

19mm High RAP WMA Binder Leveling Course

Garth Bridenbaugh, P.E.
Pennsylvania Department of Transportation
Construction Services Engineer, District 9-0

Gary 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



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 (aggressive)
- 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 – 3 tiers
 - Up to 15% RAP (follow 409 spec)
 - >15% 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 – 3 tiers
 - Up to 15%, 4.0% air voids (normal)
 - >15% to 30% RAP, 3.5 to 4.0% air voids
 - >30% to 50% RAP, 2.5 to 3.2% air voids



Mix Gradation

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



Project Use and Acceptance

- Mix acceptance by certification
- Density acceptance by optimum rolling pattern
- Samples may be lifted for information
- 2 1/2" minimum average depth
- Must apply a surface over (no SRL)



Implementation

- May 7, 2018 Use Guidelines issued for ECMS contracts

STANDARD SPECIAL PROVISION

Detail

Index or Category: Provisional Specification Related

Status: Pending

Sequence ID: 4111

District: CO

Version: A

Provision Name: c0411 ITEM 4411-0010 SUPERPAVE ASPHALT MIXTURE DESIGN, WMA BINDER COURSE (LEVELING), – HIGH RAP

Usage Information

Measurement: English-IP

Edit Body: No

Include on all projects: No

Edit Header: No

Include on all federally funded projects: No

Edit Project Specific Details: No

Include on all 100% State funded projects: No

Instructions for Usage: For use on projects with 100% State Funds Only.
Not for use on NHS

Use in accordance with the letter titled" Use Guidelines for 19.0 mm Warm Mix Asphalt High RAP Mixtures for Low Volume Roadways" dated May 7, 2018 found in ECMS file cabinet

408 Section: 411

Effective From: 05/07/2018

To: 01/01/2199

District 10 initial use

- District 10 Jefferson County project bid in May 2018 - bid two alternates high RAP vs. up to 15% RAP
- High RAP alternate \$4 lower per ton

Jefferson Co "Paving" results 12,000 Ton

<u>Low Bid Supplier</u>	<u>Version 1 - over 15% Rap</u>		<u>Version 2 - 15% Rap mix</u>	
Glenn O. Hawbaker, Inc.	\$44.45/ton	\$ 533,400.00	\$48.45/ton	\$ 581,400.00

Jefferson Co "Mill and Fill" results 16,200 Ton

<u>Low Bid Supplier</u>	<u>Version 1 - over 15% Rap</u>		<u>Version 2 - 15% Rap mix</u>	
Glenn O. Hawbaker, Inc.	\$42.45/ton	\$ 687,690.00	\$46.45/ton	\$ 752,490.00

\$112,800 reduced initial cost with high RAP 19 mm mix

Jefferson County Paving



Jefferson County Paving



2018 19mm High RAP Usage

District	Supplier Company	Tons
9	Keystone Lime	17,603.01
10	Glenn O. Hawbaker	30,702.15
11	Lindy Paving	26,558.75
	statewide total	74,863.91



Somerset County SR 2017



PennDOT Early Feedback

- Mix looked adequately “rich” on site
- Achieved compaction quickly
- Density cores for information and gauge correlation 95% to 96% range (D10)
- PennDOT happy with early taste of product
- Initial cost savings are encouraging



Cost Comparison*

2018 Cost Comparison - High RAP 19mm vs Regular 19mm

High RAP 19 mm (3 Counties)

\$45.19/ton delivered

Statewide Average 19 mm

\$52.96/ton delivered

* Based on sampling of 2018 maintenance bid awards with quantities >1000 tons



Tips for bidding

- Make sure to use SSP, this takes into account all of the mix design issues
- Check for other SP's dealing with mix design or high RAP that might conflict
- Remember that "regular" mixes up to 15% RAP still meet this special provision also



ECMS Project Use

- 45,450 tons bid in ECMS (as of 1/7/2019)
- 6 projects (D1, D10 and D11)
- Material production to occur in 2019





Questions?

