1 GENERAL REQUIREMENTS FOR PILING WORK

1.1 GENERAL

1.1.1 Scope

1 This Part is concerned with all works associated with installation of piles by any of the recognised techniques.

2 The purpose of QCS is to provide as a general technical guide for acceptable construction work practices in the State of Qatar, considering this; any addition for technology, material, specification, standard that are not mentioned in this section or their modification, shall be subject to approval as stated in the introduction of QCS (00-02).

1.1.2 References

1 The following standards and codes of practice are referred to in this Part:

BS 5228-1 Code of practice for noise and vibration control on construction and open sites – Noise

BS 5228-2 Code of practice for noise and vibration control on construction and open sites - Vibration

BS 5228-4 Noise and vibration control on construction and open sites - Code of practice for noise and vibration control applicable to piling operations

BS 8008 .....Safety precautions and procedures for the construction and descent of machine-bored shafts for piling and other purposes

EN 1997 .....Eurocode 7 - Geotechnical design

1.1.3 General Contract Requirements

1 The following matters, where appropriate, are described in the contract specific documentation for the Works:

(a) general items related to Works
  (i) Nature of the Works.
  (ii) Classes of loads on piles.
  (iii) Contract drawings.
  (iv) Other works proceeding at the same time.
  (v) Working area.
  (vi) Order of the Works.
  (vii) Datum.
  (viii) Offices for the Engineer's Representative.
  (ix) Particular facilities and attendance items where not included in this section.
  (x) Details of soil investigation reports.

(b) specific items related to particular type of pile
  (i) Soil sampling, laboratory testing and in-situ soil testing.
  (ii) Designed concrete or grout mixes, grades of concrete or grout, type of cement and aggregate, grout or concrete admixtures, concreting of piles.
  (iii) Grades and types of reinforcement and prestressing tendons.
  (iv) Pile dimensions, length and marking of piles.
  (v) Type and quality of pile shoe/splice.
  (vi) Type and quality of permanent casing.

(vii) Specified working loads.

(viii) Sections of proprietary types of pile, grades of steel, minimum length to be supplied, thickness of circumferential weld reinforcement.

(ix) Surface preparation, types and thickness of coatings.

(x) Test piles, driving resistance or dynamic evaluation and penetration.

(xi) Detailed requirements for driving records.

(xii) Acceptance criteria for piles under test.

(xiii) Disposal of cut-off lengths.

(xiv) Preboring.

1.1.4 Submittals

1 The Contractor shall supply for approval all relevant details of the method of piling and the plant he proposes to use. Any alternative method to that specified shall be subject to approval.

2 The Contractor shall submit to the Engineer on the first day of each week, or at such longer periods as the Engineer may from time to time direct, a progress report showing the current rate of progress and progress during the previous period on all important items of each section of the Works.

3 The Contractor shall inform the Engineer each day of the intended programme of piling for the following day and shall give adequate notice of his intention to work outside normal hours and at weekends.

1.1.5 Records

1 The Contractor shall keep records, as indicated by an asterisk in Table 1.1, of the installation of each pile and shall submit two signed copies of these records to the Engineer not later than noon of the next working day after the pile is installed. The signed records will form a record of the work. Any unexpected driving or boring conditions shall be noted briefly in the records.

1.2 GROUND CONDITIONS

1.2.1 Ground Investigation Reports

1 Factual information and reports on site investigations for the Works and on the previous known uses of the Site will be provided by the Engineer where they exist as part of the specific contract documentation. However, even if a full report is given, including interpretations, opinions or conclusions, no responsibility is accepted by the Engineer for any opinions or conclusions which may be given in the reports.

2 Before the start of work the Contractor shall be given a copy of any subsequent information which may have been obtained relating to the ground conditions and previous uses of the Site.

1.2.2 Unexpected Ground Conditions

1 The Contractor shall report immediately to the Engineer any circumstance which indicates that in the Contractor's opinion the ground conditions differ from those reported in or which could have been inferred from the site investigation reports or test pile results.

1.3 MATERIALS AND WORKMANSHIP

1.3.1 General

1 All materials and workmanship shall be in accordance with the appropriate British Standards, codes of practice and other approved standards current at the date of tender except where the requirements of these standards or codes of practice are in conflict with this Section in which case the requirements of this Section shall take precedence.

1.3.2 Sources of Supply

1 The sources of supply of materials shall not be changed without prior approval.

Table 1.1

Records to be Kept (Indicated by an Asterisk)

Data	Driven steel, precast concrete and steel sheet piles	Driven segmental concrete piles	Driven cast-in-place concrete piles	Bored cast-in-place concrete piles	Continuous flight auger concrete or grout piles
Contract	*	*	*	*	*
Pile reference number (location)	*	*	*	*	*
Pile type	*	*	*	*	*
Nominal cross-sectional dimensions or diameter	*	*	*	*	*
Nominal diameter of underream/base	-	-	-	*	-
Length of preformed pile	*	*	-	-	-
Standing groundwater level from direct observation or given site investigation data.	-	-	*	*	*
Date and time of driving, redriving or boring	*	*	*	*	*
Date of concreting	-	-	*	*	*
Ground level/sea bed level at pile position at commencement of installation of pile (commencing surface)	*	*	*	*	*
Working elevation of pile driver	*	*	*	*	*
Depth from ground level at pile position to pile tip	*	*	*	*	*
Tip elevation	*	*	*	*	*
Pile head elevation, as constructed	*	*	*	*	*
Pile cut-off elevation	*	*	*	*	*
Length of temporary casing	-	-	*	*	-
Length of permanent casing	-	-	*	*	-
Type, weight, drop and mechanical condition of hammer and equivalent information for other equipment	*	*	*	-	-
Number and type of packings used and type and condition of dolly used during driving of the pile	*	*	*	-	-
Set of pile or pile tube in millimetres per 10 blows or number of blows per 25 mm of penetration	*	*	*	-	-
If required, the sets taken at intervals during the last 3 m of driving	*	*	*	-	-
If required, temporary compression of ground and pile from time of a marked increase in driving resistance until pile reached its final level	*	*	*	-	-
If required, driving resistance taken at regular intervals over the last 3 m of driving	*	*	*	-	-

