



TOP 10

Ways to Get Longer Lasting Overlays

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CRH Americas Materials



Top Ten

1. Do your homework

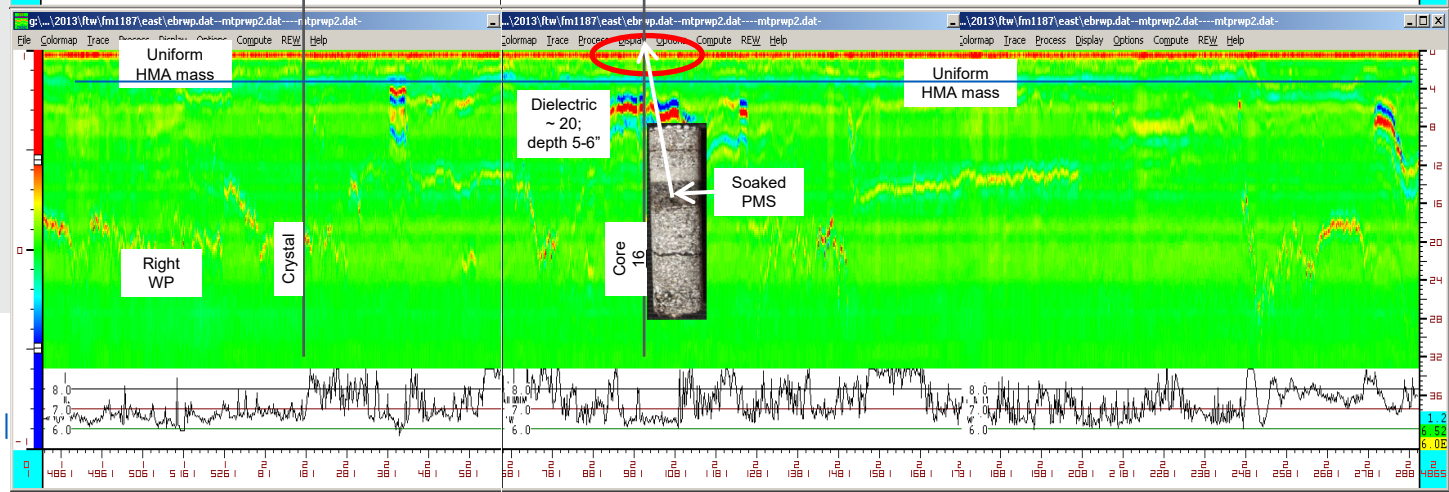
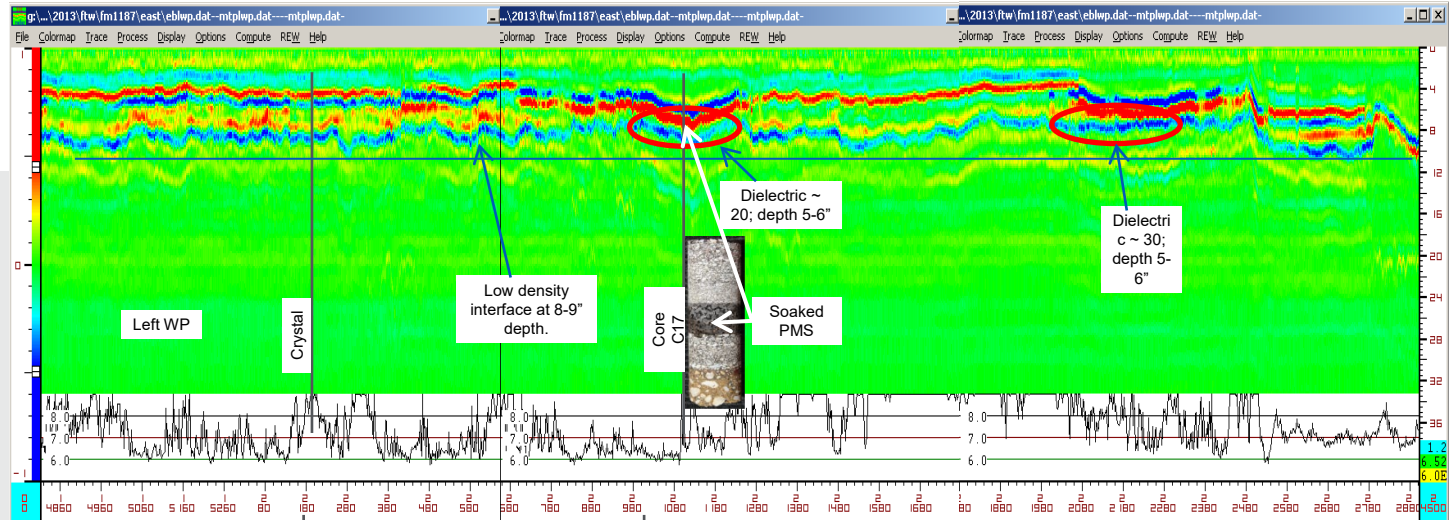


Do Your Homework

- Evaluate the existing pavement
- Pavement design (determine thickness)
- Consider all the variables
- Select the right mix for the right job

