WisDOT Asphalt Bid/Mix Specification Updates

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Agenda

- Terminology
- Specification Changes
- Combining HMA Bid Items
- Contacts & Questions

Terminology

- Binder = Performance Graded (PG) Binder
  - NOT Pavement Layer
- Upper Layer
  - DOT language for “Surface Layer”
- Lower Layer
  - DOT language for “Binder Layer”

HMA Tech Team Updates

- Mix Design Review Updates
- Tack Coat
- Percent Within Limits (afternoon breakout)
- High Recycle Implementation (afternoon breakout)
- Annual Round Robin - Ongoing
- WHRP Research (Wednesday morning)
- Combined Bid Specification

Mix Design Process

- Standardized spreadsheet submittal in 2016
- Added emphasis on department review of materials
- Mix design life

Mix Design Submittal Form

WisDOT MIX DESIGN STANDARD DATA DETAIL

For dept use only

WisDOT Project #:		Design Lab or Company:		WisDOT Mix Design ID:	
Mix Design ID:		*Mix Designer:		WisDOT Design Verification Date:	
Mix Type:		Designer HTCP Cert ID#:			
NMAS:		Producer:			
Virgin Binder PG:		Plant #/location:		Design Amended Date:	
Virgin Binder Gb:		Design Date:		Last JMF Change Date:	
Virgin Binder Source:					

Primary AC Source/ Type

*Note: Typed not Signature Block

1 3 4

Instructions: Cells that are light blue are data field for user to enter data all other cells are locked.

AGGREGATE COMPONENT GRADATION DATA

	Agg 1	Agg 2	Agg 3	Agg 4	Agg 5	Agg 6	Agg 7	Agg 8	RAM 1	RAM 2	RAM 3	JMF BLEND
Blend %s (0.1)												0.0
Virgin Agg. Blend												0.0
Material Description												
Source ID/Name												
P or Q or MF or Dust												
WisDOT Agg Test ID												Gse:
RAM Extracted % Binder												SE:
Sieve (mm)												
1 1/2" 37.5												0.0
1" 25.0												0.0
3/4" 19.0												0.0
1/2" 12.5												0.0
3/8" 9.5												0.0
#4 4.75												0.0
#8 2.36												0.0
#16 1.18												0.0
#30 0.60												0.0
#50 0.30												0.0
#100 0.15												0.0
#200 0.075												0.0
Gsb:												0.000
CAA 1F:												0.0
CAA 2F:												0.0
FAA:												
Moisture Abs:												0.0
Thin/Elong:												0.0

2 5 6 7

JMF PROPERTIES AT OPTIMUM % BINDER

	HMA	Warm Mix
Rec. Mix Temp:		
Compact Temp:		
*Type Additive:		
*Amt. Additive:		

* Additive used in initial bid, additional additives may be added in the comments section.

SMA Draindown:			
1		Pbr:	#DIV/0!
2		Pbe:	#DIV/0!
Avg.	#DIV/0!	Pba:	#DIV/0!
		Dust/Binder:	#DIV/0!
		Gmm Dryback (%):	

8 14

Alternate Sources

Alternate AC Source	AC Type	Gb	TSR**	# of Gry.	Additive*	Dosage:

9

* additive for alternate Binder can be done using JMF form

** TSR Values are required when a change in source is from a modified AC to a unmodified AC

CMM 8.66.2.3.2

TRIAL AC DATA

	Total % Binder	Added % Binder	Gmm	Gmb	% Air Voids	% VMA	%VFA
Trial 1							
Trial 2							
Trial 3							
Trial 4							
OPTIMUM							

10 11

COMPACTION EFFORT/LEVELS -Primary Binder

	Nini	Ndes	Nmax	TSR
# of Gyrations				
%Gmm at Optimum				

12

Comments:

13

WISCONSIN DEPARTMENT OF TRANSPORTATION

2015 Updates - Tack Coat

- Increased application rate from 0.025 to 0.05-0.07 gal/sy
- Unify layers – increased bond strength
- “Tack is cheap insurance – Use it!”

