

# **SPECIFICATION FOR ROTARY BORED PILES MINI PILES AND SMALL DIAMETER NON DISPLACEMENT PILING WORKS**

To be read in conjunction with schedule of attendances required.

All piling undertaken by MG Construction Ltd will be in compliance with the General Requirements section including appendix 1 to 4 of The ICE Specification for piling and embedded retaining walls Second Edition (SPERW).

The guidance notes section C of SPERW shall also be deemed the reference for guidance on allocation of responsibilities under any contract agreement entered into.

## **SECTION A - GENERAL**

1. This specification is to be read with the Company MG Construction Ltd's General Conditions of Contract Piling Schedule and Estimate and Schedule of Attendances and Services to be provided free issue.

2. The Estimate is based on the use of the Company's normal boring piling gear in ground suitable for boring by this means and based on issued tender site investigation reports. MG Construction Ltd shall not undertake their own ground investigation unless expressly instructed.

3. The Company shall not accept responsibility for the stability of existing structures adjacent or near to the piling operation. We recommend that a non-negligence insurance policy be taken out in the joint names of the employers and contractor. Where possible, the position of underground works and services shall be noticed to the Company before piling commences. Even though notified the Company shall accept no liability for damage to such underground works or services unless agreed in writing by the Company when the information is formally received. The Client shall be responsible for providing any protection deemed necessary to any existing structures local to our works. Attendance to this item and any suitable measures taken to be allowed for and carried out by others. It is assumed that the Client will have relevant insurances in place for non-negligence. We confirm that 21.2.1 type insurance can be arranged where specifically instructed at an additional charge subject to survey. We would recommend that the client should monitor the structure and any adjacent structures for any movement during our works.

### **4. Working Space and Protection to be Provided**

It has been assumed that continuity of work and access to pile positions will be available at all times. Failure of the Client to provide such will result in standing time being chargeable. Protection of surfaces in the proximity of our works shall be provided free issue by the Client and any damage due to piling or other foundation works which may reasonably be expected, shall be reinstated by others and is not deemed included in our Offer price. Enabling works including removal of fixtures, fittings etc in advance of underpinning or piling may be required to be carried out and this shall be provided in advance of our works by the Client. Liaison with MG Construction Ltd is recommended. Working space shall be provided sufficient to allow piling to progress in a continuous manner. Lay down areas and if necessary grout batching areas to be provided.

### **5. Quality of Workmanship and Materials**

The work shall be carried out in accordance with the relevant British Standard Codes of Practice and shall be of the highest quality. All materials shall comply with the appropriate latest British Standard Specifications.

### **6. Attendances Required**

Unless otherwise agreed in writing by the Company, works and services shall be carried out by others, free of charge to the Company at the location of the piling works, as per enclosed Schedule of Attendances and Services.

### **7. Spoil Arising from the Works**

The Main Contractor shall dispose of all materials to be removed off site including excess concrete or grout

### **8. Piling System and Design Calculations**

Where specifically requested to be Contractor Designed Piling, MG Construction Ltd shall submit a Method Statement full and detailed particulars of the type of pile and pile system proposed, together with pile design calculations. The selection of bored piling equipment and plant shall be appropriate for notified ground conditions. Notified ground conditions shall be defined as the factual ground investigation information presented to MG Construction Ltd during the tender period. Any site specific information which is not given to MG

Construction Ltd which subsequently affects the design or construction process shall be deemed to be a variation to the

Contract. The submitted calculations shall include the Contractor's assessment of factual site investigation information as issued at time of tender and geological information for the determination of soil and rock parameters for design. Any assumptions made to enable a pile design subsequently requiring amendment due to actual insitu conditions found shall also be deemed to be a variation requiring design revision or recalculation.

### **9. Code of Practice**

All work shall be carried out in accordance with the recommendations in the latest edition of the British Standard BS 8004 for Foundations.

### **10. Pile Positions and Working Loads**

The pile position together with the theoretical structural working load that the pile is required to carry shall be issued information to MG Construction Ltd to enable pile design. The stated working loads make no allowance for the group effect. MG Construction Ltd shall where necessary make due allowance for the group effect. The information shall be considered as provisional only and liable to variations on the final working drawings. MG Construction Ltd's proposals shall be submitted prior to commencement on site.

