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Infill Wall Effect on Seismic Analysis of Reinforced Concrete Buildings

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Abstract

Infill walls are used to fill the gap between the structural elements in a framed structure. It protects the structure from external environment and also act as partition wall to create separate rooms according to the requirements. Different types of infills are used to create masonry wall like red clay brick, fly ash brick and AAC blocks. In seismic analysis the infill wall contribution is ignored as it is considered as non-structural element. But in recent years, much research has been conducted by many researchers to study the behaviour of the unreinforced masonry during seismic event. Here, the study is to find the infill wall effect on seismic analysis and design. In our study, Bare frame model (BFM), hybrid frame model (HFM) and infilled frame model (IFM) are taken to perform the seismic analysis. Equivalent diagonal strut method is used to include the unreinforced masonry infill wall effect in seismic analysis using codal provisions of IS1893:2016. In this method, the wall is converted as a diagonal strut which only takes compressive force when the structure is subjected to some lateral forces such as seismic load. We performed few experiments on red clay brick masonry to obtain the data required for designing the diagonal strut dimension. Both static and dynamic analysis (response spectrum method) are performed using ETABS software. G+4, G+9, and G+14 models are designed to study the infill wall contribution in earthquake analysis by varying the elevation of the structure. Storey drift, storey displacement, member forces and time period are taken as the parameters. After performing both the analysis, this is observed that the infill wall significantly affect the member forces and stiffness of the structure during seismic event. So, the practicing engineers must include infill wall effect while designing real structures.

Keywords: Diagonal strut method, Hybrid frame, Infilled frame, Bare frame, Storey drift, Storey displacement, Response spectrum method