

Two large bridge projects in environmentally constrained areas

Antonio REIS

Professor
Technical Director Grid
Consulting Engineers, and
Technical University of Lisbon
antonio.reis@grid.pt



António Reis born 1949, civil engineer by the Techn. Univ of Lisbon and Ph.D by the University of Waterloo Canada. Professor of Bridges and Structural Engineering. He has been responsible by the design of many long span bridges..

Summary

In large infrastructure projects a variety of environmental constraints may influence bridge design options. Two main recent bridge projects, underway in Portugal, in which the author's design office has been involved, are discussed.

Keywords: Bridges, environmental impact, construction schemes, rail-structure interaction, plate girders, composite bridges, bowstring arches, Warren trusses, and cable stays.

1. Introduction

Environmental conditions are nowadays one of the main constraints in bridge design. In environmentally constrained and urbanized areas, several bridge alignments with different structural options and construction schemes, are usually studied at the preliminary design stage in order to minimize the environmental impact [1,2]. If the bridge is located in an alluvium area, requiring deep pile foundations, soil-structure interaction effects under seismic actions had to be considered for the bridge design. Two large bridge projects in Portugal are underway, one under construction and a 2nd one under tender on the basis of an operate / design/ built methodology. The former, refers to the new railway crossing of the Sado River, approximately 3 km long, and located about 100km south from Lisbon. The last, 3rd crossing of the Tagus River in Lisbon, for both railway and highway traffic, includes a main bridge 7 km long. The author's design office was involved on both projects

2. The New Railway Sado Crossing at Alcácer do Sal

2.1 The main constraints and basic data

The new crossing of the Sado River, in Portugal, is located nearby the Alcácer do Sal village in a environmentally protected area - "Protected Area of Natural Sado Estuary". The Owner is REFER, the bridge design was developed by GRID (Portugal) and GREISCH (Belgium) and the railway by FERBRITAS (Portugal) The bridge is inserted in a new rail network system (Fig.1), Lisbon – Madrid (HSR- high speed railway for 350km/h) and Lisbon –Algarve. The Madrid connection, improves the competitiveness of the main Portuguese port of Sines by its connection to the European freight rail transport network system Sines/Algeciras-Madrid-Paris. [3] The upgrade of Lisbon-Algarve connection allows conventional trains up to 200km/h and special trains with speeds up to 250km/h.