## **SECTION B - PILE DESIGN**

### **11.1 Ultimate Capacity of an Isolated Pile**

The ultimate capacity of an isolated pile is defined as the constant load at which the test pile continues to penetrate the ground at a steady rate or the load at which the maximum vertical deflection of the head of the pile is equivalent to ten per cent of the pile base diameter, whichever is the lesser. Where no pile load test is carried out then the ultimate capacity of a pile will be determined from the appropriate static formula. The safe capacity of an isolated pile will be either

- The ultimate capacity of a single isolated pile as determined from a static or dynamic load test
- the calculated ultimate resistance of the pile base divided by a specified factor of safety added to the calculated ultimate residual shaft resistance divided by the specified factor of safety.

### **11.2 Factors of Safety**

The factors of safety as stated hereafter, unless otherwise given will depend on the type of pile the ground conditions and the structural requirements. The minimum factor of safety of piles founded on superficial and solid deposits will be 2.0 where the ultimate capacities of the piles have been determined only from a static formula or load test.

### **11.3 Allowable Load**

The allowable load is the safe capacity of an isolated pile modified to allow for group action and the spacing of piles together with any other factors which influence the efficiency of the pile group. The efficiency of a pile group is defined as the ratio of settlement of the group to that of a comparable single isolated pile when both carry the same percentage of their ultimate capacity.

### **11.4 Compressive Stress in Pile Shafts**

The axial compressive stress in the shaft of any pile due to the allowable load, excluding wind loading, shall be designed in accordance with B.S.8110 Part 1: Clauses 3.8.4.3 and 3.8.4.4. for short braced axially load columns.

## 11.5 Clients Acceptance

Before the installation of working piles commences MG Construction Ltd shall submit for the Client's acceptance the limits of pile diameter and length within which he proposes to construct the piles with supporting calculations.

### **SECTION C - PILE LOAD TESTS WHERE QUOTED OR INSTRUCTED**

#### 12.1 Capacity of Load Test Equipment

##### 12.1.1. Non Working and Working Piles

The test equipment shall be capable of safe application of 150% of the anticipated test load on a working pile or 200% if a trial pile is required.

#### 12.2 Reactions for Static Load Test

##### 12.2.1 Tension Piles in Static Load Test

If tension piles are used to provide the reaction for the hydraulic jack these piles shall not be closer to the test pile than 1.5 metres measured centre to centre or a distance equivalent to five diameters of the largest pile whichever is the greater.

#### 12.3. Static Load Testing

Incremental loading and testing shall be carried out in accordance with recommendations of the ICE Piling Specification 1988 written report issued to the Client or his Engineer. A 2-cycle test shall be made.

#### 12.4. Dynamic Load Testing

Dynamic Load testing shall be carried out on working piles or a trial pile by an independent consultant specialising in this field. Information on the specialist Company proposed shall be issued to the supervising officer prior to the test.

#### 12.5. Working Piles

##### 12.5.1. Definition

Working piles shall be piles installed as part of the Foundation.

##### 12.5.2. Notice of commencement of Load Test

MG Construction Ltd shall give at least 48 hours notice of the commencement of each test to the Client.

##### 12.5.3. Test Report

The Contractor shall send to the Client within one week of completion of each test a report on test results.

##### 12.5.4. Working Piles as Tension Piles

The use of working piles as tension piles for the purposes of load tests may be adopted by MG Construction Ltd.

##### 12.5.5. Acceptance of Load Test Results

The deflection at the head of the working pile at the end of the period under the maintained calculated safe capacity during the first cycle of incremental loading will not exceed 15 mm.

#### 12.6. Trial Pile / Preliminary Pile static testing

Trial Pile / Preliminary Pile static testing shall be undertaken on the basis of verification of proposed pile SWL with adopted F.O.S. Should amendment of SWL be required, this variation shall be valued through the contract and any additional costs borne by the client.

#### 13. Tolerances

##### 13.1. Position

No piles shall be out of plan position at 'cut-off' level by more than 100 mm. Setting out pile positions for rig shall be the sole responsibility of the Client. Tolerances may not be achieved due to piling equipment being obstructed by boulder etc

deflecting pile in position and level from vertical. Any additional works considered necessary by the client to the piling contract will require an instruction to be actioned, where practical, by MG Construction Ltd. This will be deemed to be additional measurable works.

#### 13.2. Level

All piles shall be constructed to the commencing surface level, which will be a minimum of 300 mm above cut-off level. Except in the case of test piles as described elsewhere the trimming of pile heads ready for integrating reinforcement into pile caps will be carried out by the Main Contractor for the main Building Contract.

#### 14. Order of Boring

This shall be determined by MG Construction Ltd.

