



Reinforcement of Felix Houphouët-Boigny bridge in Abidjan

Ludovic Picard, Nicolas Descamps

Eiffage Infrastructures, Vélizy-Villacoublay, France

Emmanuel Simon

Spie Fondations, Cergy-Pontoise, France

Frédéric Menuel, Hamadi Gabouge, Amandine Chambosse

Egis JMI, Guyancourt, France

Contact: Ludovic.picard@eiffage.com

Abstract

Felix Houphouët-Boigny bridge in Abidjan is a twin double deck bridge (Road up / Rail down), crossing the Ebrié laguna, 372 lm long with 2 x 8 x 46.5 lm spans, built in 1956. Further to the sliding of a layer of sand that induced horizontal efforts, significant cracking occurred on the piles that worsened over time. Moreover, the concrete of the piers has been gradually deteriorated due to the salty laguna environment and the deck has suffered the effects of aging. The solution of reinforcement consists in creating new piles next to the existing ones, which will support “transfer beams” built under the existing deck, at each end of each span. Afterwards the weight of the deck is transferred on the new beams and the new piles through a combination of jacking and grouted pot bearings. In addition, the deck will be reinforced using a combination of well-known techniques.

Keywords: post-tensioning, bored piles, jet-grouting, maritime works, double deck, additional prestressing

1 Introduction

Felix Houphouët-Boigny bridge takes a special place in the economic development of the city of Abidjan. It is located on the historical route that links the inside of the country, and its natural resources, to the trading port that was built on the other side of the Ebrié laguna, on the island of Petit-Bassam (Figure 1).

The first link was made by a floating bridge built in 1929 that supported 2 lanes of road traffic and a track of metric width. This bridge, called “Abidjan bridge” quickly proved to be unable to drain the intense road and rail traffic (Figure 2).

In 1946, it was decided to replace it by a modern bridge designed to meet the needs in terms of traffic. Following a contest launched in 1952, the project selected is that of the company Boussiron

and the architects Badani, Roux-Dorlut, Lagneau and Weill. The new bridge was opened to circulation in 1957. Since then two other road bridges were built crossing the laguna: Charles de Gaulle bridge in 1967 and Henri Konan-Bédié bridge in 2014. But Felix Houphouët-Boigny bridge remains an very important road link and the only rail link between the port and the continental plateau. That's why, 60 years after its achievement, its maintenance and its reinforcement are crucial issues for the economic development of Abidjan (Figure 3).

2 The existing bridge

The existing bridge was mainly designed by M. Nicolas Esquillan, technical director of Boussiron Company, with the participation of M. Jean Kerisel for the design of the piles.