

Shear Reinforcement of Stone Columns During Soil Liquefaction

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Abstract : The aim of this paper is to assess the effectiveness of stone columns as a liquefaction countermeasure focusing on shear reinforcement benefit. In fact, stone columns which have high shear modulus relative to the surrounding soils potentially can carry higher shear stress levels. Thus, stone columns provide shear reinforcement and decrease the Cyclic Shear Stress Ratio CSR to which the treated soils would be subjected during an earthquake. In order to quantify the level of shear stress reduction in reinforced soil, several approaches have been developed. Nevertheless, the available approaches do not take into account the improvement of the soil parameters, mainly the shear modulus due to stone columns installation. Indeed, in situ control tests carried out before and after the installation of stone columns based upon the results of collected data derived from 24 case histories have given evidence of the improvement of the existing soil properties. In this paper, the assessment of shear reinforcement of stone columns that accounts such improvement of the soil parameters due to stone column installation is investigated. Comparative results indicate that considering the improvement effects considerably affect the assessment of shear reinforcement for liquefaction analysis of reinforced soil by stone columns.

Keywords : stone column, liquefaction, shear reinforcement, CSR, soil improvement

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