



## New bridge to Soto de Ribera over river Caudal, Spain

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### Summary

The new access bridge to the town of Soto de Ribera over Caudal river in Asturias (Spain) is an adaptation of the concept of cable stayed bridge to a whole composite section scheme. The solution starts with a twin steel beam solution with concrete slab which has a wide spread in the world for his advantages: speeder construction, industrial quality and economy. These characteristics are the guide of the design of this cable stayed bridge.

**Keywords:** Cable-stayed bridge, composite bridge, twin beam deck, cantilever, tower, fork socket.

### 1. Introduction

The improvement of entrance to the town of Soto de Ribera in Asturias, some meters upstream of the confluence of rivers Caudal and Nalón, was proposed with the construction of a new bridge to resolve the problems of access.

Soto de Ribera is a small village with a wide collection of bridges. The town had the first bridge built in 1808 by Brigadier Antonio Cañedo, ship captain and governor of Nazca in Peru. This stone bridge was expanded sometime later with concrete, while maintaining the appearance of their facades as if it were the original, which was enclosed. Despite the improvement, its width allows only the crossing of two parallel cars, without pedestrian sidewalk. The second bridge is over the gates of the dam of river Nalón and only provides access to the power station that supplies electricity with coal combustion. This factor that has to be taken into account in the project. There is acid rain when moisture combines with nitrogen oxides and sulfur dioxide emitted by the central. The combination produces sulfuric acid and nitric acids transported in rain or dew. It is necessary to note that the bridge over the gates of the dam is a 1961 work of Carlos Fernández Casado in an early application of technology of precast concrete segments. This bridge has a mixed use, road and railway, both for feeding the plant with tonnes of coal.

This railway is not only used to transport coal to the plant, but it is also passenger trains. So there is a wide eight-track train station on the left bank of the river, where convoys stops at the station and occupy a width of about 40 meters. That place retains its original spaces and has been barely affected during construction of the new structure.

The new bridge also has to cross the river, which in this point is a lake with stable level and 80 meters wide. Both spaces, the train station and the lake and the necessary heights over tracks define a cable stayed structure of two spans.