



**ENGINEERING OPERATIONS COMMITTEE
MEETING MINUTES
AUGUST 21, 2024, 9 A.M. TO 11 A.M.
MDOT LAKESHORE CONFERENCE ROOM
WITH TEAMS OPTION**

Present: Gregg Brunner Jason Gutting Michael Townley
 Garrett Dawe Greg Losch Kim Zimmer
 Mark Dionise Lindsey Renner Hal Zweng

Absent: Rebecca Curtis Dee Parker Brad Wagner
 Ryan Mitchell Kristin Schuster

Guests: Linda Burchell Kevin Kennedy Carlos Torres
 Mike Eacker Ben Krom
 Fawaz Kaseer Justin Schenkel

OLD BUSINESS

1. Approval of the July 18, 2024, meeting minutes – Gregg Brunner

ACTION: Approved

2. Michigan Department of Transportation (MDOT) new materials and products – Lindsey Renner

New Material Monthly Report of Data:

- Number of Submittals Received
- Number of Submittals Accepted
- Number of Submittals Not Accepted
- Qualified Product List Revisions
- New Materials Status Report

ACTION: For information only

NEW BUSINESS

1. Safety Topic: Personal protection equipment and eye protection – Gregg Brunner

ACTION: For information only

2. Revisions to Michigan Test Method (MTM) 730 MICHIGAN TEST METHOD FOR CERTIFICATION OF INERTIAL PROFILERS – Kevin Kennedy

Issue Statement: Request approval of revisions to:

- MTM 730 MICHIGAN TEST METHOD FOR CERTIFICATION OF INERTIAL PROFILERS

Major Issue(s): MTM 730 - The current MTM 730 is 20 years old. The MTM language/terminology was updated to follow reference documents in American Society for Testing and Materials Standards and American Association of State Highway and Transportation Officials publications. Also removed language for the California Profilograph.

Background/History: The MTM was reviewed by Construction Field Services (CFS), the Regions, Industry (Asphalt Pavement Association of Michigan and Michigan Concrete Association), and the Federal Highway Administration.

Recommendation(s): Approve revisions to the MTM.

Status: New Submittal.

ACTION: Approved

3. Road Diet: Lane conversion on 0.5 miles of M-29 in the City of Algonac, St. Clair County – Tom Anderson

Issue Statement: Lane conversion on 0.5 miles of M-29 in City of Algonac, St. Clair County

Major Issue(s): The Huron Transportation Service Center (TSC) is planning a road diet on M-29 in the City of Algonac as part of a 2024 maintenance project. Through most of Algonac, M-29 is a 3-lane road with one lane in each direction and a center left turn lane. There is a short 5 lane section that is .5 miles long. As part of the maintenance project, the Huron TSC proposes to convert the 5-lane section to a 3-lane section and leave the extra space as a paved shoulder. This proposal is being presented to the Engineering Operations Committee (EOC) for information only, per MDOT policy.

Background/History: The Huron TSC is doing a maintenance project on M-29 from the west city limits to the north city limits of Algonac in St. Clair County. The project includes a single course hot mix asphalt (HMA) resurfacing and Americans with Disabilities Act ramps. This project is being paid for by maintenance funds and being let through St. Clair County. The money for project was dedicated in April 2024, the project was designed by Huron TSC, and let by St. Clair County on June 11th, 2024. M-29 is 3 lanes through most of Algonac, with a short 5 lane section. The 5-lane section has issues with encouraging passing and has little utility. The Huron TSC approached the City of Algonac about converting the 5-lane section to a 3-lane section. The City of Algonac agreed that it would be a good idea and wished to move forward.

A public meeting was held on 05/28/24 that was attended by about 40 members of the public. The comments were generally in favor of the Road Diet, with some questioning it's need. The City of Algonac passed a resolution in support of the Road Diet on 06/18/24.

Recommendation(s): The Huron TSC recommends implementing the road diet on M-29 with the 2024 maintenance project.

Status: The project is currently under construction and is expected to be completed before Labor Day of 2024.

