Prediction event invitation

Invitation to predict a pile head load- movement response due to static test loading at Construction site E45 in Gothenburg city. The event is made as a part of a Master thesis in geotechnical engineering at Chalmers University of Technology in association with PEAB anläggning.

(a) Installation (b) Measuring equipment

Figure 1: Installation of test pile, September 2017

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Registration

In order to participate in the Prediction event, please register your intent to submit by informing Johannes Pettersson at:

$$< jopetter@student.chalmers.se >$$

All submitted predictions and participants will be kept confidential and only known by the authors of the thesis (Pettersson, Edvardsson). When the registration is submitted the participants will recieve all necessary information on geometry, soil, pile and methodology as well as a template for submission of prediction. Please submit the registration before March 9. Deadline for submitting the prediction is set to April 6, and the results will be sent to the participants before May 31.

For more information or questions, please contact:
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Introduction

This prediction event project is made as a part of a Master thesis in geotechnical engineering at Chalmers Univercity of Technology. It intends to provide the opportunity for other engineers to try their ability to predict a load- movement response on a single cohesion pile at static load, and to show on the complexity of foreseeing this type of geotechnical problem. The provided results from the participants will anonymous, and the compilation of these along with the test result will be shared with all participants and in the Master thesis itself.

The test pile is installed at an ongoing project at E45, Lilla Bommen-Marieholm in central Gteborg, where the main road is to be submerged 6 meters below ground level. The construction is scheduled to be completed in 2021 and it will then include a 400 meter long tunnel to enable for future housing and office areas at ground level. The soil profile at the site consists of a more than a 90 metre deep layer of marine glacial and post-glacial clay. In order to support the forthcoming tunnel, roads, and buildings, a total of about 3,000, floating piles will be driven to about 65 m embedment. A static loading test will be carried out on a pile located outside the immediate construction area. The pile is instrumented with strain gauges attached to the reinforcing bars at five depths.

The prediction event consist of evaluating the theoretical pile head load-movement curve of this research pile based of geotechnical data of the surrounding soil and pile properties. The static load test itself is preformed by the entrepreneur, but the prediction event with its compilation and analyzation of submitted results is part of the independent master thesis by Johannes Pettersson and Fredrik Edvardsson only.

Pile Details

The test pile is a 50 meter long, 275 mm diameter square reinforced concrete displacement pile. It consist of 4 elements 13 meter each, connected with 3 joints. The pile along with the joints are dimensioned to sustain construction load. Along the pile is as mounted 140 mm half-pipe, containing the cables from the measure devices along the pile, see figure 2.

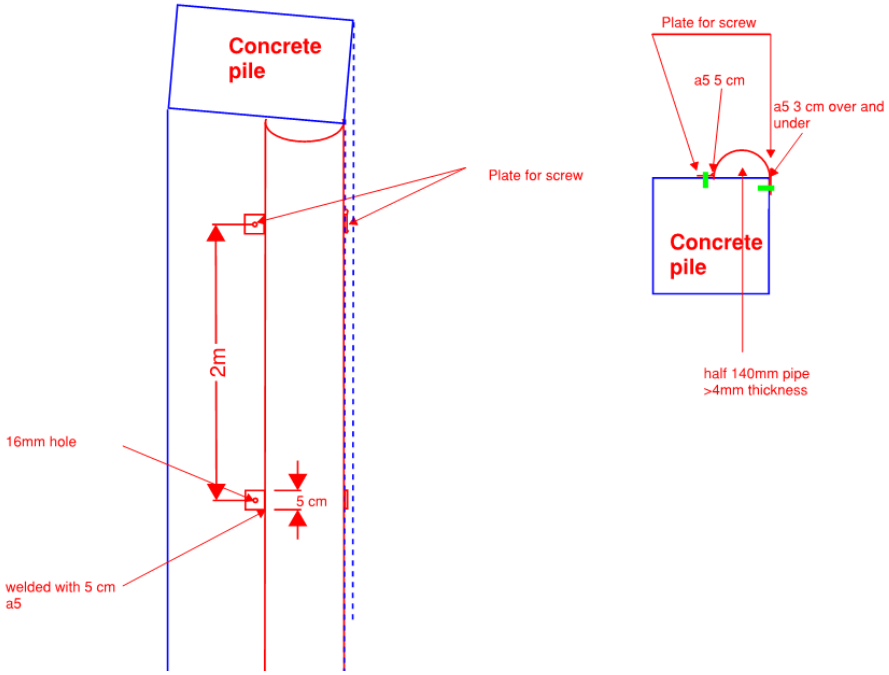


Figure 2: Profile of the pile

Equipment

The measuring equipment consists of rebar stainmeters or "Sister bars". These Strain gauges are attached to the reinforcing bars at five elevation levels, see figure 3, the first one at -2 meters from pile head. They are designed to measure concrete stains due to imposed loads. During the static load test these instruments will indicate deformations in the bars which will be used to measure force distribution along the pile. The hydraulic jack will be calibrated before test start and the force indicated by the jack is compared with the first strain gauge. Pile head movement will be measured during the whole test and correlated with reference points close to the pile.

