4.CONCRETE FORMWORK

4.1 Structure and Material

4.1.1 Structure

4.1.1.1 Formwork shall be performed to obtain accurate concrete in accordance with the designated drawings.

4.1.1.2 Formwork shall be firmed and secured to bear the force of concreting and tightened to avoid cement paste seeping.

4.1.2 Materials

4.1.2.1 Sheathing for formwork shall be waterproof plywood of not less than 12 mm thick. Joint of sheathing shall be butt joint and firmly assembled. In case of using wood board for sheathing, boards shall be 15 mm thick and applied planer. Joint shall be tongued and grooved unless otherwise approved by the Consultant.

4.1.2.2 Form liners shall be sound and suitable materials to accurately and safely cast the insitu concrete structure as shown on the Drawings.

4.1.2.3 Timber form boards for sheathing where used for fair-faced concrete shall be of such new materials as not to cause any defects to the surface of the concrete. Special care shall be taken in fabrication, storage and protection of these boards.

4.1.3 Other Material

4.1.3.1 Fastening hardware to be used shall be those with allowable tensile strength guaranteed by manufacturer through strength tests.

4.1.3.2 Form oil shall not have injurious effects on quality of concrete nor to bonding of surface finishing materials and shall be subject to approval of the Consultant.

4.2 Performance

4.2.1 Design of formwork

4.2.1.1 Formwork shall be designed to withstand construction leads during concreting, lateral pressure of fresh concrete, shock and vibrators due to concrete placing.

4.2.1.2 Formwork shall be free of injurious leakage of water, easy to remove, and shall not damage concrete at removal.

4.2.1.3 Supports shall be provided with the adequate horizontal and diagonal bracing and/or stays to prevent collapsing, heaving and twisting of formwork due to horizontal loads working during concrete placing.

4.2.2 Tolerance

The dimensional tolerances in location and cross section of concrete member used for designing and construction of formwork shall conform to the following table.

Standard Values of Dimensional tolerances

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Item	Tolerance (mm)
Tolerance in distance from datum line of each floor to respective members	+ 10
Tolerance in cross section of columns, beams and walls	- 5 , + 10
Tolerance in thickness of floor and roof slabs	0, +10

4.2.3 Fabrication and Erection

4.2.3.1 Erection of formwork, and transportation and storage of materials thereof shall be started only after previously placed concrete has reached an age which acceptance of these loads will not have any adverse effect on the concrete.

4.2.3.2 Sheathing shall be fabricated and installed accurately to match the locations, shapes and dimensions of members called for in the Drawings.

4.2.3.3 Sheathing shall be installed tightly so as not to permit cement paste or mortar to escape from joints.

4.2.3.4 Pipes, boxes and other embedded hardware shall be properly secured to sheathing or others so that they will not move during concrete placing.

4.2.3.5 Supports shall be erected plumb. Supports at any two vertically consecutive floors shall be erected as near as possible to identical locations on a common plane.

4.2.3.6 Shoring shall be erected paying special attention to safety.

4.2.3.7 If sheathing is reused, the surface in contact with the concrete shall be thoroughly cleaned off and sufficiently repaired before reuse. In case of using for fair-faced concrete, the same sheathings shall be used twice after approval of the Consultant.

4.2.4 Inspection

4.2.4.1 Formwork shall be inspected by the Consultant prior to placing of concrete.

4.2.5 Striking of forms

4.2.5.1 The minimum period for keeping the forms in position and for watering after laying the concrete shall be as stated below, except otherwise specified in drawings. Forms shall be removed in such a manner as to ensure the complete safety of the structure, so that there is no shock or vibration as would damage the reinforced concrete.

4.2.5.2 The responsibility for the safety of the concrete shall rest entirely with the Contractor and the Contractor shall be held liable for any damage done and shall have to make good the same at his own expenses.

4.2.5.3 The Contractor shall inform the Consultant when he intends to remove shuttering and shall obtain his consent, but the consent of the Consultant shall not relieve the Contractor of his responsibility.

4.2.5.4 The minimum time for formwork to remain in place shall be as per the following table.

Vertical sides of beams, slabs and columns	24 hours
Soffits of slab	10 days
Soffits of beams	21 days
Cantilevers	28 days

4.2.6 Relocation of Support

4.2.6.1 Supports under concrete shall be not relocated

4.2.7 Removal of formwork

4.2.7.1 Formwork shall be removed gently, after its removal has been approved by the Consultant.

4.2.7.2 Inspection by the Consultant shall be obtained immediately after the removal of sheathing and defects shall be immediately remedied according to instruction of the Consultant.

