

Viaduct over the River Deba on the ‘Basque-Y’ high-speed rail line

El viaducto sobre el río Deba en la “Y-Vasca” de alta velocidad

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Abstract

The viaduct over the River Deba on the Basque-Y high-speed rail line crosses the river valley in an area near Bergara, a town in the Spanish province of Guipuzcoa. The deck is a prestressed concrete box girder with variable depth over the piers. Built with an underslung movable scaffolding system (MSS), its span arrangement is 50 + 80 + 70 + 60 + 3 × 65 + 70 + 65 + 70 + 3 × 65 + 45 m.

On the back of developments in recent years in Spain, the technology could be deployed to build the main 80 m span, setting a national record for high-speed rail span length using this building system.

The article contains a detailed description of the characteristics of the viaduct, as well as its construction and the monitoring systems applied during its erection.

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Keywords: Prestressed box girder; Variable depth; Movable scaffolding system (MSS); High-speed rail; Record span length

Resumen

El viaducto sobre el río Deba en la Y-vasca de alta velocidad permite el paso del ferrocarril sobre la vaguada por la que fluye el río Deba en las cercanías de la localidad de Bergara. El viaducto presenta un tablero con sección cajón de hormigón pretensado con canto variable en la zona cercana a pilas, que se ha ejecutado con autocimbra, con una distribución de luces de 50 + 80 + 70 + 60 + 3 × 65 + 70 + 65 + 70 + 3 × 65 + 45 m.

El desarrollo de la tecnología que han experimentado las autocimbras en los últimos años en España ha permitido llegar a un vano principal con 80 m, que supone el récord de luz en alta velocidad ejecutado con este sistema.

El artículo describe con detalle las principales características del viaducto, así como su proceso constructivo, y los sistemas de control y monitorización empleados durante la ejecución.

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Palabras clave: Cajón pretensado; Canto variable; Autocimbra; Alta velocidad; Récord de luz

1. Introduction

This article contains a detailed description of the background, design and construction of the River Deba Viaduct on the Bergara–Bergara section of the ‘Basque-Y’ high-speed

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Figure 1. Finished River Deba Viaduct.



Figure 2. Lamiategui Viaduct.

railway line and some brief mention of the other less noteworthy structures comprising this section of the line.

1.1. Structures on the Bergara–Bergara section of the high-speed line

The River Deba Viaduct (Fig. 1), described in detail in a later section, straddles a deep river valley near the town of Bergara, towering more than 90 m over the ground below. While 900 m apart at deck elevation, the valley's relatively sharp sides form a fairly symmetrical 'V', although this symmetry is briefly broken by the Vitoria/Gasteiz-Eibar motorway near abutment E-1 between piers P-1 and P-2 (upper right, Fig. 1).

Three further viaducts lie on the Bergara–Bergara section:

- Lamiategui Viaduct, with a total length of 425 m and a span arrangement of $30 + 8 \times 40 + 35$ m (Fig. 2);
- Altzeta Brook Viaduct, with a total length of 140 m and a span arrangement of $30 + 40 + 40 + 30$ m (Fig. 3);
- Olzaileko Brook Viaduct, with a total length of 100 m and a span arrangement of $30 + 40 + 30$ m (Fig. 4).

These three viaducts were designed and built with typical 40 m spans to capitalise on ancillary resources and systematise construction. The three decks are constant depth prestressed concrete box girders. Since the height over the terrain is moderate in all three, they were erected using shoring towers, thereby

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