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Ground improvement colleagues, it is my pleasure on behalf of the Editorial Advisory Board to introduce this themed issue titled '**Ground Improvement adopting waste materials for civil infrastructure'**.

The demand for the reuse and recycling of waste materials in civil infrastructure projects has been increasingly higher in last decades driven by the accelerated natural resources depletion and environmental impact associated with the disposal of industrial wastes. Furthermore, as waste materials arising from the different domestic, industrial and mining loops are being used as construction materials or as stabilisers, it enhances their circularity in the construction sector. While the reuse and recycling of wastes derived from a variety anthropogenic activities is attractive from both economic and environmental perspectives, often the behaviour of these materials are not well understood, as their properties differ quite substantially from those of well-established additives (e.g. lime and cement) and natural fill materials (e.g. soil and aggregates).

This themed issue aims to highlight applications of waste materials in ground improvement applied to civil infrastructure and thus provide guidelines for their potential adoption in construction projects. A total of 7 papers successfully completed peer review and appear in this waste materials focused issue.

The 7 papers selected for this issue have captured the potential for reuse and recycling of a variety of waste materials, i.e. calcium carbide residue, coal wash, fly ash, steel and copper slags and recycled rubber (crumbs, chips, shreds, mats and tyres). The 7 papers showcase applications of waste materials as synthetic fill material and artificial inclusions (Indraratna et al, 2022, Banzibaganye et al. 2022 and Yadav et al, 2022) and as a soil stabiliser (i.e. chemical stabilisation, Ekinci et al, 2022, Darikandeh et al., 2022, Phanikumar et al., 2022, Phanikumar, 2022).

Indraratna et al. (2022) provided a comprehensive state-of-the-art study undertaken on the use of waste materials in a variety of civil infrastructure applications. These include (i) CW-based granular mixtures (i.e. SFS+CW, CW+FA) for port reclamation and road base/subbase, and (ii) using recycled tyre products (i.e. rubber crumbs, tyre cell, under sleeper pads and under ballast mats) to increase track stability and reduce ballast degradation. While the application of the waste materials proved advantages and met the required specification requirements, the authors recommended ranges, e.g. blended ratios for optimised performance. A novel concept of using synthetic energy absorbing layer (SEAL) composed of steel slag, coalwash and rubber crumbs was introduced as novel synthetic fill material with superior energy absorption characteristics. The use of recycled tyres infilled with traditional capping materials contributed to a substantial reduction in vertical settlement of a rail substructure as well as a reduction in ballast degradation. The use of recycled rubber elements on track substructure (under sleeper pads and under ballast mats) resulted in enhanced track performance with less lateral and vertical deformation, higher damping properties, and less ballast degradation.

Banzibaganye et al. (2022) studied the dynamic properties of the new synthetic fill material composed of sand having rubber tyre chips. A series of undrained and drained cyclic triaxial tests were conducted for studying to the liquefaction susceptibility of different sands and different replacement ratios of sand-tyre chips mixtures. The results suggested that the addition of rubber chips (10% by weight) resulted in an increase in susceptibility to liquefaction for all the sands tested. However, when chips content was increased beyond 20% - 30% there was an improvement in performance with respect to liquefaction for fine and medium sand. Nonetheless, this improvement was not observed for coarse sands. While the results are moderately encouraging for liquefaction mitigation, the addition of rubber led to an increase in the resistance to axial deformation, rendering the composite material more ductile. Two empirical relationships were proposed for predicting the excess pore pressure trends in the different sands, and reasonable predictions were obtained.

Yadav et al. (2022) presented an experimental study focussing on the evaluation of the strength and ductility behaviour of a clayey soil stabilised with cement and reinforced by rubber granulates and fibres. The behaviour of the different mixes (different cement and rubber contents) was evaluated through a series of unconfined compression strength (UCS) and splitting tensile strength (STS) tests. The results showed that at a given cement and rubber content level, the strength, absolute toughness and toughness index of cemented clayey soil specimens with added rubber fibres exceeded that of rubber granulates. This difference was attributed to poor interfacial bond between the rubber granulates and cemented clayey soil. In contrast, the inclusion of rubber fibres caused the behaviour to be strain-hardening, which resulted in an improvement in ductility. This was attributed to the 'bridge effect' of rubber fibres. Finally, based on the results obtained, the authors recommended that the percentage by weight addition of rubber granulates and rubber fibres should not exceed 5 and 7·5%, respectively.

Ekinci et al (2021) conducted an experimental study on the potential use of a binder that incorporates copper slag together with Portland cement, hydrated lime to stabilise marine clay. A series of unconfined compression and split tensile tests were carried out to assess the performance of the binder treatment and the microstructure was evaluated using scanning electron microscope (SEM) imaging. The results indicated that while the use of copper slag, as a partial replacement of Portland cement contributed to smaller shear strength gain, the combination with lime activated the pozzolanic reactions enhancing comparison with cement only specimens. An empirical model was proposed for predicting the performance of the marine clay with the binder incorporating copper slag based on the adjusted porosity/binder index ratio, and reasonable predictions were obtained.

Darikandeh et al., (2022) simulates the behaviour of expansive soil (e.g. black cotton soil) ground having reinforced by columns of calcium carbide residue and fly ash (CCR−FA) mixed in-situ and compacted. A series of swelling tests were conducted on a small-scale model incorporating an expansive soil bed and the CCR−FA columns. To evaluate the efficiency of the columns installed using the two methods, the model was subsampled, and unconfined compression tests were conducted. The results indicated that the compressive strength of samples increased up to two-fold for both installation methods after 90 d of curing. In addition, X-ray diffraction showed mineralogical changes in the stabilised specimens that provided evidence of chemical treatment (e.g., dissolution of alumina and silica compounds). While the UCS results showed that both mixed in situ and compacted CCR−FA columns performance is comparable, a larger reduction in swelling was observed for the mixed in-situ columns. This difference was attributed to the migration of dissociated calcium and hydroxyle ions into the surrounding soil mass in the early stage of swelling.

Phanikumar et al. (2022) described how the addition of fly ash can influence the swell-compressibility characteristics of an expansive clay prepared in lumps and powders. The fly ash content studied ranged from 0, 5, 10, 15 to 20% (by weight). The results indicated that while swelling and compressibility of the clay decreased with increasing fly ash content, the heave was the lowest at 15% fly ash. The addition of 4% lime to the fly ash-clay blends was also considered for enhancing the performance of the treatment, but only marginal reduction of about 10% in swelling potential was achieved. While the swell potential was found to be higher for clay powders than for clay lumps at 15% fly ash, the swelling pressure was higher for clay lumps. This was mainly associated with the porosity in the clay lumps and powders.

Phanikumar (2022) conducted a series of swelling tests on expansive clay bed stabilised with a fly-ash clay cushion. The results showed that heave and swelling pressure of the expansive clay beds decreased when provided with a clay cushion, but surprisingly heave and swelling pressure increased with increasing fly-ash content in the clay cushion. This was mainly attributed to the increasing in the surcharge load on the clay bed derived from the clay cushion thickness and the effect that fly ash has on the dry unit weight of the stabilised clay. While the benefit of the fly ash addition in the clay cushion is not evident in the reduction of the swelling pressure, it does provide better stress-settlement response.

I hope these manuscripts are useful to all our readers and would like to take this opportunity to personally extend my 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.