

# RAP/RAS Task Team Update

Jim Musselman/Tim Aschenbrener

# Team Members

- Howard Anderson
- Bill Buttlar
- Sam Cooper
- Audrey Copeland
- John D'Angelo
- Lee Gallivan
- Danny Gierhart
- Stacy Glidden
- Salman Hakimzadeh
- Andrew Hanz
- Ann Holt
- Gerry Huber
- Becky McDaniel
- Nathan Morian
- Brian Pfeifer
- Tim Ramirez
- Ron Sines
- Hassan Tabatabaee
- Randy West
- Richard Willis
- Jack Youtcheff
- Tim Aschenbrener – Co-Chair
- Jim Musselman – Chair



# TEAMWORK

Together, we can accomplish anything

# Primary Activities

- Update/revise AASHTO M 323 “Standard Specification for Superpave Volumetric Mix Design”
- Two teleconferences – June 2 & August 31
- Good participation
  - Variety of opinions!



## Issues to be Addressed:

- Inconsistencies between Table 2 and Table 3
  - Binder requirements by % of RAP or RAP Binder Ratio?
- Consider adding an option for mixture performance testing and/or Delta  $T_c$  for high RAP mixes
- Clean up Appendices
- Consider adding language for Rejuvenators?
  - Would also apply to PP 78
- Possibly add a Primary Control Sieve to the 4.75 mm mix.
- A number of smaller/editorial changes.



## Changes to date...

- Added definitions for binder content ( $P_b$ ) and RAP binder content ( $P_{bR\text{AP}}$ )
- Added references to AASHTO M 332 “Standard Specification for Performance-Graded Asphalt Binder Using Multiple Stress Creep Recovery (MSCR) Test” for binder selection – in addition to the existing M 320 references.
- Changed references to LTPPBind (it’s currently web based...)
- Changed the Binder Selection Guidelines for Reclaimed Asphalt Pavement Mixtures
  - Deleted Table 2
  - Added language for each Agency to determine their own requirements by characterizing their own RAP and virgin materials and following the Appendix
  - Added the RAPBR Table as an “in lieu of”

# Existing Binder Selection Guidelines

**Table 2**—Binder Selection Guidelines for Reclaimed Asphalt Pavement (RAP) Mixtures

Recommended Virgin Asphalt Binder Grade	RAP Percentage
No change in binder selection	<15
Select virgin binder one grade softer than normal (e.g., select a PG 58-28 if a PG 64-22 would normally be used)	15 to 25
Follow recommendations from Appendix X1	>25

**Note 4**—An Agency may alter the virgin binder selection criteria from Table 2 based on the research procedures provided in Appendix X2 and field experiences.

- 5.3.2. *Reclaimed asphalt pavement binder ratio*—If the agency elects to use the RAPBR method, the binder grade selected in Sections 5.1.3 and 5.2 must be adjusted according to Table 3 to account for the amount of stiffness of the RAP binder. Procedures for developing a blending chart are included in Appendix X2.

**Table 3**—Binder Selection Guidelines for Reclaimed Asphalt Pavement (RAP) Mixtures

Recommended Virgin Asphalt Binder Grade	RAPBR
No change in binder selection	<0.25
Follow recommendations from Appendix X2	>0.25

# Proposed Binder Selection Guidelines

- 5.3. If RAP is to be used in the mixture, it is specified according to RAPBR.
- 5.3.1. The binder grade selected in Sections 5.1.3 and 5.2 must be adjusted to account for the amount and stiffness of the RAP binder. This adjustment shall be based on characterized properties of RAP asphalt binder either specific to a mix design or within a geographical area, as determined by the Agency. Develop the binder selection adjustment requirements in accordance with Appendix X3.
- Note 4**—In lieu of developing Agency specific binder selection requirements, the binder grade selected in Sections 5.1.3 and 5.2 can be adjusted according to Table 2 based on RAPBR to account for the amount and stiffness of the RAP binder. Procedures for developing a blending chart are included in Appendix X2.

# Example

$$RAPBR_{\max} = \frac{T_c(\text{need}) - T_c(\text{virgin})}{T_c(\text{RAP Binder}) - T_c(\text{virgin})}$$

Florida

Tc (need)	-22.0
Tc (virgin)	-23.4
Tc (RAP Binder)	-19.5

RAPBR <sub>MAX</sub>	0.36
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Some other state

Tc (need)	-22.0
Tc (virgin)	-23.4
Tc (RAP Binder)	-13.8

RAPBR <sub>MAX</sub>	0.15
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# Proposed Binder Selection Guidelines

**Table 2**—Binder Selection Guidelines for Reclaimed Asphalt Pavement (RAP) Mixtures

Recommended Virgin Asphalt Binder Grade	RAPBR
No change in binder selection	<0.15
Follow recommendations from Appendix X2	>0.15

$$RAPBR = \frac{(Pb_{RAP} \times P_{RAP})}{100 \times Pb_{Total}} \quad (1)$$

where:

$RAPBR$  = Reclaimed asphalt pavement binder ratio to nearest 0.01

$Pb_{RAP}$  = Binder content of the RAP to nearest 0.1

$P_{RAP}$  = RAP percentage by weight of mixture to nearest 0.1

$Pb_{Total}$  = Total binder content in the mixture to nearest 0.1

**Note 5**—An Agency may alter the virgin binder selection criteria from Table 2 based on the research procedures provided in Appendix X2 and field experiences.

**Note 6**—A mixture performance test for cracking implemented by an agency is acceptable in lieu of the RAPBR binder selection criteria in Table 2.

## Other Decisions....

- Determined the Primary Control Sieve did not apply to the 4.75 mm mix
- Decided not to add Delta  $T_c$  requirements for high RAP mixes
- May possibly add a Note to address Rejuvenators

# Future Activities

- Still cleaning up the Appendices
- Need to make a final decision on Table 2
  - Is 0.15 too conservative?
- Needs more editorial changes
- Final version will be need to be ready by...?



# Questions?

