identified in the report are not specific to any one terminal type. MASH states that guardrail terminals “are generally developed and tested for selected idealized situations that are intended to encompass a large majority, but not all, of the possible in-service collisions.” Additionally, the more the crash conditions differ from the test conditions, the more likely it becomes that performance will be outside of the desirable limits.

The findings in the report helped provide insight as to why guardrail terminals may react in an unusual manner during an impact, and also explain why variations exist in terminal performance when comparing different crashes.

Task force #2 recommended that transportation agencies begin using MASH-compliant roadside safety devices in lieu of NCHRP 350 devices. However, there are potential issues with requiring the use of MASH-compliant devices at this time, such as (1) sole-sourcing proprietary devices, (2) unavailability of MASH-compliant devices for certain applications, and (3) compatibility issues with trying to connect MASH-compliant devices to existing (non-MASH) devices. The BAC recommends examining these issues in detail and formulating solutions before mandating the use of MASH-compliant devices.

MDOT received information from Trinity Industries indicating that the following 14 states have reinstated the ET-Plus for new installations: Alabama, Arkansas, Florida, Iowa, Idaho, Indiana, Kentucky, Maryland, Minnesota, Montana, North Carolina, Ohio, Rhode Island, and Utah. In addition, Oklahoma has reinstated the installation of ET-Plus terminals for repair and maintenance purposes only (i.e., not for new installations on construction projects).

The Barrier Advisory Committee (BAC) completed its review of information related to the ET-Plus guardrail terminal, including a review of crash information provided to BAC involving ET-Plus impacts that occurred in Michigan. As a result, on 3/31/16, BAC members voted to recommend reinstatement of the ET-Plus for new installations and for maintenance purposes.

EOC is requested to approve this recommendation.

*ACTION: Deferred action to a future meeting.*

2. Construct Roundabout at M-52/Church/Broad Street Intersection – J. Pittman

Route/Location: M-52 (Broad/Church Street) in the city of Adrian, Lenawee County

Job Number: 124166

Control Section: 46072

Letting Date: 2-3-2017

The City of Adrian requested MDOT to explore options for possible improvements to the M-52/Church/Broad/State Street intersection. Signalization and a roundabout option were considered. The current intersection layout prohibits left turn movements from M-52 to Church and State Streets as well as left turns from Church Street onto M-52.

An urban roundabout is being proposed at this intersection location to eliminate turning movement restrictions. The City of Adrian will fund all required right-of-way needs for the project. Roundabout lighting will be installed at project cost. The City of Adrian has agreed to fund all future lighting operational and maintenance costs. A local resolution was also passed in support of the roundabout option.

*ACTION: Approved*

3. Joint Pipe Operations Committee (JPOC) Operating Charter – J. Gutting/K. Schuster

The operating charter for the JPOC was last updated in 2012. The attached updated charter reflects organizational changes that have occurred to organizations represented on the committee since 2012.

EOC is requested to approve the recommendation updates.

*ACTION: Approved*

## 4. Pavement Selection – Old US-131 Turnback - B. Krom

Route/Location: Old US-131: approx. four miles north of Cadillac to M-42, Wexford County

Job Number: 113348

Control Section: 83032

Letting Date: 12/2/2016

Department policy requires that Life Cycle Cost Analysis (LCCA) be used to determine the lowest cost pavement design alternative following the procedures outlined in the MDOT Pavement Design and Selection Manual. Final pavement selection requires approval by the Engineering Operations Committee.

The reconstruction alternatives being considered are a Hot Mix Asphalt Pavement (HMA Alt #1) and a Jointed Plain Concrete Pavement (JPCP Alt #2). For both alternatives it is recommended that a combination of existing and new sand subbase be used. The pavement designs being considered are as follows:

Alternative #1: Reconstruct with Hot Mix Asphalt Pavement

|       |   |
|-------|---|
| 1.5"  | HMA, 5E1, Top Course, PG 58-28          |
| 2"    | HMA, 4E1, Leveling Course, PG 58-28     |
| 3"    | HMA, 3E1, Base Course, PG 58-22         |
| 6"    | Aggregate Base                          |
| 18"   | Sand Subbase (15.3" existing, 2.7" new) |
| 30.5" | Total Section Thickness                 |

|   |                     |
|---|---------------------|
| Present Value Initial Construction Cost | \$277,800/lane-mile |
| Present Value Initial User Cost         | \$14,261/lane-mile  |
| Present Value Maintenance Cost          | \$114,443/lane-mile |
| Equivalent Uniform Annual Cost (EUAC)   | \$15,708/lane-mile  |

Alternative #2: Reconstruct with Jointed Plain Concrete Pavement

|     |   |
|-----|---|
| 8"  | Non-Reinforced Concrete Pavement, P1 Modified, w/ 12' joint spacing |
| 6"  | Open Graded Drainage Course   |
|     | Geotextile Separator  |
| 10" | Sand Subbase (8.5" existing, 1.5" new)                              |
| 24" | Total Thickness   |

|   |                     |
|---|---------------------|
| Present Value Initial Construction Cost | \$372,071/lane-mile |
| Present Value Initial User Cost         | \$15,370/lane-mile  |
| Present Value Maintenance Cost          | \$113,690/lane-mile |
| Equivalent Uniform Annual Cost (EUAC)   | \$18,924/lane-mile  |

Pavement designs are based on the 1993 AASHTO "Guide for Design of Pavement Structures" and the AASHTO pavement design software, DARWin Version 3.1, 2004.

The Equivalent Uniform Annual Cost calculation is based on the pavement selection process as approved by the EOC on June 3, 1999. Construction costs are derived from historical

averages on similar projects while user costs are calculated using the MDOT Construction Congestion Cost model.