4.2.7.3 After shoring have been removed, members shall be carefully observed for cracking and deflection, when found, they shall be reported immediately to the Consultant.

5. STEEL REINFORCEMENT

5.1 Material

5.1.1 Reinforcing steel shall be of the dimensions given in the Drawings.

5.1.2 Reinforcing bars shall comply with the requirement of B.S.4449. and welded wire fabric, square bar fabric and expanded metal shall comply with appropriate part of B.S.4483.

5.1.3 Dia 6mm reinforcing steel shall be round mild steel bars, and 12mm, 16mm, 20mm and 25mm shall be deformed high strength bars.

5.1.4 Any other non-specified reinforcing steel shall be used only with the approval of the Consultant.

5.1.5 All reinforcing steel and binding wire shall be stored under cover and shall be at least 250mm above the ground.

5.2 Cleaning

5.2.1 Reinforcing bars shall be cleaned before use so that it is free from rust, oil, dirt or other coatings that reduce bond.

5.3 Bending and Laps

5.3.1 The reinforcement shall be bent cold in an approved bar bending machine.

5.3.2 Preferably bars of full length shall be used. Lapping of bars where necessary shall conform to BS1487 'Bending Dimensions of Bars of Concrete reinforcement.'

5.4 Reinforcement Cover

5.4.1 Concrete cover for reinforcement shall be as follows:

FOR ANY STEEL IN UNDER GROUND CONRETE	50	MM
CLEAR COVER IN SLABS	25-30	MM
CLEAR COVER IN BEAMS SOFFIT	30-35	MM
CEAR COVER IN SIDES OF BEAMS	30	MM
CLEAR COVER IN COLUMNS	40	MM

5.5 Placing

5.5.1 Reinforcement intended for contact when passing each other shall be securely tied together with binding wire.

5.5.2 Binders and stirrups shall tightly embrace the longitudinal reinforcement to which they shall be security bound or spot welded.

5.5.3 Binding wire shall be turned in from the formwork and shall not project beyond reinforcing bars.

All reinforcement shall be inspected by the Consultant and approved before concrete is placed in the forms.

6.WATER PROOFING

6.1 Description of work

6.1.1 Extent of water proofing work is shown on drawings.

6.1.2 Install slurry type waterproofing to top surfaces of balcony slabs and external surfaces of underground concrete work.

6.1.3 Install crystalline type water proofing to underground water tanks and roof slabs in strict accordance with the approved manufacture's printed instructions.

6.2 Materials

6.2.1 Crystalline Type: Material used shall be a cementatious coating containing catalytic chemicals which migrate in to the concrete using moisture present in the concrete as the migrating medium, and which cause the moisture and the un-hydrated cement in the concrete to react causing the growth of non-soluble crystals of dendritic fibers in the void and capillary tracks of the concrete that allow passage of water, there by rendering the concrete it self water proof.

6.2.2 Acceptable products: Xypex concentrate, modified, ultra plug and quick set as manufactured Xypex chemicals (Canada) Limited (or equivalent).

6.3 Storage of materials

6.3.1 General: All materials shall be stored in original undamaged containers with manufactures seals and labels intact. Material shall be stored off the ground in a dry enclosed area.

6.4 Surface preparation

6.4.1 General: All surfaces shall be examined for form tie holes and defects such as honeycombing, rock pockets, cracks, etc. These areas shall be repaired in accordance with these specifications and the manufactures printed instructions.

6.4.2 Concrete finish: concrete surfaces shall have an open capillary system to provide tooth and suctions shall be clean; free from scale, excess form oil, laitance, curing compounds and other foreign matter.

6.4.3 Smooth surfaces or surfaces covered with excess form oil or other contaminants shall be washed lightly sandblasted, water blasted, or acid -etched with muriatic acid, as required to provide a clean absorbent surfaces.

6.4.4 Horizontal surfaces shall not be troweled or power - troweled, and shall be left with a rough float finish or a broom finish. Vertical surfaces may have a sacked finish. Comply with manufactures specifications for requirements pertaining to minimum 'age' of concrete deck surface scheduled to receive water proofing.

6.4.5 Surface moisture: Water proofing shall be applied to 'green' concrete as soon as possible after forms have been stripped or to older pours which have been thoroughly moistened with clean water prior to application. Free water shall be removed prior to application.

Mixing of crystalline water proofing compound: comply with manufactures specification for 2-coat installation.

6.5 Application

6.5.1 General: Apply all materials under the direction of the manufacturer's representative.

6.5.2 Constructions joints and surface defects: Comply with waterproofing material manufacturer's printed directions in the preparation, and treatment of construction joints and surface defects.

6.5.3 Surface application: After all repair, patching and sealing strip placement has been prepared in accordance with manufacturer's recommendations and approved by manufacturer's

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representative, treat concrete surface with first coat slurry mix of crystalline waterproofing compound.

6.5.4 Brushing: Use a short bristle or broom to work the slurry well into the concrete, filing all hairline cracks and surface pores.

6.5.5 Second coat: Apply second coat while first coat is still 'green' but after it has reached an initial set, all as recommended by the water proofing material manufacturer.

6.6 Curing

6.6.1 General: Curing shall begin as soon as the waterproofing materials have set up sufficiently so as not to be damaged by a fine spray. Treated surface shall be sprayed three times a day for a three-day period. Allow material to set 12 days before filling the structure with liquid

6.6.2 Protect treated surfaces from damage due to wind, sun, rain and temperatures below 35 degrees F. For a period of 48 hours after application, arrange protections to permit proper curing conditions for waterproofing material.

6.6.3 Clean up: Remove all surplus materials from the premises and leave all areas broom-clean. In the case of temporary protections remove all such items carefully to avoid damage to treated surfaces. Assemble all such materials and remove from premises followed by broom cleaning as noted.

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7. EMBEDDED DAMPPROOF MEMBRANE

7.1 General

7.1.1 This section deals with laying of flexible sheet as damp proof membranes or has chemical or vapour barriers embedded in the fabric of the building. It does not deal with the weatherproof roof sheeting, or with vapour barriers.

7.2 Products

7.2.1 Polythene sheets for under slab DPM: gauge 500, manufacturer and reference to approval.

7.2.2 Adhesive tape: A type recommended by the sheet manufacturer.

7.3 Workmanship

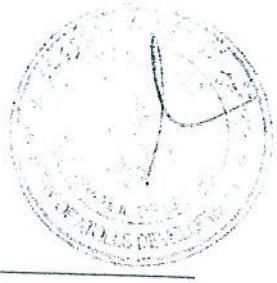
7.3.1 Manufacturers Recommendations: to be strictly followed for all products and materials. Apply sheets to clean, dry surfaces with all joints sealed to give a completely water proof continuos membrane.

7.3.2 Polythene Sheet Under-Slab Dpm: lay a level bed of fine sand, not less than 13mm thick or as specified to receive membrane.

7.3.3 Polythene Sheet Dpm: ensure that sheets are clean and dry. Lay single layer loose on base, lap edges 150mm and seal with mastic or adhesive tape.

7.3.4 Pipe Etc: where pipe etc. pass through sheeting make junction completely watertight by forming collars fully bonded / sealed to both pipes and sheeting.

7.3.5 Project: finished sheeting adequately and prevent puncturing during following work. sheet to be covered by permanent over laying construction as soon as possible.



8. STRUCTURAL STEEL

8.1 Scope

8.1.1 This section shall apply to the work involved with structural steels. All incidental items of structural steel shall be stated in the particular specification.

8.2 Materials

8.2.1 Steel

8.2.1.1 Shape of steel shall be precise and straight and free of injurious scratches and rust.

8.2.1.2 All steel sections shall be galvanized sections of strength class 43 A.

8.2.1.3 Dimensions of steel section and tolerance of dimension shall conform to standard dimension of steel regulated in ASTM or BS standard.

8.2.2 Bolt

8.2.2.1 Shape of bolt, nut, washer shall be in accordance with requirement of BS 4190 & BS 3692.

8.2.2.2 Quality of bolt shall be SC 43 A.

8.2.3 Welding Rod

8.2.3.1 Arc welding rod shall conform to materials to be welded, and position.

8.3 Fabrication

8.3.1 Main fabrication shall be done in workshop unless otherwise specified or approved by the Consultant.

8.3.2 Full scale drawing of each section shall be drawn prior to fabrication and checked by the Consultant.

8.3.3 Section of each material shall be cut perpendicular to axis unless otherwise specified in the drawing.

8.3.4 Saw and angle cutter shall be used for cutting, and cut section shall be free of any noticeable defect.

8.3.5 Deformation caused by cutting shall be corrected.

8.3.6 Normal temperature or hot drawn process shall do bending process. Steel shall be red heat in hot drawn process.

8.3.7 Those directed in the drawing shall be chiseled finish and completely attached.

Materials shall be checked for bend, distortion, warp, etc. before fabrication.

8.4 Bolt

8.4.1 Bolt Hole

8.4.1.1 Spacing of boltholes shall be as directed in the following table.

Diameter of Bolt	Standard Pitch	Minimum Pitch	End Distance	Edge Distance

12	50	30	30	25
16	50	40	40	30

8.4.1.2 Minimum pitch and end distance for lightweight steel shape shall be more than 3 times and 2.5 times a Bolt diameter respectively.

8.4.1.3 Diameter of hole shall not be over 0.5 mm larger than bolt diameter. However, for anchor bolt 5mm clearance shall be allowed between bolt diameter and diameter of hole unless otherwise specified.

8.4.1.4 Bolthole shall either be drilled open or reamed after subpunching. Punching can only be permitted for a material thickness less than 13 mm.

8.4.1.5 Rolled edge around a hole shall be removed.

8.4.1.6 Position of a bolthole shall be precise so that the center of all holes aligns.

8.4.2 Protection against loosing of Nuts

8.4.2.1 Nuts shall be protected against loosing by concrete covering, double nuts or other proper means.

8.5 Welding

8.5.1 Welding

8.5.1.1 Welder shall have an authorized qualification in Maldives and approved by the Consultant.

8.5.1.2 Other tests shall be conducted to confirm welder's skill in accordance with type of work.

8.5.1.3 Tack welding shall be carried out by the welder approved by the Consultant.

8.5.2 Welding Machine

8.5.2.1 Arc welding machine shall be alternate or direct current type, which provides sufficient and adequate current.

8.5.3 Preparation

8.5.3.1 Welding shall be done as much downward as possible using a jig such as Rotary frame.

8.5.3.2 Welding rod shall be always kept in a dry area and if necessary, dried by drying equipment.

8.5.3.3 Welding surface shall be free of water, scale or others injurious to welding work. Slag appeared on the created surface in the middle of welding shall be cleaned before starting again.

8.5.4 Fabrication

8.5.4.1 Welding edge shall be smoothed by automatic gas cutting or other proper finishes.

8.5.8 Finishes

8.5.8.1 Surface of welds shall be as smooth as possible and size and length of welds shall not be less than designed dimensions.

8.5.8.2 Reinforcement of weld shall not exceed 0.1s + 1 mm (s: Designated size) in fillet welds.

8.5.8.3 Welded parts shall be free of undercut, overlap, crack, blow hole, lack of welds, lack of weld settlement, rolled up slag or other defects.

8.5.8.4 Crater at the end of bead shall be carefully heaped up and slag, sputter, etc. shall be completely removed after welds.

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8.5.9 Safety

8.5.9.1 Safe scaffoldings shall be provided for the field welds work.

8.5.9.2 Welding facilities shall be such that there shall be no electric leakage of electric shock. There also shall be sufficient protection for fire.

8.5.9.3 Electric shock protection device shall be used and also care shall be taken not to get suffocated or intoxicated by gas when welding in small area.

8.5.10 Inspection

8.5.10.1 Welding parts shall be inspected before, during and after welding in accordance with work schedule.

8.6 Erection and Field Painting

8.7.1 Erection

8.7.1.1 Erection procedure shall be prepared by the contractor and be approved by the Consultant prior to the erection.

8.7.1.2 Material shall be stored on flat surface in order not to get distortion, twist or other defects. Correction shall be made to those distortions or twisted before erection.

8.7.1.3 Horizontal reinforcement and bracing shall be placed and bolts are temporary tightened as trusses are put up.

8.7.1.4 Connection of materials by bolts, etc. shall be made after distortion on plumb is thoroughly corrected.

8.7.1.5 Temporary bracing or other reinforcement shall be placed to resist wind pressure or other loads erection.

8.7.1.6 When heavy objects are placed on a horizontal element in the course of erection, they shall be reinforced with prior approval of the Consultant.

8.7.1.7 Care shall be taken on all facilities so that there is no accident.

8.7.2 Field Painting

All steel work shall delivered to site unprimed shall be cleaned of impurities, scrapped and wire brushed to remove rust and painted with one coat of priming paint applied by brush.

Steelwork delivered to Site primed shall be cleaned of impurities and damage to the priming paint and made good with priming paint.

Galvanized steelwork to be painted shall be cleaned of impurities. Where rusting has occurred the rust shall be removed by wire brushing and made good with an approved rust inhibitor.The surfaces shall be coated with a mordant solution, washed with clean water and painted with two coats of priming paint applied by brush.

Steelwork, which is to be concealed shall be prepared and primed as above and shall be painted with two priming coats and one finishing coat of paint applied by brush.

