

Recent Advances in Accelerated Bridge Replacement

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The use of prefabricated elements and systems in bridge replacement (ABR) has recently been the subject of much attention and interest amongst bridge jurisdictions in North America as a way of improving bridge construction and replacement of deteriorated bridges. Through mass production of the materials, the repeated use of forms, reduction of on-site construction time and labor by concentrating the construction effort in a fabrication facility rather than at the bridge site, significant economic benefits can be achieved. Issues related to work zone safety and traffic disruptions are also a major concern. A full-lane closure is very costly in busy urban highways because of the significant economic impact on commercial and industrial activities. As a result, prefabricated bridge technology is seen as a potential solution to many of these issues. Prefabricated elements and systems can be quickly assembled and could reduce design efforts, reduce the impact on the environment in the vicinity of the site, and minimize the delays and lane closure time and inconvenience to the traveling public, saving time and tax payers' money. Even at a higher initial cost, the use of prefabricated systems on bridges subjected to a high volume of traffic may be justified because excessive lane closure times can be avoided. This lecture presents the current state-of-the-art approach to the use of innovative prefabricated systems and elements in modern bridge construction. A summary of most recent ABR Guidelines and Specifications in Canada and USA will be covered. Also, the presentation will cover a variety of precast concrete girders, full-depth deck panels, abutment, piers and pile caps used to accelerate bridge construction. Moreover, a few of the latest precast connection details that have been implemented in Canada and USA using ultra-high performance fibre-reinforced concrete (UHPFRC) as connection filling material and non-corrosive glass fibre reinforced polymer (GFRP) bars as deck slab reinforcement will be covered. The use of stainless steel in replacing steel girders will be covered.