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Seismic Response of Reinforced Concrete Frames Resting on Hill Slopes

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Abstract

The Constructions done in the hilly regions are more vulnerable seismically in contrast with the structures built in flat terrains. The structures constructed in hilly regions are usually irregular, these structures are irregular both in mass and stiffness. Constructions done on the sloping ground is different from usual structures since they are asymmetrical in both horizontal and vertical directions. Columns of the bottommost story have a varying height because of slanted ground and are torsionally coupled, henceforth draw in a lot of shear forces, and without proper detailing building constructed on sloping ground is susceptible to moderate to heavy damage. In this analysis, the seismic response of three different building configurations i.e., Regular, Stepback, Stepback-Setback is evaluated. Seismic analysis using the linear static and dynamic methods was carried out using the structural analysis application ETABS 2017. Studying several building designs on a hillside includes bare frames, soft stories, concrete blockwork infill, soft stories with shear walls at corners, and frames with composite columns at the bottom story. For the various structures on the sloping ground, typical parameters such as Base Shear, Forces in the lowest floor columns, story drift, maximum top story displacement, time period, the B.M in columns at each floor, and story shear in structure will be identified and studied. Finally, several slope structure designs would be discussed in terms of their appropriateness.

Keywords: Stepback, Stepback-setback building, ETABS 2017, the slope of the ground, Linear Static method, Seismic analysis, Shear wall, Composite column, Response spectrum analysis