



NORTH CENTRAL SUPERPAVE CENTER

Update on Center Status and Activities

NCAUPG Technical Asphalt Conference

St Louis, MO

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NCSC STAFF

- Jan Olek, Director, Ph.D., P.E.
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- Undergraduate Helpers (as needed)

CURRENT ACTIVITIES

- Research
 - Completed Project Highlights
 - Ongoing Research
- Technology Transfer
 - Patching Synthesis
 - Newsletter
- Technical Support
 - What can we do for you?
- Training

COMPLETED RESEARCH PROJECTS 2012

Increased Use of RAP

- *Investigation of Low and High Temperature Properties of Plant-Produced RAP Mixtures (FHWA funded)*
- *Evaluation of Recycled Asphalt Pavement for Surface Mixtures (INDOT funded)*

Increased Use of Local Materials

- *Maximizing the Use of Local Materials in HMA Surfaces (INDOT funded)*

PLANT- MIXED RAP MIXES

- Evaluated 5 sets of plant-produced mixes with up to 40% RAP and 2 virgin binders
- Compared
 - Modulus
 - Low temperature properties and cracking
 - Estimated blending
 - Fatigue (TFHRC)
- Also tested extracted/recovered binders

CONCLUSIONS

- As RAP content increased, mix modulus generally increased
- No statistically significant difference between moduli of mixes with PG64-22 with 0, 15 and 25% RAP
 - Significant difference for 40% RAP in most cases
- Use of softer virgin binder did reduce modulus
- Implies grade change is needed for 40% RAP but not for 25% RAP

CONCLUSIONS

- Significant blending of RAP and virgin binders was observed in most cases
- Low temperature mix testing showed slight change in critical cracking temperature at up to 25% RAP with no grade change
- Critical cracking temperatures were lower with PG58-28, but may not be needed
- Fatigue results were unexpected; no clear effect of RAP content or binder grade

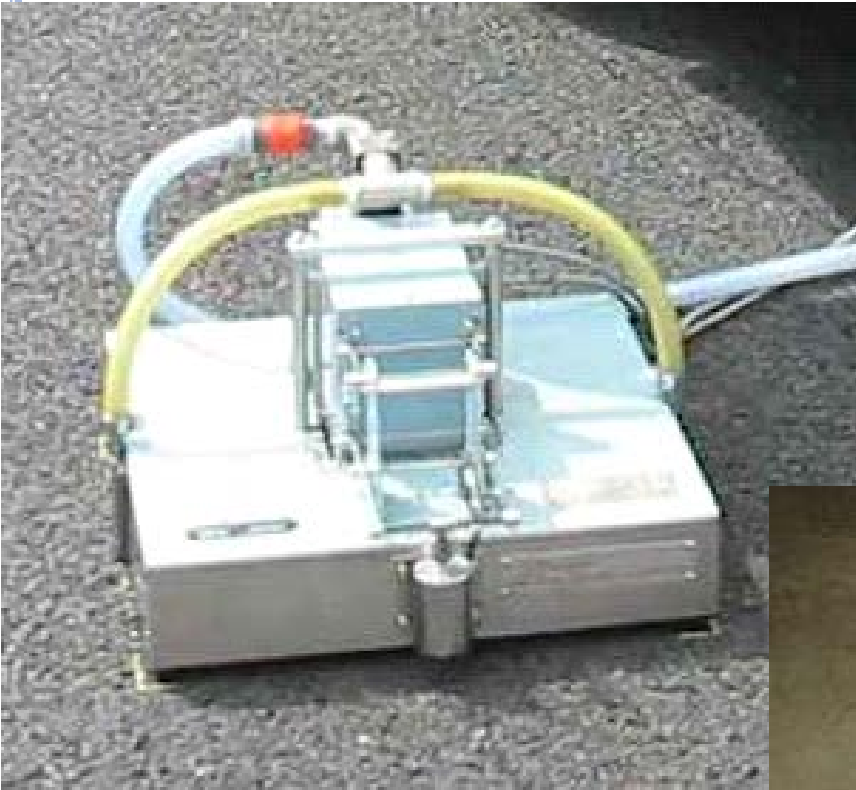
OUTCOME

- INDOT OMM explored PG grading of 33 RAP sources across the state (average PG90.1–11.1)
- Based on all these results, spec change was approved
 - 25% with no grade change, 40% max
 - Also changed to binder replacement
- Reports that some other states are verifying these results
- Subject of NAPA webinar

RAP FOR SURFACE MIXTURES

- RAP historically not used to full extent in surfaces
- Determine threshold level of RAP that has minimal effect on friction
- Evaluated lab-fabricated RAP at up to 40% blended with steel slag and ACBF Slag in HMA and SMA
- Friction testing of 8 existing surfaces with 15-25% RAP

SURFACE CHARACTERISTICS



FINDINGS AND RECOMMENDATIONS

- Field friction testing suggests 15% RAP is acceptable and higher RAP contents are possible for medium volume roadways.
- Recommended limit of 20% fine RAP by binder replacement.

MAXIMIZING THE USE OF LOCAL MATERIALS IN HMA SURFACES

- Objective – explore opportunities to allow the use of more local materials in HMA in place of “imported” fine and coarse aggregates
- Local coarse aggregate up to 40% blended with steel slag, ACBF and sandstone
- Local fine aggregate up to 20%
- HMA and SMA mixes

POTENTIAL COST SAVINGS

Substituting local agg for steel slag could save:

- \$1.50 to 2 per ton of hot mix (fine aggregate)
- \$3 to 4 per ton of hot mix (coarse agg)
- \$4.50 to 6 per ton of hot mix (both)
- Up to 10% of cost of mix
- \$3000 to 4000 per lane mile of surface mix
- *With the same performance.*

OUTCOME

- Up to 25% coarse local aggregate allowed in surface mixes
- New/revised test procedure to use friction and texture testing in the lab to screen possible aggregate sources
- First step before field trials.

OPTIMIZING COMPACTION

- AKA – Designing at Higher Air Voids
- See John Haddock's presentation this afternoon.
- Anticipated outcome – more durable asphalt pavements

TECHNOLOGY TRANSFER

- New NCHRP Synthesis on *Pavement Patching Practices*
- Patching practices for asphalt and concrete pavements
- Programming, equipment, monitoring, materials, performance, etc.
- Survey and literature review
- To be completed by Fall 2013

REINSTITUTING NEWSLETTER

- Combined effort with Southeast Superpave Center
- Electronic publication
- Mailing list

TECHNICAL SUPPORT

- Testing aggregate source for Polish Resistance for contractor
- Binder extraction and testing for contractors for RAP mix design
- Mix testing for contractor experimenting with recycling agent
- Friction testing of thermoplastic material
- Extensive binder testing for one state

OTHER THINGS WE CAN OFFER

- ▶ Testing Capabilities
 - Field and Lab
 - Binder, mixture and components
 - Formal research and informal forensics/evaluations
 - Equipment and test protocol evaluations
- ▶ Training Resources
 - ▶ Internships, one on one, our place or yours
- ▶ Technical Advice
 - Proposal review
 - Strategic planning
 - Research in progress/Literature synthesis
 - Speakers

QUESTIONS?

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