Arkansas State Highway and Transportation Department
Transportation Research Committee

RESEARCH PROBLEM STATEMENT

DATE: 08/27/2010 **PROJECT AREA:** Design

TITLE: Service Load Effects on the Performance of Reconstructed Concrete Bridge Decks

PROBLEM STATEMENT:

Poor performance of concrete bridge decks is one of the most frequently cited maintenance concerns related to managing bridge assets. There are many material, environmental and structural configuration/loading characteristics that can influence the life-cycle performance of a concrete bridge deck; however, previous research on the effects of these characteristics has not led to dramatic improvements in the long-term performance of the concrete decks. Furthermore, most concrete bridge decks now reconstructed while the bridge remains in service. This subjects the reconstructed deck to a traffic induced vibrations and other static and dynamic loadings that are not well-characterized or typically encountered during brand new construction. Because the vibrations and other loads are influenced by the re-construction sequence, the structural configuration, and the live loads on the structure, and given the possible variations in properties of the uncured concrete, there is no true consensus in the practice on the degree to which these service load effects may impact the long-term performance of the reconstructed deck. A systematic evaluation employing analytical simulations, laboratory testing, and field testing is proposed to establish and evaluate the effects of service loads on the as-constructed properties and long-term performance of reconstructed concrete bridge decks.

OBJECTIVES:

(1) Identify and review any existing literature related to loading effects on concrete deck reconstruction, (2) measure the structural responses and vibrations during the deck reconstruction of an in-service bridge to characterize the actual loading environment, (3) apply measured load history and other simulated loadings using a shaker system to small-scale reinforced concrete specimens they cure and evaluate their physical and mechanical characteristics after curing, (4) develop numerical/analytical models to identify expected load ranges with different structural configurations and simulate and evaluate their effects on concrete as it hardens.

Form of Research Implementation:

A final report will be developed that will document the findings from the experimental testing program. The report will include recommendations related to the loads and vibrations that may occur during deck reconstruction and possible strategies to minimize their effects on the long-term performance of the deck.

Total Estimated Cost and Project Duration: **$** 160,000 **and** 24.00 **months.**

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ADVISORY COUNCIL RANKING	TRC RANKING	Statement Combined with Statement Number(s)
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