



Effects of Open Stories on Expected Seismic Losses in Hilly Buildings

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Abstract

Due to the lack of adequate flat land in the hilly region, it is often opted to construct buildings on the slope. Further, to accommodate the need for large covered open spaces (e.g., parking, shops etc.), open stories are provided in the hilly buildings at levels based on the location of the approach road. In this study, an attempt is made to determine the variation in the expected seismic losses due to the presence of open story in reinforced concrete (RC) hilly buildings. For this, two basic types of hilly buildings with different story ratios are considered. Bi-directional non-linear dynamic analyses are performed under 22 ground motions. The expected repair cost is estimated considering the repair of four drift-sensitive building components. The component-wise and floor-wise deaggregation of the expected repair costs due to the considered components are studied. It is observed that the unreinforced masonry wall contributes to the majority of the expected seismic repair cost in all the considered hilly buildings. Moreover, the presence of open stories just above the uppermost foundation level is observed to be the most critical in terms of estimated seismic losses to structural components.

Keywords: Hilly buildings, Open story, Seismic loss estimation