Editorial

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Welcome to the May 2018 issue of *Ground Improvement*, for which it has been my pleasure to write the Editorial. Ground improvement continues to develop, expand and innovate on a truly global scale in a range of ground engineering applications and is increasingly featuring in major urban expansion and infrastructure projects, both as part of the temporary and permanent works. This philosophy of continual development and innovation in ground improvement, together with the diversity of techniques it encompasses, is clearly demonstrated in the papers presented in this issue of the journal.

Six research papers are included within this issue, with the first five papers investigating the modification of ground/soil properties through either addition of materials or addition of materials combined with compaction/vibration or application of direct electrical current, and with the final paper based on a parametric study of the seismic design of soil nailing.

In the first paper Saftner *et al.* (2018) describe the changes in soil properties following installation of displacement rammed aggregate piers in loose sand deposits at the field scale, with particular emphasis on time-dependent strength gain (sand-ageing effects). Cone penetration tests (CPT) and dilatometer tests (DMT) were performed both immediately before and after the installation of piers, with further CPT's performed 1 month after installation of the piers. The DMT horizontal stress index was shown to increase by around 100% and the dilatometer modulus increased by around 200% in loose clean sand immediately following the installation of the piers, with CPT tip resistance increasing by around 100% in this layer immediately following the pier installation and a further 33% in the month following the installation. It is highlighted that the way in which the soil is disturbed by the ground improvement process and the magnitude of disturbance have a significant influence on the magnitude of sand-ageing effects, in addition failure to account for sand-ageing can delay construction schedules.

The next four research papers are laboratory-based investigations, with the second paper by Henzinger and Heyer (2018) summarising the findings of an interesting experimental study

on the improvement of soft, fine-grained soils using recycled aggregates (0/4 mm) derived from demolition waste. Nine different base soils with a wide range of plasticity and recycled aggregate (0/4 mm) addition rates of up to 50% by mass were investigated focussing on parameters such as improvement effect, compaction characteristics, air void content and bearing capacity, with soil-related patterns in the changes of these parameters identified. The results provide an indication of level of improvement which can be achieved for consideration of improvement of fine-grained saturated soils. This ground improvement technique also demonstrates clear sustainability credentials.

The third paper by Mahvash *et al.* (2018) is concerned with investigating the influence of Class F fly ash (FA) content on stabilised sandy soil (with addition of cement acting as an activator) on the California Bearing Ratio (CBR), to establish the optimal quantity of FA content for stabilisation from a perspective of assessing suitability of the material for the construction of embankments, i.e. the sustainable use of a by-product from coal-fired power stations. Three different FA content percentages (5, 10 and 15%), three main curing periods, with durations of 1, 2 and 4 weeks and a constant cement content of 3% were investigated. For comparison purposes some sand samples were treated with only 3 and 5% cement, with no addition of FA. Performance of the sands was found to be significantly influenced by FA percentage and curing time, with a curing period of 28 days, for 15% FA content having a positive effect on bearing capacity, comparable to results with 3% cement and 0% FA content. Extension of the research into other soil types particularly clayey sands is advocated by the authors.

Continuing on a similar theme, the fourth paper by Consoli and Tomasi (2018) investigates the impact of increasing the dry unit weight (γ_d) through vibration/compaction and the addition of Portland cement as a ground improvement technique to enhance the performance and durability of granular materials, with an experimental programme of wetting-drying cycle tests for distinct γ_d and cement content (C) undertaken to assess their influence. A steadiness of the characteristic loss

of mass (CLM) during 12 wetting-drying cycles for distinct specimens (for each γ_d and C values) was observed reducing the number of cycles required and enabling extrapolation of results up to the required 12 cycles, with clear benefits in terms of time. It is also demonstrated that the CLM of each specimen is reduced on increasing γ_d and C with the porosity/cement index controlling not only the strength but also the durability of sand-cement blends.

In the fifth paper of this group Ayodele and Agbede (2018) present the results of the investigation of the influence of electrochemical treatment (ECT), (involving the application of direct current across moist soil, resulting in movement of pore fluid from the anode to the cathode by electro-osmosis and migration of ions to oppositely charged electrodes by electromigration), on a residual tropical laterite soil (RTLS), focussing on undrained shear strength (S_u) and stiffness (V_S). The injection of Ca^{2+} into remoulded samples of RTLS led to a reduction in both the S_u (90%) and stiffness V_S (8%) of the treated RTLS. The injection of PO_4^{3-} on the other hand resulted in improvement in both the S_u (151%) and stiffness V_S (20%) of the treated RTLS. The need for non-destructive measurement of soil properties during and after ECT is also highlighted, with soil shear wave velocity measurement (soil stiffness measurement) obtained with the aid of bender elements in the investigations.

The sixth and final paper by Villalobos *et al.* (2018) presents the observations from a parametric study of the seismic design of soil nailing, a ground improvement system which has become an increasingly preferred solution for stabilising cuttings and slopes in residual soils in Greater Concepción, Chile, where demand for urban expansion and development of associated infrastructure and transport routes is driving construction and development into challenging steep slope environments. Investigation of variation in geometrical and mechanical parameters for the nail and soil of a slope were made to assess their effects on the global factor of safety together with investigation of and any limitations of the software.

I trust you will find these papers both interesting and informative and the journal would welcome discussion on these which will assist in further developing their scientific contribution.

Major infrastructure projects provide opportunities for innovative ground improvement application in often complex and challenging conditions. Case history information on such

projects provide important sources of field data on ground improvement application and performance and would request submission of more ground improvement case histories to the journal, particularly where supported by high quality geotechnical site characterisation and monitoring data. I would also encourage submission of briefing papers on any cases of unsatisfactory or unexpected ground improvement performance. Back analysis and forensic review of such data provides important opportunities for greater insight into mechanisms that patently cannot be examined in successful ground improvement application and also makes an important contribution to the advancement of both design and understanding, in addition to more effectively managing risk.

Finally, I would like to take the opportunity to thank all the authors for their contribution to the May 2018 edition of the journal and also call for an increase in the level of research collaboration that takes place within academia and industry, as well as between both academia and industry, to facilitate greater focus on the unknowns or poorly understood issues and optimise development and understanding of ground improvement processes, application and innovation whilst avoiding any unnecessary duplication.

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