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Editorial

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Ground Improvement



Editorial: Transportation geotechnics (ICTG 2024)

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Welcome to Volume 179, Issue 2 of *Proceedings of the Institution of Civil Engineers – Ground Improvement*. This Part 1 Special Thematic issue contains six out of a total of 12 invited papers covering various ground improvement techniques, which were initially presented at the 5th International Conference on Transportation Geotechnics (ICTG 2024) held in Sydney, Australia, in November 2024, chaired by Distinguished Prof Buddhima Indraratna, hosted by Transport Research Centre, University of Technology Sydney, in liaison with ISSMGE Technical Committees, TC202, TC211, TC307, the Australian Geomechanics Society, and Transport for New South Wales. They have been extended to the desired journal standard followed by rigorous peer-review, prior to acceptance and publication herein. The remaining papers will be presented as Part 2 of this thematic in the next issue (Issue 3) of the journal. A short summary of each of the six papers forming Part 1 is given below.

Alzghool *et al.* (2026) investigated a hybrid alkaline–lime treatment as an alternative to conventional lime stabilisation for expansive soils, focusing on swelling control and microstructural changes. A synthetic soil representing residual Bringelly Shale was treated using sodium hydroxide (NaOH), lime, and combined sodium hydroxide–lime admixtures. Swelling tests and microstructural analyses showed that alkali activation significantly reduced swelling, while the hybrid treatment achieved the most consistent performance. Improvements were attributed to the formation of aluminosilicate binding phases that densified the soil fabric and refined pore structure. The study demonstrates that lime content can be reduced while maintaining effective swelling control, offering a more sustainable ground improvement solution.

The study by Lei *et al.* (2026) presents the long-term cyclic deformation behaviour of saturated clay under traffic loading, with emphasis on shakedown ranges and dynamic shakedown strength. Undrained cyclic hollow cylinder tests were conducted on saturated Shanghai clay under varying cyclic stress levels. Permanent axial strain, excess pore pressure, energy dissipation, and damping ratio were employed to distinguish plastic shakedown, plastic creep, and incremental collapse regimes. The results showed that the effective cyclic stress ratio is a more reliable indicator of shakedown behaviour than conventional stress measures. Comparisons revealed that static strength parameters can

overestimate dynamic shakedown limits. A simplified criterion was proposed to identify shakedown ranges for design applications.

A series of Australian field case studies was adopted by Goodall *et al.* (2026) to examine lateral displacements induced by pile driving in soft, saturated clay. The paper presents monitoring data from the installation of precast concrete piles and steel H-piles at brownfield sites with existing infrastructure. Measured lateral displacements were analysed using three-dimensional finite-element modelling and the strain path method. Good agreement was observed between field measurements and predicted movements. The study demonstrates that established analytical and numerical approaches can reliably estimate pile-driving-induced ground displacements, providing practical guidance for assessing risk and managing impacts on nearby structures in soft clay environments.

A case study on the performance of surcharged embankments constructed on soft ground along the Peka Peka to Ōtaki Expressway in New Zealand was presented by Ramilo *et al.* (2026). The embankments were founded on highly compressible peat and organic silt deposits, posing settlement and stability challenges. A staged construction approach was adopted to accelerate consolidation and reduce long-term settlement. Finite-element modelling, calibrated using observed settlement and pore pressure data, showed good agreement with field measurements. The study demonstrates the effectiveness of surcharge preloading combined with an observational design approach for controlling soft-ground embankment behaviour.

Peiris *et al.* (2026) assessed the long-term performance of soft-ground improvement at a bridge approach embankment founded on highly compressible clay in Australia. The ground improvement scheme comprised prefabricated vertical drains combined with surcharge preloading to accelerate consolidation and limit long-term settlement. Observed performance was evaluated through back-analysis to investigate residual settlement and serviceability. The study highlights the limitations of relying solely on short-term consolidation assessments and demonstrates the importance of long-term monitoring, reassessment, and adaptive management to ensure the performance of embankments built on soft ground.

A case study on the ground improvement design for upgrading the main access road to Port Macquarie Airport in New South Wales, Australia, constructed over soft clay was presented by Chow and Wong (2026). Several options, including surcharging with and without prefabricated vertical drains and rigid inclusions, were evaluated, with significant constraints imposed by adjacent wetlands and environmentally sensitive habitats. Rigid inclusions using concrete injected columns with a load transfer platform were adopted as the preferred solution. The paper demonstrates that the selected system effectively limited post-construction and differential settlement while providing a feasible and environmentally sustainable solution for the project.

We would encourage discussion on any of the papers presented to further enhance their contribution. Details on how you can contribute can be found on the journal website www.emeraldgroupublishing.com/journal/jgrim.

Finally, we wish to express our sincere appreciation to the authors, reviewers, members of the editorial panel, and the staff at Emerald Publishing for their collective contributions to this special thematic issue of the *Ground Improvement Journal*.

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