Topics

• Asphalt Binder Testing
• Updates to Specifications for 2020
• Cold Weather Paving
• Cold In-Place Recycling
• Longitudinal Joint Construction
• Longitudinal Joint Density
• PWL Summary
• Wisconsin Research.
Asphalt Binder Testing
Asphalt Binder Content Testing

• Required starting with the December 2018 Letting
• Pay Credits based on QV testing:
  ▪ 0.4 to 0.5% below mix design target
    • 75% pay
  ▪ More than 0.5% below mix design target
    • remove and replace or 50% pay if allowed to remain in place
Asphalt Binder Content Testing

• QV testing results for 2019
  ▪ 877 QV tests in 2019
  ▪ 27 Noncompliant QV tests (AV, VMA and/or AC)
  ▪ 7 of 27 had low binder content - 0.8%
  ▪ 4 of the 27 were AC only
    • 2 were confirmed by BTS to be -0.4% below JMF
  ▪ 3 of the 27 were AC and VMA or AV
    • 1 was confirmed by BTS to be -0.4% below JMF
2020 Specification Updates

• Tack Coats
• 4.75mm Mixes
• Interlayer Mixes
• Nuclear Density Testing
• Cold Weather Paving
• QMP Updates
Tack Coat

• Nonconforming tack defined
  - Tack coat tracked offsite or to other areas of the construction site
  - Excess tack coat accumulation in puddles
  - Areas with insufficient residual asphalt content.

• Only allow h-type emulsions
  - SS-1h, CSS-1h, QS-1h, CQS-1h

• Allow up to 72 hours between tacking and paving on closed lanes
No. 6 (4.75-mm) HMA via ASP-6

• Gradation and agg quality added to SS 460
  ▪ VMA is a range (16.0 – 17.5)
• Min-max thickness: 0.75 – 1.25 inches
• Density
  ▪ Upper layers: 450.3.2.6.2 *NEW* roller pattern by growth curve
  ▪ Lower layers: 450.3.2.6.3 ordinary compaction
• Uses
  ▪ Upper layer at design speeds of 45 mph or lower
  ▪ Lower layer or wedging/leveling layer
Interlayer STSP

• 1.0 inch thick, low void, highly elastic mix
  ▪ Mitigate amount and severity of reflective cracking for HMA overlays on PCC

• Performance Testing
  ▪ Flexural Beam Fatigue for mix design acceptance
  ▪ HWT and IDEAL-CT for information

• Density
  ▪ Roller pattern by growth curve with additional cores for information

• Base Patching using plunge milling at spalled joints & transverse cracks
CMM 8-15 Nuclear Density Testing

• Random locations for BOTH longitudinal and transverse offset
• Specify linear subplot system for all projects
  ▪ Nominal tonnage system eliminated
  ▪ Sublot layout and testing frequency based on:
    • Single paved lane length
    • Multiple lanes within a contiguous area
  ▪ Example layouts for mainline, roundabouts, and intersections
• Round pcf, and % density to nearest 0.1
• Testing times:
  ▪ Project testing (All HMA, soils, and base): 1-min
  ▪ Ref site and gauge comparison (CMM 8-15.7 & 8-15.8): 4-min
1 Lot (Single Day's Paving)

Offset Range 1
Offset Range 2
Offset Range 3

Note: 12 ft driving lane (typical). Required QC or QV tests determined by specification.

1 Sublot (1100 Lane Feet)

Segment 1
Segment 2
Segment 3

Reference Line

Divide lane into equal segments according to Table 2.

Note: May be necessary to move tests relative to tapered edge. Required QC or QV tests determined by specification.
1 Sublot (420 Centerline Feet)

Note: 12 ft driving lane (typical), required QC or QV tests determined by specification.
CMM 8-36 QMP - HMA

• $G_{mm}$, $G_{mb}$, and Compaction testing procedures updated to WisDOT-Modified AASHTO
• Ignition Oven:
  - WisDOT will use Ignition Oven for AC% testing unless otherwise stated
  - Individually-packaged samples required for all ignition oven correction factors
  - New requirement for correction factor sample labeling
    - Now includes reason for submittal (new design, annual re verification, other)
Cold Weather Paving

REMAINING COOL BELOW AVERAGE TEMPERATURES LIKELY FOR THE FIRST HALF OF NOVEMBER
Cold Weather Paving

• Communication, Communication, Communication

• Short term, daily
  ▪ Identify normal, cold weather or no paving

• Long term
  ▪ Identify possible paving days on long range forecast
  ▪ Identify critical paving needing completion
  ▪ Identify paving that could be pushed to next season
  ▪ Prioritize all paving
  ▪ Stage work accordingly!
CIR - Cold In-place Recycling
CIR - Cold In-place Recycling

• STSP Updates for May 2020 Lets
  ▪ Targets 2.0% +/- 0.30% foamed asphalt
  ▪ Targets 2.0% +/- 0.30% mix water
  ▪ Mix design still required
    • Informational purposes
    • Region may request test strip @ mix design targets
  ▪ Supporting SPV’s aligned to make bidding easier
CIR- Cold In-place Recycling
Longitudinal Joint Construction
Longitudinal Joint Construction

• SDD 13C19 updated to include all joint types
• Notched wedge joint required for all HMA layers ≥ 1.75 inches
  ▪ Only milled out for SMA or as directed by the engineer to address specific lengths of damaged joint
  ▪ State-wide special provision available for wedge removal
• Discontinue specifying joint heaters
• Include Longitudinal Joint Density SPV on all PWL projects
  ▪ Non-PWL projects will require joint density measurements for information in 2021 spec
Implementation of New Longitudinal Joint Construction

• Feb 2020 PSE  (starting with May 2020 Letting)
  ▪ Notched wedge joint used on all mainline HMA layers ≥ 1.75”
  ▪ Wedge only milled out for SMA and when joint is damaged by traffic as directed by the engineer
    • Statewide STSP 204-045 used for wedge removal (rarely)
  ▪ LJD STSP included on all PWL projects
  ▪ Discontinue use of joint heater STSP

• Aug 2020 PSE  (starting with Dec 2020 Letting)
  ▪ Begin collecting joint density for information on Dec 1 letting
  ▪ 2021 Standard Spec will be edited to require collection of joint density data on all projects that don’t include the LJD SPV
GENERAL NOTES

In addition to the details provided in this drawing, conform to standard specification 402.03 for precast concrete joint construction requirements.

