

Third Millennium Bridge over the Ebro River. Zaragoza. Spain

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Summary

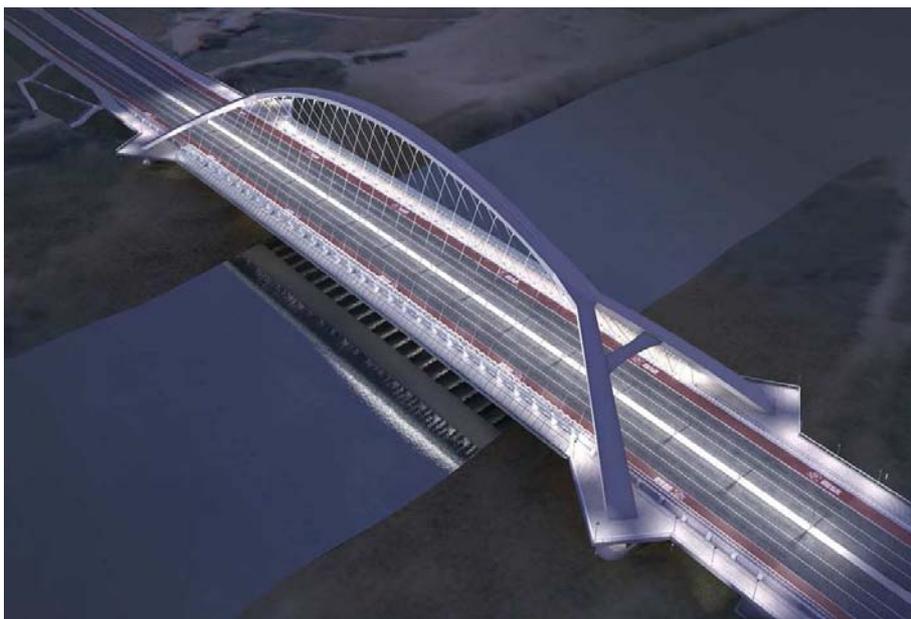
The way followed from conception to construction of this high strength white concrete arch bridge, an urban 216 m span bow-string arch bridge, is described in this paper. The approach to the city needs, the choice of type and material, the geometric design, the structural solution, the specific studies developed, and the bridge construction, are all explained to show how this outstanding and challenging structure takes bridge design and engineering one step beyond.

The experience of Arenas & Asociados and Dr. J.J. Arenas as its main responsible, as authors of the project and construction managers in construction site is summarized in this article on this challenging structure which has been recently awarded with the Gustave Magnel Golden Medal 2004-2008.

Keywords: Bow-string arch bridge; white self-compactable high resistance concrete; conceptual design; external post-tensioning, bridge aesthetics, structural art; advanced structural analysis.

1. Introduction

The Third Millennium Bridge is a white concrete bowstring arch, with 43 m of typical deck width and a main span of 216 m, becoming the bowstring bridge with the biggest span built to date using this material.



The design of the central arch with final open “A” frames, where the main arch divides itself into two leaning legs linked by a crossbeam, is an evolution of the 168 m span and 30 m wide steel made Barqueta Bridge, designed by the same author and built for Sevilla Universal Exposition of 1992. This bridge can be considered a test model for the design and construction of the much wider and longer post-tensioned high strength concrete made Third Millennium Bridge.

Fig. 1: Render image of the Third Millennium Bridge