Ground Improvement
Volume 169 Issue GI4
Editorial
Saride

ice | proceedings

Proceedings of the Institution of Civil Engineers
Ground Improvement 169 November 2016 Issue GI4
Pages 231–232 http://dx.doi.org/10.1680/jgrim.2016.169.4.231

Editorial: Deep soil characterisation and stabilisation

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With immense pleasure, I welcome you to the November issue of *Ground Improvement*, which brings a number of flavours of ground engineering for deep soil stabilisation. This issue offers a wide range of knowledge disseminated through one briefing report and six research papers, ranging from the improvement of problematic soils to the design modifications to enhance the performance of the soils and structures mostly established though experimental and numerical approaches substantiated with field data.

One of the most successful and widely adapted ground improvement techniques in clayey as well as sandy soils is a vibro technique. Serridge (2016) is a proponent of the field-based vibro-stone column (VSC) study. He provides more insight on their behaviour in improvising the design methodologies in his briefing report. Based on his own experience from Kings Lynn, UK (Serridge and Synac, 2007), and noted field research studies from other parts of the world (Greenwood, 1970, 2004; Munfakh *et al*. 1983) he concludes that the percentage of soil replacement and settlement reduction are much lower than the values observed in laboratory-based VSC studies, although the latter has contributed extensively in understanding the behaviour and mechanisms of VSCs. Serridge (2016) further highlighted that the quality and consistency of field studies warrant a high-quality soil parameter characterisation technique. Serridge (2016) advocates the adoption of high-quality, non-destructive testing methods to obtain the soil parameters. Besides the VSCs, granular columns in soft soils will enhance the stability of the soils along with better drainage capabilities (e.g. Mitchell and Huber, 1985). It was shown that the bulging behaviour of the granular columns under embankment loads can be controlled by encasing the columns with geosynthetics (e.g. Murugesan and Rajagopal, 2006; Hosseinpour *et al.*, 2014).

Later in this issue, Hosseinpour *et al.* (2016) discussed the advantages of geotextile-encased granular columns in soft ground improvement through field test embankments, with one column as a controlled section with prefabricated vertical drains (Magnani *et al.*, 2010). It was noticed that the geotextile-encased granular columns enhanced the load carrying capacity by 2·5 fold and drainage properties of the soft soil compared with the control section with PVDs. The authors reported that they achieved low vertical (settlement) and horizontal displacements at the base of the 4·0 m-high embankment when reinforced with geotextile-encased granular columns. The reasons were attributed to the reinforcement effect of the columns, which would reduce the embankment loads on the soft soil and high permeability of the composite ground.

The monopile foundation technique is the most amenable and economic foundation system for offshore wind turbines. However, the current single pile designs do not prove economical for varied submarine soil conditions. Hence, in the first paper, Haiderali and Madabhushi (2016) have proposed a few design alternatives to economise and improve the performance of the monopile foundation system. Based on a validated realistic three-dimensional finite-element model subjected to severe loading combinations and typical of offshore environment, the authors suggest that a monopile with hybrid features, especially skirted steel footing and fins, mobilises the highest soil resistance and enhances the monopile’s lateral capacity.

In the second paper, Sadrekarimi (2016) advocates using state parameter to estimate the degree of compaction of sandy soils rather than relative density. Sadrekarimi (2016) proposed a generalised state parameter obtained through an extensive series of scaled miniature cone penetration tests (CPTs) by relating the initial states of CPT data with the critical state line of tested sands. This state parameter is very useful in quantifying the liquefaction potential of loose-to-medium dense saturated sands.

A widely accepted ground modification technique for soft soils is grouting, which is generally considered to be expensive compared with other similar techniques due to the involvement of sophisticated methodology, materials and processes. In the third paper, Bauer *et al*. (2016) highlighted the importance of chemo-thermal effects on the quality assessment of jet grouted columns. They proposed a new two-dimensional chemo-thermal finite-element model to account for the influence of the aspect ratio of jet-grouted columns and temperature developed between the adjacent columns in a realistic quality assessment scheme of jet-grouted columns. In the fourth paper, Fransson *et al*. (2016) have strengthened the Swedish grouting design concept and demonstrated its practical applications. The characteristics of the grout mix (penetrability and yield stress) are addressed through the hydraulic aperture of the rock. It is highlighted that the knowledge of fracture characteristics of the rock to be grouted is used as a basis for selection of the best grouting technique. The authors further demonstrated that the improved grouting design concepts work well with the Newtonian and Bingham fluids such as silica sol and cement-based grouts, respectively. In continuation of the grouting techniques, in the fifth paper, O'Connor and Orr (2016) attempted to make the process affordable by replacing the conventional cementitious suspended grout materials with industrial by-products including pulverised fuel ash (PFA) and ground granulated blast furnace slag (GGBS). It is observed that the PFA-based grouts enhanced not only the grout properties like groutability but also the permeability of the permeated soil. Overall, the PFA-based grout performed better than the GGBS and bentonite-based Portland cement grouts.

