

Performance of Rapid Impact Compaction as a Middle-Deep Ground Improvement Technique

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Abstract : Rapid Impact Compaction (RIC) is a modern dynamic compaction device mainly used to compact sandy soils, where silt and clay contents are low. The device uses the piling hammer technology to increase the bearing capacity of soils through controlled impacts. The RIC device uses "controlled impact compaction" of the ground using a 9-ton hammer dropped from the height between 0.3 m to 1.2 m onto a 1.5 m diameter steel patent foot. The delivered energy is about 26,487 to 105,948 Joules per drop. To evaluate the performance of this technique, three project sites in the United Arab Emirates were improved using RIC. In those sites, a loose to very loose fine to medium sand was encountered at a depth ranging from 1.0m to 4.0m below the ground level. To evaluate the performance of the RIC, Cone Penetration Tests (CPT) were carried out before and after improvement. Also, load tests were carried out post-RIC work to assess the settlements and bearing capacity. The soil was improved to a depth of about 5.0m below the ground level depending on the CPT friction ratio (the ratio between sleeve friction and tip resistance). CPT tip resistance was significantly increased post ground improvement work. Load tests showed enhancement in the soil bearing capacity and reduction in the potential settlements. This study demonstrates the successful application of the RIC for middle-deep improvement and compaction of the ground. Foundation design criteria were achieved in all site post-RIC work.

Keywords : compaction, RIC, ground improvement, CPT

Conference Title : ICGE 2017 : International Conference on Geotechnical Engineering

Conference Location : Rome, Italy

Conference Dates : September 18-19, 2017