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Seismic Performance of Different Typologies of Stone Masonry Houses in India

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Abstract

World over, stone has been extensively used as a building construction material due to its local availability and high durability. The scenario for the construction of buildings in India is no more different than compared to other parts of the world. According to the 2011 Census of India, 43.48 million houses (~14% of the total number of houses) have stone as the predominant wall material. Owing to the fact of non-engineered construction, wide variations in terms of stone masonry construction can be seen in the Indian subcontinent, particularly in the Himalayan belt. In this study, a field survey is conducted to identify the seismic resistant features in traditional building practices which make use of stone for construction, e.g., Thathara construction, Dry-stone construction, Koti Banal construction, etc. The percentage of these types of structures is decreasing due to an increase in urbanization, increasing housing demands, non-availability of traditional construction materials and skilled artesian for building new structures as well as costly repair and retrofitting techniques for damaged and existing structures. Thus, there is a dire need to safeguard these structures as if this trend continues, these buildings will become things of the past. In this paper, a review of structural configuration, roofing systems, foundation type and potential failure modes of these construction typologies are studied, and the effect of different retrofitting techniques that exist in the construction type on their expected seismic performance is discussed.

Keywords: Stone masonry, Typologies, Construction features, Seismic behaviour