

**Pathological and structural health monitoring of a residential building in
Lota, Chile**
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ABSTRACT

Lota is a city in Chile which urban development was strongly influenced by the coal-mining industry during 19th and 20th century. Virtually the entire city was built, initially, by Matias Cousiño's Coal Company and, later, by the National Coal Company (ENACAR). At the beginning of the 21st century, the city began to experience a decline because of the closure of coal mines. This situation affected not only the economy and employment of the city, but also the maintenance of its infrastructure and the conservation of historical buildings.

The “Anibal Pinto Building” is a 5 stories reinforced concrete and masonry structure, built in 1966 in the city of Lota. Besides of an aggressive coastal environment and poor maintenance, this building has experienced one major earthquake (Mw 8.8 in 2010). As a consequence, cracks, concrete spalling and reinforcement corrosion is observed in several structural elements.

To evaluate the current state of the building and determine its remaining operation life, a structural assessment procedure was implemented based on field explorations, laboratory analysis and numerical modeling. Field explorations considered test to identify carbonation, humidity, porosity, concrete hardness and density. While, laboratory test included compression test of concrete cores extracted from the building. These investigations were developed with the aim of determine the mechanical properties of buildings materials and for identifying pathologies that affects reinforced concrete.

The experimental data was used to elaborate a finite element model in ETABS to estimate building performance compared to the current seismic regulation in Chile. Potential failure conditions were identified and several reinforcement and rehabilitation schemes were proposed to reinstate structural safety.

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