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A Review of Seismic Safety Measures for the Construction of New Stone Masonry Houses

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Abstract

Stone masonry walls have inherent weaknesses against the lateral forces of an earthquake. These weaknesses result in inadequate performance during earthquakes. Mistakes are commonly committed in the construction of stone walls, especially in the random rubble type masonry. These mistakes further erode strength. When shaken, poorly constructed walls having inadequate interlocking between the inside and the outside faces (wythes), the faces begin to separate, resulting in rapid weakening of the wall and leading to the collapse of one or both wythes. In the presence of excessive openings, the wall becomes weak against the tearing action caused by the earthquake forces that are parallel to the length of the wall. This results in diagonal cracking of varying severity in the walls. Further, due to poor connection between the walls and the floor/roof, it results in failure of the floor diaphragm and affects the overall stability of the structure. Hence, while choosing to construct a building with stone masonry, the owner must make sure that the measures required to counter these weaknesses are taken during the construction so that in the event of a potentially destructive earthquake, the structure can withstand its impact without suffering much damage. Therefore, in the present study, an overview is presented for different failure modes of stone masonry houses, seismic safety provisions for the new construction considering the regulations for the wall, floor/roof construction, and the provision of horizontal and vertical reinforcement to ensure good seismic performance against the future earthquakes.

Keywords: New construction, Stone masonry, Failure modes, Seismic safety provisions, Wall and floor/roof