

METHOD STATEMENT FOR ROUTINE VERTICAL PILE LOAD TEST



METHODOLOGY FOR ROUTINE VERTICAL LOAD TEST (KENTELEDGE METHOD)

PURPOSE

The purpose to find application in foundation to transfer load from a structure to competence subsurface strata having adequate load bearing capacity. Piles load test by kenteledge method through anchorage by piles or dead load is the most direct method for determining the ultimate load carrying capacity of pile and arrive the safe loads on piles including its structural capacity with request to soil in which it is installed. This code IS2911 (Part 4) covers all types of piles test and provides guide lines for determining of safe load based on the following types of

- A) Vertical load test (Compression)
- B) Lateral Test
- C) Uplift Test

TERMINOLOGY

Cut-off level: The level where the installed pile is cut-off to support the pile caps or beams.

Datum Bar: - A rigid bar placed on immovable supports at a distance of $3D$ (Subjected to minimum, of 1.5 m) from the edge of piles. (Where D is dia pile)

Routine Test: - It is carried out a working pile with a view to check whether pile is capable of taking the working load (i.e. 1.5 times of safe load).

Kenteledge: Dead weight used for applying the test load on piles by dead load method or anchorage method through pile.



Ultimate Load: The maximum load which a pile can carry load before failure of ground.

Safe Load: It is load on a pile derived by applying a factor of safety on ultimate load capacity of pile as determined by load test.

Working Load: The load designed to a pile according to design.

Pile test may be carried out on a single pile or group of piles as required. For group of piles, cap will be provided for test.

Before starting the pile load test work at the site ensure the availability of below list of equipment and tools.

-  Hydraulic Jacks
-  Power pack

- Pressure Gauge
- Magnetic stand and Deflectometer (0.01 mm sensitivity) and Glass sheet
- Crane
- Concrete block for dead load

Preliminary Activities

Traffic Management

The traffic management shall be implemented as per the submitted 'Environment Health & Safety' plan & IRC: SP:87-2010, Section9 & IRC:SP: 55)

Structures & Other Encumbrances

Identified structures and encroachments along the alignment shall be removed by the authority before commencement of the work

Cube Test for the Concrete

The Cube tests for the pile concrete shall be carried out and shall be recorded prior to the load test.

Calibration of Deflection dial gauges

The deflection dial gauges shall be calibrated in accredited laboratory for their correction factor. The calibration certificate for the dial gauges shall be submitted to client for the review.

Calibration of Pressure Gauges

The pressure gauges shall be calibrated in accredited laboratory for their correction factor. The calibration certificate for the dial gauges shall be submitted to client for the review.

Calibration of Hydraulic jacks

As such there is no proving ring higher capacity available for testing the efficiency of hydraulic Jacks. For the purpose of Pile load test the efficiency of Hydraulic Jacks can be considered as 95%. The Manufacturer's drawing shall be used to calculate the area of the ram under pressure shall be considered.



Sequential Construction Activities

Vertical Load Test (Compression)

In this type of test, compression load is applied to the pile top by means nos. of hydraulic jack (according to load and capacity of jack) against rolled steel joist or suitable load frame capable of providing reaction and settlement is recorded by suitably positioned dial gauges. Maintained load method is according to 6.2 of I.S. code 2911 Part (IV) should be used for termination of safe load.

Preparation of Pile Head

After casting of piles, a proper pit shall be excavated with proper slope as shown in general arrangement drawing. A sump shall be provided for percolating water. After casting of pile, the additional built up portion shall be Chipped up to the design cutoff level / or till sound concrete is reached, whichever is lower. The pile shall be cast with a suitable pile head as detailed in drawing. Suitable structural



arrangement shall be made to facilitate fixing of magnetic stand and deflect-meter for measuring the settlement of pile

Reaction

The reaction on pile for testing can be done by following ways:

- Kentledge on a platform supported clear of the test pile by using dead load.
- Reaction through anchorage piles (designed as per I.S. 2911 (Part III)). The distance between center of test pile and anchor pile should be 3 times of test pile dia or subjected to minimum 2 m.
- Reaction through rock anchors with distance 2 times of edge of piles.

Placement of Jack



Before placing the jacks on the pile head a structural steel plate shall be provided for distribution of load uniformly over the pile head. All the required capacity jacks shall be identical and connected to the power pack with a common manifold; this shall ensure that equal pressure is developed in all the jacks simultaneously.

Placement of Kentledge and Structural platform

Structural platform and kentledge shall be placed in position as per drawing.

Datum Bar

The datum bar of size as detailed in the drawing shall be positioned.

Method of loading

After Placing of concrete blocks on top of the test frame and after construction of reference system for measurement of pile deflection, the hydraulic jacks shall be activated with the help

of powerpack. The rate of activation in the hydraulic jacks shall be @50Kg/sq.cm per minute. However there is no specific codal requirement for this. The rate of activation shall be controlled from the powerpack. After reaching the required pressure the pressure shall maintained for the required time as specified in the cycle. If any loss in pressure during the standing time shall be applied.

Measurement of Settlement

4 Dial gauges of 0.01 mm sensitivity are used to measure the pile top settlement. Four settlement gauges are placed equally at the sides of the test pile to measure the settlement of the pile and firmly held by magnetic base as shown in figure. The average of the four readings is taken as the pile settlement. A temporary bench mark will be established on the well-founded structures. Hence the TBM will serve as a second check for the pile top settlement.



