

Realisation of the Busan-Geoje Fixed Link - Large scale prefabrication for marine bridges

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Summary

This paper recaptures the design and construction of the bridges for the recently finalized Busan-Geoje Fixed Link in South Korea. The bridges included two cable stayed bridges with main spans of 475m respectively 2x230m. Main aspects of the bridge design are briefly summarized in this paper but focus is on the widely used prefabrication for the bridge construction and on the construction control method applied for super structure erection for the cabled stayed bridges.

Keywords: Stay cable bridges, marine bridges, concrete caissons, steel-concrete composite girders, AASHTO LRFD design, prefabrication, construction control

1. Introduction

On December 14th 2010 the 8.2km long Fixed Link Between the city of Busan and the Geoje Island was opened to public traffic. The fixed link comprises 3.2km submerged tunnel and two cable-stayed bridges - a three-pylon-bridge with two main spans of each 230m and a total length of 1.65km and a two-pylon-bridge with a main span of 475m and a total length of 1.86km.

The project was developed as a Public-Private-Partnership project where GK Fixed Link Corporation was awarded the concession to design, construct and operate the Link for 40 years. The concession was based on a conceptual design for the link.

The GK Fixed Link Corporation is formed by seven Korean contractors with Daewoo Engineering & Construction Co., Ltd. as the leading company of the concessionaire.

The location of the Busan Geoje Fixed Link with direct exposure to the South Sea and deep waters in a typhoon prone area, together with the requirements for marine structures with a 100 years design life, called for special care and consideration while choosing the construction methods for the bridges. In the design process it was early identified as beneficial to utilize prefabrication at on-shore yards to the largest possible extent in order to minimize offshore activities and to achieve factory like production qualities. The outcome of this finding was a construction schedule based on prefabrication of all primary load carrying elements except pylons and stay cables.

The current paper summarizes design and construction of the Busan-Geoje Fixed Link Bridges and in particular address issues related to prefabrication of caissons, pier shafts, pier heads and composite girder segments. Also issues related to the choice of construction control methods for the cable-stayed bridges with the use of prefabricated and trial assembled steel girder sections and precast deck panels will be addressed.