

Development of Guidelines for Designing of Masonry Structures

Partner Agencies:

Higher Education Commission (HEC)

Investigators:

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Masonry structures exist all over the world and are popular among people due to their qualities, such as low cost, use of local material, etc. Since these structures, in many cases, are not designed using engineering principles and services the quality of construction of masonry buildings is often low: these are termed as non-engineered structures. The walls in masonry structures are the main load resisting elements which are made of a combination of masonry units and mortar. The units may comprise of brick, block or stone.

Recent earthquakes in and around Pakistan such as the 2005 Kashmir earthquake (magnitude 7.6, death toll over 73,000), caused a colossal damage and major human and economic losses in Pakistan. A huge proportion of housing stock in Pakistan consists of vernacular rural housing, which is extremely vulnerable to earthquake effects due to poor construction quality and lack of seismic resistant features. The unavailability of design guidelines for masonry buildings is a major contributing factor to the unsafe built environment in the country. The key objective of the proposed project is to develop guidelines for designing of masonry structures so as to improve the quality of life and safety of built environment. The research program will be focused on assessing the properties of available materials and developing methods for the designing of block masonry buildings for enhanced seismic performance. An experimental study will be performed to simulate seismic performance of masonry buildings using shaking table testing of models, and an analytical study will be performed to assess the influence of different parameters upon seismic performance of these structures. The project is expected to strengthen existing local capacity and develop sustainable human resources in the areas of safer built environment. Capacity building will be accomplished by developing manuals and guidelines for the practicing engineers, and by organizing training activities and workshops for various stakeholders, including government officials, development agencies, engineers, architects, and developers.

Objectives and Scope

The aim of this project is to formulate guidelines for designing of block masonry structures. These guidelines do not exist presently in Pakistan. The aim of the project has been realised by pursuing the following objectives

a) Understanding the mechanical properties of masonry through experimental testing

- b) Understanding the behaviour of masonry structures under gravity and seismic load through dynamic and pseudo-dynamic testing
- c) To carryout analytical studies for the development of simple models
- d) To document and disseminate the project outcomes through development of manuals, guidelines and workshops