

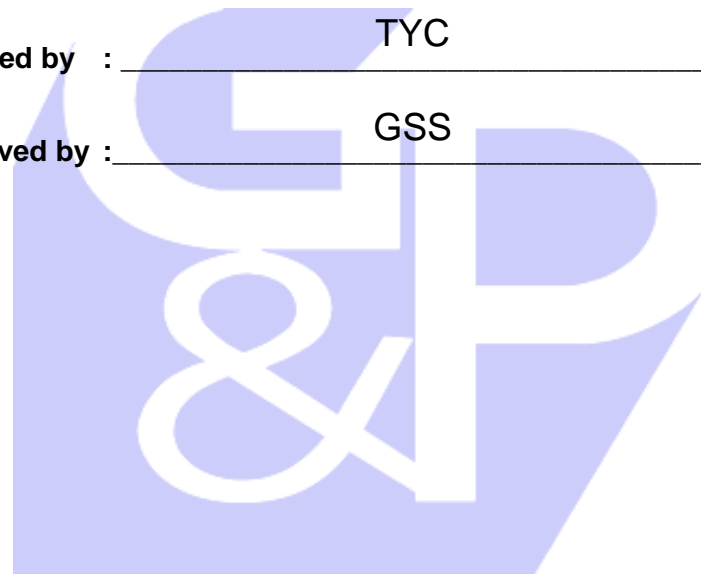


**WORK INSTRUCTIONS FOR ENGINEERS**

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**OP-3-22. SUPERVISION OF GROUND ANCHOR CONSTRUCTION**

## SUPERVISION OF GROUND ANCHOR CONSTRUCTION

### 22.0 SUPERVISION OF GROUND ANCHOR CONSTRUCTION

#### 22.1. INTRODUCTION

A checklist for supervision of ground anchor construction.

#### 22.2. STANDARDS & REFERENCES

- BS 8081 Code of Practice for Ground Anchorage
- DIN 4125
- Model specification for prestressed ground anchors Geospec 1 by GCO, Hong Kong
- G&P GEOTECHNICS Standard Specification :
  - 1) Temporary Ground Anchorage
  - 2) Permanent Ground Anchorage
  - 3) Relevant specifications of the contract

#### 22.3. DESK STUDY FOR SITE SUPERVISION

- Obtain a copy of Site Supervision Plan (ISO Form) from the Engineer In-charge.
- Thoroughly discuss with Engineer regarding :
  - Design of anchor
    - size (diameter)
    - length (fixed and free)
    - working capacity of anchor
    - number of strands, size of strands
    - grout strength
    - positions of anchors and inclination
  - Any foreseen problems at site
  - Manner and frequency of communication/reporting to the Engineer
- Prepare Field Advice Sheet
- Obtain the following :-
  - Site layout plan.
  - Ground anchors location plans.
  - The approved Method Statement from the Contractor on ground anchor installation (check on collapse of soil and loss of fine, if there is potential of soil collapsing, double acting equipment shall be used).
  - Site topography/survey/soil stratification plan.
  - Nearby service line survey plan (if any).
  - Dilapidation survey with measured quantum or measurement to neighbouring structures.
  - Lines of settlement points and other instrumentation installed before commencement.
  - Site Report.
- Review the contract/tender document for special requirements.
- Bring a camera and sufficient number of films.
- Bring a measuring tool (measuring tape).
- Safety boots, hard hats and other safety gears.

**SUPERVISION OF GROUND ANCHOR CONSTRUCTION****22.4. FIELD WORKS****22.4.1. General**

- Take photographs of the site to show general site condition, work progress
- Ensure workers observe safety measures
- Keep a record of weather condition for the full duration of the field works
- Cross check anchor locations with those indicated in anchor location plan

**22.4.2. Anchor Fabrication**

- Cross check all the following anchor details with the design and construction drawings :-
  - Working load of anchor
  - Diameter
  - Free length
  - Fixed length
  - Grout length
- Ensure that the anchor's tendon and system components are according to the approved shop drawing

**22.4.3. Material**

- Ensure that all material supplied and stored on-site meets all requirements in our Specification and Code of Practice
- Paint and reject if any of the above materials fails to meet the requirements of Specification and Code of Practice

**22.4.4. Equipment and Labour**

- Ensure that all equipment and labour for anchor installation work are suitable, efficient, capable and operational to meet the approved Method Statement

**22.4.5. Records**

- Ensure that the Contractor fills-in the installation record sheet (which has been approved by our office) for each anchor construction. The records shall be forwarded to the Engineer within 48 hours of anchor installation

**22.4.6. Sampling of Cement Grout**

- Instruct the Contractor to prepare grout cube testing as per Specifications. Six cubes are require to be tested for each new batching

**22.4.7. Drilling**

- Ensure that the Contractor uses full temporary casing during drilling as per the Specification particularly in collapsible soils. Any proposed alternative method must be approved by the Engineer
- Water testing shall be carried out to determine the likelihood of grout loss around the fixed length

**SUPERVISION OF GROUND ANCHOR CONSTRUCTION****22.4.8. Anchor Insertion**

- Inspect the drill hole and check with the records for drilling before allowing anchor insertion to proceed.
- The anchor shall be inserted within 24 hours of completion of drilling except where otherwise agreed by the Engineer.
- The anchor shall be handled with care. During insertion, it shall be installed at a controlled rate to avoid damage to itself and the drill hole.
- Spacer shall be used to ensure sufficient cover to the tendon and the tendons are properly spaced.

**22.4.9. Grouting**

- Ensure that the grout and grouting procedure is as per the Specifications.
- Ensure that the free stressing length shall be flushed-out to remove any excess grout above the bond length.

**22.4.10. Anchor Head**

- Ensure that the anchor head construction is being carried out as per approved construction drawing.

**22.4.11. Stressing**

- 3 types of tests shall be carried out according to the BS 8081 and the specification:
  - (a) Proving test on preliminary ground anchors to at least 3 times the working load.
  - (b) On-site suitability test shall be carried out on working anchors or preliminary anchors. Test load is normally equal to 1.5 to 2 times the working load of anchor.
  - (c) On-site acceptance test shall be carried out on all working anchors before locking them off. Test load is equal to 1.3 times the working load of anchor.
- The number of test to be carried out shall be as per the specification.
- Stressing of an anchor can only be carried out at least 7 days after grouting or the grout test cubes' compressive strength showed that it has achieved the required strength.
- Ensure that the "method statement on stressing the anchor" submitted by the Contractor has been approved by the Engineer.
- Ensure that the testing procedure and setting-up of equipment on site for stressing of anchor is as per the approved method statement.
- A copy of the test monitoring record shall be forwarded to the Engineer for analysis.

**22.4.12. Anchor Removal**

- Ensure that the Contractor has obtained approval from the Engineer to remove the anchor.
- Identify the anchor to be removed.
- Ensure that the anchor to be removed is distressed according to the approved Method Statement.
- Ensure that no attempt should be made to remove any fixed anchor by jacking of the complete tendon, unless approved by the Engineer.