19mm High RAP WMA Binder Leveling Course

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BOCM, Quality Assurance Division
Why High RAP Mixes?

- PennDOT focus on low volume roadway network
- RoadMap initiative - $70 million dedicated funding
- Excess RAP in urban areas
- Alternative to Dept. 100% cold recycled mix program
Deputy Secretary Direction

- Focus on binder/leveling course
- Up to 50% RAP in WMA
- Modify mix design requirements to simplify and speed mix approvals
- Looking for cost savings on low volume roadways
- <5000 ADT, <750 trucks
- ASAP (March issue, before July ‘18)
High RAP Task Force

• Joint effort between PAPA and Department
• PennDOT - Garth Bridenbaugh, Tim Ramirez, Neal Fannin, Andy Firment, Steve Koser, Larry Ligon, Kim Martin
• PAPA – Gary Hoffman, Tom Abbey, Martin Libertini, John Savastio, Greg Brouse, Jeff Frantz (folks w/ experience in High RAP)
Specification Development

- Binder evaluation – looked at historic LTS RAP results for average binder grades
- Final spec – 2 tiers
  - Up to 30% RAP, PG 64-22
  - >30% to 50% RAP, PG 58-28
  - Contractor option to test for binder grade at >30% RAP
Mix Volumetrics

- 50 gyrations
- Lower air voids for higher RAP contents
- Air voids Final spec – 2 tiers
  - Up to 30% RAP, 3.5 to 4.0% air voids
  - >30% to 50% RAP, 2.5 to 3.2% air voids
- VFA Final spec – 2 tiers
  - Up to 30% RAP, max. VFA 77
  - >30% to 50% RAP, max. VFA 83
Mix Gradation

• Due to leveling nature of application, wanted a fine graded 19 mm mix
• Final spec – 32% min. passing #8 sieve
• Modified 1.2 maximum F/A ratio to allow up to 1.3 ratio for >30% to 50% mix
Project Use and Acceptance

- Mix acceptance by certification
- Density acceptance by optimum rolling pattern
- Samples may be lifted for information
- Limited rut testing for information
- 2 ½” minimum average depth
- Must apply a surface over (no SRL)
May 7, 2018 Use Guidelines issued for ECMS contracts

Mix procurement for Dept. force paving – ongoing development

District 10 Jefferson County Department Force paving project bid in May 2018 - bid two alternates high RAP vs. up to 15% RAP

High RAP alternate $4 lower per ton
# Jefferson County 19.0 mm Bid

## Jefferson Co "Paving" results  12,000 Ton

<table>
<thead>
<tr>
<th>Contractor</th>
<th>Version 1 - OVER 15% Rap</th>
<th>Version 2 - 15% Rap mix</th>
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<tr>
<td>Bidder 1</td>
<td>50.91</td>
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## Jefferson Co "Mill and Fill" results  16,200 Ton

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<th>Contractor</th>
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Jefferson County Bid

SAVINGS TO PENNDOT IN THIS BID = $112,800.00 or 9%
PennDOT Early Feedback

- Mix looked adequately “rich” on site
- Achieved compaction quickly
- Density cores for information and gauge correlation 95% to 96% range
- One road to be seal coat this year, the other next year
- PennDOT happy with early taste of product
- Initial cost savings are encouraging
Jefferson County Producer Comments

- Mix Design – **GOH** followed SSP and Project Addendum
- Started with an approved 19.0 MM <0.3 ESALS 25% RAP design
- Increased RAP to 35%
- Made 3 Ndes Specimens and 2 T-209, with a final air void for design of 3.1% and 5.5% total asphalt
- Equates to 0.33 RBR
- PG 58-28 Binder
Jefferson County Producer Comments

- Plant Production - Material produced at 200 TPH drum plant
- Material Testing – First 2 days production of 2571 tons showed too much variability
- Team huddled & devised 3rd day plan to utilize two RAP feed bins (17.5% RAP from each bin)
- This resolved mix variability issue
Jefferson County Producer Comments

- Tons produced and shipped to the County paving crew as of July 23rd were just over 12,700 tons
- PennDOT Crew Comment - Material looked good - “but fine”, and was easy to compact
• Lindy Paving
• 20,000 Ton FOB Paver
• Saving = $3.00 per Ton
• Lindy Also Paving With 40% High RAP Mix
What’s Next?

• To date 55,067 tons bid in 2018
• Feedback, fine tune specification
• Rejuvenators/Recycling agents?
• Wearing courses?
2 Producers have approved mix designs

2 Producers have mix designs pending

Start using mix and producers will submit more designs

Plenty of RAP in Philly and Pittsburgh

Limited RAP in rural areas of PA
Questions?