

## **A EXCAVATION AND EARTHWORKS**

### **1.1. Datum and Nature of Excavation**

The Contractor shall be responsible for setting up and maintaining a site datum level. 'Zero' datum shall be given on the site by the Engineer, unless otherwise noted on the Drawings. Information pertaining to the nature of the ground may be given to the contractor, when available, but without any guarantee of correctness or accuracy.

### **1.2. Bench Marks**

The Trade Contractor shall establish permanent benchmarks determined by an approved land surveyor or professional civil engineer. Maintain all established bounds and benchmarks and replace as directed by the Construction Manager those, which are destroyed or disturbed due to the excavation operations, at no cost to the Owner. Each Benchmark (B.M.) or centerline for the building and/or other constructions to be under this contract, shall be properly set out by the Contractor as shown on the Drawings and inspected and approved by the Engineer prior to commencing excavations.

### **1.3. Surface Leveling**

All earth works on Site shall be completed before any fill is deposited. Excavations over areas of Site or filling with approved material shall be carried out where required to the levels shown on the Drawings or to such other levels as may be directed by the Engineer.

### **1.4. Size and Depth of Excavation**

Excavation shall be cut to the size of the foundation shown on the Drawings and taken down to the foundation levels shown on the Drawings. If, without the Engineer's written instructions, the Contractor goes down below the foundation level specified, he shall fill up the part so excavated with concrete of the same type and grade as that required for the piles as defined in Concrete Works and the Bill of Quantities at his own expense.

### **1.5. Reduced Level**

All excavation for reduced levels shall be carried out to the lines and levels shown on the drawings or to such lines and levels as directed by the Design Professional. If, from any cause whatsoever, excavation are carried out beyond their true line and level other than that directed by the Design Professional, the Trade Contractor shall, at his own cost, make good to the required lines and levels with mass concrete as directed by the Design Professional. All excavations shall be performed so that the works are continually and effectively drained.

### **1.6. Shoring Excavations and Dewatering**

The sides of excavations shall be supported as necessary to maintain a vertical face and/or to prevent caving-in of any nature, especially during subsequent operations. The Contractor shall be responsible for the design, supply, fixing, safety and removal of all planking, strutting and shoring required to the side of the excavation. The Contractor is responsible on the type and nature of soil to be excavated; also he is to use any equipment, including dewatering equipment, to carry out the work required by this Contract.

### **1.7. Types of Excavations**

Excavations shall be classified according to the nature of the materials to be removed either as excavation in rock or as excavation in earth. Excavation in rock shall be classified as including all excavations in hard and consolidated materials which cannot be removed by normal excavation tools and equipment, and which require drilling or other special means for their removal. All excavation which is not in rock shall be defined as excavation in earth.

### **1.8. Required Bearing Capacity**

The Contractor shall notify the Engineer and obtain instructions if the required bearing capacity: (1).is obtained at a lesser depth than that shown on the drawings. (2).is not obtained at the depth shown on the drawings.

Excavation bottoms are to be approved before new work is laid on them. The Contractor is to inform the Engineer when excavations are ready for inspection. If, after approval, surfaces become unsuitable due to flooding or other causes, the Contractor shall excavate further, backfill with approved filling material and compact to approval at no extra cost to the owner.

Should the soil condition, after the Engineer has been informed the excavations are ready for inspection, be such that the Engineer deems it necessary to carry out tests, the Contractor shall perform such tests to the satisfaction of the Engineer. Any expenses incurred in the performance of such tests are deemed to be included by the Contractor in his tender.

### **1.9. Filling**

All filling materials shall be approved by the Engineer before being placed in position. Approved earth, sand, or any other suitable material free from rubbish shall be used to make up levels as shown on the Drawings. The material shall be placed in successive layers each having a finished thickness not exceeding 250 mm before compaction, watered and compacted to at least 98% compaction ratio of the maximum dry density of the Modified Proctor test (ASTM D-1557) prior to the placement of the succeeding layer.

Any exposed side or edge of fill shall be properly and evenly graded to a slope as directed or specified. When the required quantities of approved fill are not found on Site the Contractor shall, at his own expense, obtain them from locations approved by the Engineer.

Filling to make up levels under building shall be executed with approved suitable material from existing ground levels up to underside of ground floor slab, and shall be placed in successive layers each having a finished thickness not exceeding 250mm, compacted to at least 98% compaction ratio of the maximum dry density of the Modified Proctor test (ASTM D-1557) prior to the placement of the succeeding layer.

