

2024
APAM
Conference
Hot Mix Asphalt
(HMA) Update

NATHAN MAACK

HMA OPERATIONS

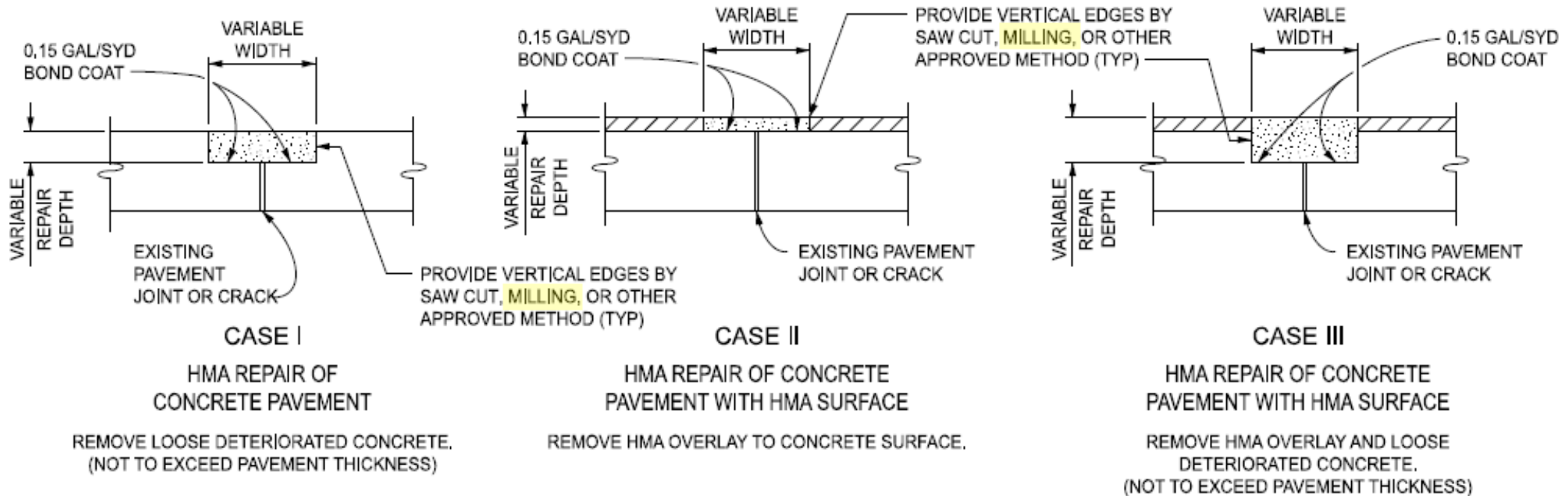
MICHIGAN DEPARTMENT OF
TRANSPORTATION

CHUCK MILLS

ASPHALT PAVEMENT ASSOCIATION OF
MICHIGAN

2-28-24

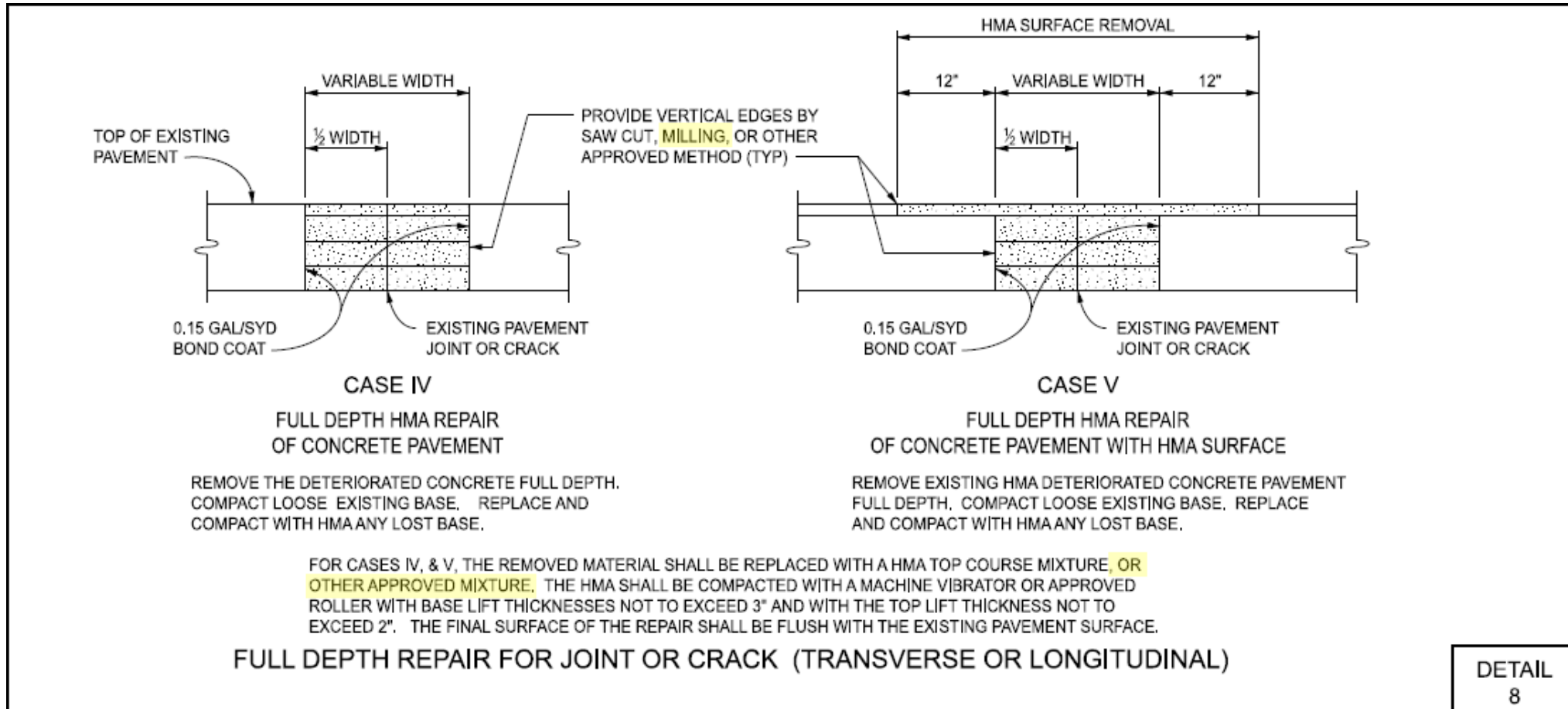
Detail 7s and 8s

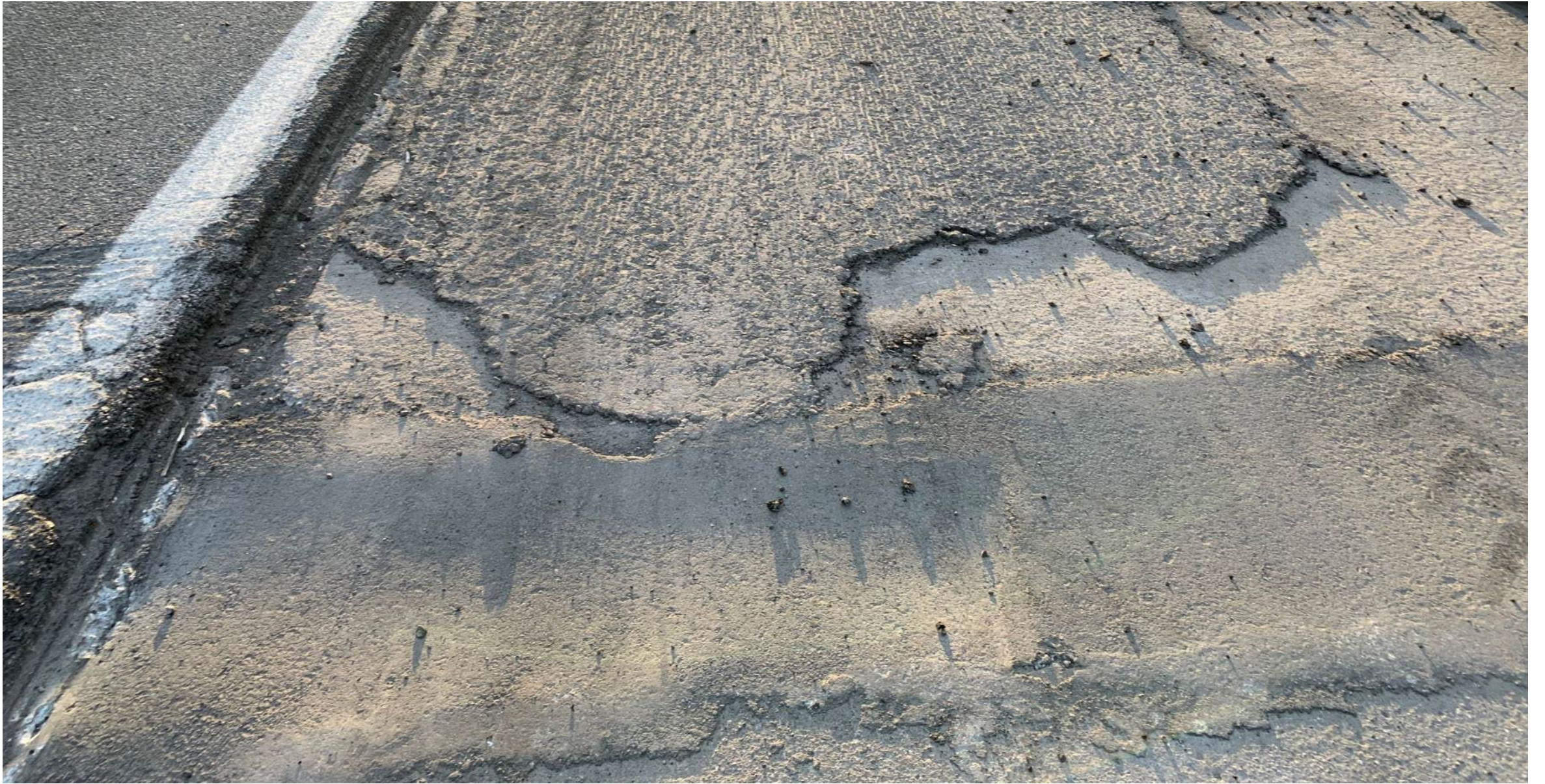


FOR CASES I, II, & III, THE REMOVED MATERIAL SHALL BE REPLACED WITH A HMA TOP COURSE MIXTURE, OR OTHER APPROVED MIXTURE. THE HMA SHALL BE COMPACTED WITH A MACHINE VIBRATOR OR APPROVED ROLLER WITH BASE LIFT THICKNESSES NOT TO EXCEED 3" AND WITH THE TOP LIFT THICKNESS NOT TO EXCEED 2". THE FINAL SURFACE OF THE REPAIR SHALL BE FLUSH WITH THE EXISTING PAVEMENT SURFACE.

