



Project Number

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Alternative Aggregates and Materials for High Friction Surface Treatments

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Current Situation

Since 2006, the Florida Department of Transportation (FDOT) has finished road segments, such as tight curves and intersections, with high friction surface treatments (HFST). This treatment, composed of fine, very hard aggregates bound to the road with a polymer resin, increases traction and helps to prevent crashes, especially when the road surface is wet. HFST has been shown to reduce crashes by 60 percent or more. However, the high cost of HFST limits the number of sections that can be treated annually. Also, HFST-treated sections often suffer from severe cracking and potholing of the pavement, delamination from the existing surface, and raveling of the aggregate from the resin binder.

Research Objectives

Researchers at the Texas A&M Transportation Institute studied the materials and practices that best eliminate premature HFST failures and reduce overall HFST costs, while maintaining or improving treatment life and friction performance.

Project Activities

The researchers reviewed the literature to determine the materials and practices used in HFST application. They interviewed FDOT staff to locate all HFST sections in Florida and to learn about experiences with these sections. Each section's performance was evaluated based on distress, friction resistance, and crash reduction.

From the Florida HFST sections, the researchers selected six for detailed study. The sections ranged in their performance from good to poor. The sections were paved with either concrete, open-graded, or dense-graded asphalt. Pavement condition was documented and cores were taken for laboratory analysis of the HFST's friction and its bonding to the pavement.

A series of laboratory tests were then conducted on virgin materials in order to determine the factors that determine the serviceability of HFST. Calcined bauxite and a commercial product composed mostly of silica and aluminum oxide were used as high friction aggregates. Epoxy resin, epoxy urethane resin, cresole-modified epoxy resin, and acrylic polyester resin binders were evaluated. Samples made from these materials were subjected to several tests: pull-off strength, cyclic shearing, aggregate loss, thermal compatibility, and binder gel time. Alternative materials were tested in a variety of formulations. .

Results of these studies led to a series of recommendations, a set of guidelines, and a proposed revision of the FDOT specification for HFST.

Project Benefits

HFST has proven benefits in crash reduction. Improved performance and increased cost-effectiveness of materials and methods for HFST application can extend these benefits to more roadway sections, making Florida roads safer to travel.

For more information, please see dot.state.fl.us/research-center



This curve approaching an intersection is treated with a high friction surface treatment.