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D3 flyover over route I-18, railway and Hričov reservoir

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Abstract

The presented paper describes the overall design philosophy, the choice of construction technology and the construction itself of one of the longest bridge in Slovakia. The two post-tensioned prestressed concrete beam bridges with 30+ spans, with the largest span of 110,0 m are being built these days near the city of Žilina. Two separate bridge constructions are being built, each for one route direction.

The bridge has been divided into four parts depending on different construction technology. The bridge cross section of technological parts Nr. 1, 2 & 4 consists of twin-T beam girder, whereas the part Nr. 3 is formed by box girder with continuously changed height of the cross-section.

The overall width of the superstructure is the same for both bridges and equals 13,10 m. The superstructure is being built over dense area of the highway crossing, railway with frequent traffic and over the reservoir that serves as the energy source for water-based power station. Above the supports the cross-beams are designed with indirect support scheme. Internal post-tension prestress tendons are to be anchored in end cross-beams and in construction joints.

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1. Introduction

The bridge object, which is numbered as Nr. 223-00, is a part of the D3 highway construction stage near the city of Žilina. The construction site extends the completed part of the D3 highway at the west-end suburbs and develops

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the north-western bypass of the city. At its end, the D3 construction stage connects to the existing route I/11, which continues further to the north to borders with the Czech Republic and Poland.

The described construction also includes 2.2 km long tunnel named “Považský Chlmec”, and directly following another bridge construction. The investor of the highway construction is the National Motorway Company (Národná diaľničná spoločnosť) and the construction is being built with the participation of funds of the European Union. For further information, see Fig. 1

Fig. 1 – Situation map of the described D3 highway construction stage

2. Basic characteristics

The highway layout within the bridge is mainly formed by arc with radius R = 750 m. In the final part of the bridge, the layout changes, and both lanes deviate to connect to tunnel tubes. The transition curves are adopted along the bridge with superelevation change designed within a single span. In vertical alignment, the highway gradient advances from the beginning to the middle of the bridge, then it descents to another arc and another ascent at the end of the bridge.

The described bridge construction Nr. 223-00 is formed by two separate constructions, each of which carries one traffic lane direction. Focusing on the division, in the longitudinal direction only one single expansion unit is being built, which is very unique within the Slovakia.

The overall length of the superstructure is as follows - the left bridge cca 1493 m and it is divided into 31 spans. The right bridge is cca 1437 m long and it is divided into 30 spans. The main span length is 2 x 110.0 m, and these pass over the Hričov resevoir basin. For details, see Fig. 2.

The bridge (both constructions) has been divided into four technological parts, each of which uses unique technology of contruction. This is due the tight time-schedule, and allows for the save of time and for use of more technology equipments and machinery at one time.