

Seismic Retrofit of Existing Bridge Foundations with Micropiles: 3D Finite Element Analysis

Authors : Mohanad Talal Alfach

Abstract : This paper concerns the seismic behaviour of soil-piles-bridge reinforced by additional micropiles. The analysis carried out by three-dimensional finite element modelling using the FE software ABAQUS. The soil behaviour is assumed to be elastic with Rayleigh damping, while the micropiles are modeled as 3D elastic beam elements. The bridge deck slab was represented by a concentrated mass at the top of the pier column. The interaction between the added micropiles and the existing piles as well as the performance of the retrofitted soil-pile-superstructure system were investigated for different configurations of additional micropiles (number, position, inclination). Numerical simulation results show that additional micropiles constitute an efficient retrofitting solution. Analysis of results also shows that spacing between existing piles and retrofitting micropiles has little effect; while it is observed a substantial improvement (in case of weak piles/micropiles - soil interface) with reducing the inclination angle of retrofitting micropiles.

Keywords : retrofitting, seismic, finite element, micropiles, elastic

Conference Title : ICECCGE 2019 : International Conference on Earthworks, Civil, Construction and Geotechnical Engineering

Conference Location : New York, United States

Conference Dates : August 08-09, 2019