

JOINT TRANSPORTATION RESEARCH PROGRAM

Principal Investigator: Jusang Lee, Purdue University, jlee@indot.in.gov, 765.463.1521

John E. Haddock, Purdue University, jhaddock@purdue.edu, 765.496.3996

Program Office: jtrp@purdue.edu, 765.494.6508, www.purdue.edu/jtrp

Sponsor: Indiana Department of Transportation, 765.463.1521

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Quality Control and Quality Assurance of Asphalt Mixtures Using Laboratory Rutting and Cracking Tests

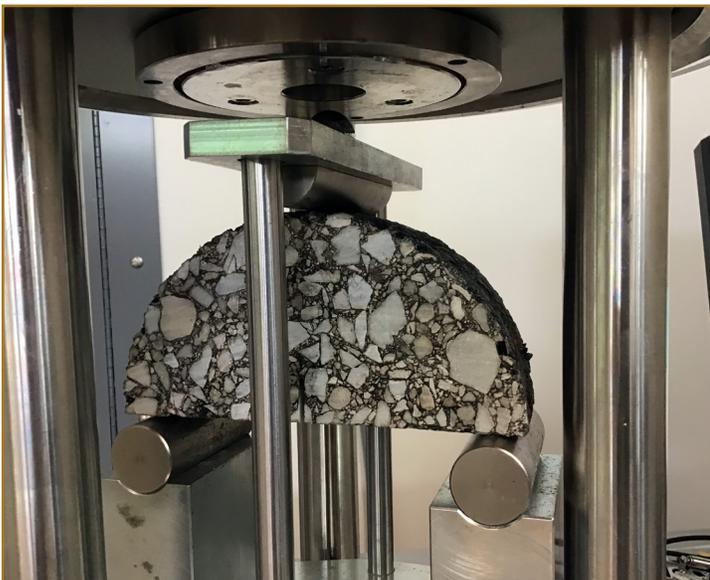
Introduction

Since the implementation of the Superpave mixture design method by the Indiana Department of Transportation (INDOT), permanent deformation problems, such as rutting and other stability challenges, have been effectively addressed in Indiana. Thus, INDOT's attention and effort have shifted toward improving asphalt pavement resistance to cracking-related distresses, while maintaining suitable rutting resistance.

This research project evaluated the Illinois Flexibility Index Test (I-FIT) and the Hamburg Wheel Track Test (HWTT) as possible quality acceptance cracking and rutting tests, respectively, using two types of specimens, plant-mixed laboratory-compacted (PMLC) and plant-mixed field-compacted (PMFC). The cracking characteristics of the PMFC mixtures were also compared to fatigue performance predictions from FlexPave

Findings

- Flexibility index values obtained from PMFC specimens were consistently higher than those from their corresponding PMLC specimens.
- Flexibility index values are affected by variations in specimen thickness and air voids content.
- The I-FIT test may reasonably detect binder cracking characteristics in asphalt mixtures.
- The I-FIT test may assist in understanding pavement fatigue cracking performance.
- The 10th and 20th percentiles of flexibility index values could be used as threshold values to exclude the poorly performing mixtures relative to cracking performance.
- Distributions of rut depth and relative rut depth values present clear distinctions among the mixtures in terms of high-temperature binder grades.



- Asphalt mixtures containing PG 64 binders may be more susceptible to moisture damage than those containing PG 70 and PG 76 binders.
- The calculated Stripping Inflection Point (SIP) values of the PMLC specimens indicate higher moisture damage susceptibility for larger mixture types with softer binders. However, no apparent impact of mixture size on the SIP is observed from PMFC specimens.
- The 10th and 20th percentiles of different rutting parameters could be used as threshold values to exclude the mixtures having the poorest rutting characteristics.
- Relative rut depths are well correlated with air voids contents. This finding may indicate implementing higher initial pavement densities should help improve asphalt pavement rutting performance.

Implementation

Given the experimental results of the project, INDOT suggests the current Illinois Flexibility Index Test not

be implemented for quality control or quality assurance since the results can often conflict with observed pavement performance. Additionally, INDOT will not implement the Hamburg Wheel Track Test for quality control or quality assurance purposes, since asphalt pavement rutting is currently not a major INDOT concern.

Recommended Citation for Report

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