

2022  
APAM  
Conference  
Hot Mix  
Asphalt  
(HMA)  
Update

NATHAN MAACK

HMA OPERATIONS

MICHIGAN DEPARTMENT OF TRANSPORTATION

2-23-22

# Hot Mix Asphalt (HMA) Update

- ▶ Local Agency Volumetric Specification
- ▶ Fine Texture Pavement Milling
- ▶ Changes to HMA Operations
- ▶ Asphalt Binder Update
- ▶ PWL Update
- ▶ 2020 Spec Book

# Local Agency Volumetric Specification

- ▶ Developed by the County Road Association
- ▶ Volumetric single test acceptance of dense graded HMA mixture for use on Local Agency Projects
- ▶ Historically Local Agency Projects accepted based on density, binder content, and gradation
- ▶ Pilot specification adds air voids and voids in mineral aggregate to acceptance
- ▶ Different spec limits, penalties and weighting of pay factors.
- ▶ Pilots started in 2020 and continue through 2022

# Fine Texture Pavement Milling

- ▶ FUSP 501 J
- ▶ For use on trunkline, one course, non-freeway mill and resurface projects
- ▶ Where the existing pavement condition allows for traffic to be maintained on the milled surface for up to 72 hours
- ▶ Allows for an increase in production paving and expedited project schedules
- ▶ Has a shorter paving train and fewer trucks entering and exiting the work zone at the same time

# Fine Texture Pavement Milling

- ▶ Ensure the milling operation is providing an acceptable surface texture by achieving a maximum Macro texture of 0.08 inches thickness according to ASTM E 965.







# Micro Cold Milling Hot Mix Asphalt (0-3.5 Inches)

- ▶ Use Statement :
  - ▶ Use on CPM Surface Seal projects that require the removal of a previous surface seal or where improved ride quality is desired. The integrity of the pavement should be suitable to allow traffic to be maintained on the milled surface.
- ▶ This was developed for use on CPM projects.
- ▶ There is no traffic restriction written into the special provision.

# Changes to HMA Operations

- ▶ New Personnel
  - ▶ Mix Design Engineer: Michelle Miller
    - ▶ Cell 517-256-6799
  - ▶ Transportation Technician Recognized Resource: Josh Arritt
    - ▶ Vicki Theis retired October 2021

# Update on Asphalt Binders

- ▶ Updates to AASHTO M320
- ▶ 20SP-501C-02 PRICE ADJUSTMENTS ON PERFORMANCE GRADE ASPHALT BINDERS
- ▶ Added: *The following note (g) has been added to the 2020 Standard Specifications for Construction, Table 904-1, Table 904-2, and Table 904-3 Pressure Aging Vessel Residue Dynamic Shear: (g) The maximum intermediate temperature stiffness,  $G^* \sin\delta$ , is 5000 kPa. If the intermediate phase angle is greater than or equal to 42 degrees, the maximum intermediate temperature stiffness,  $G^* \sin\delta$ , is 6000 kPa.*

# PWL Specification Update

- ▶ Reviewed Gse data
  - ▶ Changed the upper limit to 0.025
  - ▶ Kept the lower limit at 0.020
- ▶ Updated PWL and STA spreadsheet

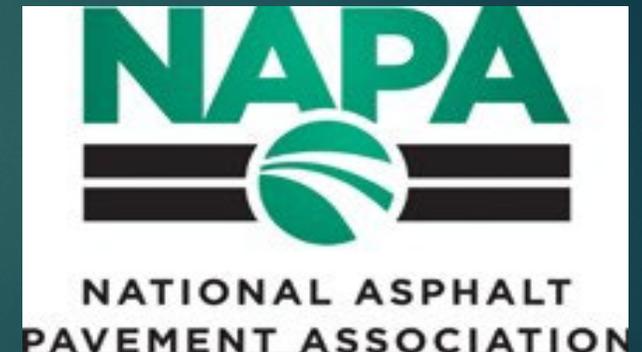
# 2020 Spec Book

- Reduction of HMA Mixes
- Incorporation of FUSPs
- Removal of Seasonal Limitations



# National Peer Review

- ▶ States have reduced or simplified the number of gyration levels
- ▶ Working towards simplifying gyration level categories
- ▶ Michigan has too many different gyrations levels





# New MDOT Mix Designations

- ▶ Major changes made to Tables 501.2, 501.3 and 902.6
  - ▶ New Mix Design Designations
  - ▶ Changes mostly relevant to Mix Designers
- ▶ Minor changes to Tables 501.1, 501.4 and 902.5

# New MDOT Mix Designations

Estimated Traffic (million ESAL)		Mix Type		Number of Gyration Ni, Nd, Nm	
2012	2020	2012	2020	2012	2020
0.0-0.3	0.0-0.3	LVSP	EL	6, 45, 70	7, 50, 75
0.0-0.3		E03		7, 50, 75	
0.3-1.0	0.3-3.0	E1	EML	7, 76, 117	7, 75, 115
1.0-3.0		E3		7, 86, 134	
3.0-10	3.0-30	E10	EMH	8, 96, 152	8, 100, 160
10-30		E30		8, 109, 174	
30-100	30-100	E50	EH	9, 126, 204	9, 125, 205