The ground surrounding the building and pavements shall be filled with approved material, fine sand and coarse materials, free of foreign materials, debris, clay lumps, organic and vegetation.

a) Coarse materials Such as sandy gravel, gravelly sand, etc., which is the material retained on sieve no. 4, and consists of crushed rock. It shall be clean, hard, tough and free from deleterious substance.

b) Fine Sand Materials Shall consist of that portion of the total aggregate/fines passes no.4 sieve, such as sand, silty sand,...etc. The fill materials shall consists of the combination of coarse and fine sand.

#### **1.10. Disposal of Surplus Material**

All surplus excavated material not used in backfilling or leveling shall be loaded and transported elsewhere on the Site as required by the Engineer or, if not required on the Site, shall be loaded and carted away from the Site to a dump to be selected by the Contractor and approved by the Municipality at the Contractor's own expense.

All rubbish arising from the Works shall be cleared away and removed from the Site as it accumulates according to the Engineer's instructions and also on completion of the Works.

## **B                      CONCRETE WORKS**

### **2.1 General**

The Contractor shall provide all labor, materials and equipment necessary for the various classes of concrete and the reinforcing steel as shown on the Drawings and as specified, according to BS or an equivalent standard.

The contractor shall do a mix design for the various used concrete classes and must take the approval of the engineer and all is controlled by samples testing.

### **2.2 Concrete Materials**

Concrete shall comprise Portland cement, fine aggregate, coarse aggregate and water proportioned and mixed as described in this Specification.

Coarse aggregate for concrete shall consist of crushed stone or gravel composed of durable pieces, free from organic matter, chemically stable, free from undesirable adherent coating such as oil, clay, petroleum products etc. and not containing deleterious substances. Coarse aggregates shall comply with BS 882.

Fine aggregate shall consist of natural silica sand and approved by the engineer and comply With BS or an equivalent standard.

a.    b.

Portland cement shall comply in all respects with DIN 1164 or AASHTO standard specification M85 Type I, BS 12, for Ordinary Portland Cement, each consignment of cement shall be accompanied by a certificate from the manufacturer giving results of their tests. If this certificate is not made available, then samples may be taken from different bags or containers of the consignments suitably packed and sent for testing to any approved Materials Testing Laboratory in Amman, or to the Engineer's laboratory on site, at the Contractor's expense.

Water used in concrete shall be clear, fresh water free from oil, acids, alkali, sugar, vegetable substances or any other contaminating agent.

If required by the Engineer's Representative, the water shall be tested in accordance with BS

3148, ASTM D-512, 516, AASHTO T-26 or in comparison with distilled water.

Comparison shall be made by means of standard cement test for soundness, time of setting and mortar strength. Any indication of unsoundness, change in time of setting of plus or minus 30 minutes or more or a decrease of more than 10 % in strength from results obtained with mixtures containing distilled water shall be sufficient cause for rejection of the water being tested.

### **2.3 Classes of Concrete**

All concrete shall be as stated in the drawings for the different works.

Class 30 concrete shall contain a minimum of 350 kg of cement per cubic meter of concrete and shall have a minimum compressive strength of 200 kg/sq.cm at 7 days and 300 kg/sq.cm at 28 days when tested in accordance with T.22 of AASHTO Standard method.

Class 25 concrete shall contain a minimum of 300 kg of cement per cubic meter of concrete and shall have a minimum compressive strength of 160 kg/sq.cm at 7 days and 250 kg/sq.cm at 28 days when tested in accordance with T.22 of AASHTO Standard method.

Class 20 concrete shall contain a minimum of 200 kg of cement per cubic meter and shall have a minimum compressive strength of 130 kg/sq.cm at 7 days and 200 kg/sq.cm at 28 days when tested in accordance with T.22 of AASHTO Standard method. The cement used shall be as defined under 8.2.

Class 35 concrete shall contain a minimum of 400 kg of cement per cubic meter of concrete and shall have a minimum compressive strength 350 kg/sq.cm at 28 days when tested in accordance

with T.22 of AASHTO Standard method. This concrete will be water tight by using chemical additives. The dosage shall be in accordance with the manufacturer specifications

Coarse aggregate and fine aggregate in each batch shall be combined in proportions that will produce a mixture within the grading limits for combined aggregates according to DIN 1045, BS,

ASTM or equivalent. Within these limits, the relative proportions shall be subject to the approval of the Engineer's Representative.

