TESTCONSULT

SPECIFICATION

DYNAMIC LOAD TESTING OF FOUNDATIONS BY THE SIMBAT TEST METHOD

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1. GENERAL

Testing will be carried out by Testconsult Limited or other similar approved specialist pile testing company.

The SIMBAT test is a method of predicting the static load/settlement behaviour of piles from dynamic measurements.

The test involves applying a series of impacts to the pile top and for each blow measuring:

Strain	- using two strain gauges
Acceleration	- using two accelerometers
Displacement	- using a precision electronic theodolite

These measurements are converted to force, velocity and displacement and then processed to give the dynamic soil reaction. From a series of blows, typically 5 - 10, a static load/settlement plot is obtained.

2. METHODOLOGY

For a cast-in-place piles, a 'cap' shall be constructed, approximately 1.5 pile diameters above the mean surrounding ground level.

The cap shall be permanently cased using thin section steel casing to prevent bursting under the drop weight impact. The cap shall be of the same diameter as the pile and shall be a minimum of 7 days old or have a strength of not less than 30 N/mm^2 at the time of the test.

For other pile types (steel cased, driven steel tubes, pre-cast etc.) the pile head shall be left extending above mean surrounding ground level by approximately 1.5 pile diameters.

Two foil strain gauges, two accelerometers and an electronic theodolite target shall be securely fixed to the pile cap.

Access, and a clear line of sight for the theodolite, which shall be placed 4.0 – 6.0 m from the pile, shall be provided.

A drop hammer shall be provided capable of applying sufficient force to the pile top to allow determination of the static load settlement behaviour up to the required test load.

A series of impacts shall be applied to the pile head and all data stored for subsequent signal processing.

3. TEST EQUIPMENT

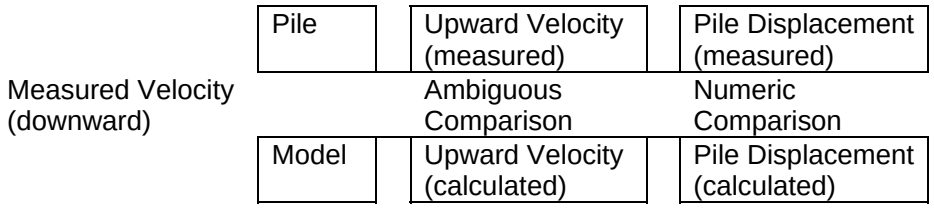
The test equipment shall consist of 2 strain gauges, 2 accelerometers and an electronic theodolite capable of measuring respectively the strain, acceleration and displacement of the pile top and defining the signal waveform over the full duration of the impact. The instruments shall be connected to a data acquisition/processing unit to ensure accurate and well-defined results.

4. ANALYSIS OF DATA

On site processing of data and interpretation will include the separation of forces into their upward and downward components, measuring dynamic reaction and estimation of static reaction.

5. SIMBAT SOIL MODELLING - (Where Required)

The SIMBAT model has been discussed in detail by Paquet, (see ref 1). The general philosophy of the simulation is given below.



5.1 Measured velocity/time data is recalled from computer memory and inputted into the model.

5.2 The model should have a minimum of 10 layers including a toe layer, with variable parameters for quake, viscous and rupture.

5.3 A visual comparison is made between the measured upward velocity from the site data and computed upward velocity from the soil parameter table.

5.4 A numeric comparison is made between the measured displacement and computed displacement.

5.5 Soil model parameters are modified until an acceptable match is obtained between velocity traces and identical final displacement values are obtained.

5.6 The sum of the dynamic reactions from the model is then plotted with the measured dynamic reaction to confirm that rupture has occurred and that the 'case' wave equation is valid for that blow.

5.7 Dynamic reaction from either the model or the case method are then plotted against pile penetration for each blow and corrected using:
RSTAT = RDY - (K x PEN)$^{\alpha}$ where K is a function for the pile and α is a function of the soil. These two factors are kept constant for all the sequence of blows.

5.8 The final load settlement plot will include a value for elastic shaft compression but will not include consolidation settlement.

6. REPORTING

The testing organisation shall be provided with full details of the known soil condition, pile geometry and any other relevant information.

The test report shall include the following:

6.1 A brief description of the pile type, soil conditions, etc.

6.2 A table of the drop hammer sequence for each pile, showing blow No., drop height, permanent settlement and dynamic reaction.

6.3 An example of a force separation curve showing the dynamic soil reaction for a selected blow.

6.4 An example plot showing how acceleration data is corrected using the theodolite data as a base.

6.5 An interpretation of the results giving a predicted static load settlement plot for each pile.

REFERENCE 1

Paquet I 1988 - Checking Bearing Capacity by Dynamic Loading - Choice of a Method
3rd Conference on the Application of Stress Wave Theory on Piles - Ottawa, Canada May 1988

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