

Assessing the Effect of Underground Tunnel Diameter on Structure-Foundation-Soil Performance under the Kobe Earthquake

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Abstract : Today, developed and industrial cities have all kinds of sewage and water transfer canals, subway tunnels, infrastructure facilities, etc., which have caused underground cavities to be created under the buildings. The presence of these cavities causes behavioral changes in the structural behavior that must be fully evaluated. In the present study, using Abaqus finite element software, the effect of cavities with 0.5 and 1.5 meters in diameter at a depth of 2.5 meters from the earth's surface (with a circular cross-section) on the performance of the foundation and the ground (soil) has been evaluated. For this purpose, the Kobe earthquake was applied to the models for 10 seconds. Also, pore water pressure and weight were considered on the models to get complete results. The results showed that by creating and increasing the diameter of circular cavities in the soil, three indicators; 1) von Mises stress, 2) displacement and 3) plastic strain have had oscillating, ascending and ascending processes, respectively, which shows the relationship between increasing the diameter index of underground cavities and structural indicators of structure-foundation-soil.

Keywords : underground excavations, foundation, structural substrates, Abaqus software, Kobe earthquake, time history analysis

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