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Use of In Situ Tests for Design of Drilled Shafts in Coarse Granular Deposits

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Abstract

The soil conditions along the Salt River in Phoenix, Arizona, consist of alluvial Sand, Gravel, and Cobbles (locally known as SGC). Structural loads for heavy structures built in this area are typically carried by large-diameter drilled shafts. The conventional methods for axial capacity determination, which come from experience with types of soils other than SGC soils, may not be appropriate for these ground conditions. In addition, the analytical and empirical design methods for axial capacity determination may not be appropriate for these ground conditions. Because of the difficult ground conditions, an Osterberg cell load test in addition to a comprehensive subsurface investigation and characterization program were carried out for a large-scale design project to obtain accurate site information on side shear and end bearing ultimate capacities of drilled shafts. To better characterize the in-situ shear strengths of SGC soil, pressuremeter tests were performed as part of the subsurface investigation. Comparisons were developed between predicted axial capacities of drilled shafts using several design methodologies, and the axial capacity measured from static load testing. This paper provides the results of the site investigations, drilled shaft foundation load testing procedures, and the shaft load distribution. Where high percentages of gravel and cobbles are encountered, the drilled shaft capacity may be significantly underestimated by design equations commonly used, therefore design criteria, as well as the methods used for obtaining soil parameters, should be revisited.

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