

Measured and predicted performance of prefabricated vertical drains (PVDs) with and without vacuum preloading

Author(s): Saowapakpiboon, J (Saowapakpiboon, J.)²; Bergado, DT (Bergado, D. T.)²; Youwai, S (Youwai, S.)³; Chai, JC (Chai, J. C.)⁴; Wanthong, P (Wanthong, P.)⁵; Voottipruex, P (Voottipruex, P.)¹

Source: GEOTEXTILES AND GEOMEMBRANES **Volume:** 28 **Issue:** 1 **Pages:** 1-11 **DOI:** 10.1016/j.geotexmem.2009.08.002 **Published:** FEB 2010

Abstract:

This paper presents the effectiveness of vacuum preloading in accelerating the consolidation of PVD improved soft Bangkok clay by comparing with the corresponding results without Vacuum preloading. Laboratory tests were conducted using a large scale consolidometer having diameter of 300 mm and height of 500 mm with reconstituted specimens installed with prefabricated vertical drains (PVD) with and without vacuum preloading. In addition, field data were collected from Second Bangkok International Airport (SBIA) site improved by PVD with and without vacuum pressures. Analyses were carried out to compare the compressibility parameters ($C(h)$ and $k(h)/k(s)$) by back-calculation of laboratory and field settlements using Hansbo (1979) method. From the laboratory tests, the horizontal coefficient of consolidation ($C(h)$) values from reconstituted specimens were 1.08 and 1.87 m^2/yr for PVD without and with vacuum pressure, respectively and the $k(h)/k(s)$ values were 2.7 for PVD only and 2.5 for vacuum-PVD. After the improvement, the water contents of the soft clay were reduced, thereby, increasing its undrained shear strengths. Similarly, the field data analysis based on the back-calculated results showed that the $k(h)/k(s)$ were 7.2 and 6.6 for PVD without and with Vacuum, respectively, The $C(h)$ values increased slightly from 2.17 m^2/yr for PVD only to 3.51 m^2/yr for vacuum-PVD. The time to reach 90% degree of consolidation for soils with vacuum-PVD was one-third shorter than that for soils with PVD only because of higher $C(h)$ values. Thus, the addition of vacuum pressure leads to increase horizontal coefficient of consolidation which shortened the time of preloading. The PVDCON software was found to be useful to predict the settlements of the PVD improved ground with and Without vacuum preloading. (C) 2009 Elsevier Ltd. All rights reserved.

Addresses:

1. King Mongkuts Univ Technol N Bangkok, Dept Teacher Training Civil Engn, Bangkok 10800, Thailand
2. Asian Inst Technol, Sch Engn & Technol, Klongluang 12120, Pathumtharn, Thailand

3. King Mongkuts Univ Technol, Dept Civil Engn, Bangkok, Thailand
4. Saga Univ, Dept Civil Engn, Saga 8408502, Japan
5. Rajamangala Inst Technol, Dept Civil Engn, Pathum Thani 12120, Thailand

แหล่งอ้างอิง Web of Science