2024 MN Asphalt Conference & Trade Show

Bituminous Update

December 11, 2024

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Update Items

- TH 65
- Warm Mix Asphalt Provision
- High RAM/RAP
- Superpave 5
- Balanced Mix Design (BMD)
- Specification Items

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TH 65

- SP 0208-165
  - Anoka Co. on TH 65 from CSAH 10 to 237th Avenue NE
    - Blaine to Bethel
- Mill (2.5”) and 1-lift Superpave (2.0”) and UTBWC final lift.
- Previous construction issues related to vibratory compaction:
  - High water table
  - Anoka blow sand

TH 65 Special Provision

- Prescriptive Compaction Modification:

S-65 **(2360) PLANT MIXED ASPHALT PAVEMENT**

REVISED 10/14/22

S-65.1 Add the following to MnDOT 2360.3 D, "Compaction":

Compaction of the SPWEB440F mixture placed on MN65 (CENTRAL AVE), FROM CSAH 10 (MOUNDS VIEW BLVD) TO 217TH AVE IN EAST BETHEL will be performed with all rollers in static mode. Vibratory or oscillatory mode of rollers will not be allowed.

The Contractor will be required to furnish and maintain a rolling train utilizing a minimum of five (5) rollers meeting the following requirements to compact the mixture.

2 – Steel Wheeled Rollers

A minimum of 2 steel wheeled rollers shall be self-propelled and have a minimum mass of 8 tons. Vibratory or Oscillatory mode will not be allowed.

3- Pneumatic Tired Rollers

A minimum of 3 pneumatic tired rollers shall be self-propelled and have a minimum total mass of 8 tons. If equipped, Vibratory mode will not be allowed.

The Contractor will determine placement or order of the rollers in the rolling train. Do not allow rollers to stand on the uncompacted mix or newly rolled pavement with a surface temperature greater than 140F. Do not roll with steel-wheeled rollers if rolling produces aggregate that is crushed, cracked, or pulverized or causes displacement of the mixture. Compact mixture in accordance with 2360.3 D.1 Maximum Density. Monetary adjustments for Density as discussed in 2360.5 B.13 will include Incentive payment but exclude Disincentive payment. However, if a single core density is less than 87.0 percent of Gmm the Engineer will decide if the mixture is subject to removal and replacement or if a monetary deduction of 50 percent of the relevant Contract Unit Price will be applied.

TH 65 Superpave Density Results

- Average Density – 93.3%
- Project Low Density – 88.3%
- Project High Density – 97.7%

TH 65 Superpave Density Pay

- SPWEB440F – 93,183 tons
  - Total of 452 cores taken
    - » Total Incentive Possible: $557,000
    - » Incentive Achieved: $371,000 (67%)

Warm Mix Asphalt Option with Incentive

- WMA: Mix produced with an additive and temperature less then 275F exiting the drum.
- Incentive based on mix temperature

Table 2360.2-1A

Warm Mix Asphalt Incentive Payment

Plant Mixing Temperature	Incentive Payment, percent
≥ 275°F	0
250°F - 275°F	2
< 250°F	4

Why WMA?

- Help reduce GHG and carbon footprint.
- Less aging of the mix during production.
- Many WMA additives act as liquid anti-strip as well as a WMA.
- Many WMA additives improve compaction.

2025 Projects Including WMA Option

- District 1 – 2 Projects
  - SP 6930-41 (TH 73) -- 80,000 tons
  - SP 3104-61 (TH 2)
- District 4 – SP 5680-147 (I-94) -- 22,860 tons
- District 6 – 2 Projects
  - SP 5080-179 (I-90) -- 6,700 tons
  - SP 5502-106 (TH 14) -- 3,000 tons
- District 7 – 2 Projects
  - SP 0708-47 (TH 60) --50,000 tons
  - SP 4603-52 (TH 15) -- 15,000 tons


High RAP

High RAP Special Provision

- Promote sustainability and reduce carbon footprint.
- High RAP = 40-45% RAP
  - Mix requires use of Recycling Agent (RA)
    - » Added at the plant
- Mixture Performance Tests Required:
  - Hamburg Wheel Track Tester
  - DCT

Minnesota RAP History

- Minnesota was a pioneer in use of RAP.
  - 1976-- Conway Avenue (McKnight to TH 120) Maplewood, Mn
    - » Estimated costs: $8/ton recycle, $10/ton virgin
  - Utilized a “Heat Transfer Method”
  - Prior to this project, all HMA in Minnesota was virgin material only
    - » Very few, if any, milling machines
  - 70% RAP material was allowed in mixture

