

Investigation of Aged Hot-Mix Asphalt Pavements

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Dynatest 8000 Falling Weight Deflectometer Tester

Introduction

Over the lifetime of an asphalt concrete (AC) pavement, the roadway requires periodic resurfacing and rehabilitation to provide acceptable performance. The most popular resurfacing method is an asphalt overlay over the existing roadway. In the design of asphalt overlays, the thickness is related to the structural strength of the existing pavement. As the layers are overlaid their structural characteristics change due to aging of asphalt. However, currently there is no method to determine the effect of aging on the strength of existing pavement layers.

Project Description

This study examined structural characterization of six pavement test sections in Kansas using three different test methods: Falling Weight Deflectometer (FWD), Portable Seismic Property Analyzer (PSPA), and Indirect Tensile (IDT) tests. The results were analyzed to determine how the modulus of an AC pavement layer changes over time. The primary goals of this study were:

1. To determine how AC pavement layer modulus changes over its lifetime;
2. To develop a correlation between moduli obtained from FWD, PSPA, and IDT tests; and
3. To investigate the fatigue properties of the aged asphalt layer materials.

Project Results

The results indicate that as the AC pavement ages, its modulus decreases due to pavement deterioration. The most prominent cause for AC pavement deterioration was observed to be stripping. Two of the test sections on US-169 and K-4 showed little signs of stripping and had a minimal reduction or even an increase in AC moduli.

The analyzed results from different test methods for moduli were inconclusive as far as any correlation among the methods is concerned. While the correlation between various test methods studied was mostly consistent for a particular roadway, no universal correlation was found for all pavement sections tested.

Fatigue test results show that older pavement layers have a higher propensity for fatigue failure than the newer layers. However, some older pavement layers showed excellent fatigue life. Fatigue results correlated well with the condition of the cores as assessed by visual observation.

Project Information

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