Florida Department of Transportation Research

# Development of a Procedure for Evaluating and Approving Liquid Anti-Strip Agents

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BE585

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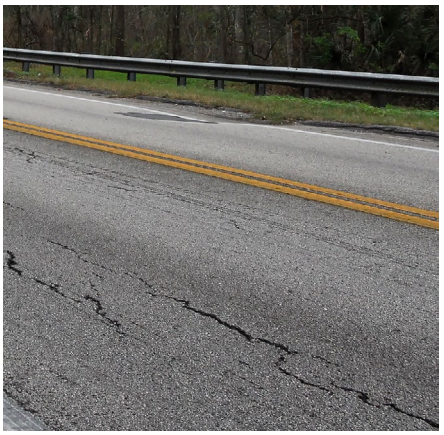
## Current Situation

In Florida, asphalt pavement is composed mainly of limestone aggregate and asphalt, which binds the aggregate. Moisture can weaken the bond between asphalt binder and aggregate, making the pavement susceptible to stripping, a loss of asphalt, which can lead to cracking and fragmentation of the pavement surface. To reduce stripping, the Florida Department of Transportation (FDOT) requires antistripping agents (ASAs) as part of pavement mixes; however, field personnel have reported that some approved ASAs have produced asphalt mixes that are too soft and move excessively under rollers during compaction while still hot and may still be soft and crumbly after cooling.



*Moisture can cause set up pavement to lose asphalt and crack, leading to pavement loss.*

## Research Objectives

To update the current approval thresholds for ASAs, Texas A&M Transportation Institute researchers studied the effect of liquid ASAs on asphalt mixture stability during and after compaction, including determining effective laboratory procedures for evaluating these effects.

## Project Activities

In the field, asphalt pavement is compacted using a drum roller vehicle. The action of the drum roller is simulated in the laboratory using a gyratory compactor (GC), a device that applies pressure to an asphalt mix sample while it is slowly rotated. A GC test produces a cylindrical sample of compacted asphalt mix that can be used for further testing.

In phase one, the effect of the number of gyrations on asphalt mixes was examined. Control and ASA-treated asphalt mixtures were subjected to GC at a selected number of gyrations to obtain compaction parameters that could be correlated to asphalt mix stability during and after construction. Out of 121 parameters, three were most useful in distinguishing mixtures in terms of stability during compaction: one shear energy index and two compactability energy indices.

In phase two, the researchers examined the effect of mixture air void content, an important factor in pavement durability, for control and ASA-treated mixtures. Performance parameters of the GC samples were determined using resilient modulus testing, asphalt pavement analyzer, Hamburg wheel-track, Cantabro abrasion loss, and the recently developed IDEAL shear rutting tests. Asphalt mixture stability was determined at times after compaction up to 72 hours. Like phase one, these studies showed that treated mixtures were generally softer and less resistant to shear than control mixtures. The tests performed for this series provided a ranking of liquid ASA-treated mixtures more consistent with field observations than other test protocols.

Project results led to an improved protocol for approval of liquid ASAs based on their effect on asphalt mixture stability. These results, based on the use of a single asphalt binder, suggest that this protocol should be verified with a broader range of binders and in field studies.

## Project Benefits

An improved protocol for approval of ASAs will help improve the durability and quality of pavements on Florida roads and reduced maintenance and replacement costs.

*For more information, please see www.fdot.gov/research/.*