

## ITEM 506 STATIC LOAD TEST

### 506.01 Description

### 506.02 General

### 506.03 Application of Load

### 506.04 Basis of Payment

**506.01 Description.** This work consists of applying a static load to a driven pile and furnishing instruments and facilities to obtain load-settlement data required to determine the ultimate bearing value of the pile. When subsequent static load tests are specified, the Engineer will determine whether subsequent static load tests are to be performed and the location of all piles to be tested.

**506.02 General.** Use the hammer selected for driving the test pile to drive all piles represented by the test. If the Contractor finds it necessary to use a different hammer, the Engineer will determine if an additional static load test is necessary.

If using anchor piles to apply the load to the test pile, locate the anchor piles not closer than 7 feet (2.1 m) center-to-center from the test pile. If possible, install anchor piles parallel to the axis of the test pile. The Contractor may use battered piles as anchor piles; provided the horizontal forces in the anchor system are balanced and excessive bending stresses are not induced in the piles. The Contractor may also use bearing piles meeting these requirements as anchor piles. After the test has been completed, remove or cut off at least 1 foot (0.3 m) below the bottom of the footing or finished surface of the ground all anchor piles outside the limits of the footing. Cut off anchor piles, other than bearing piles, within the limits of the footing 3 inches (75 mm) above the bottom of the footing. Redrive all bearing piles used as anchor piles that are displaced upward during the application of the test load according to the plan requirements.

Furnish a calibrated load cell to determine the load applied and a recent verification of the calibration of the gages and devices by a reliable agency equipped to do the testing.

For the duration of the test, provide adequate facilities to record load and settlement readings 24 hours per day. To avoid column buckling of the pile, ensure that tested piles are substantially vertical and that the load is applied to the pile at a point as near the ground surface as possible.

Determine if piles on the plan order list for cast-in-place reinforced concrete piles have a pile wall thick enough to withstand the maximum required static test load of twice the ultimate bearing value. The minimum pile wall thickness to support twice the ultimate bearing value is:

$$t = \frac{2R}{113000D} \quad \left( t = \frac{2R}{780D} \right)$$

Where:

- $t$  = pile wall thickness in inches (mm)
- $R$  = ultimate bearing value in pounds (N)
- $D$  = diameter of pile in inches (mm)

If the pile wall thickness for the test pile is less than  $t$ , before performing the static load test, either drive a test pile with a thicker pile wall, or fill the pile with concrete and

allow the concrete to cure for 5 days. The static load test is unacceptable if the pile fails internally during the test due to improper installation or procedure by the Contractor.

**506.03 Application of Load.** Apply the load at least 5 days after placing concrete in the pile or 72 hours after driving both the test pile and the anchor piles.

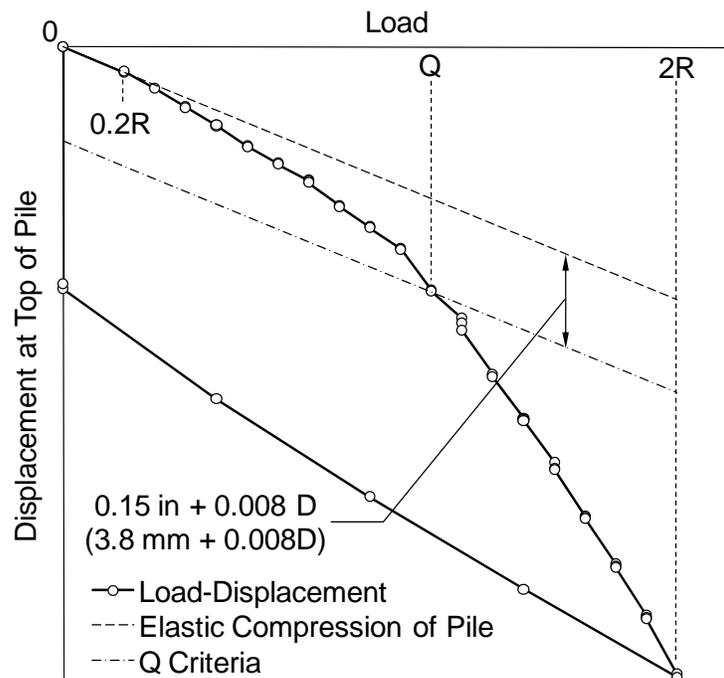
Apply a concentric load using a method that allows definite determination and control of the load acting on the pile at all times. Furnish a backup system for measuring the settlement of the pile being tested.

For the initial loading, use approximately one-fifth of the ultimate bearing value shown on the plans. For subsequent loadings, use increments of approximately one-tenth the plan ultimate bearing value, and apply these increments 1 hour after all measurable settlement due to the previous load increment has ceased. Measurable settlement is defined as 0.01 inch (0.3 mm) or more in a 20-minute time interval.

The Engineer will record all settlement readings.

Increase the test load until it reaches two times the plan ultimate bearing value or until the test pile reaches the failure load where the test pile experiences plunging failure. Plunging failure is defined as a settlement rate of 0.03 inch per ton (0.8 mm/9000 N) for the load increment applied.

To determine the load test ultimate bearing value (Q), first plot the settlement versus load on the pile. Next, draw a line parallel to the slope line through the zero (0) point and the initial load reading (0.2R) but offset by the settlement formula, 0.15 inch + 0.008D (3.8 mm + 0.008D). The test load ultimate bearing value (Q) is the load corresponding to where the offset slope line crosses the load-settlement curve.



If plunging failure is reached before the total applied load exceeds 1.5 times the plan ultimate bearing value, apply an additional increment of load to ensure that the failure

**506.04**

load has been reached. If the amount of settlement per increment is repeated or increased, stop applying the load. If the amount of settlement per increment is not repeated or increased, continue applying the load increments until the failure load is reached or until a total applied load of two times the plan ultimate bearing value is applied. If the failure load has not been reached after applying the last required load increment, continue applying the total load for at least 1 hour after all measurable settlement has ceased. Unload the pile in 25 percent decrements every 5 minutes.

The Engineer will continue to obtain settlement recovery measurements for 3 hours after totally unloading the pile.

If it is necessary to remove and reapply the load, use the same loading procedures to reapply the loads except apply load increments 15 minutes after all measurable settlement has ceased.

**506.04 Basis of Payment.** If the Contractor subsequently finds it necessary to use a different hammer, the Engineer will determine if an additional static load test is necessary; the Contractor shall complete any such additional test at no additional cost to the City.

The cost of furnishing test piles with thicker pile walls is included under Static Load Test.

The City will pay for accepted quantities at the contract prices as follows:

<b>Item</b>	<b>Unit</b>	<b>Description</b>
506	Lump Sum	Static Load Test
506	Each	Subsequent Static Load Test