ACTION: For information only

4. Pavement demonstration final reports and approval of report recommendations and associated implementation plans for each project – Justin Schenkel, Fawaz Kaseer, Mike Eacker

Issue Statement: To inform the EOC of the pavement demonstration final reports for the following projects and to seek the EOC's approval of the report recommendations and associated MDOT implementation plans for each:

- Thin Unbonded Concrete Overlay Projects – M 3 & M-1 (MDOT Job Numbers 72407 & 79673)
- Low Volume (Thin) Concrete Reconstruction Projects – M-13 & M-99 (MDOT Job Numbers 53356 & 75184)
- Perpetual Hot Mix Asphalt Pavement Over Rubblized Concrete Project – I-75 (MDOT Job Number 90279)
- Full-Depth Reconstructed Perpetual Hot Mix Asphalt Pavement Projects – M-84 & I-96 (MDOT Job Numbers 31804 & 52803)

Background/History: Public Act 457 of 2016, MCL 247.651i, contains what is referred to as the pavement demonstration law. Within this law, MDOT is allowed to build demonstration projects where historical information for maintenance costs and performance (service life) are not available.

These projects are monitored until a final decision is made regarding the suitability of adopting them as MDOT standard practice. It has been determined that the projects being presented to the EOC have enough performance history and data to complete their review as part of the demonstration program.

As part of the finalization process, final reports on each project type have been drafted. Michigan Technological University, with Dr. Zhanping You as the Principal Investigator, was contracted to draft these reports.

The following summarizes each report's pavement demonstration:

Report A: This document is a final comprehensive report on the "Thin Unbonded Concrete Overlay" projects on M-3 and M-1 in Wayne County, MDOT job numbers 72407 and 79673, respectively. The M-3 and M-1 projects were constructed in 2005 and 2010, respectively. Both projects are 4-inch (thin) unbonded non-reinforced concrete overlays, each with a 15-year design life. While unbonded concrete overlays 6 inches or thicker are already a standard fix for MDOT, these demonstration projects aimed to evaluate the use of overlays less than 6 inches thick, which MDOT categorizes as "thin." Furthermore, M-3 included test sections to evaluate two different HMA separator layer mixes (open- and dense-graded) and the use (or not) of joint (transverse and longitudinal) sealing with hot-pour rubber.

Report B: This document is a final comprehensive report on the "Low Volume (thin) Concrete Reconstruction" projects on M-13 in Bay County and M-99 in Jackson County, with MDOT job numbers 53356 and 75184, respectively. The M-13 and M-99 projects were constructed in 2005 and 2006, respectively. These demonstration projects were designed to assess a cost-effective concrete cross-section alternative for reconstructing roadways with low traffic volumes (both overall and commercial traffic). Typically, MDOT concrete reconstruction consists of jointed plain concrete pavement (JPCP) designed to have a thickness of 8 inches or greater with 12-foot joint spacing and load transfer at the transverse joints. In contrast, these demonstration projects were evaluated using 6-inch jointed plain concrete panels with shorter joint spacing and no-load transfer at the transverse joints. Like standard JPCP construction, these demonstration concrete pavements were designed with a 20-year design life.

Report C: This document provides a comprehensive report on the "Perpetual HMA Pavement Over Rubblized Concrete" demonstration project on I-75 Northbound (NB) in Cheboygan County, with MDOT job number 90279, constructed in the fall of 2008. The pavement structure is comprised of three layers of HMA (total thickness of 8.5 inches) over 9-inch of rubblized Portland cement concrete pavement. The design life is 40 years, designed so that the strain at the bottom of the HMA layer is lower than its endurance limit to prevent bottom-up, fatigue cracking. Typically, MDOT HMA rubblization projects are designed with a 20-year design life with no specific emphasis on the endurance limit.

