PROJECT SUMMARY REPORT

0-7064: Use of Tamper Bar Paver to Place Thick-Lift Asphalt Concrete Pavement

Background

Thick-lift paving is the placement of asphalt concrete in lifts thicker than the allowable maximum. A tamper bar paver (Figure 1) might address concerns of poor compaction and ride quality in thick-lift paving since tamper bar screeds provide greater compaction behind the paver than a typical vibratory screed. The purpose of this research was to determine whether a tamper bar paver can effectively place asphalt concrete in thick lifts and identify the best practices to do so.

Figure 1. Thick-Lift Paving with a Tamper Bar Paver.

What the Researchers Did

The research team coordinated with the Dallas, Atlanta, and Tyler Districts to construct thick-lift sections on three projects using tamper bar pavers. In total, 28 unique test sections were constructed based on the following:

- Placing 6 to 10 inches of Superpave Type C or B mixtures in a single lift and in two lifts.
- Enabling and disabling the tamper bar on the screed.
- Modifying the rolling pattern to between three and six vibratory breakdown passes.

The mat cooldown time was measured at the surface and at various depths using infrared sensors and a thermocouple probe. Throughout compaction, the air voids were measured with a non-nuclear density gauge. The finished mat had full-coverage testing with a PaveScan rolling density meter and three-dimensional radar. An inertial roughness profiler was used to measure ride quality. The team sampled over 170 cores, at least six cores per section, and measured the core air voids content using the traditional bulk saturated surface-dry method and air voids uniformity using a computed tomography scanner.

What They Found

The cooldown time of the mat surface was between 5 and 6.5 hours, and 6 to 9 hours in the middle of the lift. Surface cooldown time increased by 0.7 hours per additional inch of thickness.

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Overall mat compaction was acceptable for all test sections. Additional roller passes had the biggest effect on air voids but with diminishing returns. Construction in two lifts produced higher air voids because the bond interface itself had high air voids (Figure 2). Thicker lifts, when compared to the mixture nominal maximum aggregate size, increased the air voids. Thicker lifts also increased vertical segregation, but a single thick lift was still more uniform than two lifts of the same total thickness. The effect of the tamper bar screed itself was not significant though there were several confounding variables interfering with the evaluation.

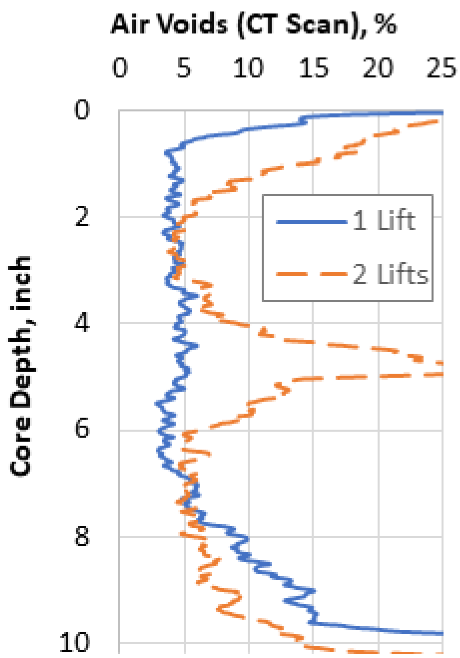

Figure 2. Air Voids Uniformity for Cores Placed in One Lift and Two Lifts.

Pavement roughness was expected to increase when placed in a single lift, but the analysis was inconclusive.

What This Means

Table 1 shows scenarios for when and when not to use thick-lift paving. The document *Thick-Lift Asphalt Concrete Paving Guidelines* discusses recommended paving equipment, compaction practices, concerns about opening to traffic, and management of ride quality.

Table 1. Scenarios for Thick-Lift Paving.

When to Use Thick-Lift Paving	When NOT to Use Thick-Lift Paving
• Thick mill-and-fill patches • To place thick intermediate lifts at one time (e.g., place one 4-inch lift of SP Type C instead of two 2-inch lifts) • Asphaltic concrete base layers • Perpetual pavement layers • When there is a concern with bonding of multiple lifts • When there is a concern with air voids at the lift interface	• For the final riding surface when optimal ride quality is needed • The roadway needs to be opened to traffic very quickly • If mixture delivery will not be consistent; frequent paver stops will increase roughness • If milling and construction would leave excessive work zone drop-offs that cannot be adequately protected

For More Information

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