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PhD Thesis: The Effects of Time on Soil Behaviour and Pile Capacity. Aalborg : Department of Civil Engineering : Aalborg University, 2006. 301 pp. (DCE Thesis; 4)

Abstract: This thesis is based on a number of scientific papers and reports that deal with elements of pile design and time effects in soils in general, especially the influence of time on pile capacity. The thesis consists of two parts. Part I deals with pile design, whereas Part II deals with time effects in soils in general. The two parts should be looked upon as steps towards a more reliable pile design and towards a better understanding of time effects in soil in general.

An increase in pile capacity with time after installation is denoted "set-up". In the literature it is suggested that the pile capacity increases with the logarithm to time after installation which is confirmed in this thesis. In continuation of this, it is analysed whether the magnitude of the set-up is related to the properties of the clay surrounding a pile. Design methods for piles in clay and sand have been a controversial matter within geotechnical engineering for many years due to their empirical nature. Therefore, the design of piles has remained a constant source of attention, especially with regard to the methodology for predicting the capacity. Three very different design methods for piles in both clay and sand are assessed by comparing predicted capacities with measured capacities from established databases of static loading tests. Guidelines are given for the choice of design method to be used in different circumstances.

In respect of time effects in soils in general, the purpose of the study is twofold. Firstly, a concise review of time-related phenomena observed in connection with laboratory tests on clay and sand is presented. Secondly, a concise review which categorizes and describes the basic features of existing models as well as their advantages and limitations is presented. Existing models can be used for modelling isotach behaviour. Thus, existing models and concepts can in principle be used to model time-dependent behaviour of clay whereas this is not the case when considering sand.

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