Braila Suspension Bridge: Construction Methodology of the Pylons

Oguz Berber, Manabu Inoue, Tunc Cetinkaya, Takanori Shima, Cihat Koc

IHI Infrastructure, Braila, Romania

Contact: oguz.berber@ihiro.ro

Abstract

The 2 km long suspension bridge with a main span greater than 1 km which crosses the Danube River is the focal point of the 23 km highway project in Braila/ Romania. The bridge will carry two lanes of highway traffic in each direction. IHI Infrastructure Systems Co., Ltd. is the EPC contractor for the project together with Astaldi SpA.

To accelerate the bridge construction, the slip-form method was chosen for the construction of the concrete pylons and precast cross beams were installed by the heavy lifting method. This paper discusses the effects of the pylon's construction method on the structural design and geometry control of the pylons during construction.

Keywords: Braila Suspension Bridge, Pylons, Design, Construction, Geometry control

1 Introduction

Braila Suspension Bridge will be the third-longest bridge in Europe after traffic opening. Bridge has three continuous spans having a total length of 1974.30 m with a main span of 1120 m and two side spans 489.65 m on Braila side and 364.65 m on Jijila side.

Three spans suspension bridge consist of 31.7 m wide to 3.2 m depth steel orthotropic box girder with a typical 25 m length deck segments. The main cable diameter is 570 mm comprising 16 nos. strands made of 544 nos. wire with 5.38 mm diameter. The bridge has a 1/8.7 sag to span ratio which corresponds to 175 m pylon height.

The pylons are concrete structures having closed box section legs inclined by about 1:50. Section dimension is 6.5 m x 6.5 m with 1.45 m thickness on the bottom of the pylon and reducing to 0.8 m thickness at the top. Pylon legs connected at the top with two cross beams have dimensions 6.75 m x 3.0 m.

Pylons have been traditionally built either with concrete or steel material for the long-span suspension bridges so far. Each material has the advantage in its way needs to be considered carefully to choose the best solution in terms of engineering, time and cost taking into consideration the requirements of the project and environmental effects. Steel pylons would be the optimum solution for the suspension bridges in regions that face severe seismic loads such as Akashi Bridge in Japan and Izmit Bay Bridge in Turkey. Moreover, steel solution allows the contractor to fabricate pylon segments in the steel shop and that leads to fabrication liberated from the critical path of the construction schedule and faster erection on the site. However, although today's high technology slightly reduced the cost of steel manufacturing yet it is still way too expensive comparing to concrete. And also, concrete pylons have greater weight comparing to steel and that makes them significantly more efficient against wind-induced vibrations.

The concrete solution would mean greater time consuming, but by following alternative casting solutions, the effect on the construction schedule could be easily minimised. Considering the demand