Florida Department of
TRANSPORTATION

RAP/RAS Team Update

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TEAM MEMBERS

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- Tim Ramirez
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ADDITIONAL SUPPORT

- Tom Bennert
- Gerry Reinke
- Mike Anderson
- Pamela Turner
- Geoff Rowe

Two Main Issues

- How much of the RAS binder becomes effective asphalt binder?
  - Quantity of binder
- How to address the stiffness/brittleness of the RAS binder?
  - Quality of binder

Existing Approach (PP 78-14)

- Binder quantity:
  - Uses RAS Binder Availability Factor of 0.70 – 0.85
- Binder quality:
  - Uses Binder Grade Adjustment Guidelines:

Recommended Virgin Asphalt Binder Grade	RAS or RAS + RAP Binder Percentage
No change	<15
One grade softer	15 to 25
Use blending charts	>25

TASK TEAM RECOMMENDATIONS

Quantity of Binder

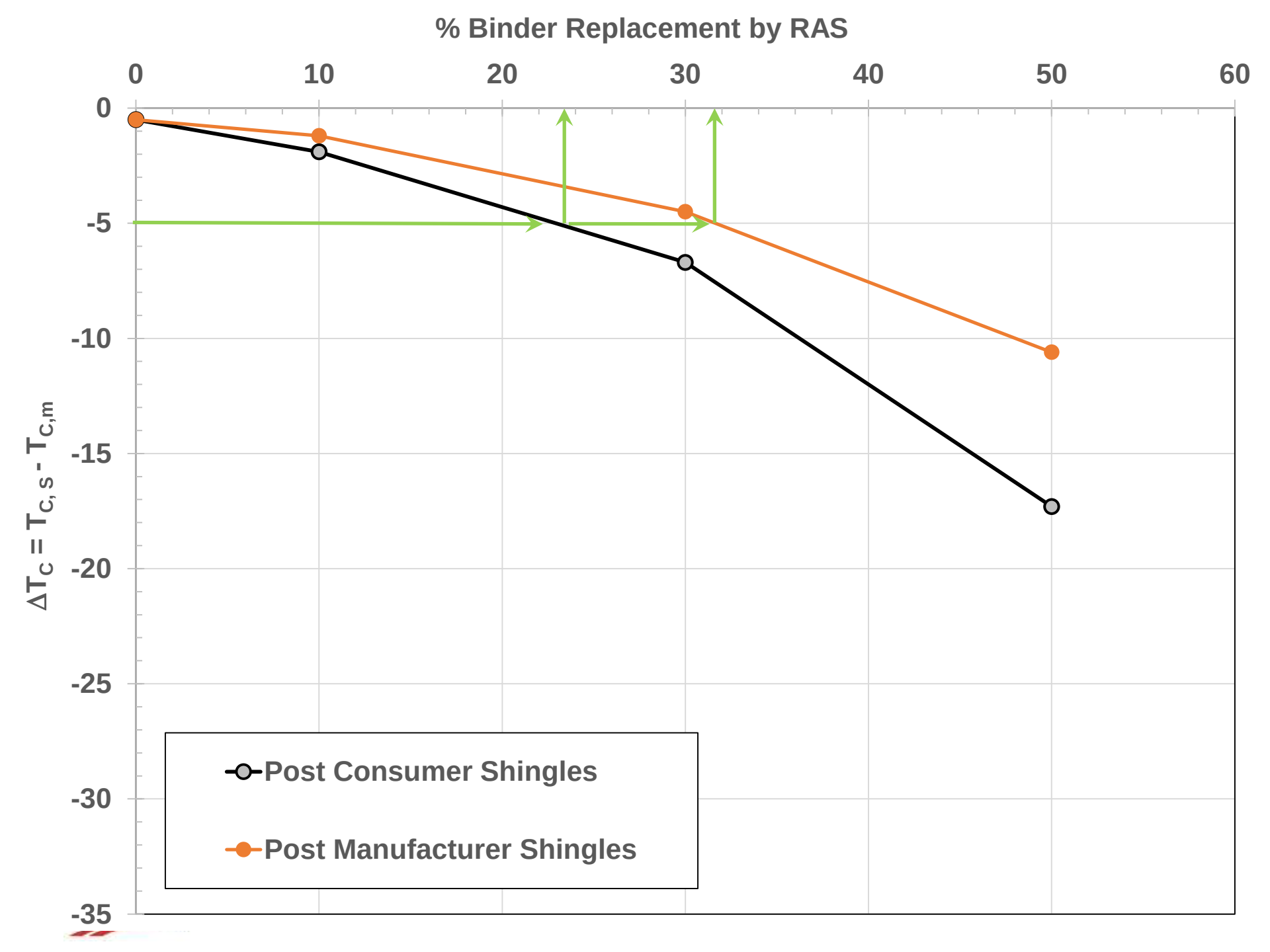
- Raise minimum VMA by 0.1% for every 1% RAS (by weight of total aggregate).
  - Based on assumption of 70% binder availability
  - Will increase effective binder in the mix to offset for the potential for non-effective binder on the RAS
- Simple way of addressing binder availability
  - More binder → Improved durability
  - Angular aggregate and stiffer binder in RAS → Minimal risk of rutting

