Cite this article

Osman A, Akhtar S, Higgins K and Toll D (2022)

Editorial.

Proceedings of the Institution of Civil Engineers – Geotechnical Engineering **175**(1): 1–2,

<https://doi.org/10.1680/jgeen.2022.175.1.1>

Editorial

ICE Publishing: All rights reserved

Geotechnical Engineering

ice Publishing

Editorial

Ashraf Osman

Durham University, Durham, UK

Salim Akhtar

Jacobs, London, UK

Kelvin Higgins

GCG, London, UK

David Toll

Durham University, Durham, UK

The first issue of *Geotechnical Engineering* for 2022 is a themed issue on pile foundations: innovative design and construction. Many parts of the world are presently witnessing an unprecedented amount of new geotechnical work to use underground space in congested cities and provide foundations for ever-taller high-rise buildings. Engineers are being challenged with schemes to use the ground at ever-greater depths. Such challenges are generating novel solutions, and this dedicated issue seeks to present some valuable information on such solutions. Eight papers are published in this issue covering multiple aspects of piling, all equally important to understand the performance of pile systems.

Cheng *et al.* (2022) provide details of the monitored performance of a pile–net composite foundation in a collapsible loess soil as part of a piling testing programme for the Yinxi high-speed railway in China. As part of the monitoring programme, instrumentation coverage included that for the geogrid transfer platform supporting an embankment and for the underlying softer shorter piles as well as more rigid longer piles. The observed outcomes show interesting behaviour of the composite system, including the load sharing as arching effects develop within the load-transfer geogrid platform as well as the load contribution differences between the shorter and longer piles.

Finite-element modelling and full-scale load tests are used to evaluate design parameters and the effects of grouting methods. Bayesteh and Fakharnia (2022) use finite-element analysis to back-analyse field tests to understand the increase in bearing capacity and diameter of the bonded zone in hollow micropiles compared to solid piles. The results show that (i) the diameter of the bonded zone in fine-grained and gravelly soil was 1.5 and 2 times larger than the drill bit diameter, and (ii) the bond strength was 10–30% higher than current recommendations for hollow-bar micropiles, based on existing guidance.

Massarsch *et al.* (2022) present a state-of-practice paper on vibratory driving of piles and sheet piles. An overview is provided of driving and impact methods. The driving process affects the performance of vibratory-driven piles more strongly than impact-driven piles. Concepts are presented for assessing driveability. The importance of resonance of the

vibrator–pile–soil system (system resonance) for driveability and pile bearing capacity is explained.

Packer *et al.* (2022) report a systematic full-scale ‘blind’ site trial of four geophysical techniques carried out by five independent specialist contractors to assess the most appropriate sensing tool(s) for the detection of toe depths of driven cast-in-situ piles. The need for reliable non-destructive techniques to determine pile toe depths is highly relevant to the reuse of piles, particularly for congested brownfield urban sites.

Saggu (2022) uses the finite-element method to study the effects of increased temperature on the response of geothermal piles and supporting soils. A parametric study was carried out for different pile fixity conditions, different values of pile length, pile diameter, the relative density of the sand and the coefficient of lateral earth pressure of the soil. The paper finds that the thermal response of the piles and soil was found to depend on the soil’s relative density and the magnitude of thermal load experienced by the piles.

The construction technology of ‘impression’ piles is presented by Lalicata *et al.* (2022). In these piles, the soil–pile friction can be increased by profiling the side walls of a bored cast-in-situ pile with small discrete ‘impressions’ such that the latter form nodules on the shaft of the concrete pile. The paper reports centrifuge tests and field trials from different sites in London, UK. The paper shows that the shaft capacity can be increased by about 40% by using impression pile construction technology. The paper presents a simple design method for the impression pile method based on experimental evidence and plastic failure mechanisms for piles. This paper is an interesting example of the type of innovation that is likely to lead towards carbon-saving methods in foundation engineering.

Testing of instrumented concrete piles is becoming routine in engineering practice. However, practitioners are often faced with difficulties in interpreting the results from the instrumentation due to various factors such as installation and curing effects, insufficient and malfunctioning gauges and testing procedures. Two companion papers by Flynn and McCabe (2022a, 2022b) present a comprehensive study on pile testing. In the first paper (Flynn and McCabe, 2022a), the authors present a detailed review of established and emerging trends in

the methodologies for concrete pile testing, including the selection of appropriate strain gauges, their arrangement within a pile, issues associated with installation and curing, as well as static load testing. Over 100 published case histories on instrumented pile testing were reviewed. The authors' second paper (Flynn and McCabe 2022b) provides guidance on the interpretation of strains from instrumented concrete pile tests. It is envisaged that these companion papers will provide practitioners with a helpful guide to enable a successful execution and interpretation of pile tests.

We wish to thank all readers, contributors and reviewers for their continued support of the journal and hope that they enjoy reading the eight papers in this themed issue. We would also like to encourage discussion articles on any of the papers in this themed issue or other papers published in the journal.

REFERENCES

- Bayesteh H and Fakharnia M (2022) Numerical simulation of load tests on hollow-bar micropiles considering grouting method. *Proceedings of the Institution of Civil Engineers – Geotechnical Engineering* **175**(1): 15–30, <https://doi.org/10.1680/jgeen.20.00049>.
- Cheng X, Cai X, Zha W, Zhou Y and Gong L (2022) Engineering characteristics test on pile–net composite foundation in loess areas. *Proceedings of the Institution of Civil Engineers – Geotechnical Engineering* **175**(1): 3–14, <https://doi.org/10.1680/jgeen.20.00042>.
- Flynn KN and McCabe BA (2022a) Instrumented concrete pile tests – part 1: a review of instrumentation and procedures. *Proceedings of the Institution of Civil Engineers – Geotechnical Engineering* **175**(1): 86–111, <https://doi.org/10.1680/jgeen.21.00126>.
- Flynn KN and McCabe BA (2022b) Instrumented concrete pile tests – part 2: strain interpretation. *Proceedings of the Institution of Civil Engineers – Geotechnical Engineering* **175**(1): 112–135, <https://doi.org/10.1680/jgeen.21.00127>.
- Lalicata LM, Stallebrass SE, McNamara A and Panchal JP (2022) Design method for the 'impression pile'. *Proceedings of the Institution of Civil Engineers – Geotechnical Engineering* **175**(1): 75–85, <https://doi.org/10.1680/jgeen.21.00033>.
- Packer ML, d'Agostino SJ and Schreiner HD (2022) Systematic field test of non-destructive techniques for driven cast in situ pile lengths. *Proceedings of the Institution of Civil Engineers – Geotechnical Engineering* **175**(1): 49–61, <https://doi.org/10.1680/jgeen.20.00171>.
- Rainer Massarsch K, Wersäll C and Fellenius BH (2022) Vibratory driving of piles and sheet piles – state of practice. *Proceedings of the Institution of Civil Engineers – Geotechnical Engineering* **175**(1): 31–48, <https://doi.org/10.1680/jgeen.20.00127>.
- Saggu R (2022) Temperature effects on pile–soil interface behaviour in the case of piles in sand. *Proceedings of the Institution of Civil Engineers – Geotechnical Engineering* **175**(1): 62–74, <https://doi.org/10.1680/jgeen.20.00197>.