Admixtures may be used with permission from the Engineer unless otherwise specifically forbidden in these Specifications.

## **2.4 Mixing Concrete**

All concrete shall homogeneous and thoroughly mixed in mechanically operated mixers. There shall be no lumps or evidence of undispersed cement. Uniformity of concrete mixtures will be determined by differences in slump or by variations in the proportion of coarse aggregate.

The difference in slump, determined by comparing slump tests on two samples of mixed Concrete from the same batch or truck load, shall not exceed 20 mm. Variation in the proportion of coarse aggregate will be determined from the results of tests of two samples of mixed concrete from the same batch or truck load and the difference between the two results shall not exceed 3%. ACI requirements for concrete handling, mixing etc. shall apply.

The Contractor, at his own expense, shall furnish samples of the freshly mixed concrete and provide satisfactory facilities for obtaining the samples.

## **2.5 Placing Concrete**

The Contractor shall obtain the approval of the Engineer to his proposed arrangements before commencing concreting. All placing and compacting of concrete shall be carried out under the direct supervision of a competent member of the Contractor's staff.

The Contractor shall regard the compacting of the concrete as work of fundamental significance, the object of which shall be to produce a concrete of maximum strength and water tightness. Concrete shall be thoroughly compacted during placing and shall be thoroughly worked around the reinforcement and any embedded fixtures and into corners of the formwork and moulds.

Mechanical vibrators shall be used for compacting.

Unless otherwise agreed by the Engineer on the basis of satisfactory site trials concrete shall

Not be dropped into place from a height exceeding two meters. Chutes or funnel tubes shall be Used where heights exceed two meters.

If the ambient temperature reaches 40° C, concreting operations shall be discontinued unless The Contractor has adequate means of cooling the ingredients and keeping the temperature of Mixed concrete below 32°C.

In any event, the surface of freshly placed concrete shall be protected against drying by Covering it with wet cloth or burlaps and, where practical, continuous water curing shall be applied during the first few hours after placement. All concrete shall be kept moist on exposed surfaces for a period of 2 weeks according to DIN 1045.

When the ambient temperature is less than 2°C, all concreting operations shall stop and the freshly laid concrete shall be protected against freezing, unless the Contractor uses adequate means to keep the temperature of mixed concrete above 13°C for thin sections and 7°C for massive sections.

## **1.6 Steel**

Steel reinforcing bars shall be deformed, high tensile billet steel bars for Reinforcement concrete reinforcement conforming to the specification ASTM A615 Grade 60.

Bars should have the following characteristics:

|                          |                         |                         |
|--------------------------|-------------------------|-------------------------|
|                          | High                    | Median                  |
| Minimum tensile strength | 6300 kg/cm <sup>2</sup> | 4830 kg/cm <sup>2</sup> |
| Minimum yield strength   | 4150 kg/cm <sup>2</sup> | 2760 kg/cm <sup>2</sup> |

Mesh reinforcement shall conform to the specifications of ASTM A185. The gauge of the wire and the dimensions of the mesh shall be as shown on the Drawings or specified herein.

Each bundle of steel shall be tagged at the mill with an identifying mill tag, showing the name of the mill and the melt or batch number. This tag shall be a metal tag attached with a lead seal and placed in an exposed position for easy identification by the Engineer's Representative.

Certified mill tests on each batch showing physical and chemical analyses shall be available to The Engineer's Representative at the time of sampling. Two or more samples, each 750 mm long, shall be taken at random from each size in each melt or batch. All test samples shall be provided by the Contractor at his own expense.

Reinforcement steel shall conform accurately to the dimensions shown on the Drawings and approved shop drawings. Bars shall not be bent or straightened in a manner that will injure the material. Bars with kinks or improper bends shall not be used. Heating with torches shall not be allowed. Before concrete is placed, the reinforcement to be embedded shall be free of mortar, oil, dirt, loose mill scale and loose rust, and other coatings of any character that would destroy or reduce the bond.

Reinforcing bars shall be placed as shown on the Drawings and shall be firmly and securely Held in position at intersections with wire and by using precast mortar blocks or galvanized metal or plastic chairs, spacers, metal hangers, supporting wires, and other approved devices of sufficient strength to resist crushing under full load.

