Design of segmental box girder bridges with match cast dry joints in Melbourne, Australia

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Abstract

A study of recent work undertaken on the Caulfield to Dandenong Level Crossing Removal Project and West Gate Tunnel Project in Melbourne Australia. The viaducts on these projects were precast segmental box girders erected span-by-span with match cast dry joints which present several key advantages in brownfield construction of linear infrastructure.

These case studies consider the application of Australian and International design standards to the design of Australian Infrastructure. It is acknowledged that international design standards such as AASHTO have moved away from the use of match cast dry joints however in the Australian context they are still relevant, and it has been necessary to interrogate current standards to establish a suitable design basis. This approach is imperative when assessing existing infrastructure like recent work on the West Gate Tunnel Project which involved the assessment of the existing precast segmental City Link Viaducts. This study seeks to present recommendations on how AS5100.5 may be modified to provide a more practical and efficient solution for the design of new and the assessment of existing infrastructure.

Keywords: Precast Segmental Box Girders; Match Cast Dry Joints.

1 Introduction

Precast segmental box girders utilise match cast joints. Segments are cast such that their relative erected position is identical to their casting position. This requires a perfect fit between the ends of segments and is achieved by casting each segment directly against the face of their neighbouring segment. Joints may be 'wet' type with epoxy applied across the entire joint surface, or 'dry' type with no additional treatment. The type of joint appropriate for the design is dependent on site specific environmental conditions and the type of tendons used. For benign environments with external tendons 'dry' joints may be used. Where environmental conditions are more severe or internal tendons are used 'wet' joints are required. Although match cast joints are designed to remain under residual compression under all serviceability limit state combinations, minor imperfections may lead to the ingress of the water across the joint face. For 'wet' type joints, epoxy is applied to

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