#### 15. Records

A careful record shall be kept of the following data and daily record sheets, signed by an authorised representative of MG Construction Ltd and the Client's representatives, shall be submitted to the Client each week:

- A) Date of installation.
- B) Pile reference number and drawing reference number.
- C) Depth of penetration (superficial and rock).
- D) Actual depth grouted or concreted.
- E) Details of strata encountered, where possible.
- F) Details of obstructions and delays.
- G) Nominal diameter.
- H) Details of steel reinforcement.
- I) Type of cement and type of any cement replacement material (where used).
- J) Length from commencing surface to toe.

#### 16. Obstructions

In the event of obstructions, whether they be surface or natural obstructions, being encountered, MG Construction Ltd will be paid the extra over sum as priced against the appropriate item in the Estimate.

- 1) This time shall be from time obstruction hit to return to normal augering including casing installation if required.
- 2) Should the pile require to be repositioned due to impenetrable obstruction, the cost of length bored and obstruction time will be charged for.
- 3) Obstructions either natural or man made may force the pile out with specified tolerances. This may be unavoidable. Any works deemed necessary to rectify, redesign or de-rate piles shall be an extra to the contract considered requiring an instruction from the engineer or client. Subsequent amendments to cap designs shall not be the responsibility of MG Construction Ltd.
- 4) Obstructions either natural or man made may force the pile out with specified tolerances. This may be unavoidable. Any works deemed necessary to rectify, redesign or de-rate piles shall be an extra to the contract considered requiring an instruction from the engineer or client. Subsequent amendments to cap designs shall not be the responsibility of MG Construction Ltd.

#### 17. Spoil

The Client shall remove all spoil from the pile holes at reasonable intervals during the carrying out of the work. It is the Client's responsibility to ensure that appropriate Local Authority approvals can be obtained at time of tender. If such approvals cannot be obtained it is the Client's responsibility to provide alternative arrangements. Spoil will include excess grout or concrete.

## **SECTION D - CONSTRUCTION OF PILES**

### 18.1 Reinforcement

Piles shall be reinforced with either:

- a) hot rolled high yield steel reinforcement,  
or
- b) Circular hollow steel sections.

As far as possible, main reinforcing rods shall be in continuous lengths.

Where necessary full length couplers in Mini piles shall be adopted or bars lapped in bored piles.

### 18.2. Cover

Immediately before the first batch of concrete/grout is placed in any pile, all groundwater soil and debris of any description shall be removed from the temporary or permanent casing, or bore.

### 18.3. Groundwater

In the event of the pile being founded in a water-bearing stratum, or for any other reason, MG Construction Ltd require to adopt special measures as they consider necessary to place the concrete/grout, including casing the pile bore, this shall be charged for at an extra over rate unless stated as inclusive in our Estimate.

### 18.4. Trimming Pile Heads

On completion of piling, pile heads will require trimming down to beam formation level. This work to be carried out by others.

## **SECTION E - PLACING AND COMPACTION OF CONCRETE/GROUT IN BORED PILES**

### 19.1. General

The concrete/grout should be of suitable workability for the particular conditions existing at the time of placing with the concrete and shall be of such consistency that it can readily be worked around reinforcement without segregation of the materials or bleeding of free water at the surface. The concrete slump should generally vary within the limits of 75mm to 150mm. Grout to mini piles shall be placed by tremie.

### 19.2. Compaction

MG Construction Ltd shall ensure that the concrete/grout when in position is compacted entirely and solidly around the reinforcement and again the ground forming the pile hole. MG Construction Ltd shall ensure that the concrete/grout is placed solidly against the ground forming the pile hole. Vibrating concrete in bored piles is not normally adopted due to possibility of segregation.

### 20. Materials

#### 20.1. Cement

The cement shall comply with all the requirements of BS12: Portland Cement.

#### 20.2. Aggregates

The fine and course aggregates shall comply with BS 882: "Aggregates from Natural Sources for Concrete".

#### 20.3. Admixtures

Admixtures may be used to achieve required workability of concrete.

### 21. Concrete/Grout Quality

#### 21.1. Strength

Unless otherwise described in the Bill of Quantities or directed by the Client, piles shall be constructed of Ordinary Portland cement concrete or stated blended grout mix. The design strength will be stated in the Estimate or subsequent design calculations.

#### 22. Measurement of Piles

The pile length charged for shall be from presented commencing level to toe of pile inclusive of any rock socket. Boring in rock is charged at an extra over rate per metre or on a time basis.

#### 23. Down Time

We advise an allowance in programme of 15% down time. Experience is that on piling plant, there is an average site time spent effecting maintenance and repair to plant.