Orio Bridge: an innovative hybrid: cable stayed - suspended structure

José ROMO
Prof. MSc in Civil Engineering
BA in History
Director
FHECOR IC
Madrid, Spain
jrm@fhecor.es

José Romo, born 1959, received his master in civil engineering degree from the University Polytechnic of Madrid, Spain. He is Director and Partner of FHECOR Engineers Consultants SA, Madrid, Spain before becoming Professor at the University Polytechnic of Madrid, Spain. His main area of interest is related to design and designing tools.

Summary

The Orio Bridge is an innovative cable supported bridge of 180 m of main span, with 2 lateral short spans of 65 m each. The cable system is a combination of, a main central suspension cable formed by full locked coil ropes, and a system of stays to support the deck in the area closer to the towers. The cable system is located only in the center axis of the bridge in order to get a more attractive aspect, and is supported by two central masts. The design allows the construction of the main span without temporary supports, even though the cable system is anchored to the deck to avoid the transmission of the horizontal forces of the cables to the ground.

Keywords: Hybrid, suspension, cable stayed, hangers, full locked coil ropes, landscaping.

1. Introduction

Orio Bridge is a contemporary application of the hybrid type: cable stayed and suspension bridge. with central suspension (figure 1).

Fig. 1: Orio bridge: general view

The hybrid cable bridge fulfils the existing requirements: Limited pylon height, deck slenderness, no temporary supports in the river (due to its use as a rowing race course).

2. Description of the solution

The bridge has 180 m of main span, with 2 lateral short spans of 65 m each. The cable system is a combination of, a main central suspension cable formed by 4 full locked coil ropes of 153 mm diameter, and a system of stays to support the deck in the area closer to the towers.

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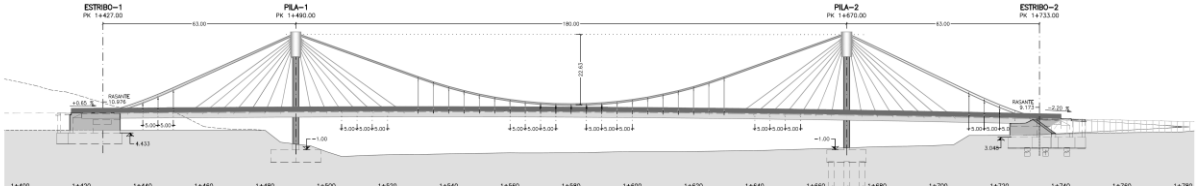

Fig.2 : Elevation of the bridge

The deck is a multi-cellular steel box section 22.80 m wide, with a concrete upper slab, with a high torsional stiffness, to span the existing 180 m between masts.

The required possibility to change each single cable during the expected life of the structure generate an important complexity in the connection of the cables that practically limits the maximum span range; especially when a central mono-towers solution is used

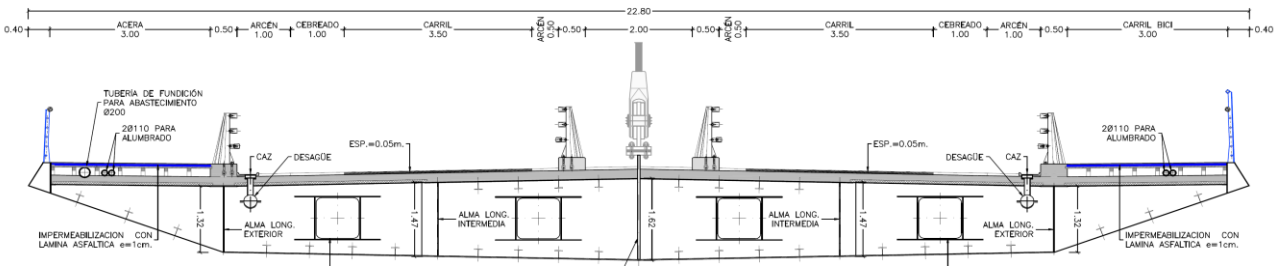

Fig.3 : Cross section

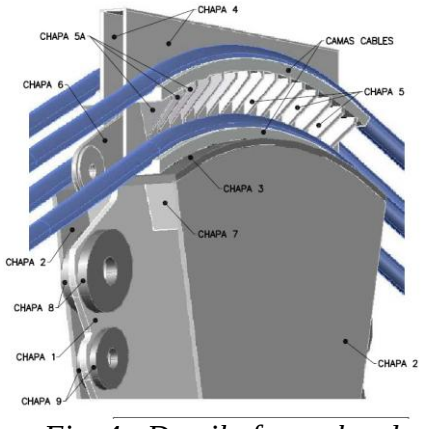

Fig. 4 : Detail of mast head section

3. Construction

One of the fundamental advantages of this solution bridge is that it can be constructed without provisional supports.

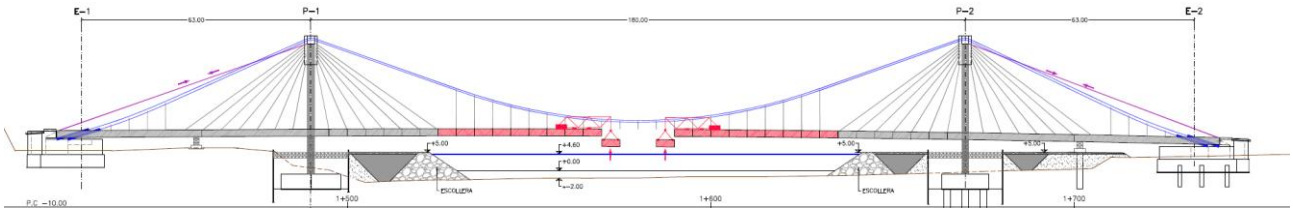

Fig. 5 : Construction of the steel deck