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# Editorial

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Readers of *Ground Improvement* will be interested in identifying innovative cost-effective solutions to problems associated with difficult ground conditions and then applying them in practice. This issue provides three examples of potentially innovative solutions for expansive soils, acidic soils and peat soils.

Thyagaraj and Zodinsanga (2014) identify that current methods of lime stabilisation of expansive soils struggle to evenly distribute the stabilising agent through soils, particularly when they are stiff and fissured. Thyagaraj *et al.* (2012) developed a method called the *in situ* precipitation technique where calcium chloride and sodium hydroxide solutions are separately diffused into the soil and later react to precipitate lime. A key advantage of the method is lime stabilisation around existing structures and other situations with difficult access. This paper addresses the effectiveness of the method during cycles of wetting and drying. The authors found that the technique was very effective at controlling cyclic shrink–swell potentials in the laboratory.

Acid–sulfate soils are problematic in Australia where widespread environmental damage occurs when pyritic soils are exposed to oxygen and water then form sulfuric acid. The acid can also cause chemical reactions with stabilisers that can lead to poor outcomes. Islam *et al.* (2014) investigate improvements to acid sulfate soils using lime-activated slag through laboratory testing. The authors find that there is an optimal content of slag required to maximise the unconfined compressive strength of the acidic soil and an optimal slag to lime ratio of 1·5 to 2.

Peats are highly compressible and have low strength. Conventional surcharging methods with or without pre-fabricated vertical drains can require staged construction over long timeframes in order to manage potential instability of the fill. The vacuum consolidation technique aids stability through applying an isotropic component of pressure to the ground and can speed up construction. Griffin and O'Kelly (2014) perform a review of the method in general and of the few examples of its use in peaty soils. The authors find that peats can be successfully treated using vacuum consolidation but lateral deformations and secondary compression of peats under vacuum conditions needs further investigation.

For the practicing engineer, this issue has two papers on design developments and one paper on construction stage verification.

Stuedlein *et al.* (2014) identify a lack of reliability-based resistance factors for ultimate limit state design of spread footings constructed on aggregate-pier (stone column) reinforced clay. The authors developed a database of full-scale field trials and used it to calibrate resistance factors. The resistance factors vary as a function of the ratio of dead-to-live load, reliability index and total variability in bearing capacity. Based on this work, the authors conclude that factors of safety currently used in practice for allowable stress design are suitable.

Design of ground improvement by soil mixing often uses methods to average the strength and stiffness of the natural and improved soil. These methods often assume equal stress or equal strain boundary conditions and a unit cell type approach. When panels of mixed soil are used to buttress a retaining wall, Ruggeri *et al.* (2014) identified that the panels can punch into the adjacent softer soils. The consequence of punching is to alter the operational stiffness of the improved ground from that assumed using conventional methods. The authors show that the actual behaviour can be approximated using micromechanical approaches for two-phase materials and successfully implemented in 2D finite element analyses.

In Sweden, it is common to drill pilot holes through soil mixed columns to facilitate column penetration tests. Bergman and Larsson (2014) realised that the applied vertical force during drilling provides additional information that can be used to assess the quality of the constructed columns. The authors call this the total sounding method and demonstrate that there is statistical correlation between the drilling vertical force and the column penetration test results. This finding creates an opportunity to optimise production testing processes and reduce cost.

A number of related articles have been published in *Ground Improvement* over the years. Readers are encouraged to search the ICE Virtual Library for further information. *Ground Improvement* publishes its most recent articles ahead of print on its Virtual Library homepage. This provides our readers with quicker access to fresh content. We encourage the reader to peruse our library at http://www.icevirtuallibrary.com/content/serial/grim

*Ground Improvement* is seeking successful case studies demonstrating how geotechnical elements perform in practice. Should you wish to contribute please navigate to the Virtual Library homepage to submit an article.

Happy reading.

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