NUMERICAL MODELING OF USING PILES TO RESIST HEAVE IN EXPANSIVE SOIL

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Abstract

Expansive soil causes considerable damages to structures all over the world. It is necessary that when designing foundations resting over expansive soils, the expected heave of foundations should be calculated and considered. Piles foundations are an alternative for the cases of highly expansive soils extending deep under the foundations, especially in light weight structures. This paper presents numerical modeling of piles in expansive soil. The finite element software (ADINA) is used in the modeling, Cam-Clay soil model representing the expansive soil behavior is used. A verification of the proposed numerical model, a well documented case study of piles constructed in expansive soil, the case of TRACON building located at Denver International Airport (DIA), Denver, Colorado, in which the behavior is tracked and measured for six years continuously. Results showed good agreement between the measured values and the reproduced numerical results. The verified numerical model is used in the analysis of cases of single piles, belled piles, and pile groups. Results showed that pile groups are more effective than belled piles in controlling the total heave than single piles.