Report D: This document provides a comprehensive report on the "Full-Depth Reconstructed Perpetual HMA Pavement" on M-84 southbound (SB) (MDOT job number 31804) and I-96 westbound (WB) (MDOT job number 52803). Both projects were completed in the fall of 2005. The pavement structures are comprised of HMA layers with total thicknesses of 6.5- and 14-inches for M-84 SB and I-96 WB, respectively. The design life for both projects was 40 years, designed so that the strain at the bottom of the HMA layer is lower than its endurance limit to prevent bottom-up, fatigue cracking. Typically, MDOT HMA reconstruction is designed with a 20-year design life with no specific emphasis on the endurance limit.

These reports provide thorough evaluations with conclusions and recommendations for each pavement demonstration project and its fix type.

Each report was reviewed by MDOT at-large and paving industry personnel. Their feedback was provided and included in these reports as appropriate. Updated final reports (as now presented to the EOC) have been provided to these persons. There are no notable concerns from those who have reviewed these reports.

Recommendation(s): EOC review and approval of the following recommendations and associated MDOT implementation plans are sought. Conclusions and recommendations from each report are provided as justification for each implementation recommendation.

Report A: Overall, these demonstration projects have established that a 4-inch unbonded concrete overlay rehabilitation procedure can achieve a service life proportional to standard six-inch or thicker concrete overlays with lower initial construction costs and similar maintenance costs over the project's service life.

Since most of the severe distress is likely due to poor drainage and construction variability, it is vital that proper drainage be provided, and quality control/quality assurance used to ensure that the design overlay thickness is achieved.

Per the findings and conclusions of this report, thin concrete overlays are a suitable fix type for MDOT's use where appropriate. This fix type is only recommended for non-freeway routes.

While the demonstration projects did not show a significant difference between sealed and unsealed joints, best practices developed from experiences elsewhere indicate that thin unbonded concrete overlays should have sealed transverse and longitudinal joints to limit the ingress of water and incompressible materials which could cause erosion of supporting layers and joint spalling. The choice of HMA separator had a negligible effect on performance. However, it is standard practice in Michigan to use open-graded asphalt mixtures to ensure stable and drainable foundation layers for the concrete surface layer.

MDOT Implementation Plan:

- MDOT CFS will cease annual site visits for these projects but will continue to monitor their performance using the annually collected condition data measurements.
- MDOT CFS has previously created a separate service life curve for thin concrete overlays to use for life cycle cost analysis (LCCA) comparison against two-course HMA over existing pavement and over crush and shaped HMA, so this fix type is implemented as approved by the EOC on June 25, 2020.

Report B: These demonstration projects have shown that a six-inch-thick concrete reconstruction can achieve a service life proportional to a standard eight-inch-thick concrete reconstruction, with lower initial construction costs and similar maintenance costs.

Most of the observed distress for the demonstration projects can be attributed to joint sawing. Therefore, since thinner concrete pavements are cured more rapidly, saw-cutting must be done immediately after construction.

Per the findings of this report, low-volume, thin concrete reconstruction is suitable for MDOT use where appropriate. It is recommended that the monitoring of this demonstration project by MDOT be ended, and the project evaluations considered complete. It should be noted that the basis of this conclusion was drawn from low-volume, non-freeway roads. Therefore, this reconstruction fix type may not apply to high-volume and/or freeway roadways.

MDOT Implementation Plan:

- MDOT CFS will cease annual site visits for these projects but will continue to monitor their performance using the annually collected condition data measurements.
- MDOT CFS will use the existing service life curve for standard thickness concrete reconstructs. The thin concrete reconstructs are included in this dataset. Thin HMA reconstructs and their data are handled in the same respective way for LCCA. MDOT has existing guidelines for thin HMA and concrete reconstruction as approved by the EOC on July 21, 2022, which will continue to be used for pavement design and LCCA, so this fix type is implemented.
- MDOT CFS will continue to monitor the performance of these pavements for possible creation of a separate service life curve if they exhibit unique performance results.

Report C: The evaluation of the I-75 NB demonstration project indicates both positive aspects and areas of concern. Compared to standard HMA over rubblized concrete, perpetual pavement offers potential advantages in terms of longer service life and lower overall cost due to reduced long-term maintenance needs. This highlights its promise as a sustainable and cost-effective pavement solution.