2024 High RAP Projects

- Metro – SP 7009-85
  - TH 169 (Chaska) Shoulders
    - » SPWEB330C – 38% RAP
- District 1 – SP 6935-94
  - TH 169 (Mt. Iron) Shoulders
    - » SPWEA340C – 40% RAP

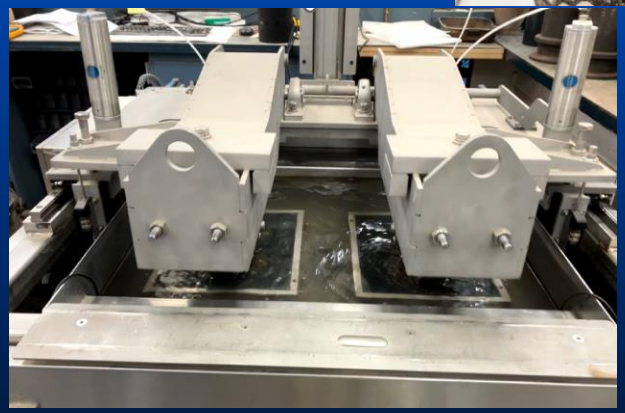
2025 High RAP Option Projects

- District 3 – SP 8001-44
  - TH 10 (Wadena) Shoulders
- District 4 – SP 5680-147
  - I-94 (Alexandria) Shoulders
    - » High RAP & WMA Options

High RAP Considerations

- Shoulder Mix
- Shoulder Mix and Non-Wear Mix
- Shoulder Mix and Non-Wear and Wear Mix

Superpave 5



Superpave 5 Background

- Superpave 5 designs mixtures at 5% air voids and also compacts mixtures in the field at 5% air voids
  - Currently, mixes are designed at 4% air voids and compacted at 8% air voids in the field
- Superpave 5 focuses on aggregate gradation changes and reduced gyrations without significant changes to asphalt binder content

Superpave 5 Average Density Data by Traffic Level

2024	
Traffic Level	**Average**
2&3	94.7%
4&5	94.2%

Superpave 5 for 2025

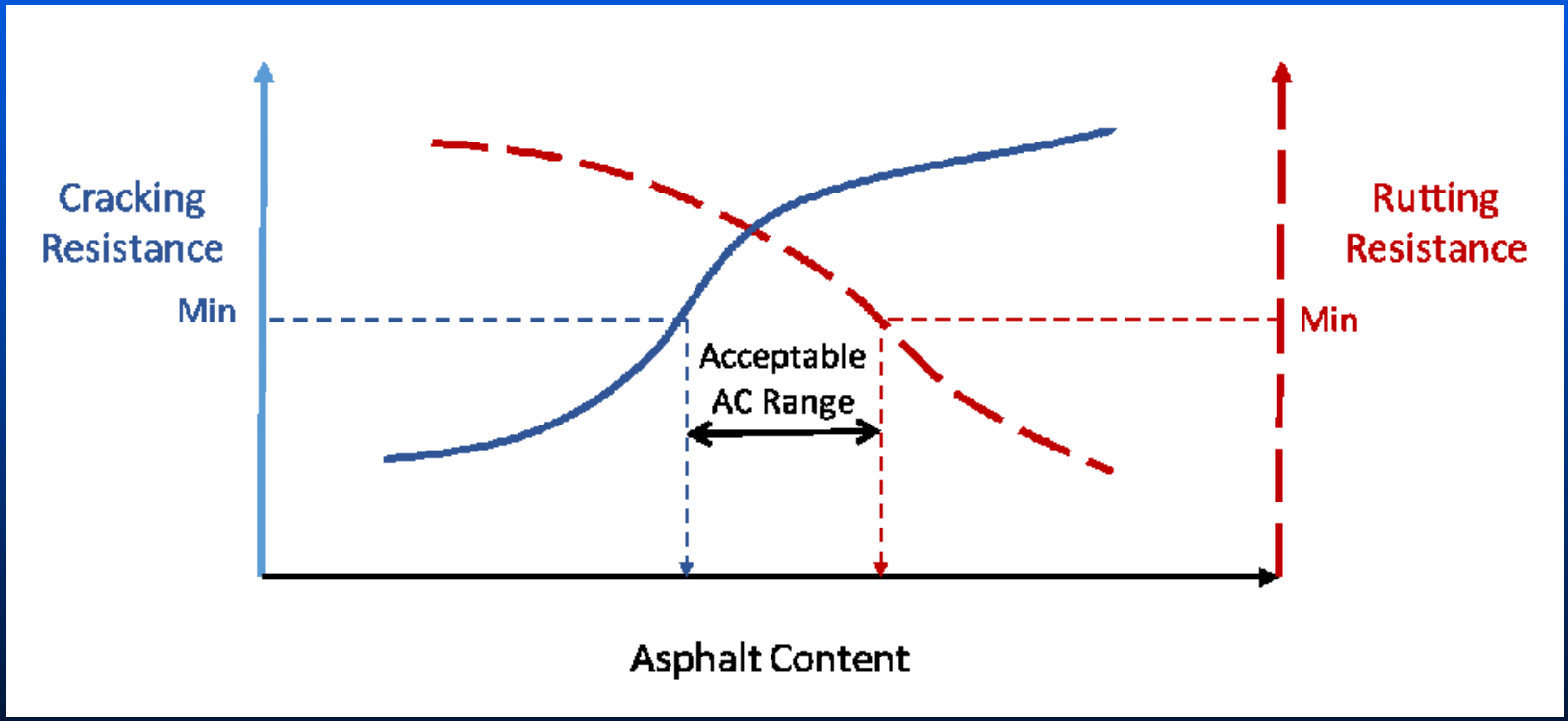
- No changes to provision. Will continue with Pilot Provision #2 as most current provision.
  - DCT
  - Hamburg
- Districts will continue to select projects.
- No immediate plans for full implementation.

