RESEARCH
PROJECT CAPSULE [14-4C]
May 2014
TECHNOLOGY TRANSFER PROGRAM

Evaluation of Bonded Concrete Overlays over Asphalt under Accelerated Loading

JUST THE FACTS:

Start Date:
April 8, 2014

Duration:
24 months

End Date:
April 7, 2016

Funding:
SPR: TT-Fed/TT-Reg

Principal Investigator:
Tyson Rupnow, Ph.D., P.E.
Senior Concrete Research Engineer
LTRC

Administrative Contact:
Mark Morvant, P.E.
Associate Director, Research
225-767-9124

Technical Contact:
William "Bill" King, Jr., P.E.
Materials Research Administrator
225-767-9129

Louisiana Transportation Research Center
4101 Gourrier Ave
Baton Rouge, LA 70808

Sponsored jointly by the Louisiana Department of Transportation and Development and Louisiana State University

POINTS OF INTEREST:

Problem Addressed / Objective of Research / Methodology Used Implementation Potential

PROBLEM

Portland cement concrete (PCC) overlays have been used with great success in many locations across both the United States and the world. There are two main types of PCC overlays: un-bonded and bonded. Un-bonded overlays are constructed over existing pavement structures with bond breakers or separating agents between the overlay and the underlying structure including the use of fabric and other bond breaking agents. Bonded overlays are built upon existing or ground surfaces of either asphalt or concrete.

The proven durability and cost-effective construction method of bonded concrete overlay over existing asphalt pavement has created a great deal of interest from many state and local transportation agencies. Currently, a typical medium- to high-volume roadway in Louisiana consists of an existing asphalt concrete layer over a PCC or cement-stabilized soil base. Due to the increasing costs of roadway maintenance, the Louisiana Department of Transportation and Development (DOTD) has great interest in determining if thin bonded concrete overlays (usually 2-6 in.) are a suitable and cost-effective alternative to the current practice of roadway maintenance. Therefore, there is a need to study the design, constructability, and performance of bonded concrete overlay pavements in Louisiana. This can be achieved through conducting accelerated pavement testing on bonded concrete overlay pavements to be constructed at the Pavement Research Facility (PRF) site in Port Allen, Louisiana.

OBJECTIVE

The overall objective of this research study is to evaluate the structural performance and load-carrying capacity of bonded concrete overlay pavement structures through accelerated pavement testing and document the experience of mix design and construction practice of PCC overlays for DOTD.

METHODOLOGY

The methodology is as follows: construct three full-scale concrete overlay pavement sections (2 in. [fiber reinforced], 4 in., and 6 in.) and evaluate the pavement performance of the concrete overlay sections using the ATLaS30 device available at the PRF; assess the fatigue, thermal, and/or moisture damage of the concrete overlay sections through instrumentation and non-destructive pavement testing; evaluate the structural bearing capacity of the concrete overlay pavement structures by monitoring of pavement surface deterioration and deflection during loading and post-mortem investigations; and, document the requirements for production and construction of concrete overlay surfaced pavements. This will provide DOTD, contractors, material suppliers, and others with a thorough introduction and review of concrete overlays and its many paving applications.

IMPLEMENTATION POTENTIAL

The results of this project will assist the Department in standardizing the concrete overlay design process. In addition, typical section design thicknesses for various traffic volumes and patterns will be established. A cost benefit analysis will be completed to show the comparative costs between current overlay strategies employed by the Department and a concrete overlay solution.