

INFLUENCE OF LOADING RATE ON UNDRAINED BEARING CAPACITY OF A MODEL PILE IN CLAY

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Abstract: The strength of cohesive soils is affected by the rate at which the external load is applied. Laboratory studies have shown that the undrained shear strength of saturated cohesive soils increases as the rate of loading is increased. However, previous studies have in general focused on the influence of loading rate on the undrained shear strength of specimens tested in triaxial apparatus. In this study, the influence of loading rate on the undrained bearing capacity of piles in clay is experimentally investigated. Undrained bearing capacity tests were conducted under different loading rates using a model steel pile with a diameter of 30 mm and a length of 500 mm. The model pile was installed in a soil cylindrical tank having a diameter of 450 mm and a height of 700 mm. In addition, consolidated undrained triaxial tests were performed under the same loading rates used in the bearing capacity tests. Experimental results showed an increase in undrained shear strength of the tested soil with the increased rate of loading. Furthermore, the undrained bearing capacity of the model pile was found to increase as the loading rate increased. The relationships between the time to failure, and both the undrained shear strength and the undrained bearing capacity can be represented by a straight line on the log-log plot. Theoretical bearing capacity was calculated based on the undrained shear strength measured in the triaxial tests and compared with the measured bearing capacity under the same loading rate.