Second Bay of Cadiz Bridge. Quality Control and Monitoring

Marcos MARTIN
Managing Director
Civil Works Department
Sevilla, Spain
mmgomez@fomento.es

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

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

Marta SACALUGA
Civil Engineer
Ginprosa
Madrid, Spain
m.sacaluga@ginprosa.es

Veronica VEGA
Industrial Engineer
CFCSL
Madrid, Spain
vvega@cfcsl.com

Javier PEREZ
Quality Control Assistant
Ginprosa
Madrid, Spain
fj.perez@ginprosa.es

Summary

The new Viaduct over the Bay of Cadiz is going to be one of the most outstanding infrastructures ever built in Spain, due not only to its large dimensions and structural design, but also to the unique environment that surrounds the area where the construction works are taking place. For this reason, the owner (the Spanish Department of Public Works) together with the Contractor and the Technical Assistance Consulting, are developing during the construction a very specific and high tech quality control assessment.

Keywords: Quality, self-compacting, underwater concrete, thermocouple, steel, monitoring.

1. Introduction

The quality control affects every single work and element built, from foundation to the top. The soft upper sand-clay layer and the important values of the loads transferred to the foundation system required the construction (already completed) of 495 deep piles for the 35 piers, 2 towers (180 m height) and 2 abutments of the structure. Non-destructive testing of these elements involves ultrasonic tests, analysis of the bottom end interface and grouting. The quality assessment of the manufacturing and on site use of the special construction materials of the Viaduct is another key issue. This involves the use of high-resistance concrete (up to 70 MPa) for an extremely aggressive environment (marine with important tidal sea level rise and fall in the Bay side and industrial and chemically hostile composed ground at the inland side of the structure), high ductility reinforcing steel for seismic safety requirements and almost 50000 tonnes of structural laminated steel for the bridge deck and the stay cable anchorages located at the top of the towers.

Moreover, a complete structural health monitoring system will provide instant, interactive, dynamic and accessible information on the key structural and environmental indicators. All over the new Viaduct, more than 340 sensors will be placed (strain gauges, accelerometers, load cells, clinometers, etc.), providing real-time data for maintenance and surveillance plan.

The new Access to Cadiz over the its Bay means a huge challenge for the Promoter, the Spanish Department of Civil Works, not to mention that is a good chance for the city to develop. A joint venture comprising Ginprosa Ingenieria, S.L. and Carlos Fernandez Casado, S.L. was awarded to perform the Technical Assistance to the Management of the Building. In the other side, the joint venture comprising Dragados, S.A. and FPS, S.A. is responsible for the construction.

2. Basis of design. Antecedents and modifications of the former Plan

After finishing the whole plan of the new access to Cadiz and starting the building as well, several new aspects to the former design had to be analyzed, mainly due to the inclusion of a Tramway platform on the deck of the Second Bay of Cadiz Bridge.

The changes induced by this tramway platform, are overcoat in the new bridge, and basically, to its deck, which section changed. The new deck sections are:

https://doi.org/10.2749/222137810796063184