

Field-testing and Modeling of Soil-Structure Interaction for Highway Support Structures

By

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Abstract

The focus of this study is the development of analytical and numerical models of soil-structure interaction in support structures that are frequently used in highway construction in urban settings. In a series of field tests, we have collected detailed and high-resolution data involving small and large-diameter reinforced concrete piles and pile groups. The data were used to develop and validate simplified (macroelement), as well as detailed three-dimensional finite element models of these support structures.

Our findings indicate that pre-existing analysis methods and design guidelines do not accurately address the need to capture the broad variety of responses that are encountered in seismic regions due to different boundary conditions and structural geometries. Our newly developed models aim to close this perceived void, and are amenable to be routinely used in common design and analysis software used by practicing engineers.