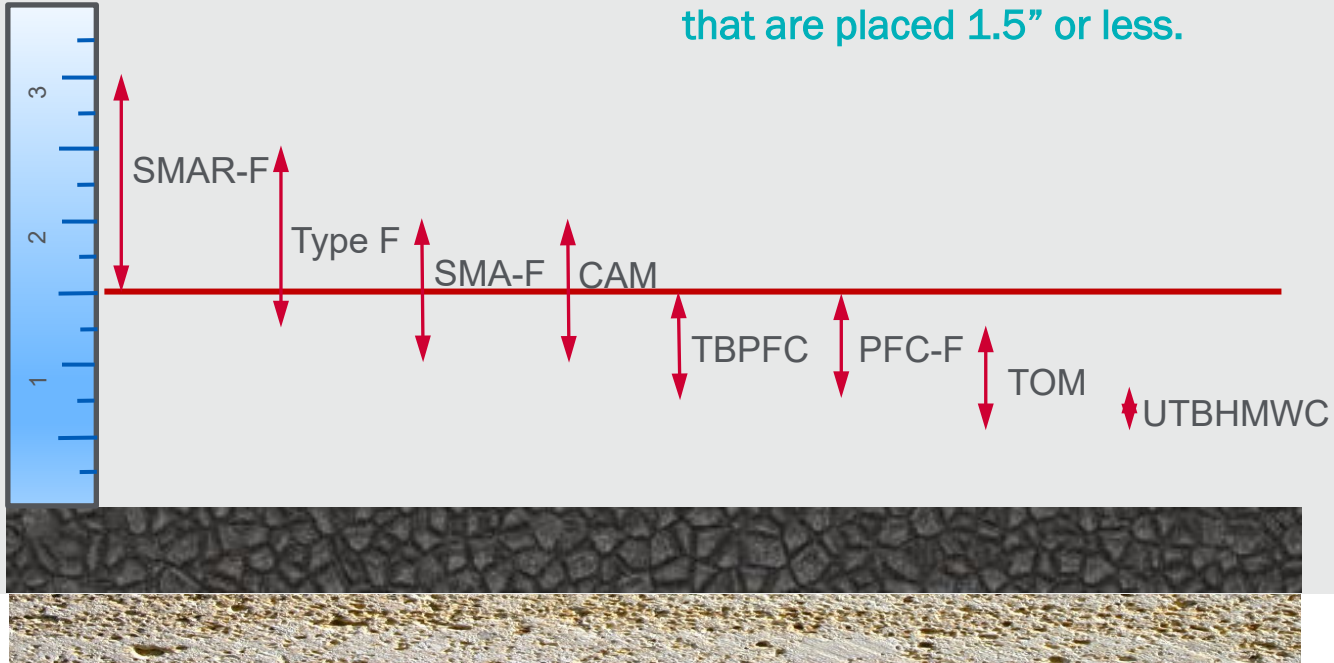


GPR Data



Mix Thickness

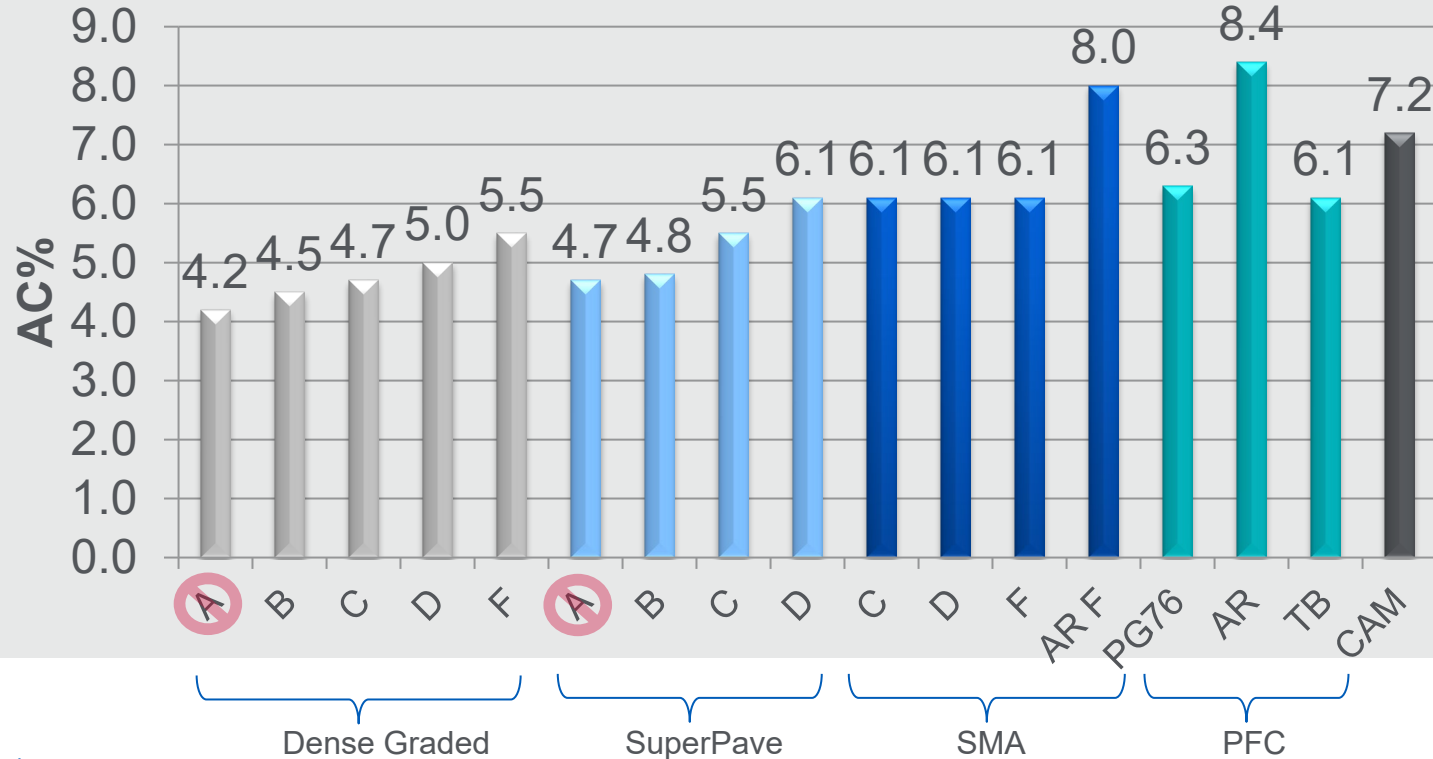
Thin Mixes are normally defined as those that are placed 1.5" or less.