*ACTION: EOC approves the selection of Alternative #1, Reconstruct with Hot Mix Asphalt Pavement, which has the lowest life cycle cost.*

#### 5. Pavement Selection Manual – B. Krom/M. Eacker

The Pavement Selection Manual has been revised to reflect the recommendations from a process improvement effort that occurred in late 2013 to late 2015. MDOT and industry stakeholders participated which resulted in many proposed revisions. MDOT stakeholders included both Region and Lansing personnel.

Every four years, MDOT partners with the paving industries to update the Pavement Selection Manual. Steps include:

- All three parties (MDOT, asphalt industry and the concrete industry) identify issues. Each party supplies supporting documentation for the identified issue. MDOT stakeholders include both Lansing and Region personnel.
- All issues are compiled and distributed to all three parties.
- All three parties state their support or lack of support for each issue including providing supporting documentation to support their position.
- All arguments are compiled and distributed to all three parties.
- Meetings are held to discuss all issues and accept specific revisions if consensus is reached.
- Changes, where consensus was not reached, are brought before a three member MDOT Executive Impasse Panel. All three parties are provided with an opportunity to state their case for or against each suggested change.
- Impasse Panel decisions are compiled and distributed to all three parties.

A timeline was developed for each of the accepted changes (changes through consensus or by Impasse Panel decision). The updated Pavement Selection Manual updates reflect those that can be implemented immediately. Additional recommendations will be implemented by late 2017.

EOC is requested to approve the updated 2016 Pavement Selection process for immediate implementation for new projects. Projects with previously initiated pavement selection analysis will continue to use the old (existing) process that was in place at the time of the initial pavement selection request.

Projects with formal pavement selection previously initiated include:

- M-59 (JN 111361, CS 50022), let date = February 2017
- I-69 (JN 115799, CS 25085), let date = March 2017
- US-131 (JN 119012, CS 41133), let date = February 2017
- US-131 (JN 117992, CS 41133, 41132), let date = December 2017

*ACTION: Approved*

6. MDOT Parklet Guidelines – S. Greene/J. Rios

Issue(s) – Parklet request and guidance.

Background – Parklets are small urban park features added to the parking lane of a city street. There have been requests to permit these within the ROW in the metro Detroit area and other large urban areas throughout the state. Currently MDOT has no official guidance for permitting these structures. The Development Services Division, with consultation from the MDOT Regions and FHWA, have developed the attached draft guidance for permitting parklet structures within the right of way. The attached documents also reference best practices from the City of San Francisco, Seattle, and locally from the City of Grand Rapids.

Recommendation(s) – It is recommended that MDOT establish guidelines with input from EOC so that applications for parklets can be reviewed and permitted with acceptable conditions attached to the permit.

*ACTION: Defer action to a future meeting*

7. Proposed MDOT Strategy for MASH Implementation and Compliance With NCHRP 350 Sunset Dates – C. Torres

The crash testing requirements of National Cooperative Highway Research Program Report 350 (NCHRP 350) were originally developed in 1993, and NCHRP 350 compliant roadside safety devices were required for new installations on NHS roadways beginning in the late 1990s.

The Manual for Assessing Safety Hardware (MASH) was published in 2009 (MASH 2009) as an updated crash testing standard to supersede NCHRP 350. In addition, MASH crash testing was required for new or revised roadside safety devices tested after January 1, 2011.

AASHTO is currently updating MASH standards (MASH 2016) and it is expected that MASH 2016 crash testing will be required for new or revised roadside safety devices tested after December 31, 2016. MASH 2016 only impacts cable barrier systems that are MASH 2009 compliant. All other 2009 MASH compliant barrier systems will likely also meet 2016 MASH requirements.

The FHWA-AASHTO joint implementation agreement that existed prior to December 2015 permitted the installation of roadside safety devices that met either NCHRP 350 or MASH criteria. This inadvertently discouraged agencies and industry from moving toward MASH compliant barrier systems. Therefore, FHWA and AASHTO agreed to an updated crash barrier implementation plan in December 2015 that includes sunset dates for NCHRP 350 compliant roadside safety devices. After the proposed sunset date for each device category, state transportation agencies will be required to use MASH-compliant roadside safety devices for new installations on the NHS.

MASH 2016-compliant devices will be required for all new installations on National Highway System contracts after the listed letting dates:

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

An exception was granted for temporary work zone devices. NCHRP 350 and MASH 2009 temporary work zone devices manufactured on or before December 31, 2019 may continue to be used after 12/31/19 throughout their normal service lives.

Transportation agencies are also encouraged to upgrade existing highway safety hardware after the sunset dates have passed to comply with MASH 2016 when they become damaged beyond repair, or when an individual agency's policies require an upgrade to the safety device.

The Barrier Advisory Committee (BAC) recommends approval of the "Proposed MDOT Strategy - MASH Compliance and NCHRP 350 Sunset Dates". EOC approval is requested.

*ACTION: Approved*

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Steven Bower, Secretary  
Engineering Operations Committee

RA:SB

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|-------------------------|---------------------------|-----------------------------|
| cc: EOC Members         | D. Parker                 | D. DeGraaf (MCA)            |
| Meeting Guests          | M. DeLong                 | J. Becsey (APAM)            |
| K. Steudle              | D. Jackson                | D. Needham (MAA)            |
| L. Mester               | W. Tansil                 | Monica Ackerson Ware (MRPA) |
| D. Wresinski            | C. Libiran                |                             |
| M. Chaput               | R. Jorgenson (FHWA)       |                             |
| Region Engineers        | R. Brenke (ACEC Michigan) |                             |
| Assoc. Region Engineers | G. Bukoski (MITA)         |                             |
| TSC Managers            |                           |                             |