

Preserving historic bearing structures by prudent integration in new structures

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ABSTRACT

For the effective consolidation of damaged historic load-bearing structures, it is necessary for the designer to understand the causes of the damage but also to know and apply the most effective consolidation methods, in order not to affect the cultural value of the building. The problem becomes even more complex for the designer when it is desired only to keep a damaged area of a historic building, which was part of an aggregate of historic buildings. Keeping this area is needed because buildings have been seismically interacting over the past 150 years, and it is necessary to maintain the static equilibrium of the building aggregate.

In most cases, in order to safeguard a damaged historic building, is achieved by consolidating the structural elements composing the building, resulting in extensive consolidation areas, long construction periods and expensive and hard to implement solutions. Additionally, it is challenging to predict the response of the building over time to various actions without continuous monitoring, which is difficult to achieve, because of the disturbance on building occupants.

The paper presents an alternative solution of safeguarding interventions on a historic building, damaged by settlement and earthquakes, through its prudent connection to the load-bearing structure of a new building. The building is located in the St. Gheorghe Square in Timisoara, Romania, located in the Banat seismic area with a peak ground acceleration of 0,20g [1]. This alternative solution saves the historic building from the total demolition, has the advantage of minimal consolidation interventions, but also preserves the historical balance between the buildings of the aggregate. The efficiency of the alternative solution is highlighted by a comparative presentation of the internal forces and deformations recorded in different areas of the historic building, first for the singular building and secondly of the building integrated into the new bearing structure. Internal forces and displacements were obtained following a spatial seismic analysis, performed with the ETABS program. In the same time, photographs of the execution, that present the connection between the buildings and the chosen consolidation solutions used to reduce the seismic vulnerability of the building, are presented throughout the paper.

REFERENCES

- [1] M. Mosoarca, V. Stoian, M. Florea and M. Niculescu, "Structural Balance of Historical Aggregates", in *Structural Analysis of Historical Constructions (SAHC2018)*, Springer, Cham, pp. 2448-2456, (2019).