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Soft Soil and Related Geotechnical Engineering Practice

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The special collection on Soft Soil and Related Geotechnical Engineering Practice is available in the ASCE Library (https://ascelibrary.org/soft_soil_engineering_practice).

Soft soils occur in many parts of the world. Their specific properties such as large void ratio, high water content, high compressibility, low shear strength, low permeability, and special structural features require significant attention for analysis, design, and maintenance of geotechnical structures founded on them. It is a great challenge to undertake large-scale construction of high-speed transportation systems, high-rise buildings, and underground works for many urban areas located on such soils. This special collection contains 12 papers on research and practice and addresses many of the important issues related to the behavior of soft soils, and analysis and design of structures founded in them. A brief review of the contents of the papers follows.

Qian et al. (2018b) present research for the effect of pavement roughness on dynamic response of subsoil moving loads using a three-dimensional (3D) analytic procedure. Analysis for the effect of nontraditional and low-carbon additives for sustainable treatment of soils for construction and pavement materials are considered by Latifi et al. (2018). Cyclic behavior of clay with ground composed of overconsolidated soil at the top is investigated by using data from three centrifuge tests under traffic loading in the paper by Qian et al. (2018a).

Ong et al. (2018) used a numerical back-analysis procedure to understand the load-deformation behavior of floating stone columns in soft clay by comparing numerical predictions with field measurements. A finite-element analysis for bearing capacity of partially embedded pipeline in clay subjected to vertical and horizontal loading considering the effect of tensile capacity between the pile and soil is presented by Zhou et al. (2018). Basack and Nimbalkar (2018) use a numerical finite-element procedure for response of a steel pipe pile group in soft cohesive soil with comprehensive laboratory model tests.

Model tests and a numerical procedure are presented by Kheradi et al. (2019) to investigate the effectiveness of ground improvement for strengthening pile foundation against buckling due to seismic loading. Shi et al. (2018) proposes a simplified method for prediction of far-field groundwater drawdown and surface settlement induced by dewatering. Mishra and Patra (2019) study consolidation by accounting for variable permeability and non-Darcy flow using a finite-difference procedure for prediction of dissipation of excess pore water pressure, settlement of piles, down drag, and shear stresses in floating piles.

Xu et al. (2019) present a simple prediction tool accounting for the effect of principal stress rotation and validations with respect to test data using a 3D dynamic finite-element analysis to evaluate permanent settlement of a section of cross-river tunnel. In two companion papers, Xiao and Desai (2019a, b) present the disturbed state concept (DSC) model for overconsolidated clays including effects of cracking, particle breakage, heating, softening, and hardening. A new disturbance function is proposed dependent on the overconsolidation ratio on strength, dilatancy, and deformation.

These papers present a wide spectrum of research and application for behavior of soft soils and practical considerations. It is believed that the results in the papers can benefit researchers, students, and practitioners.

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