



From a decrease of web thickness to a reinforcement optimization

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Abstract

A New Coastal Road (NRL) almost completely situated at sea over a length of 12,5 km will allow the inhabitants of the Reunion Island, in the Indian Ocean, to connect quickly and in complete safety Saint-Denis, the capital city located in the East, with its commercial harbor situated about twenty kilometers further west, without interruption due to massive rock falls from the cliff on the 4 lanes current coast road.

Each span of variable depth of the 5,4km viaduct is 120 m long. The cross section is a mono-cellular box girder with two webs and post tensioned overhang. The 28m wide segments of decks were proposed with a web thickness reduction in regards to the tender layout. The alternative removed the transverse ribs, to simplify the segments prefabrication.

The decrease of the web thickness was a challenge for the JV in order to prove to the client that the reinforcement and prestressing will not increase consequently. Therefore, a detailed analysis using the variable strut inclination method and specific behaviour of a precast deck allowed to keep web reinforcement in current ratios.

Keywords: design method; reinforcement; optimization; deck; pre-stressing

1 Introduction

The current 4 lanes coastal road at the foot of the cliffs exposes its users to cut-offs in case of strong swells and falling rocks, in spite of safety nets. Traffic lanes are often closed generating traffic jams.

The New Coastal Road (NRL) will allow the inhabitants of the Reunion Island, in the Indian Ocean, to connect quickly and safely Saint-Denis, the capital in the East, with its commercial harbor situated approximately twenty kilometers further west. It will be operating a total of 6 lanes at first, in addition to soft traffic (pedestrians and cyclists). A trolley line will be added on the deck at a later date.

The tender, set up by EGIS, Engineer of La Réunion Region (Owner), featured two basic technical solutions both employing the traditional cantilever construction method. The first had spans of 120 m long each and a mono-cellular box girder with transverse ribs allowing a 0,22 m thickness of the overhang. The second had spans of 100 m long each and multi-cellular box girders with four webs.

The tender was awarded to the joint venture(JV) combining VINCI Construction Major Projects (Leader), Dodin Campenon Bernard (two entities of the Division of the Major projects of VINCI Construction), Bouygues Public works and Demathieu Bard, with their own alternative. The main technical characteristics of this alternative are as follows: