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Mechanism of Performance of Soil-Cement Columns under Shallow Foundations in Liquefiable Soil

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Abstract : In this study, the effects of ground reinforcement with stiff soil-cement columns on liquefiable ground and on the shallow foundation of structure were investigated. The modelling and analysis of shallow foundation of the structure founded on the composite reinforced ground were carried out with finite difference FLAC commercial software. The results showed that stiff columns were not effective to the redistribute the shear stresses in the composite ground, thus, were not effective to reduce shear stress and shear strain on the soil between the columns. The excessive pore pressure increase which is dependent on volumetric strain (contractive) tendency of loose sand upon shearing, was not reduced to a significant level that liquefaction potential could be remediated. Thus, mechanism of performance with reduction of pore pressure and consequent liquefaction was not predicted in numerical analysis. Nonetheless, the columns were effective to resist the load of structure in compression and reduced the liquefaction-induced large settlements of structure to tolerable limits when provided adjacent and beneath the pad of shallow foundation.

Keywords : earthquake, liquefaction, mechanism, soil-cement columns
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