**1.14 Construction Programme**

Within **twenty-eight (28)** days from the date of receiving of notice for Commencement of Works, the Contractor shall submit to the Engineer for approval a complete and practicable construction programme **(GCC Clause 8.3, Part 3 of the Bidding Document)** showing the orderly performance of the Works. The Construction Programme shall show in detail the proposed method of operations, including purchase and delivery of materials and equipment, as well as the construction. The Programme shall be shown in a bar chart depicting each major item of the Works on separate horizontal lines, sequence of operation and the period required for the completion of each activity. The Construction Programme shall when approved by the Engineer become a part of the Contract.

**The construction programmes shall include the followings:-**

(a) the order in which the Contractor intends to carry out the Works, including the anticipated timing of each stage of design (if any), Contractor's Documents, procurement Equipment & Machinery, delivery to Site, construction, erection and testing,

(b) each of these stages for work by each nominated Subcontractor (as defined in GCC Clause 5 [Nominated Sub-contractors]),

(c) the sequence and timing of inspections and tests specified in the Contract, and

(d) a supporting report which includes:

(i) a general description of the methods which the Contractor intends to adopt, and of the major stages, in the execution of the Works, and

(ii) details showing the Contractor's reasonable estimate of the number of each class of Contractor's Personnel and of each type of Contractors Equipment, required on the Site for each major stage.

(iii) a statement and outline layout giving the proposals for location or locations and sizes of constructional camps, accommodation, offices, workshops and stores at the Site; and details of the programme for the construction of the works from the date of receipt of the Notice to Commence, including a complete resource allocation showing the number of units and allotted times for each unit of Contractors Equipment, Plant, materials and labour allocated for each part of the works

**1.15 Reports, Meetings and Data of the Works**

**1.15.1 Monthly Report**

The Contractor shall furnish Monthly 'Report to the Engineer, at the Contractor's' own costs, at regular monthly interval and in a form and number of copies determined by the Engineer, with the followings:

a. physical progress for the preceding month and estimated progress for the reporting month;

b. completion schedules (target and actual) based on the approved Construction Programme;

c. inventory of construction equipment and materials on which an advance was made by the Employer as provided in the Conditions of Contract;

d. a tabulation of construction equipment, listing the major items and pieces of equipment which were utilized for performance of the Works during the preceding month;

e. a tabulation of employees, showing the supervisory staff and the numbers of several classes of labourers employed by the Contractor in the preceding month; report covering the Plant and materials furnished by the Contractor for the Works; and

f. any report which may be specifically asked for by the Employer and/or the Engineer.

**1.15.2 Site /Progress Meetings**

The Contractor shall attend meeting fortnightly or as required to review the progress of the work whenever called by the Engineer.

**2.17.13 Non-destructive Testing**

The Contractor shall provide on site a 'rebound' (Schmidt or similar) hammer duly calibrated from reputed designated laboratory for checking the in-situ strength of the concrete for use by the Engineer. Testing shall be carried out frequently or at the frequency and in the locations approved or directed by the Engineer. The field test may be taken by rebound hammer on blocks; the strength should be **>15.0 N/mm2 and >10.50 N/mm2 at 28 days** for Structural Blocks and Protective Works Blocks respectively. Any concrete blocks found to be of strength less than specified will be removed from the Works site and have to be replaced by the Contractor.

**2.17.14 Casting of C.C Block**

CC Blocks Casting/Concreting yards should be leveled well compacted ground with neat sand-cement mortar finished brick soling/lean concrete finish over it. Casting Moulds/Forms are to be placed over thick polythene sheeting to prevent leakage through bottom of the shutter. Inner sides of the Moulds/Forms are to be cleaned and oiled before each batch of casting operation takes place.

Mixing of concrete shall be done by modern automated mixing plant/machine. Unless otherwise permitted by the Engineer, hand mixing of concrete is prohibited. Mixing should be done thoroughly to ensure that concrete is of uniform color and consistency.. The concrete shall be place ti in the Moulds/Forms in full and be thoroughly compacted by vibrators supplemented by hand spading and tamping. In no way the vibrator should touch the Mould/Form during vibration operation. The vibrators shall at all times be adequate in numbers to compact the concrete properly and quickly throughout the whole operation of Block casting in each batch. The duration of vibration shall be limited to that required to produce satisfactory compaction without causing segregation. Care should be taken that no leakage of cement mortar takes place. After compaction the exposed concrete at top surface shall be struck off smooth with hand held steel floats.

