

Vertical Uplift Capacity of a Group of Equally Spaced Helical Screw Anchors in Sand

Authors : Sanjeev Mukherjee, Satyendra Mittal

Abstract : This paper presents the experimental investigations on the behaviour of a group of single, double and triple helical screw anchors embedded vertically at the same level in sand. The tests were carried out on one, two, three and four numbers of anchors in sand for different depths of embedment keeping shallow and deep mode of behaviour in mind. The testing program included 48 tests conducted on three model anchors installed in sand whose density kept constant throughout the tests. It was observed that the ultimate pullout load varied significantly with the installation depth of the anchor and the number of anchors. The apparent coefficient of friction (f^*) between anchor and soil was also calculated based on the test results. It was found that the apparent coefficient of friction varies between 1.02 and 4.76 for 1, 2, 3, and 4 numbers of single, double and triple helical screw anchors. Plate load tests conducted on model soil showed that the value of ϕ increases from 35o for virgin soil to 48o for soil with four double screw helical anchors. The graphs of ultimate pullout capacity of a group of two, three and four no. of anchors with respect to one anchor were plotted and design equations have been proposed correlating them. Based on these findings, it has been concluded that the load-displacement relationships for all groups can be reduced to a common curve. A 3-D finite element model, PLAXIS, was used to confirm the results obtained from laboratory tests and the agreement is excellent.

Keywords : apparent coefficient of friction, helical screw anchor, installation depth, plate load test

Conference Title : ICSRD 2020 : International Conference on Scientific Research and Development

Conference Location : Chicago, United States

Conference Dates : December 12-13, 2020