PART – IV

PARTICULAR SPECIFICATIONS FOR CONSTRUCTION

1. EARTH WORK:

1.1 Site Clearance:

Clearance of site and removal of bushes and vegetation as per Engineer-in-Charge/ Architect's instruction and the Contractor shall carry out site clearance at his own cost. This item shall be executed as per Clause No. 2.4 of CPWD Specifications Vol. I with up to date correction slips.

1.2 Setting out and Marking Profiles:

Setting out of the work/buildings in the plot shall be carried out by the Contractor as per the instructions of the Architect and demarcation plans supplied by the Architect with the help of masonry pillars to serve as bench mark.

All existing ground levels shall be taken at 5 to 7 meters intervals. Ground levels shall be recorded in the field book. The Contractor at his own cost shall supply the labour required for taking levels. This item shall be executed as per Clause No. 2.5 of CPWD. Vol. I of 2009 with up to date correction slips.

1.3 Excavation:

Excavation for raft foundation, column footings and plinth beams in the available soil at site of work as per drawings/excavation plans and structural drawings as required.

1.4 Filling of available earth/earth brought from outside:

Available earth or sand/earth or sand brought from outside filling around foundations or as and where ever required by the Development Authority including disposing of surplus earth within the site. The filling shall be done in layers not exceeding 20 cm in depth. Each layer leveled, watered, rammed and consolidated around foundations, under floors, wherever required and in other situations to make levels/slopes as shown in drawing. Nothing extra shall be paid on this account. This item shall be executed as per Clause No. 2.23 of CPWD. Vol. I and II 2009 with up to date correction slips.

1.5 Sand filling:

Sand filling under floors to be as per drawings, the compacted thickness as required as per the drawings. Sand shall be clean free from dust, organic and foreign material. The filling is to be watered and consolidated under the floor to obtain desired thickness. This item shall be executed as per Clause No. 2.24 of CPWD. Vol. I and II 2009 with up to date correction slips.

1.6 Anti Termite Treatment

- Anti Termite treatment shall be done as specified in IS:6313 (Part-II) for pre-construction soil treatment or as specified in Clause No. 2.28 of CPWD Specifications Vol. I 2009 with up to date correction slips.

2. CONCRETE:

Applicable Codes and Standards:

2.1 The codes and standards generally applicable to the work of this section but not limited to the list herein-after including latest corrections and revisions:

IS 8112	Specifications for 43 Grade Ordinary Portland Cement.
IS 516	Methods of test for strength of concrete.
IS 1199	Methods of sampling and analysis of concrete.
IS1489- Part-1	Portland Pozzolana Cement (Fly ash Based).
IS 2386 & IS 383 (Part-I, II & III)	Method of testing for aggregate for concrete
IS 2645	Integral cement water proofing compound.
IS 3414	Code of practice for design and installation of joints in building.
IS 3558	Code of practice for use of immersion vibrators for consolidating concrete.
IS 4082	Recommendations on stacking and storage or construction materials at site.
IS 4926	Code of Practice for Ready Mixed Concrete
IS 6925	Methods of test for Determination of water soluble chlorides in concrete admixtures.
IS 9102	Admixtures for concrete.

- All concrete mix shall be as per specifications and grade required for a particular item as per drawings and specifications. Coarse sand and Stone aggregate used shall conform to IS: 2386 Part-I and IS: 383 respectively.
- OPC shall be used in all RCC work.
- PPC or OPC shall be used in all works other than RCC work viz. Lean Concrete, Concrete sub floors, Masonry, Plaster, C.M. bed under flooring.

