



ESTIMATION OF FRICTION CAPACITY OF DRIVEN PILES IN SAND: EFFECT OF SAND DILATION

Ahmed S. Alawneh ^{1,*}, Osama K. Nusier ¹, Bayan N. Jaraha ² and Nikos D. Lagaros ³

¹ Department of Civil Engineering, Jordan University of Science & Technology, Irbid 2210, Jordan;

nosama@just.edu.jo

² Graduate Research Assistant, Department of Civil Engineering, Jordan University of Science & Technology, Irbid

2210, Jordan; bnaljararha16@eng.just.edu.jo

³ School of Structural Engineering, National Technical University of Athens (NTUA), 15780 Zografou, Greece;

nlagaros@central.ntua.gr

* Corresponding Author: asshlah@just.edu.jo

ABSTRACT

This paper is dedicated to investigate the effect of sand dilation during pile axial loading on ultimate shaft capacity of driven piles in sand based on a database comprising of 37 well-documented full-scale pullout pile load tests collected from literatures. The results indicated that the contribution of sand dilation during pile axial loading to the measured shaft capacity is significant for piles with diameter less than 0.40m in medium dense and dense sand especially at low stress level. In some cases, sand dilation may contribute to as high as 45% of the measured shaft capacity. For piles with diameter greater than 0.60m, the contribution of sand dilation to the measured shaft capacity is small and generally less than 10% especially at high stress level. A design methodology for tension piles in sand which incorporates the effect of sand dilation is proposed in this study. The validity of the proposed method was verified by comparing prediction with measurement made on a well-documented field case from literature. The comparison indicated that the proposed approach gives reasonable prediction and thus can be used to predict shaft capacity of driven piles in sand.