

Accelerated Bridge Construction in South Dakota: Pilot Study for Implementation Strategy

Description

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Meta Fields

Category : Ongoing Projects

Group : Design-Making Tools

Abstract : Accelerated bridge construction (ABC) is a construction philosophy that seeks to minimize traffic interruption through reduced construction time, primarily through the use of prefabricated elements. The concept is gaining the momentum to become a recommended practice for bridge work on existing routes especially for bridges on heavily traveled corridors. Several research and implementation initiatives have been set in action around the U.S. including multiple projects in Utah, Washington, California, etc. An ABC research center has been established recently at Florida International University. All these demonstrative projects on critical bridge sites had been very successful in minimizing traffic interruption to a level that is not possible with traditional construction methods (e.g. removal and replacement of a major bridge in a week). A number of ABC applications are documented in Connection Details for Prefabricated Elements and Systems, published by the Federal Highway Administration (FHWA) in 2009. A summary of current ABC applications and experiences was presented in an "ABC Manual" [10] published recently by FHWA. The ABC methodology is quite general and can also be applied to relatively small scale projects and very typical high way bridge systems, as it was demonstrated in an Iowa Department of Transportation (DOT) project (bridge over Keg Creek near Council Bluffs, Iowa) as part of the second Strategic Highway Research Program (SHRP 2). In order to achieve the time savings, implementation of ABC will involve pre-manufacture of modular bridge components and need additional resources and special planning considerations during construction (such as special equipment and site management plan). These requirements tend to drive up the cost of the project when compared to traditional construction. Thus ABC is most beneficial when the potential traffic volume affected by the project is high. It is hypothesized in this study that given the project condition and current viable ABC techniques, there exist a threshold traffic volume and composition that must be exceeded in order to reap benefit from ABC implementation. This threshold value will depend on the nature of the traffic, significance of the road corridors, and the availability of immediate detour options. For most areas in South Dakota, it is very likely that this threshold traffic will not be exceeded. Thus the implementation of ABC in South Dakota must be planned carefully to ensure cost efficiency. Currently there have been guidelines used by other DOT's to assess the necessity of ABC (e.g. ABC rating system used by Utah DOT). But the effectiveness of these procedures has not been fully investigated. A quantitative approach to support decision making on ABC implementation in South Dakota has not been developed. The objectives of this research projects are to: (1) Identify a quantified benefit indicator to represent ABC implementation cost-benefit ratio considering project constraints such as traffic volume and site condition. (2) Develop a procedure that can be followed to evaluate ABC implementation benefit indicator for candidate bridges on the South Dakota highway system. (3) Using the proposed procedure to develop recommendations for representative sites (identified by SDDOT) in South Dakota for ABC implementation.

Key Words : Benefit cost analysis; Bridge construction; Demonstration projects; Prefabricated bridges; Traffic volume

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