

Arkansas Department of Transportation
Transportation Research Committee
RESEARCH PROBLEM STATEMENT

DATE: 09/11/2017**PROJECT AREA:** Design / Construction**TITLE:** Investigating concrete deck cracking in continuous steel bridges**PROBLEM STATEMENT:**

Concrete bridge deck cracking can cause serious serviceability issues during a bridge's design life and compromise a bridge's structural strength. Cracks allow water and chemical ingress, which accelerate road surface and structure damage. Cracking can be particularly challenging in continuous bridges with long spans. Often, cracks in a continuous deck occur before service loads are even applied to the bridge. The causes of deck cracking in continuous bridges are unclear. Many contractors use continuous concrete deck pours to speed construction, but this construction approach may lead to differential shrinkage issues. Alternatively, concrete cracking can be caused by excessive service load stresses. Deck stresses are dependent on the girder-deck cross-section behavior in the negative moment region. In addition, relatively recent changes to bridge design (transition to LRFD) may result in girders that have less bending stiffness and consequently higher stresses in the deck. Regardless of the cause, it is important to limit cracking in bridge decks to ensure a long lasting structure with minimal maintenance needs. Consequently, there is the need for ArDOT to investigate the causes of deck cracking in continuous bridges and propose long-term solutions to the problem.

OBJECTIVES:

Perform a survey of recently constructed continuous steel bridges with concrete decks to determine extent and location of cracking. This survey should include bridges using continuous concrete deck pours and bridges using panel pours. Using this information, determine potential causes of cracking (pour sequence, excessive service stress, improper curing, inaccurate assumed girder-deck behavior, etc.), and investigate these potential causes. This investigation will include analyses of bridge sections to determine concrete deck stress and bridge deck instrumentation using vibrating wire strain gages to monitor both temperature and strain in the bridge deck during casting and curing. Other studies will be performed as needed.

FORM OF RESEARCH IMPLEMENTATION:

This project will determine causes for continuous bridge deck cracking at AR bridges and suggest remediation approaches for the ArDOT to implement. Whether the solution includes design changes, different curing regimes, or changing pouring sequence, a reduction in bridge deck cracking will lead to longer lasting bridges and less bridge maintenance over the bridge's design life.

Estimated Project Duration: 24 months**PREPARED BY:** Cameron Murray and Ernie Heymsfield**AGENCY:** University of Arkansas**PHONE:****REVIEWER:** Chris Dailey

Standing Subcommittee
Ranking

2 / 5

Advisory Council
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7 / 44

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