



WORK INSTRUCTIONS FOR ENGINEERS

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RECORD OF REVISION

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OP-3-21. SUPERVISION OF PILE DRIVING

21.0 SUPERVISION OF PILE DRIVING

21.1. INTRODUCTION

A check list for supervision of driven piling works.

21.2. DESK STUDY

Study the following Documents and Clarify with Project Engineer:

- 1) Method Statement on Pile Installation including driving rig and equipment.
- 2) Specifications for Materials and Testing (Reinforcement, Grade of Concrete and Dimensions including end plates and shoes).
- 3) Construction Drawings.

Review and Comment on the following Construction Records:

- 1) S.I. and surface profiles information (Borelogs & other investigation information).
- 2) Format of Driving Record and Pile Reference No. for setting out.

Anticipate Potential Problems and Pile Length estimation:

- 1) To predict and estimate the pile length based on S.I. and design information.
- 2) Evaluate potential problems. (premature set, unset, hit boulders or sand pockets, tensile stress induced by soft driving.)
- 3) Possible solutions/remedial measures.

21.3. ON SITE CONSTRUCTION SUPERVISION

21.3.1. Check the following items in the submitted records:

- 1) Driving Record
 - (a) Date and time of Commencement/Completion.
 - (b) Driving blow count per 300mm or 500mm with indication of hammer drop height.
 - (c) Hammer weight/Type of Hammer.
 - (d) Piling rig No. (especially when more than one rig)
 - (e) All relevant levels (Working Platform, Pile Cap Cut-off level, etc).
 - (f) Pile Manufacturing Reference No. with Date of Manufacturing.
 - (g) Pile Reference No. to indicate pile location with a pile cap.
 - (h) Starter Pile and Extension Piles with indication of respective pile lengths.
 - (i) Pile Dimensions and Working Capacity.
 - (j) Indication of type of pile shoe used if any and confirmation of the properties of shoes.
 - (k) Set/Temporary Compression records on graph paper.
 - (l) Signatures by Piling Contractor, Client Representative.
 - (m) Deviation of pile (Verticality/Position Offset).
 - (n) Types and thickness of hammer cushion.
 - (o) Any peculiar event during driving.

Records with signatures by relevant parties to be submitted not later than noon of the next working day after a pile has been installed.

SUPERVISION OF PILE DRIVING

- 2) Setting Out
 - (a) Pile Centre Offset Tolerance at/above ground level (normally position < 75mm in any directions).
 - (b) Tilting Tolerance at ground level (normally verticality < 1/75).
- 3) Handling, Pitching and Driving
 - (a) Storage of Piles (proper packing and supports at permissible points are needed).
 - (b) Lifting of piles should be in accordance to recommended lifting point by the pile manufacturer.
 - (c) Verticality of Driving Rigs (normally by plumbing).

21.3.2. Visual Inspection on Materials at site/pile manufacturing plant:

- i) Conditions of Steel Elements
 - (a) Visual Defects (Rusty, Distorted, etc).
 - (b) Lapping of bars and connection to end plate.
 - (c) Spacers to centralise Reinforcements.
 - (d) End Plate. (The end plate shall be perpendicular to the centre line of the pile shaft)
 - (e) Steel Pile Toe and shoes, if any.
- ii) Concrete
 - (a) Cracks (Shrinkage/Tension/Flexural).
 - (b) Honey comb/Segregation.
 - (c) Collect of pile material testing records for each batch of delivery (with Pile Reference No.).
- iii) Casting of Pile
 - (a) Casting Platform.
 - (b) Curing process.
 - (c) Storage of pile at plant.
 - (d) Straightness of the pile (Centroid of pile at any section should not deviate more than 12mm from a line connecting between the centroid of the end plates on both ends).

21.3.3. On Site Supervision on Installation Process:

- (a) Check the deviation of installed driven piles in accordance to specification.
- (b) Check the penetration depth markings (normally either 300mm or 500mm).
- (c) Check the welding quality, weld size, cooling time (normally 30min.), application of anti-rust protection paint and qualification of the welder.
- (d) Check pile installation sequence.
- (e) Check on adjacent pile heave and displacement by levelling and optical survey.
- (f) Compare blow count with the nearest borehole profile available and inform the Engineer in the event of discrepancy between blow count and borehole profile.

21.3.4. Rejection of Piles on Site (To be clearly painted with "X" for all sides of the piles):

- (a) Piles with horizontal and/or vertical cracks.
- (b) Non-straight piles beyond tolerance allowed as per specification.
- (c) End plates of piles which are tilted/uneven/eccentric.
- (d) Low quality of concrete (honeycomb on pile shaft, spalling of concrete and etc)
- (e) Piles do not have casting date and pile reference no..