Top Ten

1. Do your homework
2. Specify mixes that have a higher binder content

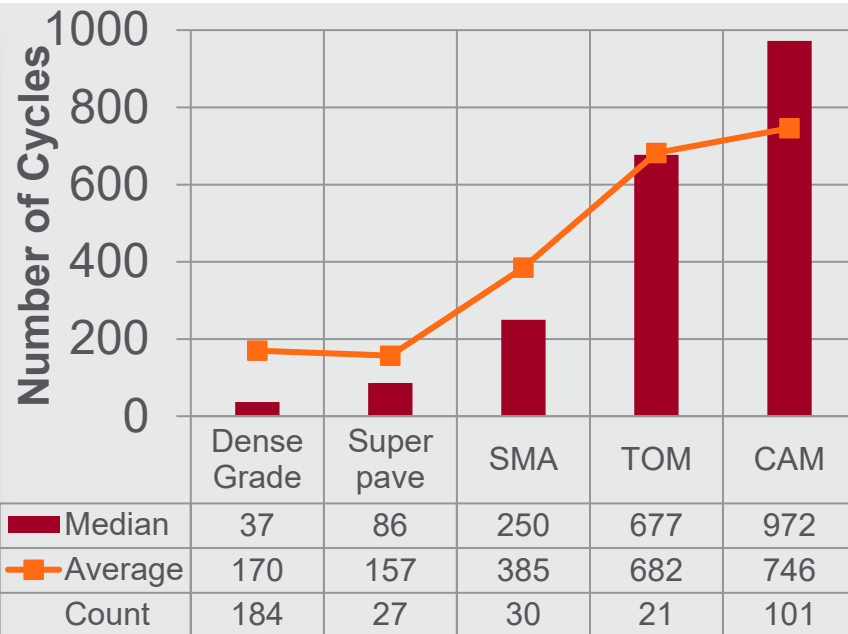
Binder Content - Average



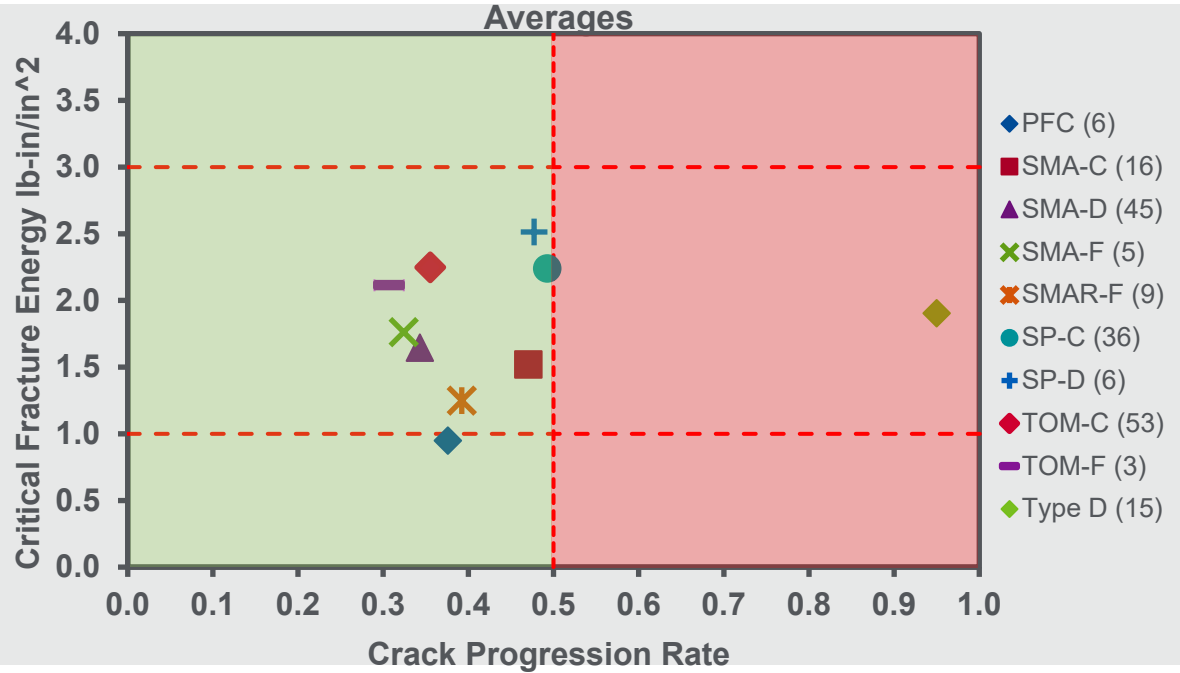
Binder Content – Statewide Averages

Mix Type	Dense Graded	SuperPave	% Increase
Type A	4.2	4.7	11.9
Type B	4.5	4.8	6.7
Type C	4.7	5.5	17.0
Type D	5.0	6.1	22.0