SURFACE REPAIR FOR JOINT OR CRACK (TRANSVERSE OR LONGITUDINAL)

Detail 7s and 8s







12
↑

NO RIGHT
TURN
AHEAD

NO RIGHT
TURN

AMTRAK
Dearborn, MI
John D. Dingell
Transit Center







Bond Coat Checklist

Form 0552

Available on the MDOT website

More information available in the Construction Manual

Michigan Department
of Transportation
0552 (04/20)

Clear Form

BOND COAT APPLICATION INSPECTOR / OPERATORS CHECKLIST

DOCUMENT REVIEW

- Type of bond coat (*typical is SS-1H*)
- Planned application rate (*standard is indicated in plans*)
- Materials Safety Data Sheet (*on file in the Contractors' MSDS binders*)
- Manufacturer's instructions

EQUIPMENT INSPECTION – DISTRIBUTOR

- The spray bars are at the proper height
- All nozzles are uniformly angled 15° to 30° from the spray bar
- All nozzles are free of clogs
- The spray pattern has been checked for uniformity
- Circulating bond material before spraying
- The spray pattern has been checked for proper overlap
- The application pressure has been verified
- The distributor's application calibration has been verified (*ASTM D2995*)
- Set application rate

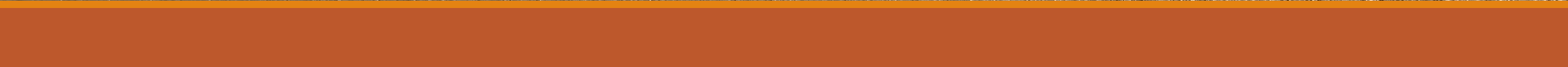
PROJECT REVIEW – WHAT TYPE OF SURFACE WILL BE BOND COATED

- Milled Existing HMA New HMA PCC

Is the existing surface to be bond coated non-uniform?