## **2.6 Geotechnical Investigation**

The work shall include mobilization of all necessary equipment, providing necessary engineering supervision and all technical personnel, skilled and unskilled laborers etc as required to carry out the entire field as well as laboratory investigation, testing, analysis and interpretation of test data collected and preparation of geotechnical report.

The work shall determine the limits and conditions of the various soil strata and for obtaining samples for examination, field classification, and laboratory analysis. The actual location, spacing and depth of borings shall be dictated by the topography, geological conditions, visible soil conditions and design conditions.

The depth of exploration should be carried to different soil strata to a minimum depth of five meters below the bottom level of foundations. This depth also depends on the soil types,



conditions and uniformity. The spacing and number of boreholes depend on the site conditions and the soil strata. If the soil conditions are well known with fairly thick individual layers of consistent physical properties, relatively widely spaced borings may be sufficient. If however, soil conditions vary appreciably from place to place, more closely spaced borings will be required. The number and spacing must be determined by engineering judgment at the work progress. In general, a site needs at least three borings at the location of the structures.

All necessary tests shall be performed in accordance with AASHTO and/ or ASTM Standard Methods of Testing. The tests will include classification tests (sieve analysis, hydrometer Analysis (when applicable), liquid limit, plastic limit, plasticity index and shrinkage limit), strength tests that depends on the soil type (unconfined compression test, direct shear test, triaxial test)

and other tests (moisture content, unit weight, consolidation, loss on ignition test, earth pressure coefficients) The geotechnical report shall be complete with project and site description and all testing data and results. It should contain general recommendations, detailed geotechnical conditions, borings logs, test data and engineering analysis. The engineering analysis shall include settlement, slope stability, retaining structures recommendations, shallow foundations, deep foundations, etc. The geotechnical report shall be submitted to the engineer for study and judgment on the foundations and site conditions.

## **2.7 Formwork**

Formwork shall be constructed to attain the required surface textures of the structures and be such that it remains rigid and grout-tight during the placing and setting of the concrete.

Formwork shall be fixed in perfect alignment and to the true shape and dimensions of the permanent work shown on the Drawings.

Before each concreting operation is commenced formwork shall be carefully examined and cleaned out and the concrete contact faces of the works shall be treated with an approved

release agent. The Contractor shall take particular care to ensure that no release agent comes

in contact with reinforcement.

Forms for chambers and all exposed surfaces shall be constructed of plywood or metal or glass reinforced plastics, at the option of the Contractor. Unless otherwise directed by the Engineer's Representative, all exposed sharp edges of finished concrete shall be chamfered with triangular fillets (arrises) not less than 20 mm by 20 mm, to prevent mortar runs and to preserve smooth, straight lines. All inserts, step irons, anchors, etc., shall be solidly and properly fixed to the formwork at locations shown on the Drawings.

Concreting shall not begin until the Engineer's Representative has inspected the formwork, reinforcement etc, and approved the pour.

## **2.8 Testing**

The Contractor shall make all necessary arrangements for the sampling and testing of fresh and hardened concrete in accordance with the provisions of DIN 1048 or BS 188 and shall supply all necessary apparatus, labour, materials and transport.

Slump tests shall be carried out according to ASTM C 143 at such times and places as the Engineer's Representative may direct and shall be used as a guide to the consistency of each class of mix.

During the course of construction of the works concrete test cubes in sets of six shall be made At such times and places as the Engineer's Representative may direct and in any case at no Less than the average rate of one set of cubes for every 18 cubic metres of concrete placed. In judging compliance with the characteristic strength requirements of this Specification, three cubes from each set shall be tested at seven days and the remaining three cubes shall be tested at twenty eight days.

At any time more than 28 days after the placing of the concrete the Engineer may request that core samples be taken for testing at an approved laboratory. Such instruction would only normally be given when cube results indicate a possible problem of concrete quality and core

samples shall therefore be taken and tested at the Contractor's expense.

Tensile strength tests and bending tests from the samples taken as described under par. 4.6 shall be carried out as directed by the Engineer according to ASTM A 615 M.

Compression strength tests of concrete cylinders or concrete cubes as well as tensile strength tests and bending tests of reinforcement shall be carried out as described above. The

Contractor shall be responsible for handling, storing, and transporting of all test materials to an approved laboratory.

