Editorial

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The scarcity of land, following rapid development in cities has put enormous pressure on increasing the height of buildings, elevating roadways, constructing subways, and improving urban rail projects etc., all of which aggravate the related problems of constructing infrastructure and buildings over problematic soils and highlight the need for well thought and innovative ground improvement design. I have the pleasure of writing the Editorial for the first issue of *Ground Improvement* in 2019 which covers several papers discussing performance of various ground improvement techniques for clays and sands, and soil deformation.

The briefing presented by Zomorodian *et al.* (2019) assesses the impact of adding nano-silica to sand to increase its resistance against hydraulic erosion. Laboratory test results indicated that addition of nano-silica increased the critical shear stress of the soil significantly while the improvement was achieved after a relatively short curing time. Although further large-scale laboratory and field results would be recommended, this study highlights the great potential that nano-silica has to replace traditional grouting materials such as lime and cement.

Many research studies highlight the environmental and logistic issues related to fly ash produced by coal-based power plants. In their paper presented in this issue, Mir and Sridharan (2019) investigate the application of high-calcium (class C) and low-calcium (class F) fly ashes to improve engineering properties of expansive soils. It was observed that the addition of pozzolanic fly ash contributed to the reduction of the soil porosity, while increasing the unconfined compressive strength. This paper offers further insight into potential use of this industrial waste in civil engineering construction.

In an attempt to expand the application of Microbial-induced calcite precipitation for ground improvement, Mahawish *et al.* (2019) investigates the influence of equimolar and non-equimolar cementation solution, reaction time and temperature on improved poorly graded coarse sand. It was observed that adopting low concentrations of non-equimolar cementation solutions resulted in greater uniformity of calcium carbonate

distribution in the soil columns, while the content of precipitated calcium carbonate increased with an increase of the temperature. Scanning electron microscopy images and energy-dispersive detector analysis indicated that the increase in the compressive strength was induced by large agglomerated calcium carbonate crystals filling the gaps between soil particles.

Muthukumar and Shukla (2019) assess the extent to which addition of 6 mm long polypropylene fibres, together with lime, could improve swell and shrinkage potential of problematic soils. It was observed that addition of fibres of up to 2% contribute to the reduction in swelling of the utilised high plasticity clay. An interesting observation was that different optimum lime contents were required for controlling swelling and shrinkage. Results show that combination of polypropylene fibre and lime can be considered as an effective composite additive for improving expansive soils.

The finite element model developed by Allouzi *et al.* (2019) is introduced as a tool to assess the response of ground to rapid impact compaction. The results of field compaction points in sandy soils were used to calibrate and validate the numerical model. Then a relationship between the soil bearing capacity and the number of hammer blows was developed, helping to plan the required number of blows on site.

The last paper in this issue looks at vertical deformation of the sand foundation induced by the change of water level. Li *et al.* (2019) conducted discrete element simulation while considering the water flow effects by adding pressure differences via velocity field of fluid on balls/grains. The numerical predictions showed that particles move at rather random fashion at the beginning of recharging, while rebound of the sample occurred after recharging.

Since problematic soils such as soft clays, loose sands and expansive soils are prevalent particularly around lakes and coastal environments, where demand for construction is generally higher, the above papers can help engineers to design

and utilise suitable ground improvement techniques in order to perform satisfactorily under the applied structural loads. All five research articles and one briefing presented in this issue cover laboratory, field and numerical research studies in the field of ground stabilisation and deformation assessment. I believe researchers and practicing engineers would benefit from the results and appreciate the authors for outstanding contributions.

In closing, I would like to mention that that *Ground Improvement* publishes its most recent articles Ahead of Print on its Virtual Library homepage, allowing the community quicker access to fresh content.

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