Florida Department of Transportation Research

Open-Graded Friction Courses Suitable for Suburban Environments

March 2026

Project Number
BEB15

Project Manager
Howie Moseley
State Materials Office

Principal Investigator
Nam Tran
National Center for Asphalt Technology at Auburn University

Current Situation

The Florida Department of Transportation (FDOT) uses an open-graded friction course (OGFC) known as FC-5 on multi-lane roads with speeds of 50 mph or higher to improve safety by reducing hydroplaning and splash/spray during rain events. However, FC-5 layers on high-speed, multi-lane suburban roads often experience premature raveling due to increased lateral stresses from turning, rapid acceleration, and braking. This issue compromises the longevity and effectiveness of the pavement, particularly in suburban environments.

FDOT uses an open-graded friction course known as FC-5. The research from BEB15 provides an assessment of strategies designed to improve the durability of FC-5 mixtures.

Research Objectives

The project aimed to evaluate the impact of four strategies designed to improve the durability of FC-5 mixtures: employing a 9.5-mm nominal maximum aggregate size (NMAS) gradation; using a high polymer (HP) modified binder in the mixture; assessing the effectiveness of a 12.5-mm stone matrix asphalt (SMA); and exploring an alternative friction course (AFC).

The study sought to ensure that these mixtures could provide adequate drainage, surface friction, and improved durability for use in suburban areas.

Project Activities

Following a literature review, the National Center for Asphalt Technology at Auburn University research team evaluated four different mix designs following four steps. First, they selected two asphalt binders (PG 76-22 and HP binder) and two aggregate types (granite and limestone). Second, the team developed mix designs and evaluated the mixtures with two asphalt binders to assess the impact of utilizing the 9.5 NMAS gradation and HP binder and to establish the baseline performance data for the AFC design.

Next, they developed mix designs and conducted performance evaluations for the AFC mixtures, testing durability, permeability, cracking resistance, and rutting resistance. Short-term and long-term aging processes were also applied to simulate real-world conditions, assessing the mixtures' performance after exposure to aging and weathering.

Lastly, the research team conducted performance comparisons and cost analysis.

Project Conclusions and Benefits

The results of this study were promising regarding improved durability of friction courses, enhanced safety with drainage, and cost-effective, reducing the need for frequent maintenance and extending the lifespan of suburban road pavements.

The project concluded that using 9.5-mm OGFC, AFC mixtures, and/or HP binder would improve pavement durability in suburban roads while maintaining the safety characteristics of FC-5. Additionally, these modifications could be implemented at a minimal cost increase of approximately $2 per ton for 9.5-mm OGFC and AFC mixtures.

Findings from this project have already been implemented into the Standard Specifications and Flexible Pavement Design Manual with the incorporation of FC-7 (a 9.5-mm OGFC) into those documents.

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