

Ripollet viaduct for the Bus-HOV lane on the C-58 motorway (Barcelona)

Viaducto de Ripollet, para el carril Bus-Vao, en la autopista C-58 (Barcelona)

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Abstract

Recently built for the Bus-HOV lane on the C-58 Motorway, the Viaduct consists of an elevated structure, the piers of which are located in the space between the two decks of an existing viaduct.

The new deck consists of a spatial steel tubular structure that supports a concrete platform, on which the carriageway runs.

Unknown for this type of structure, the design of the construction system involved erecting the piers and deck 100% without the support of the existing viaduct decks which were only occasionally used for auxiliary aid jobs, control and inspection so that traffic was not cut off at any time.

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Keywords: Tubular structure; Latticework; Stiffeners; Pre-fabricated slabs; Launching gantry

Resumen

El viaducto recientemente construido para el carril Bus-Vao en la autopista C-58 está constituido por una estructura elevada cuyas pilas se sitúan en el espacio comprendido entre los dos tableros de un viaducto existente.

El tablero del nuevo viaducto está formado por una estructura metálica espacial de tubos que soporta una plataforma de hormigón sobre la que discurre la calzada.

El sistema constructivo desarrollado, inédito para este tipo de estructura, ha consistido en el montaje del 100% de pilas y tablero sin contar con el apoyo de elementos de obra sobre los tableros del viaducto existente, que tan solo han sido utilizados ocasionalmente para labores auxiliares de ayuda, control e inspección, de tal forma que en ningún momento se ha precisado cortar el tráfico de vehículos.

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Palabras clave: Estructura tubular; Celosía; Rigidizadores; Losas prefabricadas; Lanzador

1. Introduction

The C-58 Motorway, for access to Barcelona from the North-west, accumulates one of the heaviest traffic peaks in Catalonia (150,000 vehicles a day in 2011), often causing traffic to collapse.

In order to reduce traffic congestion in peak hours, it was planned to extend the Motorway on the stretch between Ripollet

(Barcelona) and the Avenida Meridiana of Barcelona, by creating a Bus-HOV lane (High Occupancy Vehicles).

The extension consisted of a new carriageway with two 3.50 m wide lanes and hard shoulders measuring 1.50 m. The project had to solve a complex problem caused by the difficulties stemming from the existing space boxing in the Motorway and running along two parallel viaducts, each with three lanes of traffic.

The solution that was adopted consisted of building a new viaduct forming a singular project due to its location, the deck of which runs parallel at a level above the carriageway of both

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Figure 1. View of the deck.



Figure 2. Pier of the Bus-HOV viaduct.

viaducts (Fig. 1) and with piers that emerge from the intermediate space between the decks (Fig. 2).

The deck, which runs over the carriageways of the existing Motorway, was designed with shapes that meet the appropriate aesthetic requirements for its integration into the environment and which provide the observer with the maximum sensation of transparency.

Building the deck, which runs parallel above the carriageway of both viaducts, required designing a special procedure, which imposed a condition which consisted of dispensing with any type of lifting device over the existing decks of the Motorway because of the dense traffic.

Broadly speaking, the procedure consisted of building the structural elements of the deck and the upper part of the piers on the ground and then proceeding to assemble them into their final position using special launching systems supported by the structure itself, as it was being constructed.

2. Bus-HOV viaduct characteristics

2.1. General dimensions

The viaduct has a total length of 693 m and comprises 16 spans, with the following succession of spans measured between the axes of the piers (Figs. 3 and 4).

$$44.10 - 4 \times 34.00 - 45.00 - 2 \times 52.50 - 45.00 - 34.00 \\ - 45.00 - 43.20 - 52.30 - 52.70 - 53.50 - 37.00 \text{ m}$$

The deck has a total width of 11.50 m.

2.2. Piers

Every pier comprises a concrete shaft with a constant exterior section, which has an upper extension in the shape of a capital, suitable for providing support for the decks (Fig. 5). There is a



Figure 3. General view.

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