Arkansas Department of Transportation
Transportation Research Committee

RESEARCH PROBLEM STATEMENT

DATE: 09/11/2017  PROJECT AREA: Design

TITLE: Accelerated steel bridge construction (ABC) using non-composite pre-cast concrete decks

PROBLEM STATEMENT:
Accelerated bridge construction (ABC) techniques have significant cost and time-to-service benefits. Considering the entire bridge construction process, the erection of the steel bridge super-structure (steel girders, cross-frames, splice-plates, etc.) is a fairly rapid process aided by significant steel pre-fabrication; however, construction of the concrete bridge deck is time-intensive and often relies little on pre-fabrication. Accelerated steel bridge construction (ABC) techniques that allow for pre-fabricated concrete deck panels (where rebar tying and concrete casting can be done off site and simply installed fully cured) are desirable. Unfortunately a major implementation hold-up for precast concrete deck applications in steel bridges are the many shear studs required for composite action. Composite action is not required and in fact all bridges designed in Mississippi (up till recently) were all non-composite construction. Non-composite steel bridge designs would allow concrete deck pre-fabrication and placement, and likely result in only minimal steel weight increases from the increased girder depths required. Additionally, evidence suggests that cracking is reduced in non-composite decks (reducing maintenance costs over time), and deck replacements are easier (without the required jack-hammering around the composite studs). The proposed research project will determine cost benefit implications of ABC non-composite pre-cast deck applications in all short span steel overpass bridges and develop accelerated bridge construction design strategies for easy implementation.

OBJECTIVES:
The proposed research project has three main objectives: 1) evaluate the cost-to-service implications for using ABC pre-cast decks in non-composite girders for short span steel highway bridges, 2) develop design strategies and quality control procedures for implementing pre-cast concrete decks, and 3) develop training courses and certification classes for contractors to be certified to construct non-composite pre-cast deck girders.

FORM OF RESEARCH IMPLEMENTATION:
Results from the proposed research project will be implemented in design documents, field guidelines, and certification classes. Additionally project reports outlining financially beneficial situations for using the developed ABC techniques will be provided. Training classes for ArDOT and contractor/fabricator stakeholders will be created for implementation of findings. An implementation plan will be provided at the conclusion of the project duration.

Estimated Project Duration: 24 months

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Statement Combined with Statement Number(s)

Standing Subcommittee Ranking
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