



## Bridge over the river Nervión on the Bilbao Donostia line

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### Summary

The new bridge of the narrow gauge railway over the river Nervión is to be found at the exit of the Etxebarri station and replaces a three span beam bridge, with piers in the riverbed, which considerably reduced its hydraulic section.

It is a concrete bowstring arch bridge of 80m in span which crosses the river without piers. It has two tracks and has a lateral cantilever of 4.8m for pedestrians and bicycle traffic.

This bridge was constructed parallel to the existing bridge and then slid into its final position to allow the shortest possible interruption to train traffic.

**Keywords:** Bowstring arch, concrete, hangers, rail bridge, slid, skidded.

### 1. Introduction

The Bilbao-San Sebastián narrow gauge railway passed over the river Nervión close to the Etxebarri station by means of a bridge of three spans with two piers in the river whose foundations had been increased at different stages and which considerable reduced the waterflow in the riverbed. Furthermore, the deck, formed of simply supported re-enforced concrete beams, was in poor condition. For all these reasons the decision was taken to replace the bridge, with the aim of removing the piers from the riverbed. The solution chosen was a concrete bowstring arch bridge of 80m span.



*Fig. 1. Aerial view of the bridge*

A fundamental condition of the project was the need to interrupt rail traffic for as short a time as possible. This condition determined the construction process of the bridge. In the first place it was built entirely over provisional abutments in a position parallel to its final location and close to the former bridge. Once it was built, traffic was diverted to

pass over it which allowed the existing bridge to be demolished and the final abutments to be built in line with the provisional ones. Once complete, the whole structure was moved on skid shoes to its permanent position; the tracks were moved once more and trains began to cross. The two operations of moving the tracks- the first to pass traffic over the bridge in its provisional position, and the second to slide the bridge and allow traffic to cross in its final position- took less than five days.

### 2. A general outline of the bridge

The new bridge over the Nervión river has a span of 80m, due to the need to cross the riverbed without introducing piers due to the canalizations introduced for this zone of the river by the Territorial Water Services of the Basque Government. The bridge is to be found at the exit of the Etxebarri station and its height over the riverbed is fixed by the position of the railtracks. This