

## Retrofitting of AYALA Bridge, an historic steel bridge in Manilla (Philippines)

Vanessa BUCHIN-ROULIE, Nicolas KACZKOWSKI, Alexandre GROS, Fabien TESSON

*Freyssinet International, Reuil-Malmaison, FRANCE*

Contact: [vanessa.buchin-roulie@freyssinet.com](mailto:vanessa.buchin-roulie@freyssinet.com)

### Abstract

Ayala Bridge, in the center of Manilla, is a steel arch bridge built in the 1950s. It is comprised of 2 simply supported steel bridges constructed with 3 trusses connected together. The bridge has to be retrofitted for conformity to new codes (traffic and seismic) and lifted by 70 cm for conformity to regulatory clearance. The retrofitting solution designed by Freyssinet was chosen because of its economy when considering both deck and foundations: it consists of minimizing the current seismic loads on piers and abutments, to get them lower than actual loads seen in the past under historic seismic and typhoon. Longitudinally, the 2 decks are linked together and extended with beams and new piles: the overall structure is working as a frame. Transversally, some seismic devices are placed. The overall steel structure is then strengthened using additional steel profiling and prestressing. Major parts of the work has been done with no traffic interruption at all.

**Keywords:** Steel Bridge, seismic retrofitting, strengthening, post-tensioning, heavy lifting

### 1 Introduction

Ayala Bridge is one of the major bridges located in the center of Manilla (Philippines) over Pasig River. As a strategic axis (20 000 vehicles per day), its closure needed to be reduced to a minimum.

It is comprised of 2 independent steel arch bridge of 61,6 meters (south span) and 73,8 meters (north span), constructed with 3 trusses connected together. Transversally, the deck is composed of a concrete slab supported by stringers beams. The deck of 25,9 meters width supports 4 traffic lanes each of 3,05 meters and 2 sidewalks.



Figure 1. Global view of Ayala Bridge



Figure 2. The 3 arches connected together