

Editorial

Ian Jefferson BEng (Hons), DIS, PhD, FGS
Reader in Geotechnical Engineering, School of Civil Engineering,
University of Birmingham, Edgbaston, Birmingham, UK

It is with great pleasure that I welcome you to this, the May 2014 issue of *Ground Improvement*. Ground improvement continues to play an important role in our development of new and existing infrastructure. New challenges are being faced around the world as ever greater demands are placed on our infrastructure base. These includes the effects of climate change and ensuring that treatments offered are resilient to whatever the future may hold (e.g. see Mitchell and Kelly (2013) for further discussion). Thus ground improvement techniques have to cope with a complex and challenging array of ground conditions and development issues, while achieving their core aims and objectives. Rogers (2012) captured this when he stated that ground improvement is a process that has desirable physical and chemical consequences spanning a number of aspects, including dealing with the risks associated with different ground conditions. The six papers in this issue highlight a number of these aspects, covering current challenges through to specific issues faced with ground improvement techniques, encompassed under the general umbrella of improvement through reinforcement.

Picking up on this general theme, Anubhav and Basudhar (2014) present laboratory scale-model tests on double-faced vertical wrap-around reinforced soil (using two multifilament woven geotextiles) exposed to loading from a surface-mounted strip footing. They assessed the influence of reinforcing layers and overlap length on the load-deformation behaviour, ultimate bearing pressure and initial tangent modulus of a wall/foundation model. Although the model behaviour to some extent was as expected, useful insights to behaviour have been provided, demonstrating for example that the overlap length has a decreasingly significant effect on ultimate bearing pressure as the number of layers of reinforcement increase.

Nair and Latha (2014), following on from the first paper, discuss the laboratory behaviour of reinforced aggregate under cyclic loading (displacement controlled cyclic California bearing ratio test: 1 Hz, 10 mm amplitude, 100 cycles) to elucidate the benefits of geosynthetic reinforcement in unpaved road subgrades. One notable observation was that the inclusion of reinforcement did not improve the resilient modulus.

Dealing with a common global problem (e.g. expansive soils) Phanikumar and Muthukumar (2014) present an experimental investigation of the use of granular pile anchor (GPA) groups, made from metal chips and sand. The focus here was on controlling heave, assessing the impact of up to 3 GPAs. They demonstrated the benefits for foundations built in or on expansive soils.

For the fourth paper, Douglas and Schaefer (2014) provide an excellent review of the reliability of the Priebe method for estimating settlements associated with vibro-stone columns (VSCs). This paper provides a detailed review of a wide range of literature, discussing the most commonly used approaches to settlement predictions associated with VSCs. The discussion covers a range of aspects associated with settlement estimates including difficulties, evaluation methods and reliability of such methods. The authors conclude that the Priebe method is the most common due to its simplicity, but that this conservative approach may sometimes underestimate settlements actually achieved. The authors call on the geotechnical community to develop less conservative methods – maybe one that captures more parameters more effectively.

Continuing the general reinforcing theme of this edition, Esmaeili *et al.* (2014) present numerical (two-dimensional Plaxis) and experimental work (scaled at 1:30) to assess the use of micro piles in reinforcing high railway embankments on loose foundations. This study showed that the factor of safety for slope stability and bearing failure increased by between 30% and 65%, with an approximate reduction of settlement of 40%, when micro piles were placed at the embankment toes.

In the last paper of this edition, Mohd Nizar and Clarke (2014) present laboratory testing to evaluate electro-osmotic piles. Experimental data are used by the authors to demonstrate how the electro-osmotic principle can be applied in practice, showing the potential use of electrodes to act as vertical drains and a means to improve soil properties. The improvement achieved is a function of time of treatment, electrode spacing, applied voltage and number of anodes. Thus the layout used can readily be designed to achieve a desired post-treatment improvement.

Hopefully these papers will spark debate in and further development of the role of ground improvement. It is important to note that, as with any aspect, ground improvement must first be founded in sound engineering and scientific practice. The role of site investigation is central to this as highlighted by Douglas and Schaefer (2014), for example. I hope you find these papers stimulating, interesting and thought provoking, and I actively encourage you to discuss these papers to help further shape our understanding and development of current and future ground improvement processes.

REFERENCES

Anubhav and Basudhar PK (2014) Footing on double-faced wrap-around reinforced soil walls. *Proceedings of the Institution of*

-
- Civil Engineers – Ground Improvement* **167(2)**: 73–87, <http://dx.doi.org/10.1680/grim.12.00006>.
- Douglas SC and Schaefer VR (2014) Reliability of the Priebe method for estimating settlements. *Proceedings of the Institution of Civil Engineers – Ground Improvement* **167(2)**: 108–121, <http://dx.doi.org/10.1680/grim.12.00012>.
- Esmaili M, Nik MG and Khayyer F (2014) Efficiency of micro piles in reinforcing embankments. *Proceedings of the Institution of Civil Engineers – Ground Improvement* **167(2)**: 122–134, <http://dx.doi.org/10.1680/grim.12.00015>.
- Mitchell JK and Kelly R (2013) Addressing some current challenges in ground improvement. *Proceedings of the Institution of Civil Engineers – Ground Improvement* **166(3)**: 127–137, <http://dx.doi.org/10.1680/grim.12.00030>.
- Mohd Nizar KN and Clarke BG (2014) Electro-osmotic piles. *Proceedings of the Institution of Civil Engineers – Ground Improvement* **167(2)**: 135–144, <http://dx.doi.org/10.1680/grim.12.00023>.
- Nair AM and Latha GM (2014) Cyclic loading behaviour of reinforced soil–aggregate bases. *Proceedings of the Institution of Civil Engineers – Ground Improvement* **167(2)**: 88–98, <http://dx.doi.org/10.1680/grim.12.00007>.
- Phanikumar BR and Muthukumar M (2014) Reducing heave of expansive clay beds through granular pile–anchor groups. *Proceedings of the Institution of Civil Engineers – Ground Improvement* **167(2)**: 99–107, <http://dx.doi.org/10.1680/grim.12.00009>.
- Rogers CDF (2012) The role of ground improvement. In *ICE Manual of Geotechnical Engineering: Geotechnical Engineering Principles, Problematic Soils and Site Investigation* (Burland J, Chapman T, Skinner H and Brown M (eds)). Thomas Telford, London, UK, vol. 1, ch. 25, pp. 271–280.