

Cantilever Secant Pile Constructed in Sand: Numerical Comparative Study and Design Aids - Part II

Authors : Khaled R. Khater

Abstract : All civil engineering projects include excavation work and therefore need some retaining structures. Cantilever secant pile walls are an economical supporting system up to 5.0-m depths. The parameters controlling wall tip displacement are the focus of this paper. So, two analysis techniques have been investigated and arbitrated. They are the conventional method and finite element analysis. Accordingly, two computer programs have been used, Excel sheet and Plaxis-2D. Two soil models have been used throughout this study. They are Mohr-Coulomb soil model and Isotropic Hardening soil models. During this study, two soil densities have been considered, i.e. loose and dense sand. Ten wall rigidities have been analyzed covering ranges of perfectly flexible to completely rigid walls. Three excavation depths, i.e. 3.0-m, 4.0-m and 5.0-m were tested to cover the practical range of secant piles. This work submits beneficial hints about secant piles to assist designers and specification committees. Also, finite element analysis, isotropic hardening, is recommended to be the fair judge when two designs conflict. A rational procedure using empirical equations has been suggested to upgrade the conventional method to predict wall tip displacement ' δ '. Also, a reasonable limitation of ' δ ' as a function of excavation depth, 'h' has been suggested. Also, it has been found that, after a certain penetration depth any further increase of it does not positively affect the wall tip displacement, i.e. over design and uneconomic.

Keywords : design aids, numerical analysis, secant pile, Wall tip displacement

Conference Title : ICSRD 2020 : International Conference on Scientific Research and Development

Conference Location : Chicago, United States

Conference Dates : December 12-13, 2020