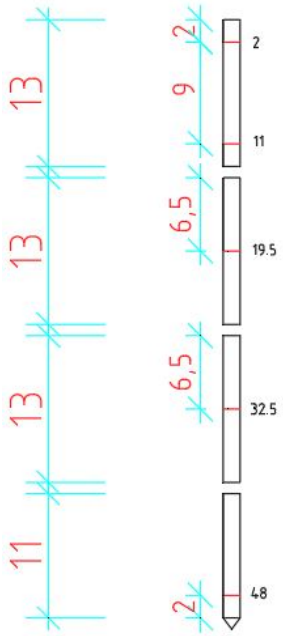


Figure 3: Test pile close up

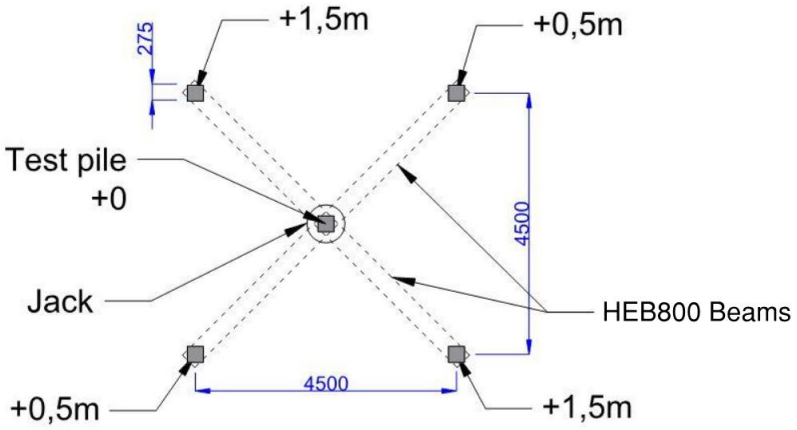
Test implementation

The static load test procedure will be preformed with several load intervals, consisting of series of equal load increments with an interval of 30 minutes. During this time, the load will be held constant until:

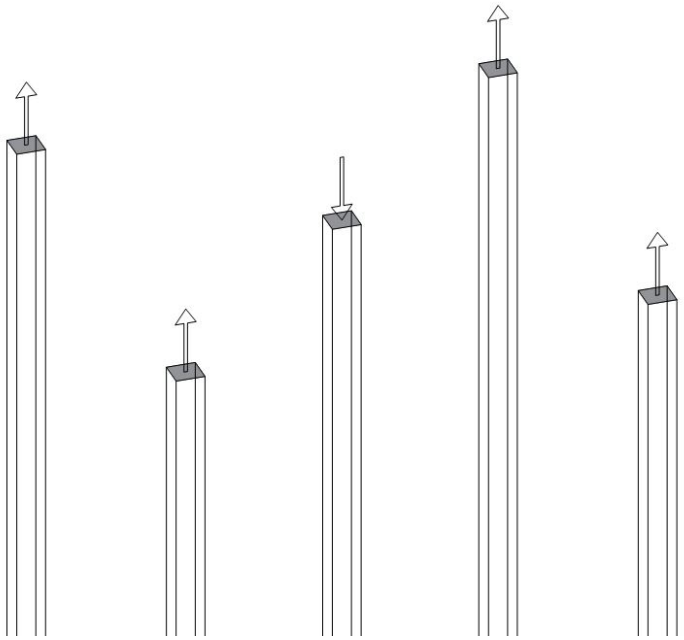
- A pile head movement of 50 mm is reached.
- Excessive movement resulting in the jack unsuccessfully holding a constant pressure.
- Maximum available jack load is reached.

Upon when any of the above situations occur, the prediction event procedure is over.

Figure 4a illustrates the test setup in 2D plane. The test pile is surrounded with four support piles. Two HEB800 Beams with dimensions 800 x 300 mm are welded on the supporting piles and creates a cross over the middle test pile. The hydraulic jack applies pressure on the test pile which creates a drag force on the acting supporting piles as well as a pressure force on the test pile, see figure 4b.



(a) Test setup in 2D plane. Four supporting piles surrounding the test pile



(b) 3D view of acting forces on piles

Prediction submission

After evaluating the given geotechnical data, each participant is requested to submit:

1. Submit the predicted pile head Load- movement response curve for the loading test
2. The geotechnical capacity of the test pile.