Overlay Tester



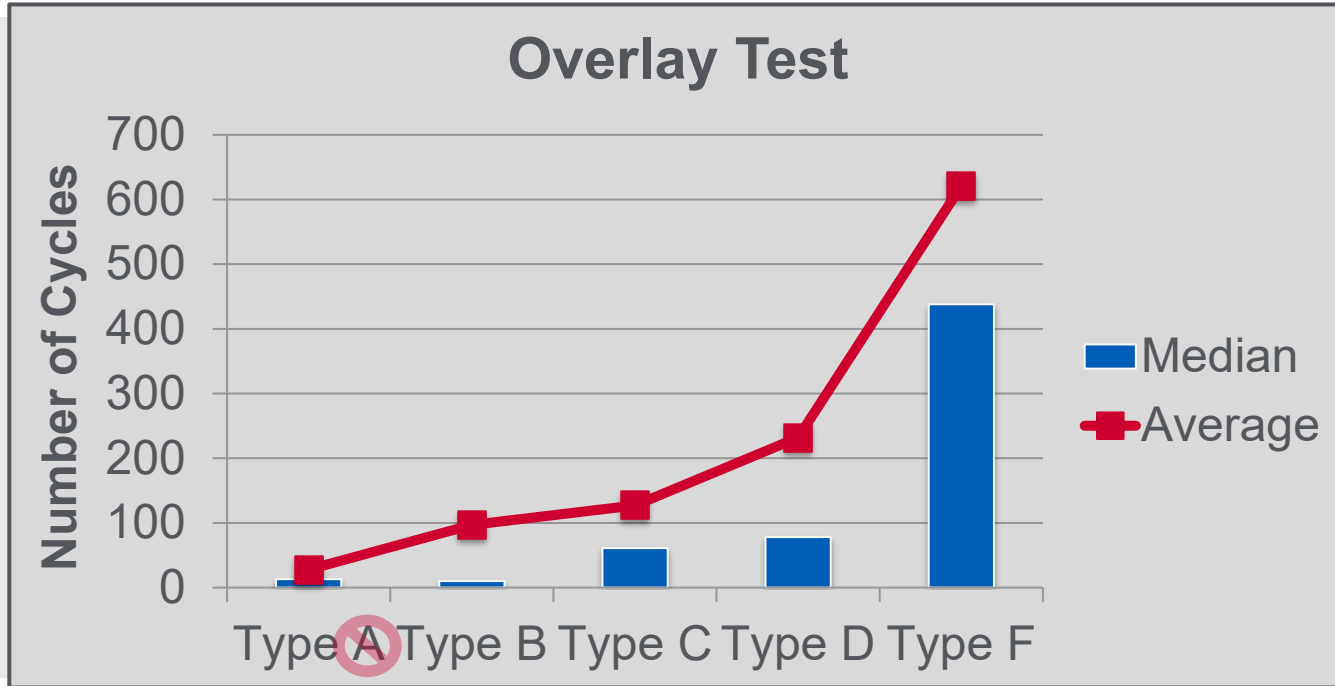
OT Data Analysis



Top Ten

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3. Specify a finer gradation for your mix type

