

Express Method of Pile Testing by Static Cyclic Load

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The current Massachusetts State Building Code and Department of Public Works Standard Specifications for Highway and Bridges related to static load testing of piles is similar to those which prevail in the USA. These requirements have three distinct limitations: (1) piles are loaded to twice the design load, a requirement contributing to over-design as failure load and actual factor of safety are unknown, (2) no unique load-testing interpretation method exists and hence subjective techniques lead to large variation in the load bearing interpretation, and (3) the short duration load test (the most common method) requires about one day. Even though substantially shorter than the slow maintained load test, the test duration presents a cost burden.

A new method for carrying out a static load test and interpreting the results is proposed. This approach is based on a methodology developed by Dr. Valery Operstein during her work as the Chief Engineer at the Research Design Institute in Dniepropetvosk, Ukraine. This institute specializes in foundations and underground construction. The method involves loading a pile to failure by applying a load at a constant rate in a series of load-unload cycles. This method enables the unique determination of the ultimate pile capacity. Furthermore, the determination of the ultimate capacity is based on the actual stress-strain relationship of the soil.

The advantages of the method are; (i) a load-test is carried out in a very short duration, (ii) the load-test can be carried out to activate full resistance, (iii) the measured resistance does not include inertia (dynamic) components, and (iv) the ultimate pile resistance can be defined uniquely.

The successful development and implementation of the method can result, therefore, in substantial cost savings while increasing the level of engineering understanding and design competence.