Enhanced Durability Through Increased In-Place Pavement Density

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Improved Durability through Increased Field Compaction

• Assumption – Pavement density can be increased with a minimum of additional cost.

• Objective – States increase their in-place asphalt pavement density requirements resulting in increased pavement life.
FHWA's Strategic Goal for the Pavement Technology Program

• Provide leadership and technology for the delivery of long-life pavements that meet our customers needs and are safe, cost effective, and can be effectively maintained.

- Part 626.3 Policy.

“Pavement shall be designed to accommodate current and predicted traffic needs in a safe, **durable**, and cost effective manner.”
Typical Asphalt Pavement Density requirements are based on what was achievable yesterday.

Today we have made significant advancements in material and construction technology and techniques.

Today we are also placing more and more resource responsible materials, containing higher levels of recycled, reclaimed, and reuse (RRR) products.

Challenge: Can we use today’s technology and techniques to raise-the-bar on in-place density to improve durability and extend pavement service-life?
Today’s Environment

2011 FHWA Division Office Assessment

About ½ of SHA’s are not satisfied with overall performance of longitudinal joints

2013 NAPA Industry Survey

More than 30% of asphalt materials are produced using WMA technology, RAP use has increased to 20+%, and there is a significant interest in other recycled materials.

Significant Advancements

Many State Target Density requirements have not changed since the 1980s!
Let’s Bring it **ALL** together…

\[ \uparrow \text{Density} = \uparrow \text{Durability} \]
2003 AASHTO SOM Survey

Minimum Target

Number of States

Minimum Mat Density (% of G_{mm})

89.0% 89.5% 90.0% 90.5% 91.0% 91.5% 92.0% 92.5% 93.0% 93.5% 94.0%

FAA
Challenges – Many Considerations

How Density is Measured:

- Percent within Limits (PWL)
- Minimum with Maximum
- Running Average
- Target with Tolerances ± 0.2%

Important Considerations:

- Appropriate lift thickness for NMAS and coarse gradations
- Appropriate mix design requirements
- Appropriate test methods for measuring compaction (both $G_{mm}$ and $G_{mb}$)
- Density only a surrogate for permeability
- Appropriate acceptance criteria that properly motivates and rewards the contractor to reach the desired level of compaction as opposed to just the minimum
Improved Durability through Increased Field Compaction

• A 2% increase in field compaction claimed to increase asphalt pavement service-life from 5 to 10+%!

• Today’s compaction target - typically 92% of maximum ($G_{mm}$) or 8% air voids), with varying requirements for the area near the longitudinal joint

❖ Increased Density Pavements target a 2% increase across the entire pavement!

• Just 2% more… makes a huge difference!
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Increased Density Pavements

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By December 2016, 10+ State highway agencies will host an “Increased Density” Asphalt Construction Workshop

- SHA, Contractors, Equipment Supplies, and Academia.

By December 2016, 10+ State highway agencies will place a “Increased Density” Pavement Section

- FHWA fund evaluations on existing pavement projects.

2017, document number of states that modify existing standards.

- Goal 10+ states
Increased Density Initiative

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Possible Next Steps:

1. Webinars (NAPA), On-site training (AI), Information search (NCAT)
2. Fund State Agency trials/reports on feasibility
3. Encourage State Agency standards changes (ex. 2% increase in MTD)
THANK YOU......