

Out-of-Plane Flexural Strength of Unreinforced Clay Brick Masonry Walls

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Abstract:

This paper presents the results of an experimental test program on eight full-scale unreinforced clay brick masonry walls. Three different levels of vertical pre-compression were used in the tests and six of the eight walls also had a window opening. A special feature of these tests is the boundary condition for the vertical edges of the test walls. The vertical edges were supported by short return walls which were themselves laterally restrained from displacing so that the two vertical edges were restrained by realistic full moment connections rather than by simple supports or rotationally rigid supports. The walls were loaded using a system of airbags placed between the wall and a reaction frame. The forces going into the reaction frame were recorded using load cells and these loads are plotted versus mid-wall displacement to characterise each wall's flexural behaviour up to and beyond the point of maximum strength. From this data the ultimate strength of each wall was determined and compared to predictions using the virtual work method. The displaced shape and cracking pattern correlations with those corresponding to the assumptions implicit in the virtual work method are also highlighted. The paper concludes with a discussion of the accuracy of the analytical predictions and implications for seismic design of brick masonry walls.

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