8.8 Anchor Bolt

8.8.1 The other methods for movable burying shall be as directed by the Consultant.

9. MASONRY

9.1 Materials

9.1.1 Material used for masonry and plastering work shall conform to Section 3 - CONCRETE WORKS.

9.1.2 Masonry work shall be done with cement bricks or blocks of approved quality unless specified otherwise.

9.1.3 The blocks shall be free from excessive amounts of salt or other impurities and shall be inspected and approved by the Consultant.

9.2 General

9.2.1 Execution Drawing

9.2.1.1 Work shall be complied with this specification unless otherwise stated on particular Specification or Drawings. Any work not specified shall be discussed and directed by the Consultant. Execution drawing of block or brick alignment (inclusive of indication for hanging bolt, wood plug and conduit pipe), detail reinforcement, window opening, and other requirement shall be prepared and submitted for the Consultant.

9.2.2 Stake-Board

9.2.2.1 Stake-board shall be provided at each 5m in length and shall be inspected by the Consultant for the accuracy, firmness and secureness. However, suitable ruler, plumb bob and leveler shall be provided for minor performance of cement block and bricks.

9.2.3 Transportation and storing

9.2.3.1 Care shall be taken for damage during transportation of materials and any defect of natural finished concrete blocks or bricks shall be rejected.

9.2.3.2 Different size of material shall be stored separately and projected from dirt and other impurities.

9.2.4 Curing

9.2.4.1 Any shock or load shall not be applied until concrete mortar or other fills hardened. Corner, projection and top of cement block or brick work shall be protected from rain, dryness, cold, damage and stain by covering.

9.2.4.2 Void between blocks or bricks shall not be intruded by rainwater.

9.3 Blockwork

9.3.1 Material

9.3.1.1 Blocks shall be of standard quality low permeability blocks with no defects and sample shall be submitted for approval of the Consultant.

9.3.1.2 Blocks shall be aerated hollow block 150 mm thick for external walls and 100 mm thick for internal walls. The average compression strength should be not less than 2.8N/mm^2 and shall comply with physical requirements of ISO 6073 : 1981

9.3.2 Horizontal reinforcement for concrete block wall;

9.3.2.1 Horizontal reinforcement shall be provided at end of wall adjoining to concrete column. Reinforcing bar shall be anchored into end block and column.

9.3.2.2 Horizontal reinforcing bar for block wall shall be 6 dia. @ 1000 mm.

9.3.3 Placing Blocks & Bricks

9.3.3.1 Cement blocks shall be saturated with water and joint shall be cleaned.

9.3.3.2 Bonding mortar shall be used immediately after mix, and mixed mortar left for more than one hour shall be rejected.

9.3.3.3 Vertical and horizontal joint of blocks shall be filled completely and suitable with mortar on line shall not be moved or rearranged. Joint and surface of block of exposed finished block wall shall be cleaned immediately after joint is filled.

9.3.3.4 In case concrete block wall is attached to structural concrete, block wall shall be placed before concreting structure.

9.3.3.5 Mortar for joint shall be touched with steel trowel before hardened and exposed joint shall be finished with uniform width and planned without roughness or cavity.

9.3.3.6 Height for placing block per day shall be maximum 1.2 m unless otherwise specified.

9.3.3.7 Blocks shall be placed with cavity side under.

9.3.4 Joints

9.3.4.1 The thickness of joints shall not exceed 10 mm and the joints shall be rated (13 mm dup.) when the mortar is still floor, so as to provide for proper bond for the plaster. Any mortar which falls on the floor from this joints or removed due to raking of joints shall not be reused.

9.3.5 Lintel

9.3.5.1 Lintel shall be reinforced concrete as approved or directed by the Consultant.

9.3.5.2 Main reinforcing bar shall be anchored more than 40D (40 x diameter of the bar) at both end.

9.3.5.3 In case lintel is prefabricated, shop drawing shall be submitted for approval of the Consultant.

9.3.6 Frame of Opening

9.3.6.1 In case frame is temporarily installed before placing of blocks, frame shall be firmly placed and joiner shall be bonded with mortar as placing each block at side and top of frame.

9.3.6.2 In case frame is installed after placing of blocks, joiner shall be bonded with additional mortar at space or every two blocks or more.

9.3.6.3 Back of frame shall be filled and compacted with mortar by providing shuttering board.

9.3.6.4 Wood plug and anchor bolt shall be covered with mortar or concrete.

9.3.7 Piping

9.3.7.1 Principally, piping shall not be placed in block wall unless piping block is in use.

9.3.7.2 In case electric conduit pipe is placed in cavity of concrete blocks, care shall be taken not to obstruct reinforcing bar, and cavity shall be completely filled.

