

RESEARCH PROBLEM STATEMENT

DATE: 09/06/2019	PROJECT AREA: Construction/Design
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TITLE: ABC Through Non-Composite Action: Re-Evaluating Material vs Labor Economic Incentives

PROBLEM STATEMENT:

Techniques that accelerate bridge construction 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, etc.) is a very 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. A major implementation hold-up for using pre-fabricated precast concrete decks in steel bridges are the many studs required for composite action. Composite action is not required and in fact was developed during a time where costs were largely driven by material savings rather than labor. This cost paradigm is no longer valid, with much of the construction cost incurred by labor. 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).

OBJECTIVES:

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. The 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 AND RETURN ON INVESTMENT:

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. Given the shifting economic paradigm in bridge construction, cost savings associated with shorter span overpass bridges are likely significant.

Estimated Project Duration: 24 Months

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REVIEWER:

Standing Subcommittee
Ranking

Advisory Council
Ranking

Statement Combined with
Statement Number(s)