Tack Application Rates

Tack – Next Steps

HMA Round Robin

- Completing the 2015-2016 Version
- Reducing the number of QV Disputes (5-6%)
- Except for 1 project, lowest number in last 3 years
  - Under 30 if one project removed

Wisconsin Highway Research Program

- Current HMA Related Research
  - HMA Joint Density & Construction
  - HMA Durability
  - HMA Performance Testing
  - Asphalt Content Testing
  - QMP impacts

2015 Updates – PG Binder Designation

Polymer

PG 58-28 P

Performance Grade

Average 7-day max pavement design temp
(58 °C / 136 °F)
To Resist Rutting

Min pavement design temp
(- 28 °C / - 18 °F)
To Resist Cracking

2015 Updates – Binder Grade Change

- PG = Performance Graded
- Eliminated the use of PG 64-22 in 2015
- Why?
  - -22 C = -8 F
  - Not the proper binder for Wisconsin Climate
- Other binder changes coming later in the presentation…

2016 Combining HMA Bid Items

- When
  - 2017 Standard Specification
  - Available by STSP in February 2016
- Why
  - Streamline the bidding and estimating processes
  - Aid design/development staff in preparing estimates
  - Simplify the choice of PG Binders for the marketplace

Combining Bids - What Is It?

Combined Bid will take the asphalt binder (PG) and mix type (ESALs, gradation/NMAS, etc) and combine them into a single bid item

This allows for WisDOT to provide a shortlist of approved mix types to be bid

Mix Selection System

- Steps: Sub Sandwich Pavement Selection
  - Step 1: Aggregate Gradation (Nmax) (Bread)
  - Step 2: Traffic Category (Meat)
  - Step 3: PG Binder (Veggies)
  - Step 4: PG Binder Traffic Designation (Cheese)
- Result – Mix from the list – LUNCH!!!

Step 1: Gradation (Nmas) – Bread

- Know what layer you are designing
- Old SS 460
  - 12.5mm Upper Layer
  - 19mm Lower Layer

Step 1: Gradation (Nmas) – Bread

- New System
  - 1 – 37.5 mm
  - 2 – 25.0 mm
  - 3 – 19.0 mm
  - 4 – 12.5 mm
  - 5 – 9.5 mm
  - 6 – 4.75 mm

- Upper Layer Options
  - 4 -12.5 mm
  - 5 – 9.5 mm
  - 6 – 4.75 mm

- Lower Layer Options
  - 2 – 25.0 mm
  - 3 – 19.0 mm
  - 4 – 12.5 mm

Step 2: Traffic Level (Meat)

Existing		New	
Load Category	ESALs	Category	ESALs
E0.3	<300,000	LT	< 2 million
E1	300,000 to < 1 million		
E3	1 million to <3 million	MT	2 million to <8 million
E10	3 million to <10 million		
E30	10 million to <30 million	HT	≥8 million
E30X	>30 million		
SMA	Not Rated	SMA	consider for ≥5 million

Step 2: Traffic Level (Meat)

Existing		New	
Load Category	ESALs	Category	ESALs
E0.3	<300,000	LT	< 2 million
E1	300,000 to < 1 million		
E3	1 million to <3 million	MT	2 million to <8 million
E10	3 million to <10 million		
E30	10 million to <30 million	HT	≥8 million
E30X	>30 million		
SMA	Not Rated	SMA	consider for ≥5 million

Reduces 7 mix categories to 4 – Fewer mix designs!