Influence of Gradation - Dense Graded



Optimized Mix Design Approach – Asphalt Mixes



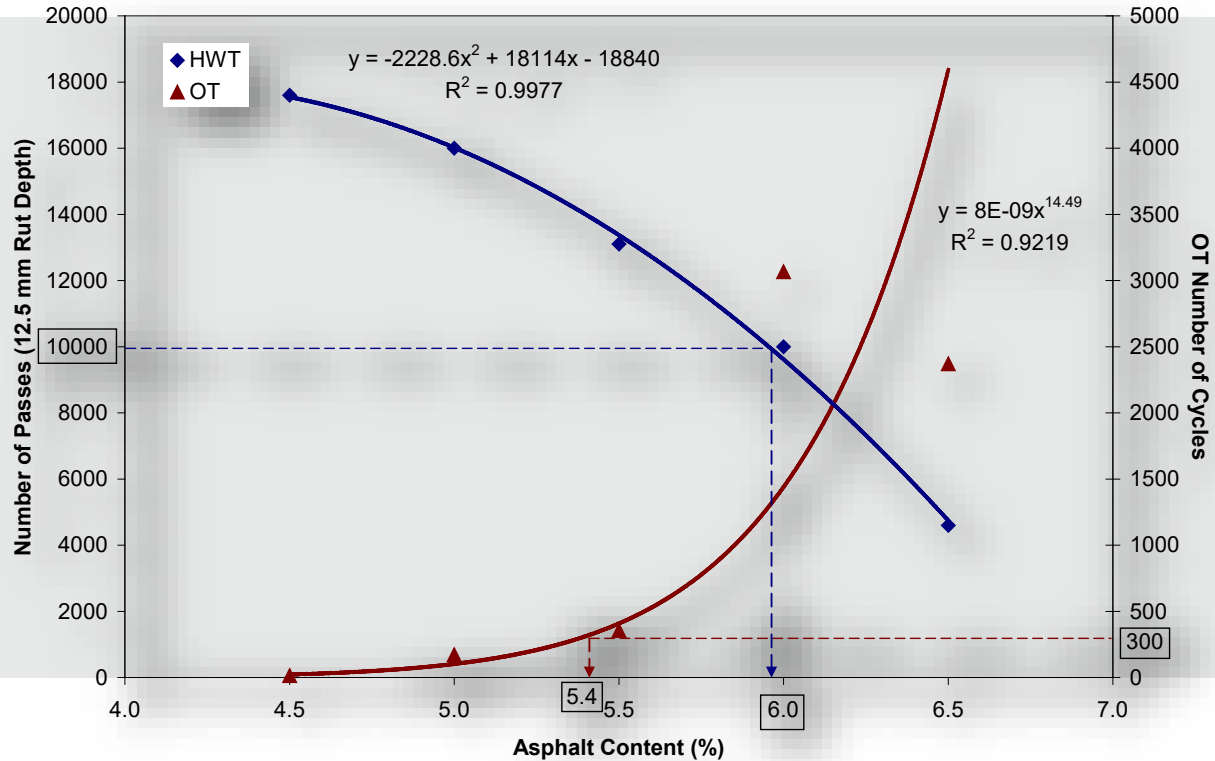
Mix Performance
Evaluation

Stability

Durability



Balanced Mix Design Approach - PG 70-22



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3. Specify a finer gradation for your mix type
4. Specify more durable aggregates when possible

