TECHSUMMARY October 2013

SIO No. 30000061 / LTRC Project No. 04-5B

Evaluation of Open Graded Friction Course (OGFC) Mixtures

INTRODUCTION

Louisiana Department of Transportation and Development (LADOTD) began the development of Open-Graded Friction Course (OGFC) mixtures in the late 1960s and early 1970s. In the early 1980s, a moratorium was imposed on the use of OGFC mixtures due to some early failure issues and a number of OGFC pavements experiencing end of life failures early. However, significant improvements have been noticed in OGFC mixture performance and service life since a new-generation of OGFC mixtures was promoted in the U.S. in late 1990s. Inspired by the success of some other state agencies, LADOTD modified the earlier mix design and constructed four new OGFC sections during the last decade to evaluate pavement performance and safety benefits. This paper includes a comprehensive evaluation of Louisiana OGFC mixtures on the basis of their laboratory and field performance. Laboratory work entailed material and mixture design in addition to performing numerous laboratory tests namely permeability, draindown, tensile strength ratio, and loaded wheel test. Field evaluation involved visual inspection, pavement condition survey, skid resistance, and traffic safety. With very few exceptions in the laboratory, the selected OGFC mixtures showed the potential to meet current LADOTD specifications as well as various performance standards established by previous studies.

OBJECTIVE

The purpose of this study was to monitor and document the construction and performance of OGFC mixtures in several field projects in the state of Louisiana. This evaluation was focused mainly on long-term performance based on wet weather safety improvement, surface crack resistance, and pavement condition survey. In addition, laboratory performance of OGFC mixtures was evaluated in an effort to determine an appropriate mix-design procedure for Louisiana.

METHODOLOGY

Four OGFC test sections were constructed on US 71, I-20, US 61, and US 171 to evaluate pavement performance and safety benefits on the basis of their laboratory and field performance. Permeability, Draindown, Loaded Wheel Tracking (LWT), and Tensile Strength Ratio (TSR) tests were conducted in the laboratory test factorial in addition to material and mixture design evaluation. Field performance evaluation was performed on the basis of visual inspection, pavement condition survey, skid resistance test, and traffic safety data analysis.

The OGFC mixtures included in this study were designed following the recommendations outlined by NCAT [7]. A Superpave gyratory compactor was used with a design gyration level of 50 during the mixture design process. The contractors were required to use a PG 76-22m or higher grade asphalt cement. The design asphalt content was a minimum of 6.5 percent with a maximum draindown of 0.3 percent by total

LTRC Report 513

Read online summary or final report:
www.ltrc.lsu.edu/publications.html

PRINCIPAL INVESTIGATOR:
William "Bill" King, Jr., P.E.

LTRC CONTACT:
William "Bill" King, Jr., P.E.
225.767.9129

FUNDING:
SPR: TT-Fed/TT-Reg

Louisiana Transportation Research Center

4101 Gourrier Ave
Baton Rouge, LA 70808-4443

www.ltrc.lsu.edu

mixture weight. Cellulose fibers or mineral fillers were used with an anticipation of improved draindown of asphalt and better reinforcement against rutting and cracking.

CONCLUSIONS

Based upon the experience obtained from the laboratory and field phases of this study, it can be concluded that Louisiana OGFC mixtures are capable of delivering impressive performance as well as providing a safe traveling surface. The following findings and conclusions are:

- The material and mixture design guidelines work very well with reasonable permeability, draindown, LWT, and TSR tests.
- The CoreLok (AASHTO T 331) appears to be a more accurate method for determining bulk specific gravity and air voids of a compacted OGFC sample.
- OGFC pavements always showed better friction resistance than their Superpave counterparts with very good macro-texture in terms of MPD results.
- Based on IFI Friction Index computation, OGFC and SMA mixtures showed better friction indices than Superpave mixtures.
- Five year pavement distress data indicate that the performance and projected life of OGFC sections are comparable to the typical Superpave sections.
- The OGFC-SMA combination provided the best reflective crack relief section for composite pavements to date in Louisiana.
- In comparison to the companion glass-grid sections, the OGFC was found to save 14 percent of the materials costs.
- Accident data analyses indicated that OGFC mixtures significantly improved the wet weather accident rate for all projects.
- The pavement design guide for LADOTD has been changed to require OGFCs for new overlay sections of all Interstate highway surfaces and for any surface being corrected for safety concerns.

RECOMMENDATIONS

Based on the outcome of this study, the authors highly recommend the implementation of OGFCs for any roadway surface having wet weather safety concern. A new DOTD specification, Section 501, was created to include OGFC mixtures which requires a maximum of 12 mm rut depth after 7500 passes of the LWT test.

Figure 1
OGFC test section

Figure 2
Workers laying down OGFC test sections

Figure 3
OGFC pavement