Step 3: Binder Grades (Veggies)

- Remember – Where am I?
  - Northern or Southern Zone
- Layer
  - Lower or Upper

Step 3: Wisconsin Climate Zones

Step 3: Binder Grades (Veggies)

- Northern Zone
  - New construction, reconstruction or pavement replacement
    - Upper Layers: PG 58-34
    - Lower Layers: PG 58-28
  - Other projects (Overlay, etc.)
    - All Layers: PG 58-28

Step 3: Binder Grades (Veggies)

- Southern Zone
  - All Layers, All types of construction (replacement & overlay)
  - PG 58-28

Step 4: Binder Traffic Designation (Cheese)

- Based on Multiple Stress Creep Recovery (MSCR) testing at the climatic high temperature at the design location (AASHTO M332 Testing)
- Grade bumping to be adjusted using MSCR designation, not E mix or PG Grade
  - Ex: Moving from an E1 to an E3
  - Ex: Moving from a PG 58-28 to a PG 64-28

Step 4: Binder Traffic Designation (Cheese)

- Binder grades to be based on expected traffic level:
  - S – Standard – Normal projects
  - H – Heavy – Higher truck movements, roundabouts, turn lanes
  - V – Very Heavy – Extreme traffic, stopping & starting
  - E – Extremely Heavy – Toll Booths, Port Facilities (Not included)
- Example (old to new): PG 64-28P → PG 58-28 H
  - H, V & E replaces the “P” Grades

Step 4: Binder Traffic Designation

Specified Binders for Wisconsin

Old System	New System
58-28	58-28 S
64-28	58-28 H
70-28	58-28 V
58-34	58-34 S
64-34	58-34 H
70-34	58-34 V

Let's put it all together!

Step 1		Step 2		Step 3	Step 4	
Gradations (Nmas)		**Traffic Level**		**Asphalt Binder**	**Designation Level**	
1	37.5 mm	LT	Low Traffic Vol. (40 gyrations)	58-34	S	Standard
2	25.0 mm	MT	Medium Traffic Vol. (75 gyrations)	58-28	H	Heavy
3	19.0 mm	HT	High Traffic Vol. (100 gyrations)		V	Very Heavy
4	12.5 mm				E	Extremely Heavy
5	9.5 mm					
6	4.75 mm					

4 LT 58-34 S

Gradation

Traffic Level

Binder Grade

Binder Designation

So, for this example:

- Gradation = 12.5 mm
- Traffic Level = < 2 mil ESALs
- Binder Grade = 58-34
- Binder Designation = Standard

< 2 Mil ESALs			
Low Volume			
3	LT	58-34	S
4	LT	58-34	S
5	LT	58-34	S
3	LT	58-28	S
4	LT	58-28	S
5	LT	58-28	S

2 to <8 Mil ESALs			
Med Volume			
2	MT	58-34	S
3	MT	58-34	S
4	MT	58-34	S
5	MT	58-34	S
2	MT	58-28	S
3	MT	58-28	S
4	MT	58-28	S
5	MT	58-28	S
4	MT	58-34	H
5	MT	58-34	H
4	MT	58-28	H
5	MT	58-28	H

≥8 Mil ESALs			
High Volume			
2	HT	58-34	S
3	HT	58-34	S
4	HT	58-34	S
5	HT	58-34	S
2	HT	58-28	S
3	HT	58-28	S
4	HT	58-28	S
5	HT	58-28	S
2	HT	58-34	H
3	HT	58-34	H
4	HT	58-34	H
5	HT	58-34	H
2	HT	58-28	H
3	HT	58-28	H
4	HT	58-28	H
5	HT	58-28	H
4	HT	58-34	V
5	HT	58-34	V
4	HT	58-28	V
5	HT	58-28	V

≥5 Mil ESALs			
SMA			
4	SMA	58-34	H
5	SMA	58-34	H
4	SMA	58-28	H
5	SMA	58-28	H
4	SMA	58-34	V
5	SMA	58-34	V
4	SMA	58-28	V
5	SMA	58-28	V

Total of 46 bid combinations.

System easily amendable as changes are needed.

