



Puente Nigale Main Bridges: Long Span Precast Segmental Cable Stayed Bridges for Railway and Roadway

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Summary

The existing bridge across the Lake Maracaibo, the General Rafael Urdaneta Bridge, dates from the 1960s and is now operating at full capacity. Construction of the second fixed link across the Lake Maracaibo, the Puente Nigale, started in 2012. The new link will carry two railway tracks and four lanes of highway. The total length is around 11 km from coast to coast and consists of 10 km approach bridges and two parallel 910 m cable stayed bridges with 430 m main span across the navigation channel in precast segmental construction. This will be world record span for a concrete cable stayed bridge carrying railway traffic. This paper gives an overall presentation of the project and describes the cable stayed main bridges with special focus on the unique features, including precast segmental superstructure, central cable plane and train/bridge dynamics.

Keywords: Fixed Link, Cable Stayed Bridge, Concrete Structures, Road Bridge, Rail Bridge, Precast Segmental, Central Cable Plane, Runability

1. Introduction



Figure 1: Location of Lake Maracaibo including the strait between the Lake and the Gulf of Venezuela.

The First Crossing of Lake Maracaibo – the iconic General Rafael Urdaneta Bridge – was inaugurated in 1962 and is linking the east and west coasts of the strait connecting Lake Maracaibo with the Gulf of Venezuela/Caribbean Sea at the southern outskirts of the City of Maracaibo in Zulia State, Venezuela, Fig. 1. This link carries roadway traffic only and is now operating at full capacity. In addition the structure shows signs of wear and deterioration.

The Government of the Bolivarian Republic of Venezuela has decided to build a new combined rail and road link across the Lake. The Second Crossing is located north of the City of Maracaibo and will provide a roadway crossing alternative to the First Crossing plus a double track railway link.

1.1 Infrastructure Development in Zulia State

The expansion of the Venezuelan National Railway Network encompasses an important component that is connecting the city of Mendoza at the eastern side of Lake Maracaibo with both the City of Maracaibo and a planned new harbour facility Puerto Bolivar at the western side of the Lake, Fig. 2.

The railway link across Puente Nigale is part of the Integrated Massive Transportation System of Maracaibo which will link city developments on the western side of the strait with planned new developments on the eastern side. At the same time the link will be integrated with the National Railway Network and consequently the railway link shall be designed to have sufficient capacity for both local and regional railway traffic for passengers.