The RSS testing laboratory will submit certified copies of test results, in duplicate, directly to the Engineer's Representative and Contractor, promptly upon completion of any tests.

## **C                    BLOCKWORK**

### **3.1 General**

Work includes concrete unit masonry walls; back-up for cavity walls, and interior partitions , complete with reinforcement and anchorage, precast concrete lintels, formation of joints and all works necessary for allowing other works.

Precast concrete blocks shall comply with BS 6073 Part 1.

### **3.2 Materials**

Cement, aggregates, water, sand and reinforcing steel shall comply with the requirements of the General Technical Specification.

### **3.3 Manufacturer of Precast Concrete Blocks**

Concrete blocks shall consist of fine aggregate and Sand and cement (4:2: 1) mix by volume and made in approved vibrated block-making machine. The quantity of cement shall be not less than 200 kg per cubic meter of the mix. Blocks shall be hard, sound, square and clean with well defined arises and size 400 mm long x 200 mm wide of variable thickness.

Hollow concrete blocks shall be manufactured in accordance with BS 6073 Part 1.

Blocks shall be tested for compressive strength whenever required by the Engineer. For each

test 12 blocks shall be selected by the Engineer. The average compressive strength for solid blocks shall be not less than 3.43 N/mm<sup>2</sup> and the minimum compressive strength of any solid block shall be not less than 2.5 N/mm<sup>2</sup>. The average compressive strength for the gross area of hollow blocks shall be not less than 3.43 N/mm<sup>2</sup> and the minimum compressive strength for the gross area of any hollow block shall be not less than 2 N/mm<sup>2</sup>.

Concrete blocks shall be manufactured by the vibrated press method and made from ordinary gravel or basalt aggregate, Portland cement and water.

The proportion of cavity volume in the concrete block shall not exceed 30%.

Weights of concrete hollow blocks shall be as follows:

100 mm thickness, weight per block between 9 and 10 kg.

150 mm thickness, weight per block between 14 and 16 kg.

200 mm thickness, weight per block between 18 and 20 kg.

### **3.4 Mortar**

Mortar for blockwork shall consist of one part cement to three parts sand by volume (1:3).

Should the Contractor wish to use plasticizer with mortar he must first obtain the approval of the Engineer. Mixing shall be carried out by means of an approved mechanical batch mixer. Excess water shall not be used in the mix, but for small quantities hand mixing May be used and should be carried out on a clean water tight platform. The machine and the platform should be cleaned before use. All mortar shall be used before the initial set has taken place and on no account shall mortar which has started to set be re-mixed.

### **3.5 Storage**

Immediately after moulding blocks shall be placed on clean, level, non-absorbent pallets. Blocks are not to be removed from the pallets until they have been inspected and approved by the Engineer. Blocks shall be cured for at least three days by sprinkling with water. Blocks are to be stacked in honeycomb fashion, with the stacks well-watered and no more than five blocks high.

No blocks shall be incorporated in the permanent works until 21 days after manufacture.

### **3.6 Workmanship**

Basic workmanship, it should comply with the clauses of BS8000 Part 3.

All block work shall be set out and built to the respective dimensions, thickness and heights shown on the drawings and/or as instructed in writing by the Engineer.

Unless otherwise ordered, hollow concrete blocks shall be used. In any case all closures end blocks such as at door jambs, window openings, etc. and blocks of special lengths or size, shall be solid. The block shall be well soaked before being used and tile tops of walls left off shall be wetted before work is recommenced.

Blocks shall be laid in true and regular courses on a full bed of mortar of 10 mm average thickness but not exceeding 13 mm, exclusive of any key in the jointing surfaces of the blocks. Sufficient mortar shall be used in bedding and Jointing to ensure that all keys are solidly filled.

Walls shall be bonded in accordance with best constructional practice, cutting blocks to size where required for bond. All blocks are to be machine cut on site to the required length specially at ends, jambs, quoins, etc.

Walls shall be carried up regularly with courses properly leveled. No portion shall rise more than one meter above adjacent portions and at changes in levels work shall be raked back.

The maximum height of laying is 1.2 m per day Perpendicular joints, quoins, jambs and angles shall be plumbed as the work proceeds.

Unless otherwise shown on the drawings, all block work shall be laid in stretcher. bond, properly, bedded and jointed as described. Bats shall not be used except where required for bond. Blocks shall be spread with mortar before laying and jointed solidly through the full thickness of the wall.