< 2 Mil ESALs			
Low Volume			
3	LT	58-34	S
4	LT	58-34	S
5	LT	58-34	S
3	LT	58-28	S
4	LT	58-28	S
5	LT	58-28	S

2 to <8 Mil ESALs			
Med Volume			
2	MT	58-34	S
3	MT	58-34	S
4	MT	58-34	S
5	MT	58-34	S
2	MT	58-28	S
3	MT	58-28	S
4	MT	58-28	S
5	MT	58-28	S
4	MT	58-34	H
5	MT	58-34	H
4	MT	58-28	H
5	MT	58-28	H

≥8 Mil ESALs			
High Volume			
2	HT	58-34	S
3	HT	58-34	S
4	HT	58-34	S
5	HT	58-34	S
2	HT	58-28	S
3	HT	58-28	S
4	HT	58-28	S
5	HT	58-28	S
2	HT	58-34	H
3	HT	58-34	H
4	HT	58-34	H
5	HT	58-34	H
2	HT	58-28	H
3	HT	58-28	H
4	HT	58-28	H
5	HT	58-28	H
4	HT	58-34	V
5	HT	58-34	V
4	HT	58-28	V
5	HT	58-28	V

≥5 Mil ESALs			
SMA			
4	SMA	58-34	H
5	SMA	58-34	H
4	SMA	58-28	H
5	SMA	58-28	H
4	SMA	58-34	V
5	SMA	58-34	V
4	SMA	58-28	V
5	SMA	58-28	V

Total of 46 bid combinations.

Key mixes highlighted in yellow

Guidance Tools

- FDM Chapter 14-10.5
  - Updated to provide guidance
  - Step through the process
- Examples to be inserted in Pavement Design Manual (WisPAVE Manual)
- WAPA
  - Handout Guide
  - Website Selection Tool
    - www.wispave.org

Example – 141 Marinette County

9” New Construction
2” – 4 HT 58-34 S
7” – 3 HT 58-28 S
or
3.5” – 3 HT 58-28 S
3.5” – 3 HT 58-28 S

You pick the new pavement

Design Information:

- County trunk highway in Ashland County
- 1.4 million design ESAL's
- 2" Mill & Overlay project
- No major traffic generator
- Not a major log hauling route

- Choices:
- A: 3 LT 58-28 S
- B: 4 MT 58-34 H
- C: 4 LT 58-28 S
- D: 2 HT 58-34 S

You pick the new pavement

Design Information:

- County trunk highway in Ashland County
- 1.4 million design ESAL's
- 2" Mill & Overlay project
- No major traffic generator
- Not a major log hauling route

- Choices:
- A: 3 LT 58-28 S
- B: 4 MT 58-34 H
- **C: 4 LT 58-28 S**
  - **12.5mm, Low Traffic, Standard PG Grade & Traffic**
- D: 2 HT 58-34 S

You pick the new pavement (2)

Design Information:

- County trunk highway in Dane County
- 2.4 million design ESAL's
- 5" Roundabout – new construction
- Pavement Designer has chosen a 2" 12.5mm upper and 3" 19mm lower layer

- Choices:
- A: Up: 2" 4 MT 58-28 S
  Lower: 3" 3 MT 58-34 S
- B: Up: 2" 4 LT 58-34 S
  Lower: 3" 3 LT 58-28 S
- C: Up: 2" 4 MT 58-28 H
  Lower: 3" 3 MT 58-28 S

You pick the new pavement (2)

Design Information:

- County trunk highway in Dane County
- 2.4 million design ESAL's
- 5" Roundabout – new construction
- Pavement Designer has chosen a 2" 12.5mm upper and 3" 19mm lower layer

- Choices:
- A: Up: 2" 4 MT 58-28 S
  Lower: 3" 3 MT 58-34 S
- B: Up: 2" 4 LT 58-34 S
  Lower: 3" 3 LT 58-28 S
- C: Up: 2" 4 MT 58-28 H
  Lower: 3" 3 MT 58-28 S

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Questions/Comments