9.3.7.3 In case chipping and piping on face of blocks is unavoidable, performance shall confirm to instruction of the Consultant.

9.3.7.4 Joiner and supporter for exposed piping shall be buried at joint which back is filled or otherwise approved by the Consultant.

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10. PLASTERING

10.1 General

10.1.1 All masonry walls shall have smooth finished cement plaster on both sides with a surface setting coat of neat cement applied within an hour of the completion of rendering.

10.1.2 Cement rendering to floor shall be same as above.

10.2 Materials and Storage

10.2.1 Plaster materials which are affected by moisture such as plaster and cement shall be stored properly

10.2.2 Materials used for plastering shall conform to those of Section 3 - Concrete Works. Grading of sand, however, shall be as in table below

Grading of sand	Mortar plastering	Plastering
5mm sifting thorough 100% 0.15mm sifting less than 10%	for first coat for finish coat	for first coat and dubbing out
2.5mm sifting through 100% 0.15mm sifting less than 10%	for finish coat	for second coat

10.2.3 White cement or filler or similar shall confirm to the requirements of Portland cement, BS.12.

10.2.4 The use of mixtures shall be approved by the Consultant's representative. The amount of admixture shall be such that it effects mortar strength very little.

10.3 Mixing ratio

10.3.1 Mixing volume ratio of mortar shall be as in table below:

Base	area of application	first coat cement:sand	Dabbing out cement:sand	Finish coat cement:sand
Masonry blocks	Floor	-	-	1:4
	Interior wall	1:4	1:4	1:4
	Exterior wall	1:4	1:4	1:4

10.4 Thickness of Coating

Standard thickness of coating (mm)

Base	Area of application	First coat	Dubbing out	Second coat	Finish coat	Total
Masonry block	Floor	-	-	-	as per dwg	as per dwg
	Interior wall	8	-	8	4	15
	Exterior wall	8	-	8	4	15

Thickness of coating shall be standard thickness of coating unless otherwise indicated on the Drawings.

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10.5 Finish

10.5.1 Type of finish and work schedule

Type	Work Schedule	Notes
1.Smooth Trowel finish	1. Shall be applied flat by metal trowel 2. Shall be finished by pressing with the trowel.	Before applying second coat, corner and edge shall be screed well.
2. Wooden float finsh	Shall be applied by wooden float	

10.6 General Preparation

10.6.1 Remove efflorescence, laitance, dirt and other loose material by thoroughly dry brushing.

10.6.2 Remove all traces of paint, grease, dirt and other materials incompatible with coating by scrubbing with water containing detergent and washing off with plenty applying coatings unless specified other wise.

10.6.3 In Situ Concrete Surfaces: Scrub with water containing detergents to ensure complete removal of mould oil , surface retarders and other materials in compatible with coating . Rinse with clean water and allow to dry unless specified otherwise.

10.6.4 Organic Growths: Treat with fungicide to manufacturer's recommendations and bush off.

10.6.5 Hacking For Key: roughen specified surfaces thoroughly and evenly by removing the entire surface to a depth of 3mm by scabbling , bush hammering or abrasive blasting . Clean surfaces by washing and brushing.

10.6.6 Smooth Concrete Surfaces: where no keying or mix or bonding agent is specified , wet smooth concrete surfaces immediately before plastering.

10.7 External Plastering

10.7.1 Dissimilar Solid Backgrounds for Plastering: where plaster is to be continued with out break across joints between dissimilar solid backgrounds which are rigidly bonded together , cover the joints with a 200mm wide mesh strip (back grounds in the same plane) or with the corner mesh (internal angle) fixed at not more than 600mm centers along both edges , unless specified or otherwise.

10.7.2 Dissimilar Solid Backgrounds for Plaster: where plaster is to be continued without break and without change of plane across the face of a 300mm and rigidly bonded to the background.

10.7.2.1 Cover the face of the column /beam/ lintol with building paper extending 25 mm on the adjacent background.

10.7.2.2 Over lay with expanded metal lathing extending 50mm beyond the edges of the paper and securely fixed with masonry nails at not less than 100mm centres along both edges.

Alternatively, an approved paper and mesh lathing may be used.

10.7.3 Dissimilar Solid Backgrounds for Rendering: where rendering is to be continued without break across joints between dissimilar solid backgrounds which are in the same plan and rigidly bounded together, cover joints with a 150mm wide strip of building paper overlaid with 300mm wide metal lathing fixed at not more than 600mm centers along both edges unless specified other wise.

