

## ABSTRACT

# Assessment of an unreinforced masonry structure and evaluation of different seismic strengthening techniques

Samara Xenia

Objects of the present dissertation are the assessment of an unreinforced masonry building that lies in Thessalonica (Greece) and a comparative study of two different techniques for its seismic upgrade.

Initially a few things are mentioned about the history of the building. A brief description of the building and its pathology follow. Additionally the process of the horizontal transport of the building, as a whole, and the architectural study of its rehabilitation are presented.

First, necessary repairing measures are being applied to the masonry structure. Then the safety assessment of the masonry structure follows (calculation of the design resistance of piers and spandrels according to EC6). A significant percentage of failure arises. The next step is the application of two different seismic strengthening methods.

The first method of intervention refers to the strengthening of masonry wall with reinforced concrete jackets. The strength of the mixed elements (piers and spandrels with jackets) is calculated under biaxial bending and unilateral shear force.

The second strengthening method refers to the installation of seismic isolation units in the base of masonry structure. The isolators units ALGAPEND (manufactured from Alga) are being used. At first a simple approach of an equivalent elastic SDOF system is examined. Then a response spectrum modal analysis for an equivalent elastic MDOF system is carried out. The safety design of isolation system and the assessment of the superstructure according to EC8 and EC6 follow. In addition inelastic time history analyses are performed based on natural recordings where a non-linear model is used for isolator units.

Finally comparative conclusions are presented for the two strengthening techniques that are applied and an interesting suggestion for the seismic upgrade of old buildings that are going to be transferred as a whole is made.