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THE USE OF POLYMER MESH FOR REINFORCING HISTORICALLY SIGNIFICANT ADOBE BUILDINGS IN SEISMIC AREAS

photograph

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ABSTRACT

Between the many material losses produced by earthquakes in earthen buildings are those regarding the cultural heritage built with earth. The most recent case of the Bam Citadel in Southern Iran, almost totally destroyed by an earthquake in 2003, brought attention to the problem of how to effectively reduce the vulnerability of historic earthen buildings and at the same time accomplish the conservation requirements for the structural intervention in this type of buildings.

Structural interventions in historical monuments must be performed according to universally accepted guidelines, which are inspired in the Venice (1964), Burra (1979), Washington (1987) Charters and other documents whose objective is to ensure the intangibility of the world cultural heritage. This implies to pay maximum respect for the construction material, building technologies and architectural typology; and at the same time provide an adequate safety that assures the survival of the monument in the future. In other words, to reach the maximum safety with the minimum intervention. By other hand, because new compatible materials and techniques can be developed in the future, current interventions should be not only limited to a minimum, but as much as it can, they should be reversible and non degradable with time.

One new promising material for this task is the reinforced polymer, that in form of bars or mesh, has the capability of being compatible with soil and durable; can be easily placed and can be reversible.

The objective of the reinforcement is to prevent the collapse of the structure in strong seismic motions by confining the adobe walls with a polymer mesh externally attached to both sides of the wall and connected through the wall with a nylon thread. A previous test with this reinforcing technique was performed on full-scale I shaped walls subjected to lateral cyclic forces static test showing a excellent ductile behavior and good energy dissipation.

This paper presents the preliminary results of a joint research project between The Getty Conservation Institute and the Catholic University of Peru, in which a ¾ scale adobe house modulus, reinforced with a geosynthetic mesh externally fixed to both sides of the wall is tested on a shaking table. It is expected, based on a previous static test, that this house module will show an excellent seismic behavior.