For future implementations, to ensure the durability and success of perpetual HMA over rubblized concrete, addressing construction quality and base irregularities is crucial for maximizing the benefits of perpetual rehabilitation as a sustainable, cost-effective solution.

Per the findings of this report, perpetual HMA pavement over rubblized concrete may provide an acceptable, cost-effective construction approach compared with traditional HMA pavement over rubblized concrete. However, due to the questionable forecast of distress index (DI), the limited dataset from this single project, and the concerns noted above, MDOT should consider constructing additional projects using this demonstration fix type before standardizing.

Consequently, since the primary issue is that of establishing and validating the performance curve and because additional detailed annual reviews would not enhance the conclusions from this project, it is recommended that the MDOT end its annual monitoring and status reporting of the I-75 NB demonstration project. Future data collection needed for fix type evaluation can be solely facilitated by the standard networkwide MDOT condition data measurements and standard MDOT project tracking.

MDOT Implementation Plan:

- MDOT CFS will cease annual site visits for this project but will continue to monitor its performance using the annually collected condition data measurements.
- To improve the limited dataset, MDOT will consider constructing new projects to improve the evaluation of this demonstration fix type.

Report D: These perpetual pavement projects have collected a sufficient amount of condition data. Still, there is some uncertainty about the forecasted fix life of these pavements due to the currently available DI measurements. Factors contributing to this uncertainty include the observed high quantity but low severity transverse cracking on M-84 and construction issues on I-96 that may overly influence current DI values. Moreover, the absence of recent (2020 and newer) DI datapoints and limited sample size as compared to the standard dataset may be impacting the accuracy of performance curve projections. Consequently, the fix life and/or service life projections may be currently underestimated.

Nevertheless, per the findings and conclusions of this report, as compared to standard HMA reconstruction, perpetual pavement offers potential advantages in terms of longer service life and lower overall cost due to reduced long-term maintenance needs. Consequently, less frequent maintenance and reconstruction events will lead to reduced disruptions to traffic. This highlights its promise as a sustainable and cost-effective pavement solution.

However, if the service life projection does not reasonably accommodate practical use as compared to standard alternatives or as necessary for MDOT life cycle procedures, then MDOT may consider the construction of additional projects using this demonstration fix type or continue to wait for additional data on the existing sections prior to standardizing.

If more projects are to be constructed, then construction quality standards should be ensured to uphold the integrity of the design. Furthermore, high-volume traffic routes should be prioritized.

Regardless, since the primary issue is that of establishing and validating the performance curve and because additional detailed annual reviews would not enhance the conclusions from these projects, it is recommended that the MDOT end its annual monitoring and status reporting of the M-84 SB and I-96 WB demonstration projects. If needed, future data collection for fix type evaluation can be solely facilitated by the standard networkwide MDOT condition data measurements and standard MDOT project tracking.

MDOT Implementation Plan:

- MDOT CFS will cease annual site visits for these projects but will continue to monitor their performance using the annually collected condition data measurements.
- MDOT CFS will review the existing data to determine the feasibility of the service life curve for perpetual HMA reconstructs. Subsequently, if feasible, MDOT CFS will determine the practical comparable fix type(s) for LCCA applications. Note that MDOT has not yet standardized a long-life concrete reconstruction fix type for comparison, so this may require unique methods for practical comparison. If

- comparable fix type(s) and methods can be determined, then this will be presented to MDOT at-large and paving industry partners for their feedback. Once agreeable, MDOT CFS will provide the results to the EOC for their approval.
- However, if the existing data cannot produce a feasible and/or practical service life curve, then to improve the limited dataset, MDOT will continue to monitor these projects for new data and/or consider the construction of new projects to improve the evaluation of this demonstration fix type.

ACTION: Approved

5. Pavement Type Selection: M-46 from Muskegon Avenue to Home Street, Muskegon County – Ben Krom

Issue Statement: Pavement Type Selection

Route/Location: M-46 from Muskegon Avenue to Home Street, Muskegon County

Job Number: 214896

Control Section(s): 61022

Letting Date: 9/5/2025

Total Estimated Construction Cost: \$29.0M

State law and department policy requires that an LCCA be used to determine the most cost-effective pavement design.

