عنوان مقاله:

Effect of boundary conditions on the seismic performance of shallow-depth underground structures

محل انتشار:

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خلاصه مقاله:

Application of underground structures particularly in large cities is one of the strategies to improve transportation. For this reason, the construction of underground structures in big cities has been developed significantly in recent years. One of the critical loadings for structural designs is the loading due to the earthquake. For the structures which are built on the ground, static and dynamic analytical methods are provided in the validated codes for seismic design of structures. However, regarding the complex behavior of the soil and the interactions involved, there is no exclusive method in the codes for seismic analysis of underground structures considering all of the effective parameters. Moreover, underground structures have public operation which makes protection of them against seismic loading more critical. One of the effective factors influencing the earthquake load applied on the shallow depth underground structures in urban areas is the existence of mid and high-rise buildings in the neighborhood of an underground structure and on the ground surface. These structures which may be built next to an underground structure cause the seismic load pattern applying to the underground structure during an earthquake to change. Ignoring the effects of these buildings in the seismic analysis of an adjacent underground structure causes damage on both of the structures during an earthquake. Using the analytical methods, in this paper the effect of mid and high rise buildings in the proximity of shallow underground structures on the seismic loading of an underground structure, is studied. The results indicate that the existence of mid and high rise buildings adjacent to a shallow underground structure has significant effect on the seismic load applied to the underground structure and ignoring this issue causes damage to both of the structures during an earthquake.

کلمات کلیدی:

underground structure, pushover curve, fiber section, stiffness of the soil, OpenSEES