

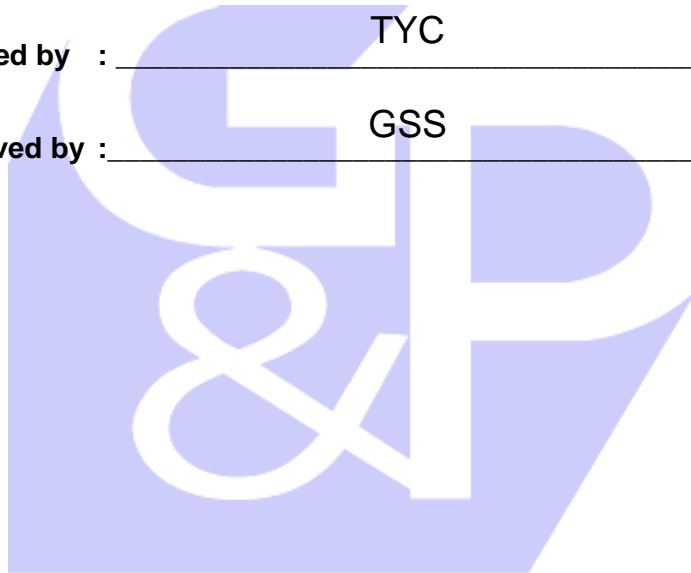


WORK INSTRUCTIONS FOR ENGINEERS

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**OP-3-20. SUPERVISION OF MICROPILE
CONSTRUCTION**

SUPERVISION OF MICROPILE CONSTRUCTION**20.0 SUPERVISION OF MICROPILE CONSTRUCTION****20.1. INTRODUCTION**

A check list for supervision of micropile construction.

20.2. DESK STUDY

Study the following documents and clarify with the Project Engineer :-

- 1) Method Statement on Pile Installation
- 2) Specifications for Materials and Testing (Reinforcement, Grout, Additives, Stabilising Fluid)
- 3) Construction Drawings

Review and comment on the following construction records :

- 1) Boring Record (Borelog with time taken for every m of drilling)
- 2) Grouting Record (Grout mix, Cube Strength, Grout Intake)

20.3. ON SITE CONSTRUCTION SUPERVISION**20.3.1. Check the following items in the submitted records :****20.3.1.1. Boring Record**

- 1) Change of Soil/Rock Formation/Karstic features(Cavity, Overhang, Floater, pinnacle)/boulders/Loss of Water/Artesian Water with respect to Depth (preferably in RL).
- 2) Drilling Rate in Soil/Rock (Time taken at convenient intervals but not more than 3m).
- 3) All relevant levels (Working Platform, Top Casing level, Water level, Bedrock level, Socket level, Pile Base level, Connection level, etc).
- 4) Pile Reference Number.
- 5) Starting/Completion Date.
- 6) Drilled hole Diameter, Pile Dimension and Capacity.
- 7) Theoretical Volume and Actual Volume of Grout.

20.3.1.2. Grouting Record

- 1) Grout Mix.
- 2) Strength.
- 3) Additive.
- 4) Grouting Pressure (if any).
- 5) Starting/Completion Time.
- 6) Grout Intake with Time.
- 7) Grout Loss.

Records to be submitted not later than at noon of the next working day after pile has been installed.

20.3.1.3. Piles Record

- 1) Record on each activity such as drilling, installing API pipe, grouting of the individual pile.

20.3.2. Visual Inspection on Materials at site :**20.3.2.1. Conditions of Reinforcement and Pipe**

- 1) Visual Defects (Rusty, Distorted, etc).
- 2) Thread at Connection.
- 3) Coupling Element.
- 4) Protection Coating, Painting or Greasing (inside/outside the API pipe).
- 5) Dimension of Reinforcement (OD, thickness).
- 6) Spacers/Centralisers

20.3.2.2. Cement Grout and Additives

- 1) Expired Date of Cement.
- 2) Expired Date of Additives.

20.3.2.3. Conditions of Casings (Permanent/Temporary)

- 1) Visual Defects (Rusty, Distorted, etc).
- 2) Dimension of Casing. (ID and OD)
- 3) Connection for Welding/Coupling.

20.3.2.4. Water quality for Grouting

- 1) Source of supply. (Portable water)

20.3.3. On Site Supervision on Installation Process :

- (1) Check the deviation of installed micropiles in accordance to specification.
- (2) Make sure both ends of API pipes completely fitted in the coupling element and good contact between two connected ends of the API pipes.
- (3) Check mixing and density of stabilising fluid before grouting and after desilting.
- (4) Make sure no debonding substance on the reinforcements or inside/outside the API pipes and casings. API pipes have been degreased on both sides.
- (5) Check dimension of spacing between the centralisers along the API pipe.
- (6) Confirm the base is clean by depth measurement in the boreholes before grouting.
- (7) Ensure the cleaning of socket by flushing process is effective.
- (8) Collect representative API pipe specimens and grout cube samples for strength testing before installation.
- (9) Check pile installation sequence.
- (10) Measure the length and mark on the tremix hose before inserting in borehole.
- (11) Only allow opening for flow of grout to the annulus at the bottom of the API pipe (not along the pipe)
- (12) Overflow grout should be the same in mixing/density as in the mixer.
- (13) Collect soil/rock samples.

SUPERVISION OF MICROPILE CONSTRUCTION

20.3.4. Report of Anomalies :

- (1) Water gushing out of hole.
- (2) Water loss during drilling.
- (3) Sudden loss of grout.
- (4) Collapse of hole.

20.3.5. Testing On Materials :

- (i) API pipe: minimum 3 specimens for each batch of supplied reinforcement or every 40 piles (which ever is larger) or as directed by the Engineer
- (ii) Grout: minimum 9 cubes for each batch of mixing or grout for 7-day, 14-days and 28-day strength testing. For test piles, extra 2 cubes are to be taken for 1-day and 3-day strength testing for early strength for load testing.