- Yes No





Coring for Thickness

Thickness cores are taken on Design-Build and Alternate Bid projects

Special Provision updated to:

- Allow density cores to be used in lieu of thickness cores
- Use Total Station Survey to determine thickness
- Revert to the original process if there is a disagreement

MIT Scan Pilot

- Used on all three courses on I-69 from Island Highway to I-94





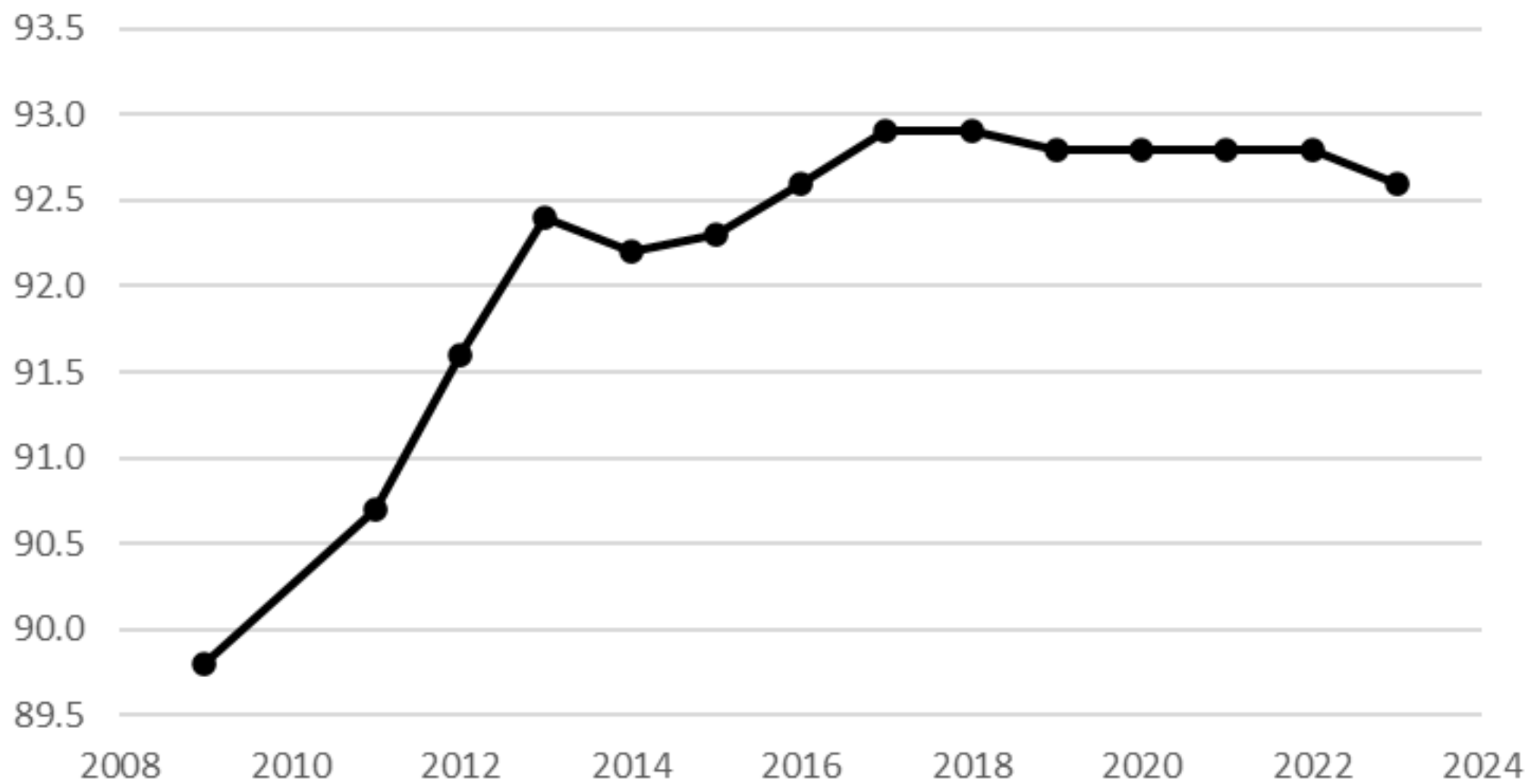




Average Joint Density

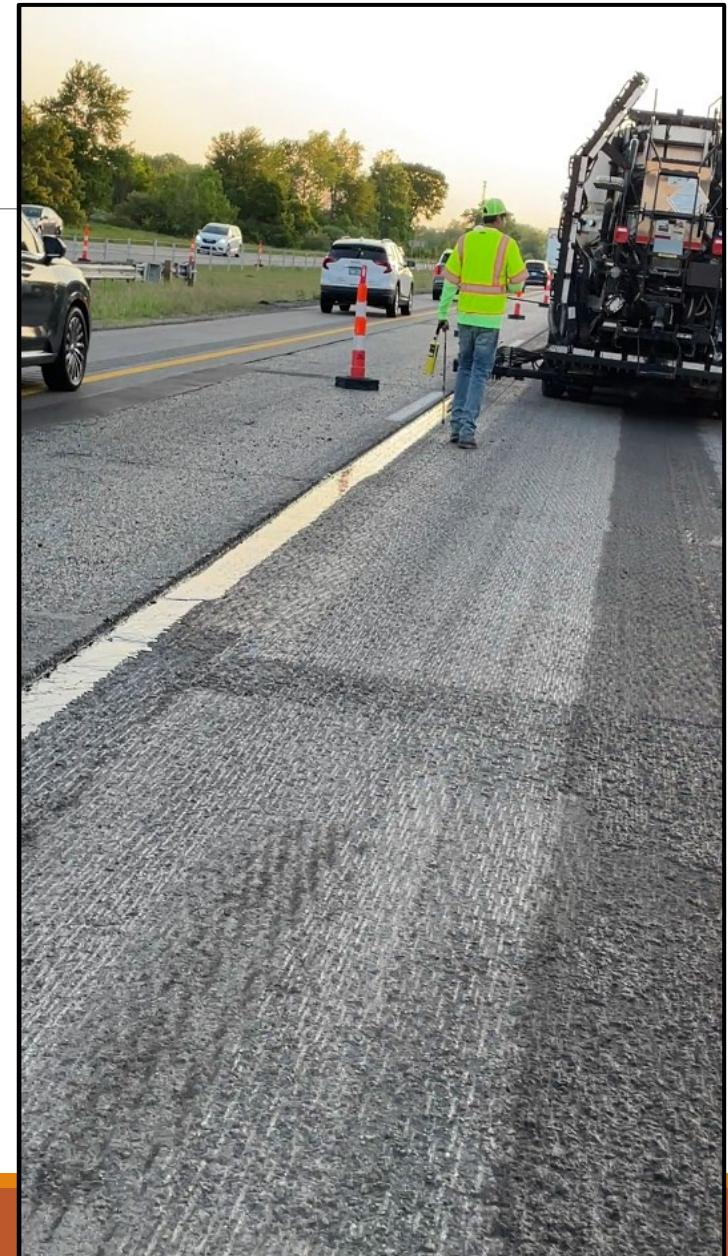
Year	Average Joint Density
2009	89.8
2011	90.7
2012	91.6
2013	92.4
2014	92.2
2015	92.3
2016	92.6
2017	92.9
2018	92.9
2019	92.8
2020	92.8
2021	92.8
2022	92.8
2023	92.6

Average Joint Density



VOID REDUCING ASPHALT MEMBRANCE

- Mineral Filler/AC
- Sprayed along HMA joint to reduce voids
- Avoiding excessive compaction effort
- JBand was supplier on both projects
- 2023 Projects
 - I-94 from Freer to Race Rd
 - US-31/M-37 Traverse City



Non-SMA Mixtures		
Overlay Thickness, inches	VRAM Width, inches	Application Rate, lb/ft
1	18	0.80
1¼	18	0.88
≥ 1½	18	0.95
SMA Mixtures		
Overlay Thickness, inches	VRAM Width, inches	Application Rate, lb/ft
1½	18	1.26
1¾	18	1.38
≥ 2	18	1.51

1. The thickness of the VRAM may taper from the center of the application to a lesser thickness on the edge of the application. Maintain the width and weight per foot.