Major Issue(s): None. The paving industries had no comments on this LCCA.

Background/History: Pavement selection was determined using the procedures outlined in the MDOT Pavement Selection Manual. Department policy requires that the pavement alternate with the lowest Equivalent Uniform Annual Cost (EUAC) be selected. Final pavement selection requires approval by the EOC.

Recommendation(s): Approve the HMA pavement alternate, which has the lowest EUAC.

ACTION: Approved

6. Alternate Pavement Bidding (APB): I-94 from Wayne Road to east of Greenfield Road, Wayne County – Ben Krom

Route/Location: I-94 from Wayne Road to east of Greenfield Road, Wayne County

Job Number: 208609, 211426, 201225, 202486

Control Section: 82022

Letting Date: 8/1/2025

Total Estimated Construction Cost: \$373.8M

Major Issue(s): Use of APB on this I-94 Design-Bid-Build project.

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 5.90%. HMA was the low-cost alternative.

The LCCA was ran following MDOT's user delay cost 'capping' policy, and the TSC is in support of the current \$61,977/day user delay cost and does not plan to pursue a reduction.

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/History: The project appears to meet the criteria for the use of APB.

Recommendation(s): The Innovative Contracting Committee recommends approval of the use of APB on this Design-Bid-Build project.

ACTION: Approved

7. Crash Cushion Attenuating Terminal (CAT)-350 Guardrail Approach Terminal – Carlos Torres

Issue Statement: CAT-350 Guardrail Approach Terminal

Major Issue(s): The major issue involves a section of guardrail beyond the sixth post of the CAT-350 terminal which the manufacturer calls a CAT-Tail section. The CAT-Tail section has different configurations depending on the type of guardrail attached to the terminal. The 12'-6" long CAT-Tail section depicted in Valtir's SS 224 drawing is the one recommended by Valtir for use with double-sided guardrail. This is the one that would be applicable to MDOT's standard applications involving the CAT-350 terminal.

MDOT's standard plans pertaining to the CAT-350 terminal, originally developed in the 1990s, never called for a CAT-Tail section as depicted in Valtir's SS 224 drawing and described in the literature developed by Valtir (formerly known as Trinity Highway Products). Instead, MDOT typically called for a 12'-6" section of Type BD guardrail beyond post #6 when installing a CAT-350 terminal. The primary difference between a 12'-6" section of Type BD guardrail and the CAT-Tail section depicted in Valtir's SS 224 drawing is the CAT-Tail section requires two 3/16" x 1.75" x 3" rectangular washers (one of each side of the post) at posts #7 and #8. The Department has no records indicating why MDOT omitted the rectangular washers from posts #7 and #8 in the standard plans. However, the February 2005 version of the CAT-350 assembly manual contains a statement on page 3 indicating the tail section is not required if 37'-6" or more of double-faced w-beam guardrail is used (see below with underlined text). Therefore, it is possible MDOT staff was under the impression the tail section, as depicted in Valtir's SS 224 drawing with rectangular washers, was not necessary, and a 12'-6" section of Type BD guardrail beyond post #6 of the CAT-350 terminal would suffice.

Unfortunately, we have no records from the 1990s explaining why MDOT did not implement the CAT-Tail section depicted in Valtir's SS 224 drawing. After recently discussing this matter with Greg Neece (Valtir), their interpretation of the underlined sentence from the 2005 CAT-350 manual is that a double-sided guardrail run (e.g., a single run of Type BD guardrail) would need to have a minimum length of 75' if CAT-350 terminals are installed on both ends of the run (i.e., a minimum length of 37.5' per terminal times two terminals).