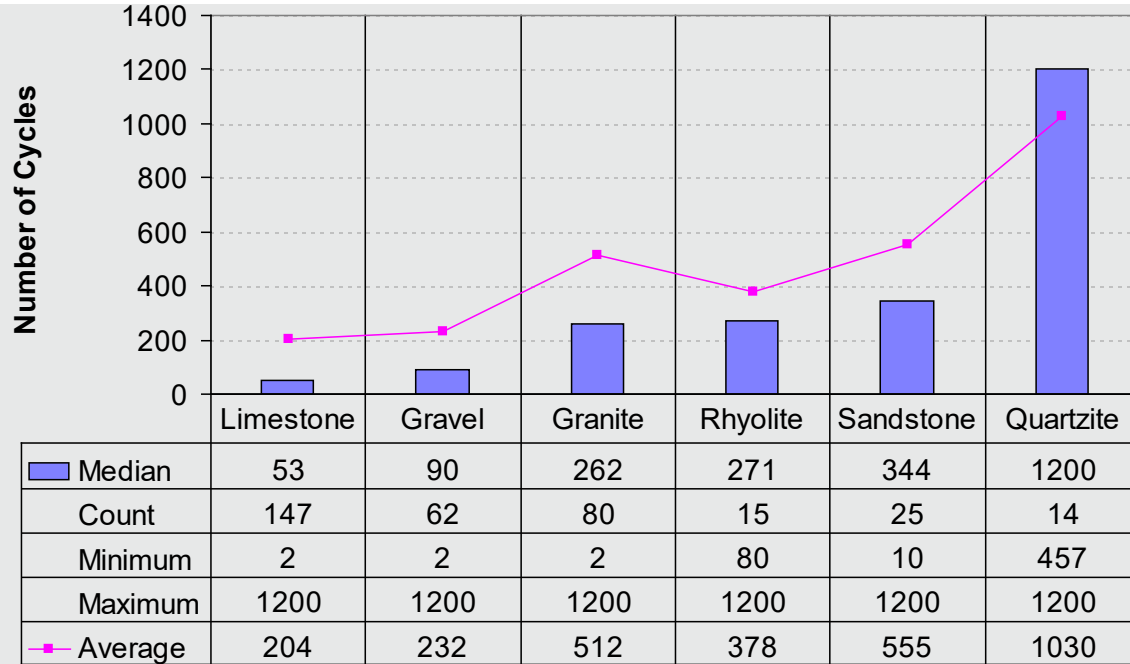
Know Your Materials

- What's Available
- What's Not Allowed



- SAC B vs. SAC A
 - Cost
 - Availability
 - Is Blending Allowed

Influence of Aggregate Type



Aggregate Quality

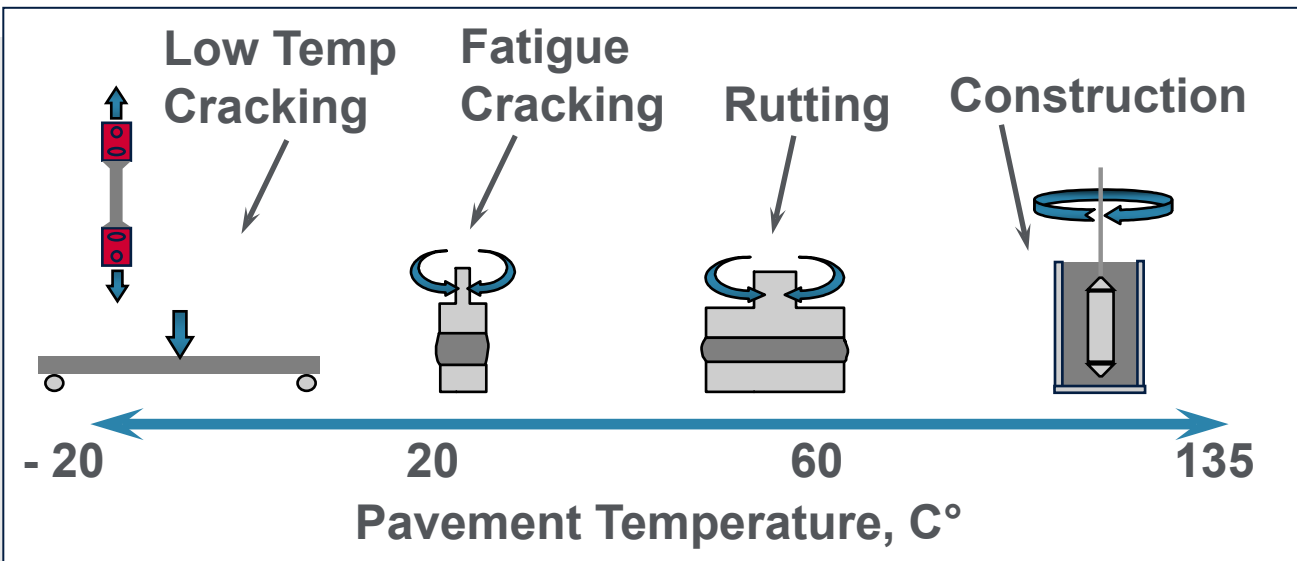
- *Gradation & Size*
- *Particle Shape*
- *Durability*
- *Toughness*
- *Frictional Characteristics*
- *Cleanliness*
- *Moisture Susceptibility*
- *Absorption*



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5. **Specify softer binders or binders with a wider PG spread**

Superpave Binder Tests



Performance
Grade

PG 64-28

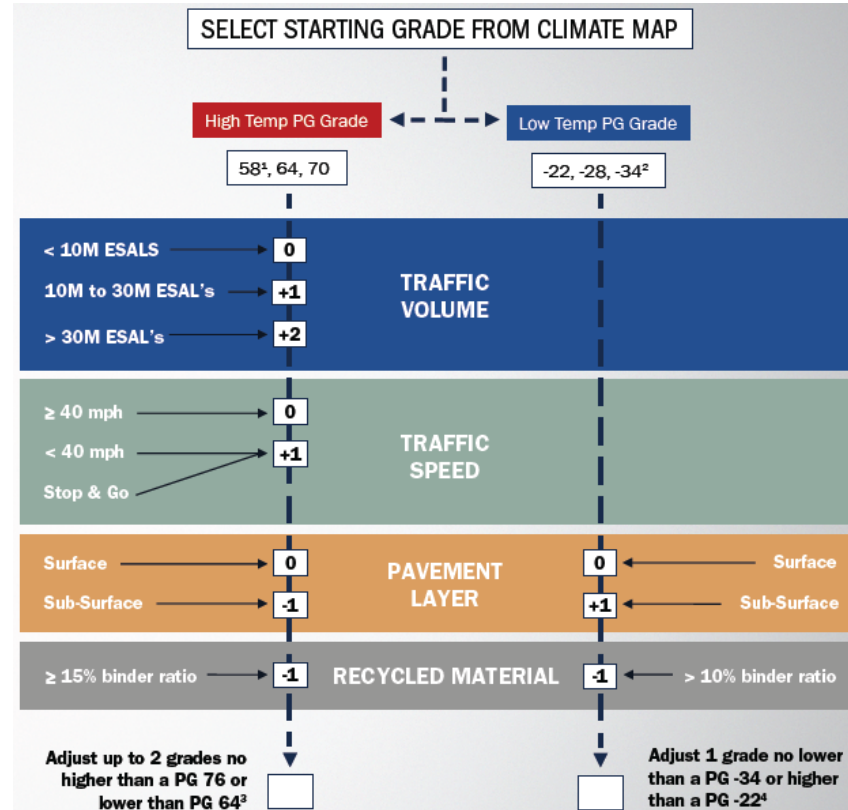
Min pavement
design temp

Average 7-day
max pavement
design temp

(Rut Resistance)

(Thermal Crack
Resistance)

Grade Adjustment Options



High PG Grades

Rutting

PG58-XX

PG64-XX

PG70-XX

PG76-XX



Adjust for:

- Climate
- Traffic
- % Trucks
- Stops & Starts
- Turning Traffic
- Location in Pavement

Low PG Grades

Cracking

PGXX-22

PGXX-28

PGXX-34



Adjust for:

- Climate
- Traffic
- Base Conditions
- Use of Recycle Materials
- Location in Pavement

