



Two Steel Bridges for the High Speed Railway line Madrid-Barcelona-French Border

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Summary

Two steel bridges have been recently completed on the high speed railway (HSR) line connecting Madrid, Barcelona and the French Border (Perpignan). Both structures cross over existing infrastructures with a limited vertical clearance in order to reduce environmental impact. The conceptual design is similar for the two structures: a composite steel-concrete deck suspended on steel tied curved members. An innovative solution, at least for the Spanish HSR lines, that has been used in the past in concrete road bridges. These bridges are two of the three first steel structures built for the HSR in Spain. This paper synthesises the design, structural behaviour and construction of these bridges near the city of Barcelona, Spain:

- Llinars Bridge crosses, at a very high skew angle, one of the busiest highways (AP-7) in Spain. This viaduct has an overall length of 574 with a maximum span of 75 m.
- Sant Boi Bridge crosses several existing infrastructures (highway, road and railway). The overall length of the bridge is 870 m with a maximum span of 63 m.

Keywords: Bridge, composite, high-speed railway & design

1. Introduction

The Strategic Infrastructures and Transport Plan of Spain for the period 2005-2020 impulses the construction of high speed railway (HSR) to promote economic development and social and territorial cohesion [1]. Rail represents about 120 billion euros of expenditure under the Plan. One of the main corridors is the stretch connecting Madrid, Barcelona and the east French border (approximately 850 km). This line is also vital as a part of the Trans-European High Speed Rail system and has been designed to ensure its interoperability. The stretch between Madrid-Lleida (481 km) was opened to traffic in 2003. The connection with Barcelona is expected to be completed in 2007, reaching the French Border in 2010.

As a result of the complexity of the Spanish geography, approximately a 10% of the railway system consists of bridges and tunnels. Almost all the bridges on the Spanish HSR network are made of concrete, in general built 'in situ'. Two bridges have been recently built near the city of Barcelona, Spain, and will be the first composite (steel-concrete) viaducts on the Madrid-Barcelona-French border HSR line: Llinars and Sant Boi bridges.