Furthermore, their position is an appropriate CAT-Tail section has always been a requirement in all applications, so this was a requirement when the CAT-350 was developed. They pointed out the date of Valtir's SS 224 drawing (4/26/96) to support their case, so their position is the drawing was in effect when MDOT approved the CAT-350 in the 1990s and was therefore a requirement. However, they acknowledged the underlined sentence from the 2005 CAT-350 manual does not clearly convey this. Furthermore, some MDOT staff don't necessarily agree with Valtir's interpretation and believe it is possible to interpret the underlined sentence to mean the CAT-Tail section is not required in certain cases. In conclusion, the issue is ambiguous.

In December 2021, Valtir published a new manual to replace the February 2005 manual, and the new manual no longer has language indicating the CAT-Tail section is optional in certain cases. Both the December 2021 version and the latest CAT-350 manual (April 2023, Revision A) clearly indicate an appropriate CAT-Tail section is required for all applications, so the language from the 2005 indicating the CAT-Tail was not necessary under certain conditions was removed.

In summary, the major issue involves the lack of 3/16" x 1.75" x 3" rectangular washers (one of each side of the post) at posts #7 and #8 with MDOT's existing CAT-350 installations. If MDOT were to take any action on this matter, this would impact existing CAT-350 terminals on MDOT roadways, and any CAT-350 terminals slated for installation on active construction projects.

A review of MDOT's guardrail data revealed a total of 262 CAT-350 terminals. This should be treated as a rough estimate due to the possibility of additional terminals and/or the removal of existing terminals not reflected in the data. The breakdown by MDOT Region is shown below:

The previous version of Standard Plan R-63 identifying the CAT-350 as an acceptable option was used on projects let before April 2024. Therefore, it is possible that CAT-350 terminals could be installed on active construction projects that were let before April 2024 and utilized the Guardrail Approach Terminal, Type 3B or Guardrail Approach Terminal, Type 3T pay items. The number of active construction projects that may be potentially impacted has not been determined.

Background/History: The CAT-350 guardrail approach terminal is a double-sided, National Cooperative Highway Research Program (NCHRP) 350 compliant guardrail approach terminal manufactured by Valtir (formerly Trinity Highway Products). The CAT-350 terminal was approved by MDOT in the 1990s. It was one of the double-sided, NCHRP 350

compliant guardrail terminals previously identified in Standard Plan R-63 Series. The first known version of Standard Plan R-63 depicting the CAT-350 is R-63-A, dated 7/13/98. R-63-A depicted the CAT-350 as a six-post system, and there is no reference of a CAT-Tail section beyond post #6 (see image below from Standard Plan R-63-A, dated 7/13/98).

Early versions of Standard Plan R-56 Series (e.g., R-56-D, dated 9/22/04) depicted a 12'-6" length of Type BD guardrail beyond the sixth post of the CAT-350, and the 12'-6" length of Type BD guardrail was paid for as part of the terminal (see image below from Standard Plan R-56-D).

Valtir provided a flyer pertaining to the CAT terminal from the 1990s depicting the different tail end configurations for this system. In addition, Valtir provided their SS 224 drawing depicting the CAT-Tail section required for use with double-sided, 27 ³/₄" (28") tall w-beam guardrail. After further discussions with Greg Neece and others from Valtir, the primary difference between a 12'-6" section of Type BD guardrail and the CAT-Tail section depicted in Valtir's SS 224 drawing is the CAT-Tail section requires two 3/16" x 1.75" x 3" rectangular washers (one of each side of the post) at posts #7 and #8. The rectangular washers are depicted in Valtir's SS 224 drawing and labeled as item #4.

MDOT never called for a CAT-Tail section beyond post #6 of the CAT-350 terminal nor specified the use of rectangular washers at posts #7 and #8 when installing a CAT-350 terminal. Most of the individuals involved in the CAT-350 approval process in the 1990s are no longer with the Department, and there are no records from that time indicating why MDOT chose to omit the rectangular washers from posts #7 and #8 rather than building a CAT-Tail section as depicted in Trinity's (Valtir's) drawings. Nevertheless, the February 2005 version of the CAT-350 assembly manual contains a statement on page 3 indicating the tail section is not required if 37'-6" or more of double-faced w-beam guardrail is used. It is possible MDOT staff was under the impression at that time that the tail section, as depicted in Valtir's SS 224 drawing, was not necessary, and a 12'-6" section of Type BD beyond post #6 would suffice. Even though there is no documentation supporting this, the underlined sentence below from the February 2005 CAT-350 manual could be interpreted to mean the CAT-Tail section is not required in some cases.