Data	Driven steel, precast concrete and steel sheet piles	Driven segmental concrete piles	Driven cast-in-place concrete piles	Bored cast-in-place concrete piles	Continuous flight auger concrete or grout piles
Soil samples taken and in-situ tests carried out during pile installation	*	*	*	*	*
Length and details of reinforcements	-	-	*	*	*
Concrete mix	-	-	*	*	*
Volume of concrete supplied to pile	-	-	*	*	*
All information regarding obstructions delays and other interruptions to the work	*	*	*	*	*

1.3.3 Rejected materials

1 Rejected materials are to be removed promptly from the Site.

1.4 INSTALLATION TOLERANCES

1.4.1 Setting Out

1 Setting out of the main grid lines shall be by the Contractor. The installation of marker pins at pile positions, as required by the Contract, shall be located by the Contractor from the main grid lines of the proposed structure. Before installation of the pile, the pile position relative to the main grid lines shall be verified.

1.4.2 Position

1 For a pile cut off at or above ground level the maximum permitted deviation of the pile centre from the centre-point shown on the drawings shall be 75 mm in any direction. An additional tolerance for a pile head cut off below ground level will be permitted in accordance with Clauses 1.4.3 and 1.4.4.

1.4.3 Verticality

1 At the commencement of installation, the pile, or pile-forming equipment in the case of a driven pile, or the relevant equipment governing alignment in the case of the bored pile, shall be made vertical to a tolerance of within 1 in 100. The maximum permitted deviation of the finished pile from the vertical is 1 in 75.

1.4.4 Rake

1 As in clause 1.4.3, the pile, or driving or other equipment governing the direction and angle of rake shall be set to give the correct alignment of the pile to within a tolerance of 1 in 50. The piling rig shall be set and maintained to attain the required rake. The maximum permitted deviation of the finished pile from the specified rake is 1 in 25 for piles raking up to 1:6 and 1 in 15 for piles raking more than 1:6.

1.4.5 Tolerance Variations

1 In exceptional circumstances where these tolerances are difficult to achieve, the tolerances of Clauses 1.4.2, 1.4.3 and 1.4.4 may be relaxed by the Engineer, subject to consideration of the implications of such action.

1.4.6 Forcible Corrections to Pile

1 Forcible corrections to concrete piles to overcome errors of position or alignment shall not be made. Forcible corrections may be made to other piles only if approved and where the pile shaft is not fully embedded in the soil.

1.5 NUISANCE AND DAMAGE

1.5.1 Noise and Disturbance

1 The Contractor shall carry out the work in such a manner and at such times as to minimise noise, vibration and other disturbance in order to comply with current environmental legislation.

2 The Contractor shall endeavour to ascertain the nature and levels of noise produced by the mechanical equipment and plant that will be used. He shall than take steps to reduce either the level or the annoying characteristics, or both, of the noise. Reference should be made to BS 5228 Part 1 for prediction of noise level due to different types of mechanical equipment and plant, and to BS 5228 Part 4 for noise and vibration control techniques applicable to piling operations.

1.5.2 Damage to Adjacent Structures

1 If in the opinion of the Contractor, damage will be, or is likely to be, caused to mains, services or adjacent structures, he shall submit to the Engineer his proposals for making preconstruction surveys, monitoring movements or vibrations, and minimising or avoiding such damage.

1.5.3 Damage to Piles

1 The Contractor shall ensure that during the course of the work, displacement or damage which would impair either performance or durability does not occur to completed piles.

2 The Contractor shall submit to the Engineer his proposed sequence and timing for driving or boring piles, having the intent of avoiding damage to adjacent piles.

1.5.4 Temporary Support

1 The Contractor shall ensure that where required, any permanently free-standing piles are temporarily braced or stayed immediately after driving to prevent loosening of the piles in the ground and to ensure that the pile will not be damaged by oscillation, vibration or ground movement.

1.6 SAFETY

1.6.1 General

1 A competent person, properly qualified and experienced, should be appointed to supervise the piling operations. This person should be capable of recognising and assessing any potential dangers as they arise; e.g., unexpected ground conditions that may require a change in construction technique, or unusual smells which may indicate the presence of noxious or dangerous gases.

2 Safety precautions throughout the piling operations shall comply with BS 8008 and EN 1997. Refer Section 1 for general safety standards to be adopted at a construction site.

1.6.2 Life-Saving Appliances

1 The Contractor shall provide and maintain on the Site sufficient, proper and efficient life-saving appliances to the approval of the Engineer. The appliances must be conspicuous and available for use at all times.

2 Site operatives shall be instructed in the use of safety equipment and periodic drills shall be held to ensure that all necessary procedures can be correctly observed.

1.6.3 Driving

1 Before any pile driving is started, the Contractor shall supply the Engineer with two copies of the code of signals to be employed, and shall have a copy of the code prominently displayed adjacent to the driving control station on the craft, structure or site from which the piles will be driven.

END OF PART