

EFFECTS OF STAIRCASE ON THE SEISMIC BEHAVIOR OF RC MOMENT FRAME BUILDINGS

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Abstract

Staircase has a potential to change the seismic behavior of structures, but it is often neglected during design. In this research, effects of staircase in 5 groups including 27 models have been studied. Results show that staircase constructed with the use of RC slab, performs as a K-shaped bracing in longitudinal direction and as an inclined shear wall in transverse direction, so in both directions structural stiffness increases, period and lateral displacement of structure decrease, but staircase constructed by means of stringer beam only acts as a bracing in longitudinal direction. Stiffness caused by small span, inclined RC slabs and perimeter infill walls of staircase, based on the staircase location and the number of structural bays could change mode shape and lead to torsion. Along ladder running, staircase leads shear force and bending moment of columns adjacent to the landing to increase, while the internal forces of others to decrease. The majority of adverse effects of the staircases can be prevented by isolating the staircase from master structure. In this case, only the changes in geometry of the structure due to location and dimension of staircase and arrangement of infill walls should be studied.

Keywords: Staircase; Seismic Behavior; Reinforced Concrete Frames; Stiffness; Torsion.