The Moulds/Forms shall not be opened until the concrete is firmly set. Honey combed or partly damaged blocks shall not be acceptable

The contractor shall arrange all land required for the CC Blocks Casting/Concreting yards, preparation of yard with brick soling, polythene sheeting, oiling of Moulds / Forms etc for which no extra cost will be paid. All compensations in this regards are deemed to have covered by the BoQ item "Cement Concrete Blocks (CC Blocks)"

**2.17.15 Curing Concrete Blocks**

Concrete Blocks shall be protected from the effects of sunshine, dry wind, rain, running water or mechanical damage for a continuous period, until the concrete has reached at least three quarters of its 28 day strength, but for not less than 10 days. The Contractor shall submit his proposals to achieve this protection for Engineer's approval. The water used for concrete curing shall be fresh water, clean and free from any substances injurious to the concrete. The use of saline water for curing purposes will not be permitted. Curing and protection of concrete may be done following the methods:

(i) By water spray in continuous operation or a layer of water; (ii) By covering with Hessian or similar absorbent material, or sand, kept continuously wet; (iii) After thorough wetting, by covering with a layer of water proof fabric kept in contact with concrete surface;

(iv) All materials spray equipment and an ample supply of water for curing shall be ready on site before manufacturing of Precast C.C Block starts. C.C Blocks that is, in the opinion of the Engineer, not cured according to the approved curing procedure will be regarded as inferior and shall be dealt with as damaged blocks.

**2.17.16 Numbering of Blocks**

Each block shall be marked with a consecutive number and the date of casting. The Contractor shall maintain a manufacturing register with signature of quality control personnel. The number, date of casting, date and location of placing of each block shall be recorded in the register and shall make the register available at all times for inspection by the Engineer.

**2.17.17 Stockpiles of Blocks**

Blocks shall not be stockpiled until they have been cured for at least 21 days. They should be stockpiled with consecutive numbers and in measurable stack. The stacks shall not contain more than 4 layers and shall not be stacks very closed to the riverbank.

**2.17.18 Damaged Blocks & Rejected Blocks**

Blocks which are found unspecified through visual inspection by the Engineer or his representative shall be rejected. If laboratory test result are found not conforming to the desired strengths, all the Blocks manufactured on the day representing the date of sample of collection shall be rejected (all the Blocks manufactured on the date representing the Test). All Those Blocks shall be stacked separately. Blocks which are damaged during stockpiling, transport or handling and shall be rejected and stacked separately. The Contractor shall remove those rejected and damaged Blocks from the site within 24 hrs. ordered by the Engineer. The contractor has to supplement the damaged or rejected number of blocks at his/their own cost.

**2.17.19 Schedule of Test**

Following Test shall be carried out at the frequencies shown in the Table to check the properties of construction materials (Cement, Sand, Gravels, Admixture), Concrete Blocks as per specifications;

|  |  |  |  |
| --- | --- | --- | --- |
| **Sl. No.** | **Name of Test** | **Frequency of Test** | **Test Method** |
| 1 | Cement:   1. Fineness 2. Soundness 3. Initial Setting Time and Final Setting Time 4. Compressive Strength 5. Tensile Strength 6. Unit Weight | 1. For each fresh Consignment arriving at Site 2. For each 100 M. Ton 3. As approved or directed by the Engineer | ASTM C786,  ASTI C403,  ISO 679:2009  or  Equivalent |
| 2 | Fine Aggregate (Sand)  i) Fineness Modulus  ii) Chemical Test | 1. 1(one) Sample for each 350 Cum or part thereof 2. At least 1 Sample in a week 3. As approved or directed by the Engineer | ASTM C 33  or  Equivalent |
| 3 | Coarse Aggregate (Stone Chips)   1. Gradation Test 2. Water Absorption 3. Aggregate Impact Value (AIV) 4. Loss Angeles Test | 1. 1(one) Sample for each 700 Cum or part thereof 2. At least 1 Sample in a week 3. As approved or directed by the Engineer | ASTM C330,  AASHTO T-85, BS-  812,  ASTM C-535  or  Equivalent |
| 4 | Water  Suitability of Water for Concrete Mixing | 1. For Each source of Water 2. As approved or directed by the Engineer | BS EN BS EN  1008:2002 |
| 5 | Concrete   1. Slump 2. Water Cement ratio 3. Cylinder Test (Compressive Strength) 4. Non-destructive Test (Rebound Hammer) 5. Concrete Core Test | 1. One set of Cylinder (One set comprises 6 Nos. test Cylinder) for each 50 cum or part thereof of fresh concrete produced with correspondence Slump and Water Cement Ratio 2. Rebound Hammer Test will be carried out as frequent as the Engineer considered 3. Concrete Core Test will be carried out if any Test Cylinder fails to pass the specified strength 4. As approved or directed by the Engineer | BS 1881,  ASTM C-42  Or  similar standard |

**2.17.20 Measurement**

Measurement of concrete blocks shall be made on blocks in numbers (size-wise) casted, cured and stockpiled and accepted. Separate Items for manufacturing of C.C Blocks for the two types of C.C Blocks have been provided in the BoQ.

**2.17.21 Payment**

Payment shall be made in number at the unit rate of block (size-wise) against the Items for two types of CC Blocks as included in the Bill of quantities.