However, in December 2021, Trinity (now Valtir) published a new manual to replace the February 2005 manual, and this manual no longer has language indicating the CAT-Tail section is optional in certain cases. Both the December 2021 version and the latest CAT-350 manual (April 2023, Revision A) indicate an appropriate CAT-Tail section is required, and the language from the 2005 manual indicating the CAT-Tail was not necessary under certain conditions was removed.

Greg Neece (Valtir) indicated the two 3/16" x 1.75" x 3" rectangular washers (one of each side of the post) are non-proprietary and are the same washers commonly used many years ago when rectangular washers were installed under each post bolt in standard guardrail installations. Most states, including Michigan, stopped using rectangular washers under post bolts many years ago. However, Greg Neece (Valtir) indicated they are still available for purchase from multiple sources and are relatively inexpensive (likely less than \$5 each; possibly \$2 each). All other items in the CAT-Tail section from Drawing SS 224 are similar to the items used with Type BD guardrail, although it should be noted that Valtir calls for

CAT-Tail, 12'-6", 12-gauge guardrail panels (Valtir Part #9G) within the 12'-6" CAT-Tail section. These are simply standard 12-gauge w-beam guardrail panels with 3 post bolt slots. MDOT staff asked Mr. Neece if using standard 12-gauge w-beam guardrail with five post bolt slots (similar to the one depicted in MDOT Standard Plan R-60 Series) would be an acceptable alternative within the CAT-Tail section, and he indicated that should be fine. The use of guardrail panels with an additional two post bolt slots should not affect the performance of the terminal or the CAT-Tail section.

In summary, the primary issue involves the use of 3/16" x 1.75" x 3" rectangular washers (one of each side of the post) at posts #7 and #8. MDOT has never specified the use of these washers at posts #7 and #8, but Valtir's position is an appropriate CAT-Tail section is required in all applications. According to Greg Neece (Valtir), the rectangular washers serve a useful purpose. They are used at posts #7 and #8 to ensure the CAT-350 panels can telescope properly over the CAT-Tail section. The rectangular washers help keep the guardrail panels within the tail section locked against the posts, and this minimizes the chances of the panels within the tail section separating from the post. This minimizes the chances of interaction between the second panel of the CAT terminal and the CAT-Tail panel while the second CAT panel slides (or "telescopes") over the CAT-Tail guardrail panel. Furthermore, rectangular washers were used at posts #7 and #8 during crash testing of the CAT-350 terminal.

Recommendation(s): Retrofit all existing CAT-350 terminals on MDOT roadways with rectangular washers at posts #7 and #8, as depicted in Valtir's SS 224 drawing.

Identify all active construction projects let before April 2024 that utilized the Guardrail Approach Terminal, Type 3B or Guardrail Approach Terminal, Type 3T pay items, and contact the Engineer on each project to determine if CAT-350 terminals have or will be installed on the project. Request contractors on all active construction projects utilizing CAT-350 terminals to install rectangular washers at posts #7 and #8 per Valtir's SS 224 drawing.

Issue information advising maintenance personnel that rectangular washers are required at posts #7 and #8 when repairing and/or installing a CAT-350 terminal.

Status: New item.

ACTION: Approved



Michael Townley, Secretary
Engineering Operations Committee

RA:lrp

cc: EOC Members	L. Mester (MDOT)	S. Waalkes (MCA)
Meeting Guests	C. Newell (MDOT)	C. Mills (APAM)
Region Engineers (MDOT)	V. Zokvic (MDOT)	D. Needham (MAA)
Assoc. Region Engineers (MDOT)	M. Ackerson-Ware (MRPA)	R. Vandeventer (MITA)
TSC Managers (MDOT)	T. Burch (FHWA)	
L. Doyle (MDOT)	R. Brenke (ACEC)	