# New MDOT Mix Designations

2012 Mix Type	2020 Mix Type	2012 Crush (Min)		2020 Crush (Min)	
		Top & Leveling	Base	Top & Leveling	Base
LVSP	EL	55/-	-	55/-	-
E03		55/-	-		
E1	EML	65/-	-	75/-	50/-
E3		75/-	50/-		
E10	EMH	85/80	60/-	90/85	80/75
E30		95/90	80/75		
E50	EH	100/100	95/90	100/100	95/90

- ▶ Table 902-6
  - ▶ Took the higher requirement for the new mix type
  - ▶ The exception is crush on EMH

# Table 902-6

For information only 2020 Spec Book with Errata as of 01-07-22

Section 902

**Table 902-6:  
Superpave Final Aggregate Blend Physical Requirements**

Est. Traffic (million ESAL)	Mix Type	Minimum Criteria						Maximum Criteria							
		% Crushed <sup>(a)</sup>		Fine Aggregate Angularity		% Sand Equivalent		LA Abrasion % Loss <sup>(b)</sup>		% Soft Particles <sup>(c)</sup>		% Flat and Elongated Particles <sup>(d)</sup>			
		Course(s)													
		Top and Leveling	Base	Top and Leveling	Base	Top and Leveling	Base	Top and Leveling	Base	Top and Leveling	Base	Top and Leveling	Base	Top and Leveling	Base
<0.3	EL	55 / —	—	—	—	40	40	45	45	10	10	—	—		
≥0.3 – <3	EML	75 / —	50 / —	43	40	40	40	35	40	5	5	10	10		
≥3 – <30	EMH	90 / 85	80 / 75	45	40	45	45	35	35	3	4.5	10	10		
≥30 – <100	EH	100 / 100	95 / 90	45	45	50	50	35	35	3	4.5	10	10		

ESAL = equivalent single-axle load

(a) XX / YY denotes that XX% of the coarse aggregate has one fractured face and YY% has at least two fractured faces.

~~(b) If a blend of different aggregate sources, the abrasion value applies to each source.~~

(c) Soft particles maximum is the sum of the shale, siltstone, ochre, coal, clay-ironstone, and particles that are structurally weak or non-durable in service.

(d) Maximum by mass with a 1:5 aspect ratio.

Clarifies abrasion maximums are based on the combined blend

# Reduction of HMA Mixes

## MICHIGAN DESIGN MANUAL ROAD DESIGN

### 6.03.09A1d (continued)

#### Hot Mix Asphalt (HMA) Mixture Selection Guidelines

##### *North, Grand, Bay, Southwest and University Region*

Mixture Type	HMA Mainline and Ramps		High Stress HMA	
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

##### *Superior Region*

Mixture Type	HMA Mainline and Ramps		High Stress HMA	
EL, EML, EMH	PG 58-34 PG 58-28	Top & Leveling Course Base Course	PG 64-34P PG 58-28	Top & Leveling Course Base Course

##### *Metro Region*

Mixture Type	HMA Mainline and Ramps		High Stress HMA	
EH, SMA	PG 70-22P PG 64-22	Top & Leveling Course Base Course	PG 76-22P PG 64-22	Top & Leveling Course Base Course
EML, EMH	PG 64-22 PG 58-22	Top & Leveling Course Base Course	PG 70-22P PG 58-22	Top & Leveling Course Base Course
EL	PG 58-22	Top, Leveling & Base Course	PG 64-22 PG 58-22	Top & Leveling Course Base Course

#### NOTES:

1. For shoulders paved greater than or equal to 8 feet or in a separate operation, use PG 58-28 for top and leveling course and PG 58-22 for base course for all Regions
2. For Temporary Roads, commercial and private Approaches, Wedging, and Hand Patching, use PG 64-22 for all Regions except Superior and North, use PG 58-28.

# Removal of Seasonal Limitations

- Weather is a determining factor
- Seasonal limitations are often exceeded
- Project clauses in proposal dictate schedules
- Construction Manual Revisions will include guidance on timing of projects relative to HMA plant operations

# FUSPs Incorporated Into 2020 Spec Book

- ▶ 501BB – Safety Edge
- ▶ 501FF – Low Tracking Bond Coat Emulsified Asphalt
- ▶ 501GG – Cold Milling Hot Mix Asphalt Surface
- ▶ 501L – Temporary Hot Mix Asphalt Pavement Quality and Compliance
- ▶ 501U & 501V – Some terminology from PWL FUSPs incorporated

# QUESTIONS?

Nathan Maack  
HMA Operations Engineer  
Michigan Department of  
Transportation  
[maackn@michigan.gov](mailto:maackn@michigan.gov)  
517-256-1595