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Industrial Bridge, Chile.

Challenge in seismic detail design

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ABSTRACT

The Industrial Bridge above the Bio Bio river will become the largest road bridge with a transverse section of main beam and slab in Chile, with a length of 2.520 m in 56 spans, when it goes into service the year 2024. The conception and structural design was marked by the location and the reduce capacity of the soil (Soil type IV), due to flood events that are products of the widest river of Chile in one of the most seismic zone of the world. The present work shows the analysis made in the Industrial Bridge, where different studies were made to define the seismic parameters of the zone. This was made through a such as a deterministic and probabilistic for different conditions, which turned out as a result into a considerable increase of the seismic demand when compared to the demands of the Highway Manual code (Design code of Chile). For the final design, it was considered the used of and base isolator with energy dissipation, that was able to maintain the period of the bridge at 1.72 s but increased the damping 25% lowering the transfer of efforts from the superstructure to the infrastructure. The main elements of the structure ended up with an atypical characteristic for a beam bridge in Chile: prestressed girders of 45,00 m length and 2,50 m height and mechanical connectors for the longitudinal reinforcement, expansion joints with +/- 40 cm of transversal and longitudinal movement, and base isolator with energy dissipation bearings with a 25% of damping.

Keywords: bridge, design, isolation; seismic risk study

1 INTRODUCTION

The Industrial Bridge over the Bio Bio River is the main structure of the Industrial Bridge Road Concession in the city of Concepción that connects both banks of the Bio Bio River and the Los Batros Estuary; it is a long structure, with an extension of 2,520 m, of which 2,094 m correspond to a straight route and 427 m in curves, joining the municipalities of San Pedro de la Paz and Hualpén, Concepción, Bio Bio Region, Chile (Figure 1).