2. In the event of a joint between a SMA and non-SMA mixture, the non-SMA application rate will be used.

3. When applying VRAM half-width, apply the application at one-half the prescribed width and rate.

US-31/M-37 Traverse City

- Mill and 2" lift
- 5EML dense mix
- Was not drawn into mat as well as expected ~ 3/4" max
- App rates may be too low



Longitudinal Joint Specification Update

Deleted language excluding echelon joints from testing and incentive/disincentive

Metro Region Design Binder

North, Grand, Bay, Southwest and University Region and Metro Region

Mixture Type	HMA Mainline and Ramps		High Stress HMA	
EMH [^] , EH, SMA	PG 70-28P PG 64-22*	Top & Leveling Course Base Course	PG 76-28P PG 64-22*	Top & Leveling Course Base Course
EML, EMH ^{^^}	PG 64-28 PG 58-22**	Top & Leveling Course Base Course	PG 70-28P PG 58-22**	Top & Leveling Course Base Course
EL	PG 58-28 PG 58-22**	Top & Leveling Course Base Course	PG 64-28 PG 58-22**	Top & Leveling Course Base Course

MTM Update

Updated MTMs

- 313 STANDARD PRACTICE OF SAMPLING HMA PAVING MIXTURES
 - Deleted obsolete sampling methods and tables
 - Updated and deleted Language to clear up confusion in the field
- 314 THEORETICAL MAXIMUM SPECIFIC GRAVITY OF HMA PAVING MIXTURES
 - Updated references to other test methods
 - Updated to show correct formatting as far as degree symbols and F vs C for temperatures
- 315 BULK SPECIFIC GRAVITY AND DENSITY OF COMPACTED HMA MIXTURES USING SATURATED SURFACE-DRY SPECIMENS
 - Updated references to other test methods
 - Updated to show correct formatting as far as degree symbols and F vs C for temperatures.
 - Deleted section 9.2 to bring MTM into alignment with the HMA Production Manual.

MTM Update

Updated MTMs

- 324 SAMPLING HMA PAVING MIXTURES BEHIND THE PAVER
 - Added the following language to 5.5: If pavement thickness allows for it two separate shovels full of mixture can be removed from each plate if a untouched sliver of HMA is between shovels. Updated and deleted Language to clear up confusion in the field
 - Deleted and updated Figures

Deleted MTMs

- 306 AIR AND WATER METHOD OF DETERMINING THE ACTUAL SPECIFIC GRAVITY BY SINGLE OPERATOR FOR A HMA MIXTURE
- 308 THE ASPHALT IMMERSION METHOD (BEAKER METHOD) FOR DETERMINING THE THEORETICAL MAXIMUM SPECIFIC GRAVITY OF HMA PAVING MIXTURES
- 311 DETERMINING AGGREGATE GRADATION FOR BITUMINOUS MIXTURE
- 322 HMA MIX DESIGN PROCEDURE

PWL Specification Update

Changed IPL Waiver Requirements

- Added: If an IPL was not completed for this mix design the contractor will be allowed to submit 4 consecutive QA tests, STA or PWL, from the current or prior season that meet the requirements in subsections e.3.C and e.3.D.
- Now allowed a waiver in consecutive seasons
- Deleted Section 2, requiring 2 lots to be completed.

Updated section references and links

PWL Specification Update

Reviewed PWL and STA data from 2019 through 2022

- STA
 - Spec limits for VMA, Air Voids and Binder Content were appropriate
 - Density was raised to 91.0 min density, 92.5 is min for full pay
 - The density pay equations were updated
 - If any individual PF is below 100 then the OSPF may not be greater than 100.
- PWL
 - Pay factors for Air Voids, VMA and Density were appropriate
 - Binder Content upper limit was adjusted to 0.50, the lower limit of 0.35 was appropriate
 - The action and suspension limits for binder content were updated
 - Sublot RQL limits were added for binder content

Mini-Stockpile is now required for sampling during wedging operations.

