

## Assessing the Impact of Underground Cavities on Buildings with Stepped Foundations on Sloping Lands

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**Abstract :** The use of sloping lands is increasing due to the reduction of suitable lands for the construction of buildings. In the design and construction of buildings on sloping lands, the foundation has special loading conditions that require the designer and executor to use the sloped foundation. The creation of underground cavities, including urban and subway tunnels, sewers, urban facilities, etc., inside the ground, causes the behavior of the foundation to be unknown. In the present study, using Abacus software, a 45-degree stepped foundation on the ground is designed. The foundations are placed on the ground in a cohesive (no-hole) manner with circular cavities that show the effect of increasing the cross-sectional area of the underground cavities on the foundation's performance. The Kobe earthquake struck the foundation and ground for two seconds. The underground cavities have a circular cross-sectional area with a radius of 5 m, which is located at a depth of 22.54 m above the ground. The results showed that as the number of underground cavities increased, von Mises stress (in the vertical direction) increased. With the increase in the number of underground cavities, the plastic strain on the ground has increased. Also, with the increase in the number of underground cavities, the change in location and speed in the foundation has increased.

**Keywords :** stepped foundation, sloping ground, Kobe earthquake, Abaqus software, underground excavations

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