EVALUATION OF WARM MIX ASPHALT

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Research Objectives

- Review available technologies for warm mix asphalt paving
- Conduct field trials on selected construction projects to evaluate the selected technologies, focusing on relationship between asphalt temperature and in situ density
- Evaluate the early age performance of WMA technologies vs. HMA control
- Review pavement performance through KTC’s Long-Term Monitoring Project
- Review potential specification changes relating changes in permitted paving techniques
Research Tasks

- Identify 9 asphalt resurfacing projects
- Split each project up into test section (WMA) and control sections (HMA)
- Contractors were asked to produce and pave WMA at or below 260°F
  - All other components of design and construction (mix design, lift thickness, equipment used, rolling pattern, etc.) remained constant
- Monitor temperature, density, in situ permeability throughout test and control sections
Research Tasks

- Measured density, temperature and permeability at locations throughout sections
  - At least 5 cross-sectional locations in WMA and 5 cross-sectional locations in HMA
  - CL, 6”, 18”, and 60” from CL Joint (on each side of the joint) at each cross-sectional location

- Cut surface cores at each point mentioned above
  - Measured core density in lab

- Collected bulk samples for future analysis
Potential Benefits

- **Contractor**
  - Money saved on fuel costs could offset additional material costs
  - Could lead to longer paving season
  - Longer haul distances open up new markets

- **Client**
  - Longer-lasting asphalt
  - Fewer rehabs

- **Public**
  - Fewer cracks = smoother pavement
  - Fewer rehabs = fewer delays
  - Better for the environment
Keep in Mind…

- Quality of warm mix MUST be as good or better than HMA, or it is NOT acceptable.
- ↑ Density = ↑ Performance
- ↓ Temperature = ↓ Cost
- Addition of WMA additive was ONLY change in mix
Average Density, All Projects (% MTD)

- **WMA**
- **HMA**

- *Chemical*
- *Wax*
Average Temperature Behind Paver, All Projects (°F)

Temperature (°F)

- Chemical
- Wax

- WMA
- HMA
Permeability Results by Location and Asphalt Type

Permeability (AIP, mmHg)

Distance from CL Joint (inches)

HMA
CHEM
WAX
Conclusions

- WMA densities were as good or better than their HMA counterparts.
- WMA temperatures were on average 60°F cooler than HMA control sections.
- Addition of wax/chemical additive does not significantly increase pavement permeability.
- Workability still seems to be a concern for some contractors.
- Actual savings will depend on plant efficiency, fuel prices, additive costs, aggregate moisture, etc.
Questions?

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