DRISI
Caltrans Division of Research, Innovation and System Information

Research Results

Pavement

Development of Bonded Concrete Overlay on Asphalt Design Method

Develop a mechanistic-empirical design method applicable in California road network and develop recommendations and guidelines for the use of Bonded Concrete Overlays on Asphalt.

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Project Title:
Mechanistic-Empirical Design

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WHAT WAS THE NEED?

The California Department of Transportation (Caltrans) employs a variety of strategies and materials in maintaining and rehabilitating the state highway system's pavements, a necessary approach given the varying characteristics of the pavements in use and their diverse properties.
Bonded concrete overlay on asphalt (BCOA) is a pavement rehabilitation alternative that has been frequently used on highways and conventional roads in several US states as well as in other counties, while its use has been very limited in California. Caltrans was interested in this technique and development of mechanistic-empirical (ME) design method applicable to Caltrans road network.

WHAT WAS OUR GOAL?

The goal of this task was to propose a ME design method applicable to thin BCOA in Caltrans road network and to develop recommendations and guidelines for the use of the proposed method. The proposed method may be a new method to be developed or, alternatively, an existing procedure. Field calibration was desirable to improve reliability of BCOA performance prediction for Caltrans road network traffic, materials, pavement structures, and weather conditions.

WHAT DID WE DO?

Caltrans, in partnership with the University of California Pavement Research Center (UCPRC) analyzed pros and cons of the different ME Design Options. The study identified the most important factors in thin BCOA performance, how those factors are addressed in current thin BCOA ME design procedures, and how they would be addressed if Caltrans decides to develop a new ME design method.

The study defined a ME framework necessary for implementation into a design program. The ME framework would require the incorporation of several modules, at least one for each of the following items: traffic, material properties, weather-related properties, structural response, and distresses. Caltrans made the decision to adopt American Association of State Highway and Transportation Officials Ware Pavement ME and develop a BCOA design catalog.

The validity of Pavement ME was verified by conducting a sensitivity analysis where the different input parameters varied across a relatively wide interval. Several sources of experimental data were explored to accomplish the calibration, recalibration, or validation of the proposed design method. Lastly, the study finalized new design method for thin BCOA and ME design tool.

WHAT WAS THE OUTCOME?

A new BCOA design catalog has been produced. This catalog can be added to the one existing in current Highway Design Manual. The BCOA design catalog was based on the nationally calibrated Pavement ME. Local calibration for Caltrans road network conditions was not possible due to the lack of experimental data since this type of pavement is relatively new to California.

WHAT IS THE BENEFIT?

Proposed ME design method will lead to a new pavement rehabilitation strategy and new design tool. The new design method and tool can be used to update standard, plans, and specifications. The study will also provide information (e.g. pavement performance, etc.) to the pavement management system.

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