

Available Low-cost Technologies to Improve the Seismic Performance of Earthen Houses in Seismic Areas



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ABSTRACT

A recent earthquake (August 15th 2007) in Pisco (Peru) has destroyed almost all the adobe houses and historical monuments in Pisco and neighboring cities, towns and villages, killed more than 500 persons, and left thousands of people with injuries and homeless. This catastrophe was neither unexpected nor surprising, because every single earthquake that occurs in developing countries where construction with earth is common leaves a similar sequel of destruction, economic loss, injuries and deaths. Earthen buildings are particularly vulnerable to earthquakes because of the low strength and fragile behavior of their walls. Inhabitants of earthen houses in the seismic areas of the world, most of them poor, therefore live under unacceptable risk. This paper first describes the observed response of traditional, unreinforced earthen buildings during earthquakes. Several low-cost reinforcement techniques developed at the Catholic University of Peru over more than 35 years of research, in order to improve the seismic safety of earthen buildings, are then presented and compared. Finally, the challenges involved in the dissemination of economical and safe construction techniques to the actual builders and dwellers of earthen houses are briefly discussed.

KEY WORDS :

Earthen, construction, adobe, earthquake, reinforcement.