WORK INSTRUCTIONS FOR ENGINEERS

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OP-012. PROCEDURES FOR HIGHSTRAIN DYNAMIC PILE TESTING (HSDPT)

12.0 PROCEDURES FOR HIGHSTRAIN DYNAMIC PILE TESTING (HSDPT)

12.1. PILE DRIVING MONITORING DURING PILE INSTALLATION (PILE STILL PENETRATING)

Attach the strain and accelerometer gauges to the top of starter pile before pile installation and continue to attach the gauges on the subsequent extension piles.

1) Start hammer blow count record with every 300mm pile penetration interval hereafter until termination of pile installation.
2) Drop the hammer with the approved hammer drop height proposed by contractor for respective pile sizes as a starting of pile driving monitoring.
3) Observe and record (in computer file) the driving stress (both tension and compression stresses), hammer energy transferred, toe/shaft resistance of pile during the entire driving process.
4) During the driving, record the number of blows for every 300mm or 500mm pile penetration and the corresponding blow number in the HSDPT monitoring in the piling record sheet.
5) Firstly, adjust hammer drop height (either rise or reduce) and, secondly, adjust hammer weight, to achieve optimised driving performance in terms of hammer efficiency and penetration rate. In any case, the driving stress shall be controlled within 60% of the compressive strength (less the effective prestress if any) of the pile. Seek advice from the testing specialist for adjustment of hammer configuration (drop height and/or hammer weight) for optimised driving performance.
6) Continue adjusting the hammer configuration as per Step Five until optimised hammer configuration is achieved.
7) If optimised hammer configuration is achieved, continue driving with the adjusted hammer configuration until reaching proper bearing stratum. This will establish the best driving hammer configuration for production pile installation.

12.2. END OF DRIVE (AT THE TIME OF PILE REACHING PROPER BEARING STRATUM)

1) Prepare the necessary equipment to take pile set on graph paper for all the hammer blow counts hereafter. This test shall only be carried out not longer than 15 minutes after the pile is terminated for pile driving.
2) Drop the hammer with the optimised drop height for respective pile sizes as a starting of end of drive monitoring.
3) Observe and record (in computer file) the driving stress (both tension and compression stresses), hammer energy transferred, toe/shaft resistance of pile and the total mobilised pile capacity.
4) Adjust the hammer drop height to mobilise the pile capacity to minimum two (2) times the recommended pile structural load. In any case, the driving stress shall be controlled within 60% of compressive strength (less the effective prestress if any) of the pile.
5) When mobilised pile capacity reaches the requirements as per Step Four, record the pile set for three successive 10 hammer blows with the adjusted hammer drop height established in Step Four. The pile set in the last 10 hammer blows will establish the set criteria with respect to the adjusted hammer drop height for the respective pile sizes for production piles.
6) Stop driving.

Remarks:

(a) Submit piling driving record with all the pile set recorded to the engineer within one working day. Changes of hammer drop height shall be recorded in the piling record at respective penetration depth and also the pile set records.

(b) Submit the HSDPT records and plots of every hammer blows with shaft resistance, toe resistance, driving stress, energy transfer as interpreted using CASE Method to the engineer within one working day. Each hammer blow record shall closely remarked with the penetration depth of the pile. The monitoring results shall be compiled for Procedure 28.1 (during pile installation) and Procedure 28.2 (end of driving) separately.

(c) Submit Wave Equation Analyses (either using CAPWAP or TNOWAVE) on the selected representative hammer blows from the last three (3) successive 10 hammer blows of the set record respectively to the engineer within five working days.

(d) The engineer reserves the right to request additional Wave Equation Analyses for any blow number if necessary. The result shall be submitted to the engineer within three working days after notice is served.

12.3. PROCEDURE FOR RESTRIKE TEST

1) This test is to be carried out at seven days after the termination of 1st HSDPT.
2) Attach the strain and accelerometer gauges to the top of the test pile before dynamic load test.
3) Prepare the necessary equipment to take pile set on graph paper for all the hammer blow counts hereafter.
4) As a starting point, drop the hammer using the established drop height for respective pile sizes from end of drive during pile driving monitoring (1st HSDPT).
5) Observe and record (in computer file) the driving stress (both tension and compression stresses), hammer energy transferred, toe/shaft resistance of pile and the total mobilised pile capacity for every hammer blow.
6) Adjust hammer drop height to reach the required mobilised pile capacities (minimum two times of the recommended structural capacity of the pile). In any case, the driving stress shall be controlled within 60% of compressive strength (less the effective prestress if any) of the pile. The cumulative number of blows during hammer drop height adjustment shall not exceed 30 blows and preferably as minimum as possible. This can be achieved from the advice of the testing specialist on hammer drop height adjustment to expedite the process.
7) When the requirements in Step Six are achieved, stop driving.
8) Submit set record (on graph paper) of every hammer blows with the hammer drop height and the respective blow number of HSDPT.
9) Submit the HSDPT records and plots of every hammer blows with shaft resistance, toe resistance, driving stress, energy transfer as interpreted using CASE Method to the engineer within one working day.
10) Submit Wave Equation Analyses (either using CAPWAP or TNOWAVE) on the selected representative hammer blows from the last three (3) successive 10 hammer blows of the set record respectively to the engineer within five working days.
11) The engineer reserves the right to request additional Wave Equation Analyses for any blow number if necessary. The result shall be submitted to the engineer within three working days after notice is served.