

Second Bay of Cadiz Bridge-Latest Construction Challenges

Manuel ESCAMILLA
Civil Eng./Assoc. Professor
ACL/University of Cadiz
Cadiz, Spain
mescamilla@acl-estructuras.com

Marcos MARTIN
Managing Director
Ministerio de Fomento
Sevilla, Spain
mmgomez@fomento.es

Julio CAYETANO
Technical Assistance Chief
Ginprosa
Madrid, Spain
j.cayetano@ginprosa.es

Alejandro CASTILLO
Director/Assoc. Professor
ACL/University of Granada
Cadiz/Granada, Spain
acl@acl-estructuras.com

Gonzalo OSBORNE
Civil Engineer
ACL
Cadiz, Spain
gosborne@acl-estructuras.com

Victor JIMENEZ
Civil Engineer
Dragados
Madrid, Spain
vmjimenez@dragados.com

Summary

The construction works for the New Cadiz Bridge started in April 2007 and the completion is scheduled for autumn 2011. By now, important challenges have been faced, such as the construction of 495 deep piles both inland and on sea, which has demanded innovative excavation solutions. The semi-submerged pier and tower bases have required composite steel-concrete watertight caissons of 1200 tons maximum weight, built inland and placed on site with heavy lift floating sheer-legs, to face the action of the 7 m-high water column, waves and ocean currents. Finally, the rising of the east tower is being developed with a climbing system in the first vertical phase, combined with a complex three-dimensional steel structure anchored to the tower to support the scaffolding of the highly inclined diamond-shaped second phase (only 41° above the horizontal line).

Keywords: cable-stayed, Cadiz, diamond-shaped towers, launching, removable bridge, tramway.

1. Introduction

This light, slender and innovative structure, conceived by the engineer Javier Manterola and his team, has a 3092 m long, 33,20 m wide deck, distributed in 37 spans. There is a central cable-stayed bridge with a 540 m-long main span and 320 m-long side spans (200 m + 120 m) involving two 185 m-height diamond-shaped towers with 176 cable stays. The composite steel-concrete deck of this part of the bridge has a constant depth of 3 m and a maximum vertical clearance of 69 m above the sea level; the west approach bridge has 9 spans of variable length (from 55 to 150 m), and is composed by a continuous composite deck structure to be built by incremental launching over the sea and a removable 150 m-long steel span with a variable depth (between 3 and 8 m) and orthotropic deck plate. On the other side, the east approach bridge has a 1183 m-long continuous prestressed concrete deck, which has 75 to 32 m-long spans from the 14th pier to the second abutment.

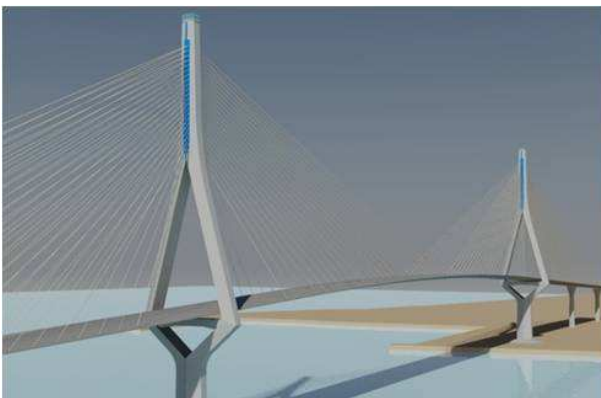


Fig. 1: Cable-Stayed Bridge (render)

The deck will house a 4 lane roadway (with interior and exterior hard shoulders) and a 2 lane tramway. Pedestrian lateral walks (only for maintenance) and wind-protective barriers will be also included at both sides.

The continuity of the deck will be broken at the removable span, and so there will be 4 expansion joints located at the first abutment, 8th pier (580 m away), 9th pier (150 m away of the previous) and second abutment. Therefore, the last stretch will have a 2362 m long continuous deck. Two sliding spherical bearings will be placed at each pier top (one of them free sliding and the other one guided), except for the central piers of the Cadiz approach viaduct and at the piers of the removable bridge