I hope you find these papers exhilarating and elucidative. We would be pleased to receive your valuable comments and discussion on this issue in particular and general comments to the journal.

Lastly, on behalf of honorary editor, editorial board members and staff, I would like to thank all the authors for publishing their research in *Ground Improvement*. We wish to receive your research developments on these topics in future.

REFERENCES

Bauer S, Pichler C, Meinhard K, Astner M and Lackner R (2016) Extending chemo-thermal quality assessment for jet grouting. *Proceedings of the Institution of Civil Engineers – Ground Improvement* **169(4)**: 264–274, http://dx.doi.org/10.1680/jgrim.15.00019.

Fransson Å, Funehag J and Thörn J (2016) Swedish grouting design: hydraulic testing and grout selection. *Proceedings of the Institution of Civil Engineers – Ground Improvement* **169(4)**: 275–285, http://dx.doi.org/10.1680/jgrim.15.00020.

Greenwood DA (1970) Mechanical improvements of soil below ground surface. In: *Proceedings of the Conference on Ground Engineering*. Institution of Civil Engineers, London, UK, Vol. 2, pp. 11–22.

Greenwood DA (2004) Discussion: Group effects in stone column foundations: model tests. In: *Ground and Soil Improvement* (Raison CA (ed.)). Thomas Telford Ltd, London, UK, p. 144.

Haiderali A and Madabhushi G (2016) Improving the lateral capacity of monopiles in submarine clay. *Proceedings of the Institution of Civil Engineers – Ground Improvement* **169(4)**: 239–252, http://dx.doi.org/10.1680/jgrim.14.00039.

Hosseinpour I, Almeida MSS and Riccio M (2016) Ground improvement of soft soil by geotextile-encased columns. *Proceedings of the Institution of Civil Engineers – Ground Improvement* **169(4)**: 297–305, http://dx.doi.org/10.1680/jgrim.16.00009.

Hosseinpour I, Riccio M and Almeida MSS (2014) Numerical evaluation of a granular column reinforced by geosynthetics using encasement and laminated disks. *Geotextiles and Geomembranes*, **42(4)**: 363–373.

Magnani HO, Ehrlich M and Almeida MSS (2010) Embankments over soft clay deposits: contribution of basal reinforcement and surface sand layer to stability. *Geotechnical and Geoenvironmental Engineering* **136(1)**: 260–264.

Mitchell JK and Huber TR (1985) Performance of a stone column foundation. *Journal of Geotechnical Engineering* **111(2)**: 205–223.

Munfakh GA, Sarkar SK and Castelli RP (1983) Performance of a test embankment founded on stone columns. *Proceedings of the International Conference on Advances in Piling and Ground Treatment for Foundations*, Institution of Civil Engineers, London, UK, pp. 259–265.

Murugesan S and Rajagopal K (2006) Geosynthetic-encased stone column: numerical evaluation. *Geotextiles and Geomembranes* **24(6)**: 349–358.

O'Connor J and Orr T (2016) Using IBPs to improve the geotechnical properties of soil. *Proceedings of the Institution of Civil Engineers – Ground Improvement* **169(4)**: 286–296, http://dx.doi.org/10.1680/jgrim.16.00005.

Sadrekarimi A (2016) Estimating relative density of sand with cone penetration test. *Proceedings of the Institution of Civil Engineers – Ground Improvement* **169(4)**: 253–263, http://dx.doi.org/10.1680/jgrim.15.00017.

Serridge CJ and Synac O (2007) Ground improvement solutions for motorway widening schemes and new highway embankment construction over soft ground. *Proceedings of the Institution of Civil Engineers – Ground Improvement* **11(4)**: 219–228, http://dx.doi.org/10.1680/grim.2007.11.4.219.

Serridge CJ (2016) Briefing: The importance of field-based vibro stone column research. *Proceedings of the Institution of Civil Engineers – Ground Improvement* **169(4)**: 233–238, http://dx.doi.org/10.1680/jgrim.15.00022.