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Doha New Orbital Highway project, Junction 7 Existing Bridge Widening

Andrew Bance, Joseph Cluett, Daisuke Saito

Mott MacDonald, Croydon, UK

George Daoutis

Mott MacDonald, Doha, Qatar

Contact: Daisuke.Saito@mottmac.com

Abstract

This paper outlines the design solution developed for the Junction 7 bridge widening, which forms part of the New Orbital Highway (NOH) around Doha in Qatar. The focus is on the modifications for the bridge at an existing junction which is being upgraded to become a larger junction for the NOH. The client ASHGHAL decided that the existing bridge should be widened instead of being replaced. The design of the widened bridge, including both new and existing structures, must comply with the latest ASHGHAL design criteria, which are more stringent than those adopted for the original design of the existing bridge. The main challenge is that the existing bridge was not designed for any seismic loads, whereas the current project requirements involve a significant seismic response analysis, from which the resulting forces are of a magnitude significantly larger than would normally be expected in the Qatar low-seismic region. An innovative structural solution was developed for the existing bridge to be widened whilst still being fully compliant with the latest design requirements without need for any major strengthening work. The proposed solution has brought significant cost-saving to the project, as well as maximising sustainability.

Keywords: Bridge widening, Seismic Retrofitting, Post-tensioning; Shrinkage

1 Introduction

Contract 3 of the New Orbital Highway (NOH) in Doha connects the Mesaieed industrial area and New Port Projects to Salwa Road, and includes a total of approximately 56 kilometres of road works. The orbital route consists of a dual seven-lane highway intersecting with five main interchanges that will service the projected increase in the area's traffic. Junction 7 is the interchange between the existing Salwa Road and the NOH, comprising new bridges and two widened existing bridges. The existing bridges are to be widened by adding a new structure to accommodate the traffic capacity expected on the new highway network. Following extensive studies on the scheme, it was concluded that a new widened bridge should be fully integrated into the existing bridge because this strategy ensures safety for the live traffic by omitting any longitudinal joint between the new

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