

INFLUENCE OF LOADING RATE ON AXIAL CAPACITY OF PILE GROUPS IN CLAY FROM LABORATORY MODEL TESTS

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ABSTRACT

The influence of loading rate on axial capacity of pile groups in clay was studied by conducting a total of forty tests on model pile groups in a clayey soil bed prepared in a test tank. The model pile groups were subjected to axial compressive loads at four loading rates of 0.01, 0.05, 0.1 and 1 mm/min. At each loading rate, five different pile group configurations (from line pile groups to square and rectangular pile groups) were tested. The center-to-center spacing of piles in a group was three or nine times the pile diameter. Along with the pile groups, a single pile was also tested. The magnitude of loading rate effect on axial pile capacity is measured in this study with two quantities. The first quantity is the loading-rate capacity parameter α representing the slope of capacity-log (loading rate) trend line. The parameter α describes the increase of capacity for tenfold increase of loading rate, and it ranged from 0.078 to 0.59 depending on the pile group configuration and center-to-center spacing of piles in a group. The second quantity is the capacity-loading rate factor N_α , which is a normalized quantity, that is more suitable for the assessment of the effect of the loading rate on the pile capacity than the parameter α . The average value of N_α equals to about 30% for all the test results, which indicated that there was a 30% increase in axial capacity of the piles when the loading rate increased from 0.01 mm/min to 1 mm/min, i.e. 100-fold increase.