



Analysis and Measurement of the Behaviour of High Speed Railway (HSR) Bridges

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Summary

Experience in the field of design and structural analysis of high-speed railway bridges in the last 25 years needs to be fed back to the data obtained from the analysis of the actual behaviour of the structure after commissioning. Aspects as fundamental as the sizing of expansion joints, location of fixed points, the dynamic amplification due to real traffic or the POT bearing behaviour have unresolved unknowns. This project led by ADIF, the Administrator of Railway Infrastructures in Spain, was developed between 2006 and 2009 and was oriented in two ways: continuous monitoring of hundred structures through regular field visits, and the monitoring of four singular viaducts: Viaduct over “Arroyo las Piedras”, Viaduct over “Arroyo del Valle” and San Boi Viaduct.

Keywords: High Speed Railway, Monitoring, Statistics, Expansion joint, Bearing, Dynamic Amplification.

1. Introduction

All work was developed based on the analysis of data coming directly as a manual measure taken on field (discontinuous monitoring, monthly frequency) or as a data collection provided from a structural monitoring network (continuous monitoring, flexible datalogger).

1.1. Discontinuous monitoring on 100 viaducts

Discontinuous monitoring was carried out on 100 viaducts [1], [2]. Initially two viaduct inspections were performed in thermally significant periods while during the last year all the effort was concentrated on three specific bridges (Anchuelo I Viaduct, Anchuelo II Viaduct and Viaduct over “Río Huerva”).

26 viaducts concrete prestress precast beams (26%), 27 slab bridges (27%) and 47 box girder bridges (47%) were inspected. All viaducts belong to the Madrid-Zaragoza-Lleida, Córdoba-Málaga and Madrid-Segovia-Valladolid lines.

1.2. Continuous monitoring on 4 viaducts

The four bridges subjected to continuous structural monitoring were chosen for their uniqueness and their main characteristics. These bridges were:

- Viaduct Arroyo las Piedras belonging to the High Speed Line Córdoba - Málaga.
- Viaduct over Arroyo del Valle belonging to the High Speed Line Madrid - Valladolid.
- Sanboi Viaduct (mixed and concrete) of the High Speed Line Madrid - Barcelona.