ABSTRACT

The dissertation presents an analysis of relation between parameters describing pile settlement curve and its length and diameter. The equations determined on this basis were used to formulate the method of static load test curve conversion in case of changed geometry. Research was based upon the results of a static load test of seven piles performed in field conditions. The static tests of analyzed piles were carried out in the full load range, which made it possible to use the measured values of pile bearing capacity. Based on the literature analysis carried out in Chapter 3, it was determined that the rest of the work will be based on the Meyer-Kowalow method (M-K method), which allows to obtain a continuous curve describing with high accuracy the relation between pile load and settlement, both in linear and non-linear range. Chapter 4 presents an analysis of the pile settlement phenomenon based on the linear elasticity theory. Then, the assumptions were presented, and equations were formulated that allow for static load test curve conversion based on the linear theory of elasticity. Due to the fact that in practice, most often we deal with loads exceeding the range of the linear load-settlement relation, the conversion method presented in Chapter 4 has a limited scope of application. Then, in Chapter 5, an analysis of methods of determining the parameters of the M-K curve was carried out. This allows for formulating the estimation method recommended for curve conversion. The use of pile static load tests results conducted in the full load range made it possible to carry out the statistical analysis presented in Chapter 6, as a result of which an empirical relationship was formulated between the pile bearing capacity, its geometric parameters and resistance at the level of its base. In further part of the work, based on the analysis of the influence of stress distribution taking into account different pile base adapt surfaces, described in Chapter 7, the final conversion method for the full load range was formulated in Chapter 8. The proposed method allows for the conversion of the pile settlement curve in the case of changes in the length and diameter, assuming that the soil conditions remain unchanged. On this basis calculation examples were conducted, in which the change in the course of both the pile settlement curve as well as curves describing base and skin resistance was determined for different lengths and diameters. Chapter 9 presents an example of practical use of proposed method of conversion, along with verification. Chapter 10 summarizes carried out research, presents conclusions and formulates program of further research.

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