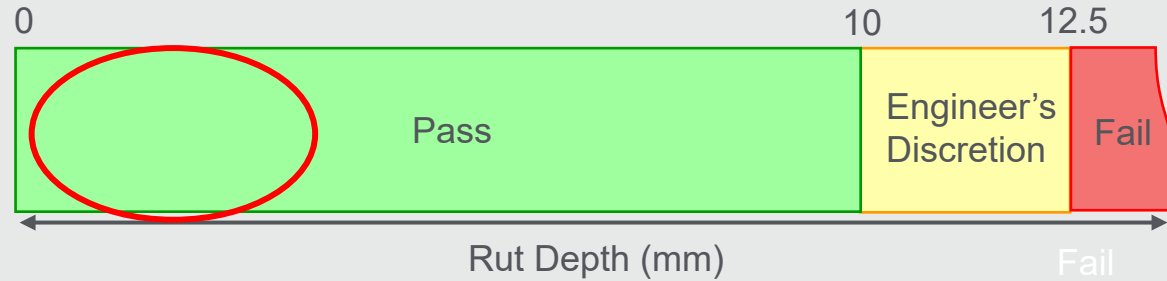
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6. **Don't over-stiffen or over-oxidize the mix**

HWT and Tensile Strength



Very low rut depths and high tensile strengths can indicate a relatively stiff mix



Recycled Materials Effects

An addition of 5% RAS or 20% RAP in the mix gives roughly one grade bump in the binder as shown by the DSR.

High Temp Grade		
Type D PG 64-22	20% RAP	5% Shingles
67	71	74

That same addition of 5% RAS or 20% RAP in the mix shows the stiffness doubling as shown by the Hamburg



Warm Mix Asphalt

- Paving Benefits Depend On:
 - Aggregate absorption
 - Mix temperature target
 - Haul distance



Light-End Asphalt Emissions



Absorption



HMA



WMA

Effective Asphalt



HMA

WMA

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6. Don't over-stiffen or over-oxidize the mix
7. **Include adequate surface preparation in the plans**

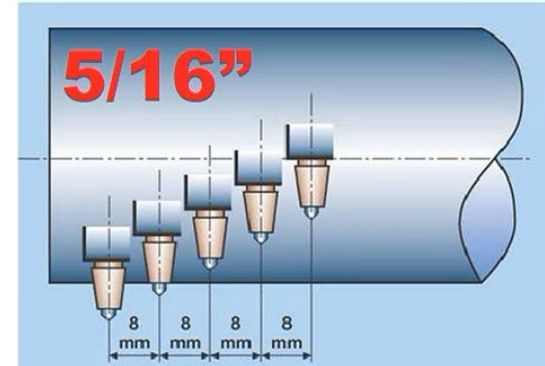
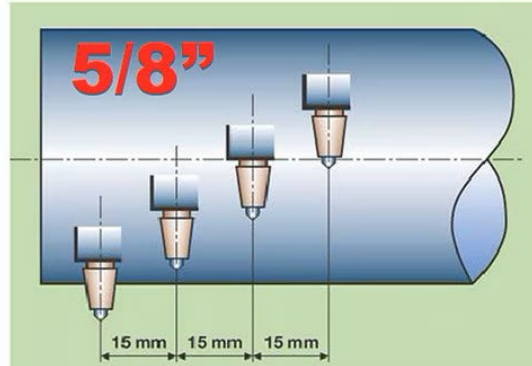
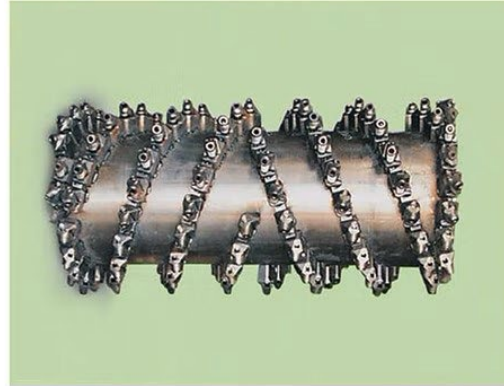
Surface Preparation

- Patch defective areas
- Seal cracks when needed
- Mill to reestablish profile or match curb and gutter



Milling Heads

- Type
- Size
- Spacing (Number of Teeth)



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7. Include adequate surface preparation in the plans
8. **Ensure an adequate bond to the existing pavement**

Surface Preparation

- Pavement needs to be clean before paving begins
- Ensure adequate bonding
 - Tack Coat
 - Bonding Membrane
 - Underseal
- **Inadequate bonding shortens pavement life**



The Issues

Tracking



Slippage



Debonding



Bonding Demonstration (From Ryan Barborak, P.E.)

11 sheets of plywood

Span length 36"

Weight of Person ~60 lbs

Measured deflection over span

- Unbonded
- Fully bonded

Deflection is 21 times greater



Unbonded
2 5/8"
deflection



Fully Bonded
1/8"
deflection

GOOD TACK?



GOOD TACK?



GOOD TACK?



Tack Tracking in Wheel Paths – Consider Trackless Material



Trackless Material

Emulsion

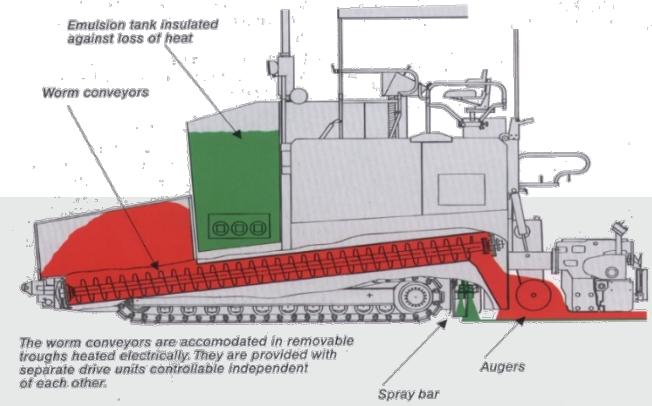
- for tack or light bonding

Hot Applied

- for bonding or seal



The Spray-Paver



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9. **Ensure the mix is uniform and consistent**