Balanced Mix Design (BMD)

- What is BMD?
  - "asphalt mix design using performance tests on appropriately conditioned specimens that address multiple modes of distress taking into consideration mix aging, traffic, climate and location within the pavement structure" FHWA 2015

Why BMD?

- Address concerns with durability and cracking.

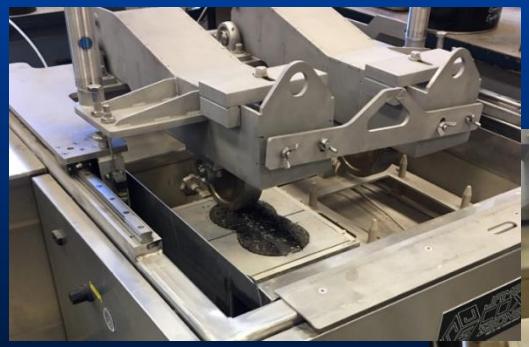


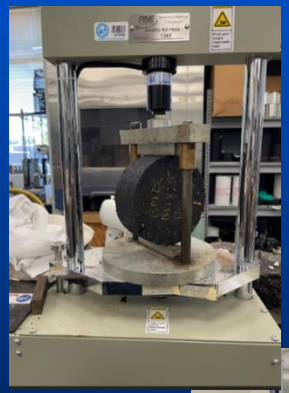
What Test Equipment is Used for BMD?

- Rutting:
  - Hamburg Wheel Track Tester
  - Asphalt Pavement Analyzer
  - Flow Number
- Cracking
  - Disc Shaped Compact Tension Test (DCT)
  - Illinois Flexibility Index Test (I-FIT)
  - Texas Overlay Tester
  - Indirect Tension Asphalt Cracking Test (IDEAL-CT)

BMD Status in Minnesota

- Currently benchmarking mixes.
- Performance Test Equipment:
  - Hamburg Wheel Track
  - IDEAL-CT





Special Provision Updates

- 2360 Plant Mixed Asphalt Pavement
  - Traffic Level Table, corrected ESAL nomenclature (Table 2360.1-1)
  - Changed title Bituminous Plant II to Bituminous Mix Designer
  - Language clarification 2360.2F
  - Change title of Bituminous Plant I to Bituminous Plant Tester
  - Changed AFT units from micrometers to microns
  - Correction of Longitudinal Joint Density Incentive/Disincentive pay factors

  - Mixture Sampling and testing procedure clarification
  - Test every verification and verification split for CAA and FAA

Mixture Sampling

- Sampling Locations:
  - Behind the paver, or
  - Truck box at the plant site, or
  - Other locations approved by the Engineer

Verification Sample

- Requirements:
  - At least once per day the Engineer will randomly determine when the mixture sample will be sampled.
  - Engineer will observe Contractor sampling and splitting the sample and take immediate possession of the Agency's sample.
    - » Engineer will include this sample with other QA samples taken during the day and randomly select at least one sample for Agency testing.

Coarse & Fine Aggregate Angularity

- CAA & FAA Testing:
  - Clarified that both the Verification and Verification Companion must be tested for FAA & CAA.


A road with trees on the side
Thank You