2.2 P.C.C. (Plain Cement Concrete):

- P.C.C. 1:5:10 (1 cement, 5 coarse sand, 10 graded stone aggregate 40mm nominal size) as per the drawings in foundation or as and where indicated in drawings excluding centering and shuttering and curing for minimum 7 days. This shall conform to CPWD Specifications 2009 with up to date correction slips for cement concrete work Clause No. 4.1 for materials and Clause No. 4.2 for mixing, and laying.
- P.C.C. 1:5:10 (1cement, 5 coarse sand, and 10 brick aggregate 40 mm nominal size) in sunken portion as indicated in drawings including curing. Brick aggregate shall conform to IS:3068 This shall conform to CPWD Specifications 2009 with up to date correction slips for cement concrete work Clause No. 4.1 for materials and Clause No. 4.2 for mixing.
- P.C.C. 1:5:10 (1cement, 5 coarse sand, 10 graded stone aggregate 40mm nominal size) under footing, Raft and in foundation as indicated in drawings including curing. Stone aggregate shall conform to IS 383. This shall conform to CPWD Specifications 2009 with up to date correction slips for cement concrete work Clause No. 4.1 for materials and Clause No. 4.2 for mixing.
- P.C.C. 1:3:6 (1 cement, 3 coarse sand, 6 graded stone aggregate 20 mm nominal size) in concrete blocks for hold fasts for frames, bed-blocks, C.I. pipe covering or where ever required including centering and shuttering, if required and curing for 7 days.
- The proportioning for cement concrete (non-structural concrete) can be done by volume. Measuring boxes shall be made out of either timber or steel, coarse and fine aggregates shall be measured for volumetric proportioning with measuring boxes. Concrete shall be mixed in mechanical mixer of adequate capacity to mix one bag of cement at a time with the required proportions of concrete mix. The mixer shall have hopper attachment.

One bag of cement will be deemed to weigh 50 kg and measure 1.23cft. in volume. Water shall be measured with calibrated cans.

2.3 R.C.C. (Reinforced Cement Concrete)

- Design mix M-25 of cement concrete shall be used in Rafts, Beams & Slabs. Design mix M-30 of cement concrete shall be used in Columns. **Use of fly ash is not permitted.**
- M-25 concrete shall be with minimum 330 Kg of cement per cum of concrete and M-30 concrete shall have minimum 340 Kg of cement per cum of concrete.
- All charges relating to testing of design mix and other materials in laboratory shall be paid by the contractors.
- All RCC items for the purpose of this tender shall be carried out as per nomenclature of the relevant item.
- Ready Mix R.C.C. or/and design mix concrete at site of grade M-25 in foundations RCC walls, columns, plinth beams and beams, lintels, staircases and landings, suspended slabs, chhajjas and other RCC members etc. with graded stone aggregate 20mm nominal size with specified reinforcement. The work to be carried out as per Clause No. 5.9 of CPWD specifications 2009 with up to date correction slips for Cement concrete and R.C.C. work.
- For all Reinforced cement concrete work other than Ready Mix, batch mixing/RMC plant of appropriate capacity shall be used.
- Weigh batcher of min. 0.5 cum. Capacity with an arrangement to control quantity of water with electronic sensors may be used with permission of Architect.
- The concrete shall be cured and protected for a period of 14 days (minimum) from the day of placing concrete in position.
- Concrete for all reinforced concrete work such as foundations, R.C.C. walls, columns, beams, slabs etc. shall be deposited and well consolidated by vibrating using mechanical vibrators. Rest of the concrete work such as chhajjas & shelves etc shall be deposited and well consolidated by punning and tamping. Care shall be taken to ensure that concrete is not over vibrated so as to cause segregation.

- The Contractor shall be issued Structural drawings with sufficient details to enable the Contractor to carry out the work. The Contractor should prepare the Bar Bending Schedules, shop drawings for structural steel work etc. and get them approved from the Architect/Engineer-in-charge.
- Concreting shall be commenced only after the Project Engineer has inspected the centering, shuttering, reinforcement and electrical conduits/junction boxes/fan clamps etc. as placed and passed the same in writing (i.e. filling of pour card as specified).

2.4 Reinforcement & Structural Steel:

- Reinforcement Steel confirming to Clause No. 5.1.3 CPWD specifications 2009 with up to date correction slips for Cement concrete and R.C.C. work for reinforcement shall be used.
- Straightening, bending, binding and placing in positions at all levels and heights, as per drawings, shall be the responsibility of the contractors.
- Laps and crossings shall be tied with soft drawn MS wires of size not less than 0.9 mm.
- The contractor shall be responsible for accurate placing of reinforcement as shown in drawings and shall not place any concrete until the reinforcement has been checked. The laps shall be provided as per drawings.
- The contractor shall provide proper cover to reinforcement as shown in drawings by using cover blocks & nothing shall be paid extra in this account.
- All structural steel shall be fabricated and fixed at site as and where shown in drawings.

