

COMPARISON METHODOLOGIES AND INTERVENTION FOR TWO MASONRY CHURCHES AFFECTED AFTER THE 2017 EARTHQUAKE IN MEXICO.

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ABSTRACT

The deterioration of heritage sites from natural disasters such as earthquakes is a loss to humanity's culture. However, most existing studies on earthquakes focus on the effects on building materials from a technical standpoint. There is a need for more studies that balance the technical requirements with the understanding of the significance of built heritage, focusing on risk management and implementing interventions with appropriate technologies.

The intention of this paper is to study and to compare the current state of two 16th century masonry churches following the 2017 earthquake in Mexico. The two complexes being analyzed are part of the World Heritage Site called "Ruta de los Conventos", on the slopes of Popocatepetl designated by UNESCO in 1994. These buildings are representative of the architectural model adopted by the first missionaries -Franciscans, Dominicans and Augustinians- who evangelized the indigenous populations in the 16th century. They are also an example of a new vision of architecture, in which open spaces take on new importance. The two heritage structures analyzed are the most endangered: the Huaquechula monastery, in the state of Puebla south of Mexico City, and the Convento de San Guillermo Totolapan, in the state of Morelos south-east of Mexico City. The churches were constructed circa 1548 and 1535, respectively. The paper will describe the two structures, providing the background history and cultural significance for each project, in co-ordination with local historians. The contrast in the construction system of both churches will be described, along with any known previous interventions, historic and contemporary.

The damage inflicted to the two churches due to the most recent earthquake (2017) will be critically analyzed, noting how they performed seismically and drawing links to the historical research previously conducted. Specifically, there will be a focus on inherent defects of the existing materials, the different construction methodologies, and on the impact of contemporary interventions such as the use of reinforced concrete and structural steel following previous earthquakes.

The paper will conclude with a discussion on potential repair methodologies going forward in order to mitigate future damage to the structure. This will include discussion on the importance of using compatible materials and proper repair procedures and the need for ongoing maintenance of these important heritage structures. These recent events prove that it is critical to evaluate the current state of built heritage in order to be better prepared for future earthquake disasters.

REFERENCES

- [1]. <https://www.eluniversal.com.mx/cultura/patrimonio/destruccion-en-la-ruta-de-los-conventos#imagen-1>
- [2] <https://whc.unesco.org/en/list/702>