Walls which are to be left un plastered shall be built with selected blocks with unchipped

arises (cut with a masonry saw where cut edges is inevitable and will be exposed to view) and finished with a fair face. Horizontal joints shall be pointed with a neat rodded joint and vertical joints with a near flush joint as the work proceeds. Samples of face work shall be prepared, representing the range of variation in appearance for the Engineer's approval before work begins.

Walls which are to be plastered shall have the joints raked out to depth of 15mm.

Bonding block work to other materials such as concrete surfaces shall be by using approved galvanized metal cramps, etc.

- The cavities of all blocks shall be filled solid with Sand and cement mortar (4:1) at the jambs of all openings.
- Block walls acting as a fire resisting barrier shall be built so that the gap between the wall and the soffit of the slab or beams is a minimum of 20mm.
- The gap shall be wedged using steel wedges and packed with approved fire resisting Foam
- All pipe work and conducts embedded with block walls shall be installed within the block cavities as the construction of the block walls precede. Cutting chases will not be permitted without the prior approval of the Engineer. Any services pipes, cables, etc . passing through block work shall be provided with proper fire stop materials.
- Provide reinforced concrete unit masonry lintels over all openings.

Concrete and reinforcement to be as follows:

- 2 Nos. 14 mm diameter bottom bars
- 2 Nos. 10 mm diameter top bars.

Stirrups , 8 mm diameter at 200 mm spacing

Maintain minimum 200 mm bearing on each side of opening. Contractor to submit shop

Drawings for details for approval.

### **3.7 Treatment of Cavity Walls**

Cavity walls shall be bonded together with approved galvanized wall ties spaced 600 mm apart horizontally and 400 mm vertically and staggered.

Extra ties shall be provided at angles and openings.

Both leaves of cavity wall shall be raised at the same time. The difference of the height of the

Two leaves shall not be greater than 400 mm. The ends of cavity walls and reveals to openings shall be closed as shown on the drawings. The cavity shall be kept clear of mortar droppings.

### **3.8 Reinforced Concrete Block Walling**

Concrete blocks shall be Portland cement/natural aggregate precast concrete blocks complying with BS 6073 part 1 having a minimum compressive strength of 7 N/mm<sup>2</sup> in accordance with BS 5628 part 2 section 6.

Concrete blocks where the reinforcement is to be placed in the block voids shall be

Manufactured to the following type as defined in table 1 part 2 of BS 6073:

200 mm thick hollow

Concrete blocks where the blockwork provides the shuttering to the reinforced cavity between

blockwork leaves shall be manufactured to the following types as defined in table 1 part 2 of BS 6073:

100mm thick hollow

100mm thick solid

150mm thick hollow

150mm thick hollow

200mm thick hollow

200mm thick solid

### **3.9 Expanded Metal Reinforcement**

Expanded metal blockwork bed joint reinforcement shall be a mesh made from stainless steel

complying to BS 1449: Part 2: and weighing not less than 1.84 kg/m<sup>2</sup>, which shall be provided

in locations given by the Engineer.

Expanded metal reinforcement shall be provided in all instances for two courses above lintels and below cells for a length of 600 mm greater than the opening width.

### **3.10 Protection and Cleaning**

Without causing detriment to the permanent works, protective boards are to be maintained at exposed external corners which are susceptible to damage during construction activities.

Expansion joint voids are to be kept clear of mortar. Excess mortar and smears are to be removed upon completion of masonry work. Adjacent work is to be matched, with defective mortar being replaced or repointed as appropriate.

Provide temporary bracing during erection of masonry work. maintain in place until building structure provides permanent bracing.

Soiled surfaces shall be cleaned using non-acidic solution of type which will not harm masonry Or adjacent materials. Non-metallic tools shall be used in cleaning operations.

Surfaces which are to receive plaster are to be left clean.

### **3.11 Shop Drawings**

Fully detailed drawings showing reinforced beams and columns and other strengthening

Required in block partition walls, reinforcement for erection, lintels and anchorages, bond beams cavity wall horizontal reinforcement single wall horizontal reinforcement, wall ties and accessories shall be submitted to the Engineer for approval.



## **D**

## **FINISHING WORK TO WALLS AND CEILINGS**

### **4.1 General**

This section of the specifications covers plaster work and other wall and ceiling finishes intended for the works all in accordance with the drawings, Bills of Quantities and as directed by the Engineer.

