

Incremental launching method for bridges of Northern Marmara Motorway, Turkey

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Abstract

This paper presents the challenge of the incremental launching of three viaducts of the Northern Marmara Motorway project in Istanbul Turkey. The incremental launching method (ILM) was pushed at its own limit to be adapted to this Viaduct. The deck, with 55 meter long spans, was moved by sliding on piers up to 82 meter high through a complex vertical and horizontal alignment.

This paper gives an overview of this construction methods, and the specificity of these viaducts. In particular, specific procedures were implemented to control the behaviour of the piers during launching operations, due to their slenderness and their non-conventional anti-seismic design. Specific geometric checks were also necessary to follow the launching curve. Temporary structure associate to ILM will also be described in the paper: prefabrication yard, design and construction of the launching nose, choice and design of launching devices.

Keywords: Incremental launching method (ILM); anti-seismic; slenderness; survey; load control; curve; temporary structure.

1 Presentation of the design

The Northern Marmara Motorway section 1 is a 115 km long ring road around Istanbul. It includes not less than 37 viaducts spread over European and Asian sides, and the iconic Yavuz Sultam Selim Bridge (3rd Bosphorus Bridge).

Most of the viaducts have been built using isostatic precast 40m long I beam deck solution. However, Freyssinet proposed an alternative design for three of these viaducts, in order to reduce the RC quantities, the footprint on the environment, the construction time and the cost.

The alternative design consist in two continuous decks in PC concrete box sections divided in 55 meter long spans, and built with the incremental

launching method (ILM). Many advantages were offered by the ILM technique: overcome the difficulties of precast beam erection in deep valley, enhancing the safety during construction, and respect the tight planning.

The three ILM bridges are viaducts V6, V14 and V17, left and right. The three viaducts have similar deck but differs in length and piers height. Each concrete box section is 22 meter wide and about 3.4 meter high. The deck is broken down into segments whose length correspond to the span length.

The length of the bridges, vertical and horizontal alignment, and the height of the piers are summarized in the table 1.