Viaduct over the Tera River on the HSR line Madrid-Galicia, Zamora (Spain)

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Summary

The Tera Viaduct is situated over the Tera River between km points 710+697.500 and 711+342.500 of the north-northeast corridor of the Madrid-Galicia high-speed railway line. It is therefore 645 m long with a span distribution of 60-75-150-75x5-60. Such arrangement, with one large 150 m span, is determined by the crossing of the Tera River, spanned by an arch. The deck is supported in the arch keystone, which enables constant modulation of the spans throughout the whole viaduct, keeping the same deck cross section and using incremental launching as construction method. The metal section arch was installed by rotating the semi-arches.

Keywords: Incremental launching, prestressed concrete, arch rotation, metal arch, S460 steel.

1. Project rationale

The work is located on the stretch awarded to the construction division of ACCIONA, of the north-northeast corridor of the HSR line Madrid-Galicia, running in the north of the province of Zamora. The most remarkable point of this stretch is the crossing of the Tera River, in an area containing a reservoir for a hydroelectric power station. The solution proposed in the awarded project envisioned a viaduct with a support in the middle of the riverbed, which proved difficult to perform due to the great depth of the river and the limitations imposed by the power station operators, Confederation and Iberdrola, concerning any action that may affect the water level.

ACCIONA called on CFC to develop a construction variant containing a solution that both companied had used in numerous high-speed railway viaducts in which they had worked together, with an incrementally launched bridge technique designed and patented by ACCIONA that uses a kind of rack and pinion system for the deck pulling operation.

The modulation of this work was well solved with spans about 75 m long. Such length is large for incrementally launched bridges and yet it is perfectly applicable when high resistance concretes are used. In a previous work of CFC 90 m long span had been already reached. This span accounts for a half of the crossing over the river, allowing us to span the Tera without supports, using an arch whose keystone serves as the deck support. We were thus able to keep the same construction solution of incremental launching in the entire civil work.

CFC carried out the construction project of the bridge and led the project management of the entire civil engineering complex execution that took place between 2010 and 2013.

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