Quality of Binder

- Focus on critical low temperature difference of the binder - ΔT_c
  - ΔT_c = Stiffness critical temp (S) – the Relaxation critical temp (m-value)
- Measured with the Bending Beam Rheometer (BBR)
- Criteria: ΔT_c for the blended binder should be greater than or equal to -5.0°C
  - Binder is PAV aged for 40 hours

Two Approaches

1. Binder Blending Procedure
   - Agency sets allowable RAS tiers;
   - Extract, recover, blend typical materials (RAS, RAP, base binder, etc.) at varying percentages
     - RASBR = 0.00, 0.15, 0.30
   - PAV age the blended binder for 40 hours
   - Test the blended binders to determine ΔT_c
   - Set the allowable tiers based on the criteria that ΔT_c must be greater than or equal to -5.0°C, and the appropriate PG grade is met.


% Binder Replacement by RAS
0
10
20
30
40
50
60
0
-5
-10
-15
-20
-25
-30
-35
ΔTC = TC, S - TC,m
Post Consumer Shingles
Post Manufacturer Shingles

Two Approaches

2. Mixture Extraction Procedure
   - Individual mixes are fabricated, extracted, the binder recovered and then PAV aged for 40 hours
   - The recovered binder is tested to determine ΔT_c
   - ΔT_c must be greater than or equal to -5.0°C, and the appropriate PG grade is met

Default Options

- A mixture performance test for cracking implemented by the State is acceptable in lieu of the binder testing for ΔT_c
- Default value option – a maximum RASBR can be used in lieu of testing
  - RASBR ≤ 0.10

Alternate Loose Mix Aging Procedure

- Mixture Extraction Procedure
  - Individual mixes are fabricated
  - Loose mix is conditioned at 135°C for 24 hours
    - Uncovered pan at a depth of 25 to 50 mm placed in a forced-draft oven with no stirring
  - Mix is then extracted, the binder recovered
  - The recovered binder is tested to determine ΔT_c
  - ΔT_c must be greater than or equal to -5.0°C, and the appropriate PG grade must be met

Summary

- Revised PP 78
- Increased minimum VMA to address issue of binder quantity
- Used ΔT_c to address binder quality
  - Recovered binder is PAV aged for 40 hours
  - Criteria: $\Delta T_c \geq -5.0°C$
- Added loose mix aging (135°C for 24 hours) as an alternate in the appendix
  - Criteria: $\Delta T_c \geq -5.0°C$

Action Items

- Revised PP 78 sent out to ETG for review
  - A few typos need to be corrected
- Need ETG green light
  - Forward to AASHTO TS 2d
- Declare victory – for now…
- Need to get a new Task Team Chair


Thank You!