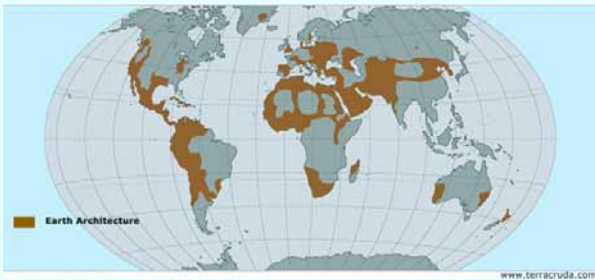


Masonry is worldwide used

Masonry is still a main building material although the use of other materials such as concrete and steel has steadily increased especially in industrialized countries. A large share of the world population still lives in masonry houses. Thirty percent of the world's population, or nearly 1,500,000,000 human beings, live in a home in unbaked earth. Roughly 50% of the population of developing countries, the majority of rural population, and at least 20% of urban and suburban populations live in earth homes.



Distribution of earth construction in the world

Masonry is used in areas where seismic activity is high.



Seismicity of the world

Masonry seismic vulnerability

Masonry is highly vulnerable to earthquakes. Past and recent experiences have shown the poor performance of unreinforced masonry buildings leading to the complete collapse of the structures and a great number of casualties.



El Salvador (2001)



Gujarat, India (2001)



Bam, Iran (2003)

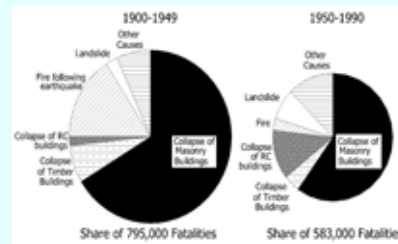


Pakistan (2005)

One of the main reasons for the high vulnerability of masonry structures is that unreinforced masonry is mostly used in rural areas of developing countries where they are erected on a traditional knowledge basis rather than on engineering criteria.

CASUALTIES

Last century, about 75% of fatalities attributed to earthquakes were caused by building collapse. The figure on the right shows the breakdown of earthquake fatalities by cause for each half of the past century. It is clear that the greatest proportion of victims died due to the collapse of masonry houses.



Retrofitting technique – Installation process

The retrofitting technique proposed in this study consists of polypropylene bands, commonly used for packing, arranged in a mesh fashion. This method for retrofitting masonry structures is economic, the material is accessible in all parts of the world and the installation method is easy-to-use and culturally acceptable. Meshes are attached on both sides of the masonry wall through wires. In order to protect the mesh from ultra violet ray, mortar is laid after the mesh is installed.



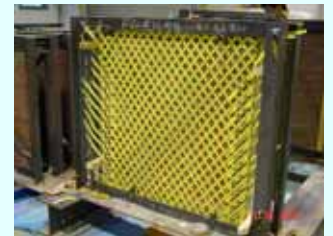
1. Polypropylene band commonly used for packing



2. Drilling holes through the masonry wall in case of existing structure but in case of new construction we can put straws to make holes



3. Polypropylene band mesh



4. Meshes attached to both sides of the masonry wall



5. Masonry wall with mesh before mortar laying



6. Detail of wire connectors through the wall



7. Mortar laying (cement mortar in this case)



8. Retrofitted wall