LOS GALLARDOS – SORBAS HIGH SPEED RAILWAY VIADUCTS. NEW ANTI-SEISMIC DEVICE TO FACE HORIZONTAL FORCES

Óscar Ramón RAMOS
Head of Structures Division
APIA XXI-Louis Berger DCE
Santander, Spain
oramos@apiaxxi.es

Jorge DE VENA
MSc. Civil Engineer
APIA XXI-Louis Berger DCE
Santander, Spain
jdevena@apiaxxi.es

Guillermo ORTEGA
MSc. Civil Engineer
APIA XXI-Louis Berger DCE
Santander, Spain
gortega@apiaxxi.es

Marcos J. PANTALEÓN
President
APIA XXI-Louis Berger DCE
Santander, Spain
mjpanta@apiaxxi.es

Summary

In Los Gallardos – Sorbas segment of the High Speed Railway between Murcia and Almería, there are 4 viaducts built span by span: Almocaizar Viaduct, Barranco Hondo Viaduct, La Gloria Viaduct and Barranco Los Giles Viaduct. This bridges are formed by a continuous concrete single-cell post-tensioned box-girder, erected span by span by means of a self launching formwork gantry and full shoring. They are situated in a medium risk seismic zone. In order to face the longitudinal earthquake action, a new anti-seismic device has been designed. It consists of hydraulic viscous dampers, to dissipate energy, in the abutments and sliding pendulum bearings with low friction, for recentering, on the piers. A nonlinear seismic analysis was carried out for the dimensioning of the anti seismic devices. Artificial acceleration time history for the earthquake analysis was needed.

Keywords: post-tensioned concrete, nonlinear seismic analysis, hydraulic viscous dampers, sliding pendulum bearings, High Speed Railway

1. Introduction

In Los Gallardos – Sorbas segment of the High Speed Railway between Murcia and Almería (south Spain), there are 4 viaducts built span by span: Almocaizar Viaduct, Barranco Hondo Viaduct, La Gloria Viaduct and Barranco Los Giles Viaduct

The continuous concrete single-cell post-tensioned box-girder is normally used in average spans railway bridges, not because of being more efficient from a resistance point of view, high resistance to bending and torsional moments or because of coping loads generated by rail traffic but because it is the typology that most optimizes the weight and distribution of the material, obtaining the maximum resistant efficiency with minimal weight.

The viaducts in the Gallardos – Sorbas segment, Almocaizar Viaduct, Barranco Hondo Viaduct, La Gloria Viaduct and Barranco Los Giles Viaduct present a similar typology. The span distribution of the viaducts has been presented in the following table

Table 1: Geometry of the viaducts

Viaduct	Nº Spans	Span length (m)	Total length (m)
La Gloria	8	27 + 36 + 5x51 + 36 + 27	381
Almocaizar	11	39 + 9x51 + 36	534
Barranco Hondo	3	39 + 51 + 36	126
Barranco Los Giles	8	992	360

https://doi.org/10.2749/222137814814069291