10.7.4 Service Chases: cover with steel mesh strip fixed at not more than 600mm centers along both edges.

10.7.5 Conduits bedded in under coat to be covered with 90mm wide jute scrim budded in finishing

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coat mix, pressed flat and trowelled in. Do not lap ends of scrim.

10.8 Internal Plastering

10.8.1 Accuracy of plaster 15mm thick or more: maximum permissible gap between an 1800mm straight edge and any point on the surface to be 3mm.

10.8.2 Dubbing Out: if necessary to correct inaccuracies, dub out in thickness of not more than 10mm in same mix as first coat. Allow each coat to set before the first is applied . Cross scratch surface of each dubbing out coat immediately after set.

10.8.3 Metal Mesh Lathing: Work undercoat well in to interstices to obtain maximum key.

10.8.4 Under Coats: generally to be not less than 8mm with thickness greater than 16mm applied as two equal coats. Rule to an even surfaces and cross scratch - end coat to provide a key for the next hand applied coat.

10.8.5 Cement Based Under Coats: all to dry out thoroughly but not rapidly, to ensure that drying shrinkage is substantially complete before applying next coat.

10.8.6 Dissimilar Backgrounds: where scrim or lathing or beads are not specified, cut through plaster with a fine blade in a neat, straight line at junctions of :

10.8.6.1 Plastered rigid sheet and plastered solid backgrounds.

10.8.6.2 Dissimilar solid backgrounds.

10.8.7 Smooth Finish: trowel or float to product a tight matt, smooth surface with no hollows abrupt change of level or trowel marks. Do not use water brush and avoid excessive trowelling and over polishing.

10.9 External Rendering

10.9.1 Dubbing Out: if necessary to correct inaccuracies, dub out in thicknesses of not more than 10mm in same mix as first coat. Allow each coat to dry before the next is applied. Cross scratch surface of each dubbing out coat immediately after set.

10.9.2 Under Coats for hand applied finishes:

10.9.2.1 Apply first undercoat or dubbing out coat by throwing from a trowel.

10.9.2.2 Coats to be no less than 8mm thick, with thickness greater than 16mm applied as two equal coats. On weak backgrounds first under coat to be not less than 10mm thick.

10.9.2.3 Brush down each under coat to remove dust and loose particles and wet thoroughly before application of next coat.

10.9.2.4 Cross scratch under coat without penetrating the coat, to provide key for following coat(s).

Drying: Keep each coat damp for the first three days by covering with polythene sheet and/or spraying with water. Thereafter prevent from drying out too rapidly. Work in shade when ever possible.

Allow each coat to dry out thoroughly to ensure that drying shrinkage is substantially complete before applying next coat.

Playing Floated Finish: Finish with wood or other suitably faced float to give an even texture.

Do not draw excessive laitance to surfaces.

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10.10 Metal Mesh Lathing / Reinforcement For Plastered/Coatings.

10.10.1 Lathing to be provided as reinforcement for plastering in columns , walls or specified in drawings products.

10.10.2 Products:

10.10.2.1 Plain Expanded Metal Lathing: To B.S 1369 with a minimum weight of 1.9 kg/mm^2. Manufacturer to approval of the Consultant.

10.10.2.2 Wire Ties : Unless other specified , annealed iron , galvanized to B.S 443.

10.10.2.3 Clout Nails: galvanized steel or stainless steel nails to B.S 1202 : Part 1, table 3.

10.10.2.4 Staples: Galvanized steel wire staples to B.S 1494: Part 2.

10.10.3 Workmanship

10.10.3.1 Framing: fix securely and accurately to help ensure that coatings on lathing , when finished, are true to line and level , within specified tolerances and free from cracks, rippling, hollows, ridges and sudden changes of levels.

10.10.3.2 Runners/Bearers spanning between concrete beams/ribs: fix with 3mm wire ties twisted around 38 mm X 10 gauge screws driven well into fixing blocks or plugs in sides of beams/ribs.

10.10.3.3 Wire Ties: twisted ends tightly together, cut off surplus and bend ends of wire away from face of coating.

10.10.3.4 Plain Expanded Metal Lathing:

(a) Stretch lathing and fix securely in accordance with manufacturers recommendations to give a taut , firm base for plaster/ rendering.

(b) Fix with the long way of the mesh at right angles to supports and with all strands sloping in the same direction.

(b) Lap side edges not less than 25mm . Lap ends 50mm at supports and 75mm between supports. Laps must not occur within 100mm of angles or bends.

