Editorial

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Ground improvement colleagues, it is our pleasure on behalf of the Editorial Advisory Board to introduce this themed issue titled ‘Ground Improvement in transport infrastructure’.

Given the current demographic and geographic trends associated with population centres, transport infrastructure is critical to sustaining the growth of the services in urban and regional areas. Efficient transport systems, integrated with optimal supply chains, are vital for the economic growth and international industry competitiveness, as well as for our social and environmental well-being. The need and demand for safe, durable and reliable transport infrastructure to accommodate faster and heavier traffic has been increasing steadily in the past decade, including the notable push for new road and high speed rail connecting key cities. This themed issue aims to highlight applications of ground improvement in transport infrastructure and how they play an important role in ensuring enhanced service performance. A total of 8 papers successfully completed peer review and appear in this transport infrastructure focused issue.

The 8 papers selected for this issue have captured the essence of the current and future potential of a variety of ground improvement techniques applied to pavements (Murakonda and Maheshwari, 2019 and Robinson *et al.*, 2019), rail (Sweta and Hussaini, 2019 and Jiang *et al.*, 2019, Zhang *et al.*, 2019), tunnels (Wang *et al.*, 2019 and Joneidi *et al.*, 2019) and compaction of fills (Bradley *et al.*, 2019).

Murakonda and Maheshwari (2019) conducted an analytical study of rigid pavements resting on geosynthetic-reinforced granular bed-stone column subgrade foundation. The governing differential equations for the soil-pavement system have been developed by modelling the geosynthetic as a rough elastic membrane and the pavement as a thin plate. The study illustrated the role of different parameters in the pavement behavior through a comprehensive parametric analysis. The results indicate that stone columns and geosynthetic layers are

effective in controlling deflection on the pavement layer and a reduction of 34, 54 and 70% has been observed for ground reinforced with geosynthetic, stone columns and a combination of both, respectively.

Robinson *et al.*, (2019) investigated the benefits of including geosynthetics in airfield pavements. A series of cyclic plate load tests adopting a typical aircraft contact pressure were conducted in 11 different airfield pavement profiles having geosynthetic used at interface of base, sub-base and subgrade. The results in terms of permanent surface deformation and vertical pressure response indicate that use of geosynthetic increases the number of cycles to failure but some level of permanent deformation (i.e. 25 mm) may be required to engage the benefits of the geosynthetic, particularly when placed at the sub-base to subgrade interface. In addition, the results provided modest evidence to suggest that a placement location closer to the surface may be preferred. In fact, performance increase obtained by using a sub-base material of superior quality far exceeded that of observed from the geosynthetic inclusions.

Sweta and Hussaini (2019) carried out large-scale direct shear tests to study the interface shear behaviour of ballast with and without geogrids. Five types of geogrids having different opening sizes and shapes were tested in the laboratory. The internal friction angle of ballast was found to decrease with an increase of normal stresses, as expected. The measured test data showed the inclusion of geogrids improves the shear strength and decreases the ballast breakage subjected to direct shearing loads.

Jiang *et al.*, (2019) conducted model tests to study the performance of screw-piles foundations in terms of bearing capacity behavior for application in the high speed rail network in China. The study shows a comparative analysis of the bearing characteristics of smooth, screw and composite (i.e. combination of smooth and screw) pile foundations. The results

showed that for the single pile testing, the screw-piles ultimate bearing capacity exceed by 67% that of the smooth pile. This enhanced performance was attributed to the variable cross-section that provides a more efficient distribution of stresses in the ground. Despite the encouraging results, Jiang *et al.*, (2019) do caution about the need of further study because negative friction was detected in the junction point between the smooth rod and screw tread sections of the screw-piles.

Zhang *et al.*, (2019) studied the transverse thermal difference of high speed rail induced in seasonally frozen regions in China. Based on field measurement data, they found that the transverse thermal difference may induce differential settlements for tracks, and hence track stability and passenger comfort will be affected.

Wang *et al.*, (2019) carried out 3D finite-element modelling to investigate the effects of different types of jet-grouting soils around tunnels and the influence of pore-water pressure relief wells in soft clay having low permeability. The FEM analysis showed that improving the strength of soils was an effective solution to decreases the lateral displacement of the tunnel.

Joneidi *et al.*, (2019) conducted 3D finite element analysis on a case study – Hakim tunnel in Tehran, Iran – to investigate the progressive settlement and bending moment at tunnel intersections. The FEM model was calibrated with monitoring data. The results showed that the bending moments increased significantly, whereas the axial forces decreased remarkably at the tunnel intersection.

Bradley *et al.*, (2019) investigated the performance of rolling dynamic compaction using a 8t four-sides impact roller for compacting sandy gravel fill material. The motion of the module was examined in a field trial using high speed acquisition photography. They distinguished the motion of the roller in five stages, i.e. impact, corner-suspended, sliding, tripping and falling. Considering the kinematics of the roller and associated velocity profiles, the energy imparted to the ground

by impact was computed to be on average 23 ± 4 kJ. They also found this to be independent of the number of passes.

We hope these manuscripts are useful to all our readers. We would like to personally extend our thanks to all authors, reviewers, advisory board and ICE staff members who worked so diligently to see this themed issue come to fruition. Your efforts have been worthwhile and should be beneficial for years to come.

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