For all longitudinal joints, ensure the precast material overlaps the previously placed pavement by 1' 4-1/2" and the hot side of the joint 1-1/2" wider than the cold side by approximately 1-1/2" after final construction.

Only remove the longitudinal notched wedge joint for black pavement or as directed by the engineer to address specific conditions or Joint damage by expansion. When milling back or removing any longitudinal joint, limit the material removed to 2" from the top notch or from the vertical joint edge on the cold side of the joint.

Use longitudinal notched joint as plans show or as the engineer directs.

TYPICAL PAVEMENT CROSS SECTION OF NOTCHED WEDGE LONGITUDINAL JOINT

TYPICAL PAVEMENT CROSS SECTION VERTICAL LONGITUDINAL JOINT

TYPICAL PAVEMENT CROSS SECTION OF MILLED LONGITUDINAL JOINT

OVERLAP DETAIL (TYPICAL)
Longitudinal Joint Density
2018 Longitudinal Joint Density SPV Project Results

- 7 projects
  - 2 LT projects
  - 5 MT projects
  - Over 1.1 million feet (211 miles) of longitudinal joint tested
2018 Longitudinal Joint Density SPV Project Results (con’t)

- **Notched Wedge**
  - Improved confined and unconfined densities
  - Increased safety for traveling public
2019 Longitudinal Joint Density SPV Projects

- 11 projects
  - 2 LT projects
  - 6 MT projects
  - 3 HT projects

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# PWL - Percent Within Limits

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<td>Tons</td>
<td>91,000</td>
<td>811,000</td>
<td>701,000</td>
<td>1,422,500 ~55% of program</td>
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# PWL – Program Improvements

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PWL – Density Improvements

![PWL - Density Improvements](chart.png)
### 2018 Air Void Data

**PWL vs QMP**

- **PWL**
  - Mean: 2.95
  - Standard Deviation: 0.41
  - 0.75% total out of spec

- **QMP**
  - Mean: 3.04
  - Standard Deviation: 0.55
  - 3.3% of values below spec
  - 0.85% of values above spec
  - 3.18% total out of spec

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**Lower limit**: 2.0

**Upper limit**: 4.3
PWL vs QMP

2018 Density Data

QMP

STD. Dev. 1.1

QMP Avg. 94.2

STD. Dev. 1.2

PWL Avg. 94.9

Density Target 93.0%

PWL vs QMP

QMP 15% of values below spec.

PWL 4% of values below spec.
2016 – 2019 PWL Projects Completed
Research

• NRRA - National Road Research Alliance

• WHRP - Wisconsin
NRRA – Flex Team – dot.state.mn.us/mnroad/nrra/

Road Research

Flexible Team
The flexible team is comprised of technical experts in the area of new and rehabilitation of asphalt roadways. Activities include prioritization of short and long term research, development of long term research test sections at MnROAD and providing input to the technology transfer team on what should be marketed.

Team Meetings
Team meetings happen the first Wednesday of every month, 10-11 a.m. (unless the chair reschedules). The link below will work for all the meetings, even if they are rescheduled.

join online meeting

There is no conference call bridge for these meetings. Please use the audio and microphone through your computer. If that doesn't work, please access the meeting through the smartphone app.

NRRA Flexible Team Efforts
2017 Synthesis
- Longitudinal Joint Construction Performance - Complete
- Tack Coats - Complete

2017 Projects
- Developing Best Practices for Rehabilitation of Concrete with Hot Mix Asphalt (HMA) Overlays related to Density and Reflective Cracking
- Cold Central Plant Recycling (CCPR)

2019 Synthesis
- Mix Rejuvenator Synthesis (Phase I)

2019 Projects
- Mix Rejuvenator Test Sections (Phase II)
- An Innovative Practical Approach to Assessing Bitumen Compatibility as a Means of Material Specification

HMA Performance Testing (doc)
Field Performance – Distress Survey Data

- Convert distress survey maps to digitized reflective cracking data (percent cracking at joints)

- After 1 year of placement, cells with less than 10% cracking at joints include:
  - **Cell 990** (1.5”, 9.5 mm (3% AV) and 2.25” HMA, 19mm)
  - **Cell 991** (1.75”, 9.5 mm (AASHTO M323 #8) and 2.25” HMA, 19mm)
  - **Cell 987** (1.5” HMA, 9.5 mm and 2.5” HMA, 19mm)
# Field Performance

![Graph showing field performance of different cells over time.](image)

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- **Cell 988**: 12.5 mm (SPWEB440E)
- **Cell 989**: Superpave5 (SPWEB450E)
- **Cell 990**: 3% Air Void (SPWEB430E)
- **Cell 991**: 9.5 mm (SPWEA440E)

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**Important to continuously monitor field sections to evaluate short and long term performance.**
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Questions?