

Assessment and Retrofitting for Upgrading Existing Infrastructures in Urban Area

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Abstract

Doha the capital of Qatar, has been facing phenomenal growth of vehicular traffic with a parallel growth and rapid development of infrastructure and this resulted in all sorts of traffic congestions, significant rise in traveling time in some areas, etc. To mitigate these problems upgrading existing intersections and subsequently the included structures along significant corridors is a strategy currently implemented. A real case study is presented with a project awarded as a Design and Build Contract by the Public Works Authority to upgrade the infrastructure at the junction of a major corridor. The paper covers the pre-design stage and the final design solution is presented outlining the methodological approach, analysis and models used to address the maintenance condition, the functional requirements and the project specific requirements and constraints.

Keywords: steel-concrete composite; condition assessment; tunnel; underpass; retrofitting; bridge joints.

1 Introduction

While upgrading existing infrastructures structural engineers are increasingly called upon to devise ways for extending the life of bridges whilst observing tight cost constraints and strict timelines in project completions. The ultimate goal is to limit construction intervention to a strict minimum, a goal that is clearly in agreement with the principles of a sustainable development.

Salwa Road is categorized as an Expressway and Furousiya Street is currently categorized as a major arterial and will be upgraded in the future to Expressway. The interchange is a critical node in the Doha road network with high traffic flows. The interchange was configured as a 4-level grade-separated signalized roundabout including an underpass (trough structure at -1), two roundabout bridges at grade (level 0), an

expressway viaduct at level +1 and a ramp bridge at level +2, as shown in Figure 1.



Figure 1. Industrial Interchange

As part of the upgrading works, the objective of the project was to design and build a complete decking within the roundabout circulatory carriageway (level 0) and to convert the at-grade portion of the junction to a signalized intersection in order to improve traffic capacity of the junction and in effect creating an underpass/tunnel