TIMBER POLE
DEEP PILE FOUNDATION
STATIC LOAD TESTING

What is Static Load Testing

A Static Load Test is a full-scale engineering test that provides robust data used to determine or validate the load capacity of a timber pile for use in a specifically-engineered foundation pile design.

Static Load Testing involves applying and maintaining incremental loads to the pile for specified periods of time. The displacement of the test pile is recorded periodically for the duration of the test.

The test pile is normally under constant load for approximately 5-10 hours, typically including 1 hour at the geotechnical ultimate capacity used for the pile design. The large loads tested to, as well as the extensive time component of the testing, means that the results of Static Load Testing are extremely comprehensive.

The test loading schedule is determined in conjunction with the foundation design engineer. Communication with the engineer is constant throughout the duration of the test so the engineer can advise of any 'on-the-fly' modifications required to maximise the usefulness of the test results to them.

A Static Load Test can be set up to test the compression or tension load capacity of the pile.

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Why Static Load Test

Static Load Testing is a valuable tool used to determine the detailed pile design for a large scale or complex project. There is potential for significant cost saving through:

a. Test results showing piles with a higher load capacity than what the engineer expected or designed for using only geotechnical data and engineering calculations.

   Static Load Testing provides accurate load capacity results for the test piles since a known load is being applied directly to the pile during testing, as compared to engineering calculations which typically provide a conservative value of pile capacity. This is particularly important when using TTT Uglie poles which provide even more skin friction than standard SED piles which the engineer may not factor into their calculations.

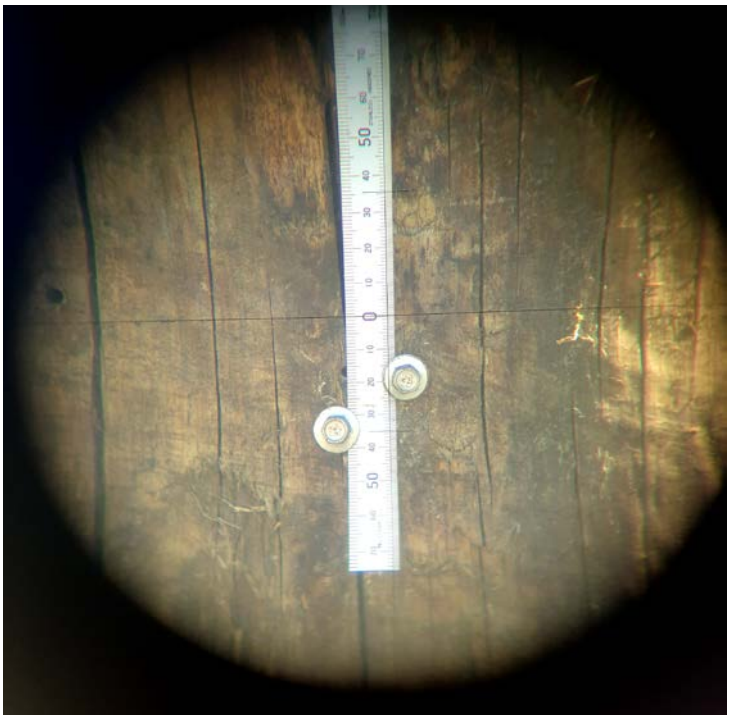
b. Test results allowing a less-conservative geotechnical reduction factor to be applied to the geotechnical ultimate capacity of the pile.

   Testing a pile for its geotechnical ultimate capacity provides the engineer with proven results which they can use to fine-tune the geotechnical reduction factor they apply to their design. Static Load Testing is often combined with Pile Driving Analyzer (PDA) Testing on other piles to determine this factor.

Both a) and b) provide factual results that could result in either smaller/shorter piles, or less quantity of piles being used in the project, thereby providing significant cost savings.

Static Load Testing can also be of value for sites with especially soft ground where there is potential for long term settlement of the foundation due to Serviceability Limit State (SLS) loads. The significant time duration in which the testing is carried out can help to provide data on expected settlement over time.

Static Load Testing is also used on sites where the geotechnical engineer wants to create a complex soil model (e.g. with Finite Element Analysis software). The test results help them to create or validate their soil model (and hence pile design) with accuracy.



Top left: Installation of sacrificial reaction piles
Top: Measuring pile displacement through an optical level

Static Load Test Methodology

NZGC have designed and purpose-built a custom-engineered Static Load Test rig capable of testing up to 2500kN loads. The Static Load Test Methodology is typically as follows:

- A test pile is installed on site using a typical installation method such as pile driving or high-frequency vibration
- Four sacrificial untreated timber piles are installed around each test pile as reaction piles
- The test rig comprised of engineered steel beams is assembled and fixed on top of these reaction piles, and bridges the test pile in the middle
- For compression pile capacity testing an hydraulic jack is placed between the top of the test pile and the underside of the test rig so the jack can apply downward (compression) load to the test pile
- For tension pile capacity testing the hydraulic jack is placed on top of the test rig and fixed to the test pile so the jack can apply upward (tension) load to the test pile
- The hydraulic pressure is measured using a calibrated digital pressure gauge that measures pressure to 0.1 bar and is controlled by an hydraulic pump
- The displacement of the test pile is measured using an optical level (dumpy level) focussed on a steel rule fixed to the pile. The steel rule is labelled in increments of 0.5mm

GROUND CONTROL

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