Maintained Load

The test should be carried out by applying a series of increment load of each increment being 20% of safe load for Routine load pile test. In this, increment 20% is given through hydraulic jacks pump and taking measurement or displacement (by dial gauges) in each stage of loading, is maintained till rate of displacement of the piles top is either 0.1 mm in first 30 minutes or 0.2mm in first one hour or till 2 hour whichever occur first. If the limit, if permissible displacement in 6.1.5 or 6.1.6 of I S 2911 part (IV) is not exceeded, testing of pile is not required to be contained further. If it is not then test load shall maintained for 24 hrs. During the unloading stages, the load on the pile shall be maintained for a minimum of 15 minutes and the subsequent elastic rebound in the pile shall be measured accurately by dial gauges.

Criterion for Load Test

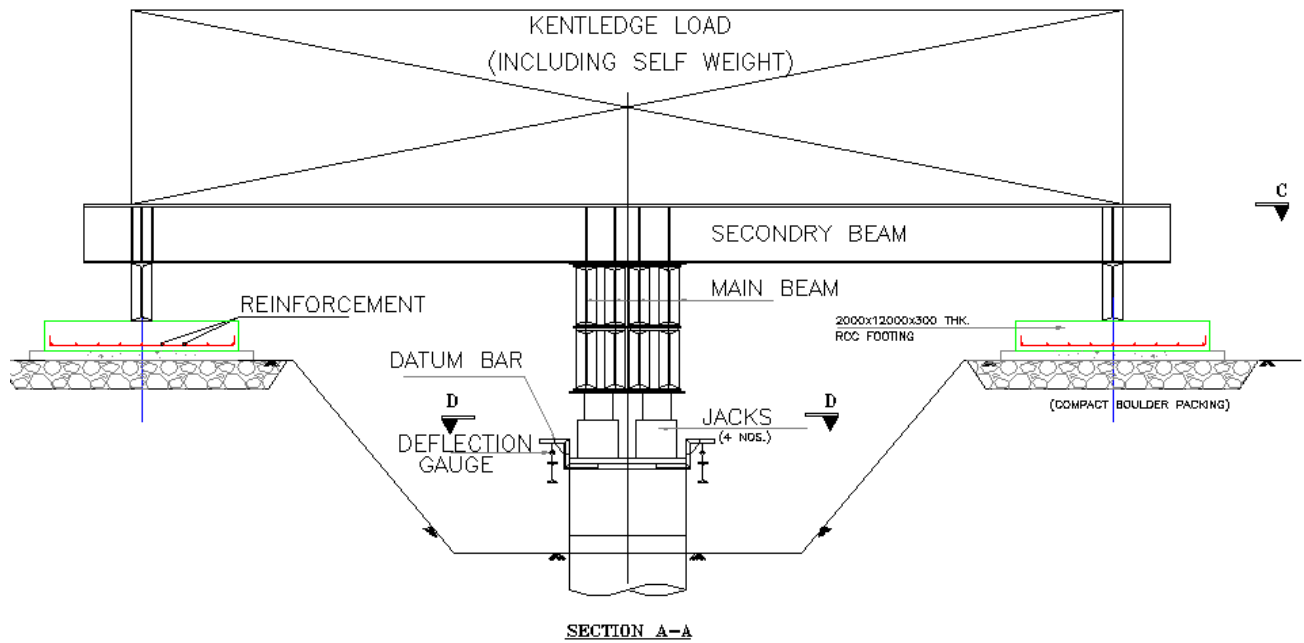
After plotting the load against settlement curve, the load test results shall be analyzed for the ultimate load and safe load carrying capacity of the pile shaft or pile.

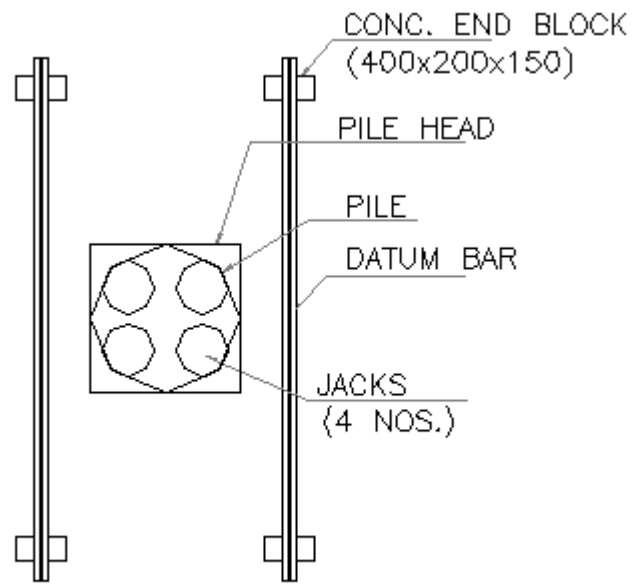
For routine test shall be carried for test load at least 1.5 times of the working load, the maximum settlement of test loading in position being not exceeding 12mm and 25mm for the test of groups of piles.

At Offsite Location

- **Plotting Load Vs. Settlement Curve:** The data observed and recorded for load test shall be plotted for test data analysis.
- **Plotting Time Vs. Settlement Curve:** The data observed and recorded for load test shall be plotted for test data analysis.

- **Test Data Analysis & Reporting:** After completion of the test data shall be analyzed and reported as a design report for finalizing the design criteria for the design of working piles.





PLAN AT D-D

PLAN AT C-C

