2018 NEAUPG MEETING
“PENNDOT’s 19.0 mm HIGH RAP WMA MIX FOR LOW VOLUME ROADS”
Tropicana Hotel I Atlantic City, NJ
October 18, 2018
19.0 mm High RAP WMA Binder Leveling Course – Low Volume Roads

Gary L. Hoffman, P.E
Director of Technical Services
PA Asphalt Pavement Association
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

RAP = RECLAIMED ASPHALT PAVEMENT
Why High RAP Mixes?

Roadway Network

- Total Miles = 43,716
- ~ 28,000 Miles of Secondary Roads 5000 ADT
- > 8000+ Miles in Poor Condition
• 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)
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
High 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
Due to leveling nature of application, wanted a fine graded 19 mm mix

Final spec – 32% min. passing #8 sieve (PCS)

Modified 1.2 maximum F/A ratio to allow up to 1.3 ratio for >30% to 50% mix
0.45 Power Chart 19 mm
High RAP Mix Project Use & 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)
High RAP Mix Implementation

• 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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<td>Bidder 1</td>
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<td>Bidder 5</td>
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<td>Bidder 6</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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<tr>
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Jefferson County 19.0 mm Bid

SAVINGS TO PENNDOT IN THIS BID =

$112,800.00

or 9%
Jefferson County 19.0 mm Paving
Jefferson County 19.0 mm Paving
• 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 coated this year, the other next year
• PennDOT happy with early “taste” of product
• Initial cost savings are encouraging
Jefferson County 19.0 mm 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 19.0 mm Produces 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 19.0 mm Produces 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
Allegheny County 19.0 mm Project

- Producer – Lindy Paving
- Laydown – PennDOT
  County Maintenance
Allegheny County 19.0 mm Project

- Producer – Lindy Paving
- Laydown – PennDOT

County Maintenance
Allegheny County 19.0 mm Project

- Producer – Lindy Paving
- Laydown – PennDOT
County Maintenance
Allegheny County 19.0 mm Producer Comments

- Special Provision is a great start.
- Setting PCS (#8) at minimum 32% passing, will prevent a coarse mix which could ravel or crack.
- Testing RAP for AC content and PG will provide consistent mix quality.
19.0 mm Project – What’s Next?

- To date 55,067 tons bid in 2018
- Feedback, fine tune specification
- Rejuvenators/Recycling agents?
- 9.5 mm High RAP Wearing Course Spec
19.0 mm High RAP Mix Designs

11 mix designs have been approved

More mix design approvals pending

Start using mix & producers will submit more designs

Plenty of RAP in Philly and Pittsburgh

Limited RAP in rural areas of PA
Questions?
Gary L. Hoffman, P.E. – Director of Technical Services

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