

Effects of ground improvement on liquefaction resistance from 3-dimensional effective stress analyses

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SUMMARY

Numerous earthquakes occurring over the last five decades have illustrated the significant hazards posed by soil liquefaction. Observations in recent decades have also illustrated the potential hazard mitigation that can be achieved by reducing soil liquefaction potential via ground improvement technologies. Despite these observations, there remain many challenges in ground improvement, both in innovative improvement technologies themselves, and also in prediction of the seismic performance of improved soil deposits. In this paper, the improvement in ground response and liquefaction resistance was examined based on seismic effective stress analyses. The analyses were 3-dimensional in nature, in order to capture the important geometric aspects of the soil deformation and used an advanced elastic-plastic constitutive model based on the state concept. Various geometrical configurations of ground improvement by the jet grouting method were examined in order to attempt to estimate the most economical improvement configuration for a given level of seismic performance required.