Recycle – Consistency is Key



- Control the Moisture



- Fractionate

THREE DROP LOAD



Monitor Paving Temperatures

Infra-Red Temperature System

- Measures temperature across entire mat
- Measures in real-time
- Identifies thermally-segregated areas
- Software & reporting features



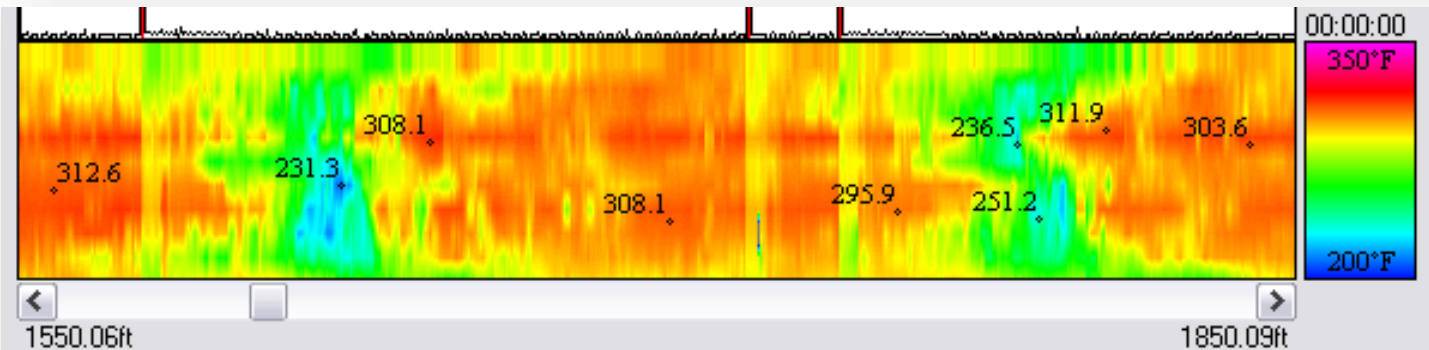
Infra-Red Mapping

Cold spots typically indicate low density areas

Density is one of the primary contributors to pavement performance

Contractor and agency risk are impacted

- Acceptance and pay schedules are based on density
- Segregated locations distress prematurely
- Ride quality ultimately impacted by thermal segregation



Common Performance Problems



Early observations:
coarser texture
and holding water

Raveling and Cracking Follow



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9. Ensure the mix is uniform and consistent
10. Ensure proper ride quality

Constructability

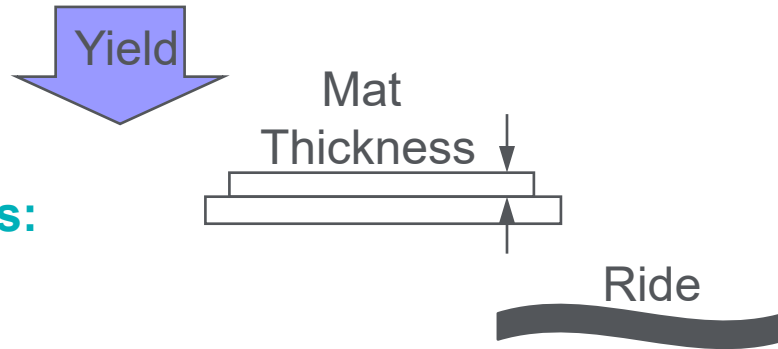
- Expectations – Density/Yield/Ride

Yield affected by:

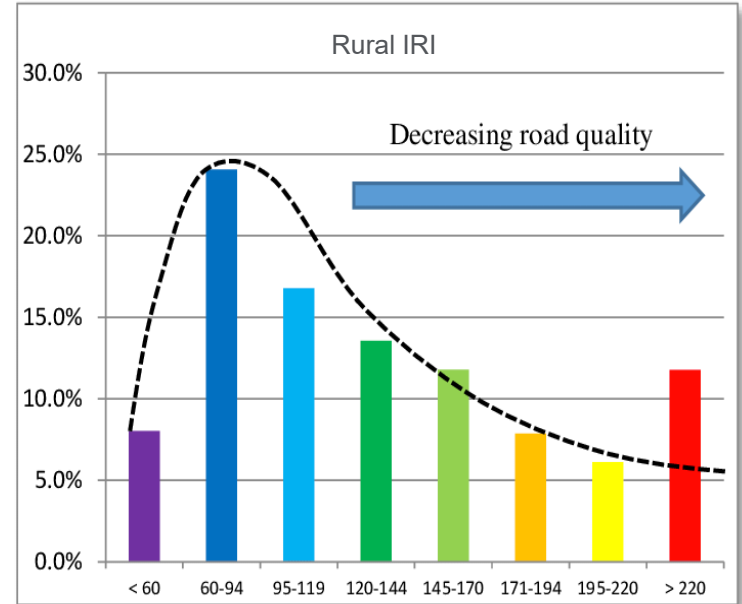
- Existing profile
- Mat thickness
- Screed crown
- Sonic grade control

Yield affects:

- Density
- Proper thickness
- Ride (IRI)
- Production



Project Goals - Smoother



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Questions?

