

Yi Sun-sin Bridge - Design of the long span suspension bridge with streamlined twin box girder

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Summary

Yi Sun-sin Bridge or 1545 Bridge having the total length of 2260m suspension bridge with a main span of 1545m is under construction to promote the future investments for Gwangyang Harbour and Hallyeohaesang National Park area and to establish tourism development infra for the International EXPO 2012 held in Yeosu in the southern seashore of the Korean peninsula. World's 4th ranking main span length of 1545m has been determined to commemorate famous Korean Admiral Yi Sun-sin's birth year and to accommodate the future passage of the 18000 TEU (twenty-foot equivalent unit)-class container ships for Gwangyang Harbour.

Saving the construction cost and achieving the structural stability were main concerns in the planning and detail design of Yi Sun-sin Bridge with 1545m main span. As a result, high-strength steel of 1860MPa for the main cables, newly developed streamlined twin box stiffening girders, 50mm thickness of epoxy asphalt pavement, etc. were adopted to satisfy the design purposes.

Keywords: suspension bridge; floating system; 1860MPa main cable; twin box girder; spindle type; epoxy asphalt pavement; rock type anchorage; innovated air spinning method

1. Introduction

Yi Sun-sin Bridge is under construction from 2007 to 2012 as a part of the approach road to Yeosu National Industrial Complex in Korea (Fig. 1). This road had planned by feasibility study in 2004 and overall basic plan was finished in 2005. In this stage, the main span of Yi Sun-sin Bridge was planned as 1100m with the total length of 1760m, to allow the passage of 12000 TEU-class container ships in Gwangyang Harbour. And two pylons, Yeosu side end pier, approach bridges and large gravity type anchorage were planned in the middle of sea (Fig. 2).

After basic plan, The Yeosu National Industrial Complex Road Project was announced to promote the 2012 Yeosu Expo by design-build project divided by four construction phases in 2006 and detail design was finished in 2007. As a result, the main span of Yi Sun-sin Bridge was designed as 1545m, 4th longest in the world, to allow the passage of 18000 TEU-class container ships and the both side spans being 357.5m with the total length of 2260m.

As the requested volume of container ship increased from 12000 TEU to 18000 TEU, main span length of Yi Sun-sin Bridge was decided to increase from 1100m to 1545m. Accordingly saving the construction cost and achieving the aerodynamic stability were mainly issued during detail design. As a result, high-strength steel of 1860MPa for the main cables, newly developed streamlined twin box stiffening girders, 50mm thickness of epoxy asphalt pavement, pylons with artificial island type ship collision protection and rock anchorage on land were adopted to satisfy the design purposes.

The following shows the description of detail features of structural systems and detail design of Yi Sun-sin Bridge including the various investigations.