11. CARPENTRY AND JOINERY

11.1 Materials

11.1.1 Timber shall be in accordance with the requirements of BS 1186 'Quantity of Timber and Workmanship in Joinery', Part 1, 'Quality of Timber'.

11.1.2 Timber and timber products shall be subject to the inspection and approval of the Consultant.

11.1.3 Timber shall be seasoned to stable moisture content compatible with the finished use, straight and true and free from wind, warp and distortion and in lengths suitable for the members required.

11.1.4 All timber shall be in long lengths and laps, scars or splices shall be over a bearing surface. Where obtainable, finishing timber exposed to view shall be in single lengths.

11.2 Preservation of Timber

11.2.1 All timber shall be treated for insect attack and is to be of the correct moisture content and free from surface moisture content and dirt.

11.2.2 All rafters, purlins, framing scribe pieces, wall plates, and trusses etc. shall be treated for insect attack with approved timber preservative. No extra payment shall be made for such coating and will be considered inclusive in the rate of the respective item in the BOQ.

11.2.3 Treatment shall be carried out after all cutting and shaping is completed.

11.3 Hardware

11.3.1 Hardware shall be standard quality and samples shall be submitted to the Consultant for approval.

11.3.2 All hinges shall be stainless steel or brass and shall be approved by the Consultant.

11.3.3 The dimensions and quality of hardware shall meet the requirements and shall not be rested, deformed or defective.

11.4 Dimensions and Finish

11.4.1 All dimensions of timber given are finished dimensions.

11.4.2 All elements and others of structural nature, which are exposed, must be machine planed to a smooth finish.

11.4.3 All unexposed timber shall be machine planed to a rough finish.

11.4.4 All joinery work shall be dressed on all four sides and hand dressed where necessary and sanded to all exposed surfaces. All arises in any way accessible shall be sanded and smoothed off.

11.5 Workmanship

11.5.1 All connections whether nailed, screwed, glued, moticed or dove-tailed shall be accurately made and properly executed to provide sound, satisfactory connections for the class of work required.

11.5.2 Timbers containing defects or distortions shall not be used.

11.5.3 All joinery shall be manufactured by skilled tradesman with accurate tolerances and set out and with tools, jigs, machines and equipment appropriate for the work.

11.5.4 Assembly of the joinery units and joinery frames, etc. shall be by means of glued connections appropriate to the work - motice and tennon, housing and doweling, etc. where practicable including the use of glued blocks wherever required. Nailing, screwing shall only be used with prior approval of the Consultant, corrugated fasteners shall not be used for effecting connections.

12. ALUMINIUM DOORS AND WINDOWS

12.1 Aluminium Doors and Windows

12.1.1 All windows and doors are to be constructed by approved specialist suppliers of medium section to the particular requirements noted on the drawings as to weight and profile. All sections shall generally conform to relevant British Standard Specifications.

All frames should be made to fit the actual openings with a 3 mm clearance all around. Discrepancies in overall width or height exceeding 3mm will not be allowed and the frames will be rejected in such cases. Any small discrepancies shall have the gaps suitably backed and filled with gun-applied water repellant mastic sealant

All sealants used in the assembly of, and in the fixing of cladding and window framing, shall be non-setting to allow thermal movement without detriment to those joint sealants used for peripheral caulking and shall be one part silicone sealant and shall conform to BS 4245. All spliced joints between mullions should be sealed with an approved silicone product, compatible with other sealants and packings used.

12.1.4 The auxiliary components in sashes as locks, pivots, sliding gear etc. shall comprise of stainless steel or resisting materials.

12.1.5 The tolerance are to be as follows:

a) Inside width of frame	3mm Maximum
b) Inside height of frame	3mm Maximum
c) Depth of frame	2mm Maximum
d) Opposite side, Inside distance	2mm Maximum

12.1.6 The performance - associated requirements are

1) Strength (resistance to wind pressure and other forces applied in use)
2) Air tightness or ability to cut out drafts.
3) Water - tightness against rain or dew.
4) Sound arresting effect to (shut off noise from outside as well as inside).

12.1.7 All surfaces shall have an anodized protective surface layer of minimum 25 Micron thickness.

12.1.8 Glazing shall be done as specified by the Consultant. Glass shall be tinted, or as specified in the drawings. Thickness shall be according to the size of panels as given hereunder.

Not exceeding 1 sq. ft.	2mm
Exceeding 1 sq. ft. but not exceeding 2 sq. ft.	3mm
Exceeding 2 sq. ft. but not exceeding 4 sq. ft	4mm
Exceeding 4 sq. ft. but not exceeding 6 sq. ft	5mm
Exceeding 6 sq. ft.	6mm