The Contractor shall attend upon other trades and protect all work specified under this section from damage during subsequent operations, make good any defects, clear away debris upon completion, clean throughout and leave all work in perfect condition to the satisfaction of the Engineer's Representative.

The Contractor shall be responsible for the design and stability of the scaffolding and for all safety precautions in connection with works specified under this section.

Damaged or defective materials shall not be used in the works. Any defective materials or materials damaged during or after installation shall be removed and replaced at the Contractor's expense.

Before commencement of any of the finishing works items, samples of the work must be approved by the Engineer.

### **4.2 Materials Generally**

The cement, water and sand used for plastering shall be as previously described in the General Technical Specification for Concrete Work.

Lime shall be imported of the hydrate type complying with Class B of BS 890.

Any pigments or coloring materials incorporated in mortar shall comply with BS 1014; 1961.

Waterproofing additives shall be to BS 5075 - Part I and to the approval of the Engineer. The materials shall be delivered in containers bearing the mark of the manufacturer and the instructions for use.

Angle beads, casing beads and stop beads shall comply with BS 1246.

The contractor shall insure that suppliers of materials are sufficient to give consistent and Uniform colors to surface finishes which are not to be painted.

Expansion joint cover assembly shall be a standard manufactured item of the detail shown on the drawings and called for to satisfy the different usage and application to floors, walls, corners, ceilings, roofs, etc.

#### **4.3 Expanded Metal Lathing**

Expanded metal lathing shall comply with BS 1369 and shall be fixed with the long way of the mesh across the supports. The strands in the various sheets shall all slope in one direction, in vertical work; they shall all slope inwards and downwards from the plaster face.

To ensure continuity of key at the fixing points, small round rods, or V-shaped ribs shall be fixed on the face of the supports. All sheets shall be lapped not less than 25 mm at the sides and ends, overlaps shall not occur at angles or curves and end laps shall occur only at supports.

Sides of sheets shall be wired together with galvanized wire if not less than 18 swg every 75 mm between supports.

Cut ends of wire used for fastening shall be bent inwards and not towards the plaster finishing coat. The metal lathing shall be secured to metal fittings by wire or purpose made steel clips.

Care shall be taken to ensure that the anti-corrosion treatment is in good condition after fixing.

Strips of metal lathing 300 mm wide shall be nailed and fixed over all joints between structural elements and block work or other types of finish before plastering commences.

#### **4.4 Preparation of Surfaces**

All surfaces to be plastered, tiled or cladded or to receive any form of permanent finish shall be clean and free from dust, grease, loose or projecting mortar and all traces of salts are to be thoroughly sprayed with water. Free water shall be allowed to dry and disappear from the surface before the plaster is applied.

Plastering shall not begin until the background has been suitably prepared. Block work joints shall be deeply raked out, efflorescence brushed off and all dust and foreign matter removed. Before plastering is commenced, all junctions between differing materials shall be reinforced or provided with grooves according to the drawings. This shall apply where walls join to columns and beams and at interfaces of dissimilar materials particularly where flush and similar situations where cracks are likely to develop and as directed by the Engineer. The reinforcement shall consist of a strip of galvanized wire mesh (10 to 15 mm hexagonal mesh) 150 mm wide which shall be plugged, nailed or stapled as required at intervals of not exceeding 450 mm at both edges. The grooves shall consist of PVC or galvanized steel sections. On all external surfaces and on all smooth internal surfaces spatter dash with a mixture of Sand and cement (2: 1) mixed to form a key shall be applied and allowed to dry before rendering is commenced. All surfaces of walls shall be wetted immediately prior to applying the first coat of rendering (undercoat) and this shall be allowed to dry out thoroughly before the next coat is applied.

The Contractor shall form vertical guide screed 50 mm wide or provide suitable galvanized steel guides. The spacing shall not exceed 1.50 meters.

The screeds shall be plumb and in the same plane with each other. The sides of the screed shall be left rough to bond with plaster, the surface shall be smooth.

The Contractor shall provide PVC or galvanized expansion joints wherever the wall length is greater than 10.8 meters.

The finished surface shall be true to shape and angle even in all directions with straight arises free of cracks and trowel marks and to the entire satisfaction of the Engineer. Any droppings onto finished work shall be cleaned off immediately.

