Getting Quality Joints

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Goal – Better Densities

• Our focus has been on getting better joint density due to performance issues of under compacted material.
Goal – Better Densities

“The amount of air voids in an asphalt mixture is probably the single most important factor that affects performance throughout the life of an asphalt pavement.” E. Ray Brown, NCAT Report 90-3

“Compaction is the most important factor in the performance of an HMA pavement.” HMA Paving Handbook, US Army Corps of Engineers
On our RPS and NHS routes we have gained in terms of density.

<table>
<thead>
<tr>
<th>Year</th>
<th>Min. Spec. Limit</th>
<th>Avg. Joint Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>N/A</td>
<td>88.9%</td>
</tr>
<tr>
<td>2009</td>
<td>N/A</td>
<td>89.2%</td>
</tr>
<tr>
<td>2010</td>
<td>N/A</td>
<td>88-90%</td>
</tr>
<tr>
<td>2011</td>
<td>≥ 89%</td>
<td>91.0%</td>
</tr>
<tr>
<td>2012</td>
<td>≥ 89%</td>
<td>91.6%</td>
</tr>
<tr>
<td>2013</td>
<td>≥ 89%</td>
<td>91.4%</td>
</tr>
<tr>
<td>2014</td>
<td>≥ 90%</td>
<td>92.3%</td>
</tr>
<tr>
<td>2015</td>
<td>≥ 90%</td>
<td>92.6%</td>
</tr>
</tbody>
</table>
Longitudinal Joints

2015 Longitudinal Joint Density Projects
Incentive/Disincentive Summary

• 124 Projects with Specification

• 493 Total Lots (2464 cores) approx. 1167 miles

• Raised min. spec. limit to \( \geq 90\% \) density for 2014 construction (Pub. 408 2011/Change 5)

<table>
<thead>
<tr>
<th>Pay Adjustment</th>
<th>Total $</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bonus</td>
<td>$1,620,868</td>
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<tr>
<td>Negative Adjustment</td>
<td>$149,851</td>
</tr>
</tbody>
</table>
Increased Projected Life of Joints Due to Improved Densities in PA, 2008 thru 2015

Projected service life curve based on a Washington state study
Joint Density Up

- We have done well in raising the density at our joints. This will pay off.

- Now let’s focus on making sure we get the density without causing cracking.
Goal – Dense Joints that Don’t Crack

• Better densities mean more roller passes

• More roller passes mean more chance to crack the pavement in the area of the joint

• Tender mixes will make this tendency worse. Be on your guard to ensure you are not creating cracking.
Close up - Unsupported Edge

Note the overhang... this needs to be on every pass, not just some of them.
What We Don’t Want

Rolling Unsupported Edge
(First Paver Pass)

Edge of drum inside unsupported edge
Can cause cracking near the edge and lateral mix movement at the unsupported edge (especially on tender mixes)
What We Don’t Want

- Note the crack that formed at the unsupported edge.
- This illustrates why rolling just inside of the edge is not desirable.
- This mix had a tender zone and cracks formed at the edge of the roller drum.
Make sure rollers overhang edges
Watch what is Going on at the Screed

Project:
- Paved June 2015
- Wedge Joint
- No joint spec
- Paver leaving shadow in mat about 3” from joint
- Next winter?
- Often watching the mat closely can pick up an issue that could be corrected
Tack at Unsupported Edges

- Apply tack coat slightly beyond the edge of the lane to be paved

Extra Tack Coat Width
I Want to See Tack Coat

Note the extra 6 inches of tack
Overlap Paver Screed 1” (to 1 ½”)

• Consistent proper overlap is key

• Operate paver so that the edger plate on the screed overlaps the previously placed pavement by 1 inch (to 1 ½ inches)
Conclusion

- Density is important, so get it
- Watch details so cracking doesn’t happen
  - Roller passes, overhang
  - Roller speed
  - Stay out of tender zone
  - Tack application
  - Watch the screed
- Use your eyes to look for issues