Development of a New Substructure System for Standard Bridges

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Abstract

Recognising that the performance of standard short- and moderate-span bridges can be greatly improved with more thoughtful substructure design, an efficient and attractive substructure system has been developed for use with standard bridge superstructure systems. The proposed substructure system of match-cast segmental elements post-tensioned together on site combines prestressing steel with high performance concrete for improved durability and structural efficiency. An economically competitive solution is achieved through attention to fabrication and erection details, which facilitate standardisation and rapid on-site construction.

This paper focuses on the development of a precast substructure system for standard bridges focusing on element shapes, substructure configurations and the construction and erection options. The process of choosing the final system and its details is presented through a review of decisions regarding aesthetic appearance, efficient use of materials and economical construction practice. Particular attention is given to decisions pertinent to potential standardisation of the system with a focus on introducing a creative, economical option.

The process of developing this system is presented to emphasise ways in which creativity can be introduced into standard short- and moderate-span bridge design - a branch of structural design that has stagnated with unattractive results in many parts of the world.

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