Global and seismic analysis of Chacao Bridge

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Abstract

The Chacao Bridge is an asymmetric two-main-span suspension bridge crossing the 2.5 kilometer wide Chacao Channel in Southern Chile.

The bridge has main spans of 1155 m and 1055 m and a total length of 2754 m. The three concrete pylons have different heights and the Central Pylon (inverted Y-shape) is tuned to balance uneven forces in the two main spans.

The bridge site has especially harsh environmental conditions with strong winds, strong currents, and most notably, high seismicity, adding challenges to the bridge design.

In the process of detail design, a comprehensive set of global analyses have been conducted. This paper identifies some of the different sets of analyses and special challenges faced in the analysis procedures.

Keywords: Suspension bridge, multi-span bridge, global analysis, wind analysis, seismic analysis, response spectrum analysis, time history analysis

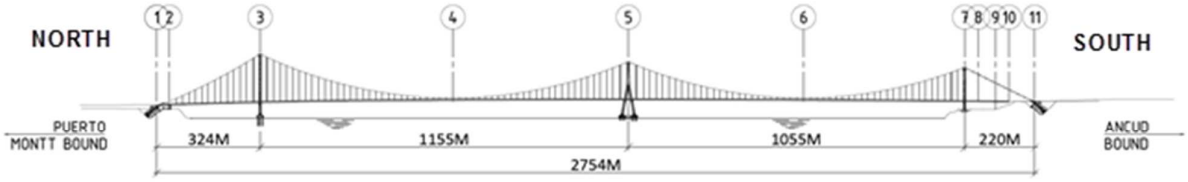

Figure 1. Chaco bridge main scheme

1 Introduction

The Chacao Bridge is a two-main-span suspension bridge crossing the 2.5 kilometer wide Chacao Channel in Southern Chile. The bridge site is about 1000 km south from Santiago and is linking the Chiloe Island to main land.

When built, the bridge will be the first longitudinal asymmetric multi-span suspension bridge of its type. The bridge has main spans of 1155 m and 1055 m, a suspended side span of 324 m at the north end and a viaduct on the south end, giving a total length of the bridge of 2754 m, see Figure 1.

The main bridge has three concrete pylons with heights of 199 m, 177 m and 157 m, from North to South. The variation of pylon heights is a direct consequence of the uneven length of the main spans. To optimize the cable quantity and to avoid unbalanced forces for dead loads, the pylon heights are optimized to achieve same cable

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