Stone Matrix Asphalt Update

2021 SMA Round Robin

Reviewed multiple state DOT specifications

Collected PWL and STA QA results from 2014 through 2021

Used the QA results to develop a new specification

New SP will be contractor option

Stone Matrix Asphalt Update

3 Pay Factors

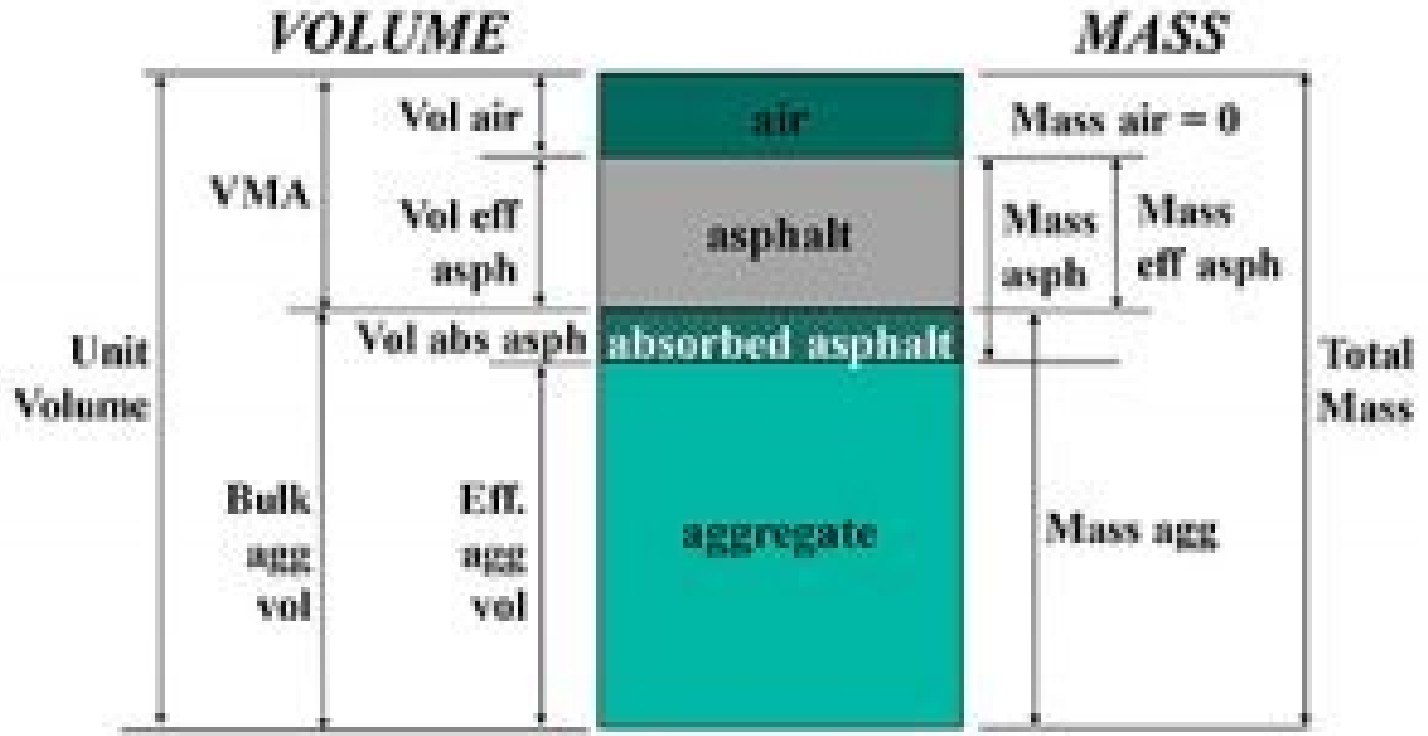
- Air Voids
- Volume of Effective Binder, V_{be}
- Density

Overall Lot Pay Factor

- Air Voids 30%
- V_{be} 30%
- Density 40%

Binder Content is a Quality Control parameter

Stone Matrix Asphalt Update



Stone Matrix Asphalt Update

Air Voids

- Spec Limit +/-1.50
- RQL +/-2.00

Vbe

- Target 15.00
- Spec Limits -1.00, +1.50
- RQL -1.50, +2.00

Density

- 92.50% Minimum

Stone Matrix Asphalt Update

Currently Reviewing 2023 projects to evaluate the changes.

Feedback from contractors and MDOT staff have been positive.

Consortium for Asphalt Pavement Research and Implementation (CAPRI)

- APAM and MDOT are members
- Purpose to improve asphalt pavements by addressing knowledge gaps and research needs in the industry.
- Stakeholders:
 - State, local, and federal highway agencies
 - Industry associations
 - Companies
 - Academic institutions
 - Research organizations

Upcoming Items

Look at Vbe spec for all HMA Mixes

Process for changing QA Labs during a project

MTM 320 and 321

- Cover Gsb testing
- Looking at how to deal with #8 Gsb
- Should we keep using and update the MTM or switch to a national method

FHWA Mobile Testing Trailer

- Looking to have it come to Michigan in 2024 or 2025

Acknowledgments

Tyler Hunt

Marc Beyer

Questions

Chuck Mills

Director of Engineering

Asphalt Pavement Association of Michigan

cmills@apa-mi.org

517-896-1468

Nate Maack

HMA Operations Engineer

Michigan Department of Transportation

maackn@michigan.gov

517-256-1595