



AUSTRALIAN GEOMECHANICS SOCIETY

VICTORIA CHAPTER

2009 E.H. Davis Lecture

Recent Advances in the Application of Vertical Drains and Vacuum Preloading in Soft Soil Stabilization

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ABSTRACT

Much of the world's essential infrastructure is built along congested coastal belts composed of highly compressible and weak soils up to significant depths. Alluvial and marine soft clay deposits have very low bearing capacity and excessive settlement characteristics, with direct design and maintenance implications on tall structures, large commercial buildings, as well as port and transport infrastructure. Stabilizing such soft soils prior to construction is essential for both short and long term stability.

Pre-construction consolidation of soft formation soils by applying a surcharge load alone often takes too long. Moreover, attributed to the low permeability and high thickness of low-lying clay deposits, the required surcharge load to achieve more than 90% degree of consolidation can be excessively high over a prolonged period. A system of vertical drains combined with vacuum pressure and surcharge preloading has become an attractive ground improvement alternative in terms of both cost and effectiveness. This technique accelerates soil consolidation by promoting rapid radial flow, decreasing the excess pore pressure while increasing the effective stress.

Over the past 15 years, Prof. Buddhima Indraratna and his co-workers have developed numerous experimental, analytical and numerical approaches that simulate the mechanics of prefabricated vertical drains (PVD) and vacuum preloading including both two-dimensional and three-dimensional analyses and more comprehensive design methods. These recent techniques have been applied for various real-life projects in Australia and Southeast Asia. The new design concepts include the role of overlapping smear zones due to PVD-mandrel penetration, pore pressure prediction based on elliptical cavity expansion theory, and the rise and fall of pore pressure via PVD under cyclic loads. The recent advances enable greater accuracy in the prediction of excess pore water pressure, lateral and vertical displacements of the stabilised ground.

This E.H. Davis Memorial Lecture presents an overview of the theoretical and practical developments and salient findings of soft ground improvement via PVD and vacuum preloading with applications to selected case histories in Australia, Thailand and China.

Wednesday 12th May 2010

Time: Commencing at 6:00 pm (with refreshments at 5.30pm) and finishing at 7:30 pm

Where: Auditorium, Engineering House, 21 Bedford St, North Melbourne

Cost: Free, refreshments provided

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Attendance at this seminar contributes towards the EA's requirements for Continuing Professional Development

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