



## Structural and Seismic Investigation on Historical Papaz Bridge in Turkey

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### Abstract

Hosting several great civilizations such as Ottomans and Roman Empire, Turkey and especially Istanbul city inherited huge number of structural heritages including mosques, bridges, palaces, churches, traditional baths, school buildings and so on. Therefore, a challenging issue appears for preservation and transferring them to the next generations considering sustainability subject. To perform a convenient intervention for restoring such structures, understanding structural behaviour is a key matter. In order to contribute that, a historical stone masonry bridge was investigated to understand its structural and seismic behaviour. A site survey was carried out and the structural deficiencies of the bridge were determined. Then, 3D structural FE model through DIANA software was prepared and analyzed under vertical and seismic loads. The results are discussed in terms of modal characteristics, stress distribution as well as displacement values.

**Keywords:** historical bridge, stone masonry, Papaz Bridge, seismic behaviour.

### 1 Introduction

Turkey hosted several civilizations such as Ottomans, Roman Empire and Byzantines in the history and an invaluable cultural heritage inventory including structural ones such as mosques, churches, bridges, traditional baths, school buildings etc. exist in the country. In most eras of such periods, Istanbul was the capital or one of the most important center. Thus, there exist a significant amount of structural heritage in the city. Some part of that structures could not survived due to several reasons, however the city still has a great number of historical structures with an invaluable architectural resource.

Preservation and pass of such structures to the next generations safely and keeping their originality become important issues. Preservation process includes several disciplines, notably architecture and civil/structural engineering, history, archaeology and so on. A possible restoration and intervention decisions must be evaluated by an interdisciplinary teamwork. Several researches focused on the structural and seismic evaluation of historical masonry bridges to contribute the issue [1,2,3]. The paper also focusses to contribute structural evaluation side of such process, and handles a historical stone masonry arch bridge, named the Papaz Bridge, back to 16<sup>th</sup> century located in Istanbul. The