2.5 Centering and shuttering:

- Shuttering used shall be of sufficient stiffness to avoid deflection and joints shall be tightly butted to avoid leakage of slurry.
- The material used for formwork for foundations, R.C.C. walls, columns, plinth beams, beams, suspended floor, roofs, lintels, landings, & staircase should be of steel or water proof ply.
- The material used for centering and shuttering shall be strong enough to withstand the dead and live loads and forces caused by ramming and vibrations of concrete and other incidental loads, imposed upon it during and after casting of concrete. The Contractor shall use Acrospan/Telescopic and base plates for formwork for slabs.

- It shall be made sufficiently rigid by using adequate number of ties and braces where required shall be provided to make up any settlement in the formwork either before or during the placing of concrete.
- The formwork shall be removed without damaging the surface of concrete or disturbing other sections.
- All the vertical supports should be of steel tubes with extension pieces i.e. Adjustable props. Ballies for support shall be permitted at specific positions with permission/approval of Architect/Engineer-in-charge.
- In case of structures with two or more floors, the weight of concrete, centering and shuttering of any upper floor being cast shall be suitably supported on one floor below the top most floors already cast.
- The shuttering should be properly repaired before use and properly cleaned to avoid stains, honey combing, seepage of slurry through joints etc.
- Suitable camber shall be provided in horizontal members of structure, especially in cantilever spans to counteract the effect of deflection. The formwork shall be so assembled as to provide for camber. The camber for beams and slabs shall be 4 mm per meter (1 to 250) or as directed by the Architect, so as to offset the subsequent deflection. For cantilevers the camber at free end shall be 1/50th of the projected length or as directed by the Architect.
- Shuttering oil is to be used on formwork before casting.
- The items shall be deemed to include for small and incidental labour such as Splays, rounded or covered angles, rebates to be provided as per architect's instructions.
- Minimum period for striking Form work shall be 3 days for soffit of slabs (props to be refixed immediately after removal of formwork), after 7 days in case of soffit of beams (props to be refixed immediately after removal of formwork), removal of props for slabs spanning up to 4.5 meter after 7 days, removal of props for slabs spanning over 4.5 meter after 14 days, removal of props for beams spanning up to 6 meter after 14 days, removal of props for beams spanning over 6 meter after 21 days from the day of casting in normal circumstances, except for vertical formwork to walls, columns and beams can be removed after 24 hours from the time of casting, as per Clause No. 5.2.3.7 of CPWD Specifications 2009 with up to date correction slips for cement mortar, cement concrete and RCC work.

- All propping and centering should be of steel tubes with extension pieces, specifications duly approved of Architect. Staging shall be made sufficiently rigid by adequate number of ties and braces and extended with sufficient overlaps. Screw jacks or hard board wedges where required shall be provided to make up any settlement in the formwork before/during the placing of concrete.
- Shuttering used shall be of sufficient stiffness to avoid deflection and joints shall be tightly butted to avoid leakage of slurry. Shuttering plywood and steel shuttering with plane surface without dents etc. shall be used for shuttering and runners of required size shall be provided suited to the shuttering material. Shuttering surfaces shall be coated with suitable oil.

2.6 Construction joints:

- Concreting shall be carried out continuously up to the construction joints. Construction joints shall be provided as shown in structural drawings and as per Clause No. 5.4.4 of CPWD Specifications 2009 with up to date correction slips for Cement mortar, Cement concrete and R.C.C. work. The number of such joints shall be kept to minimum.

2.7 Expansion joints:

- Expansion joints shall be provided as shown in structural drawings and as per Clause No. 5.4.5 of CPWD Specifications 2009 with up to date correction slips.

3. MASONRY WORK/BLOCK WORK

Different type of walling with FPS clay bricks, AAC blocks or Fly ash brick shall be done as provided on drawings.

- Clay Brick work with bricks of class designation 75 shall be used. Clay Brick work shall be used upto 4th floor for external peripheral walls as specified (full brick 230mm or 115 mm as specified) and where indicated in drawings. 230 mm brick work in cement mortar 1:6 (1 Cement: 6 Coarse sand) shall be provided wherever required as per the drawings.115 mm thick brick work with cement mortar 1:4 (1Cement: 4 Coarse sand) including reinforcement of 2 nos. 6 mm dia. ms bars at every third course including raking out of joints etc. complete shall also be provided wherever required. This item shall be

executed as per Clause No. 6.2 of CPWD Specifications. Vol. I- 2009 with up to date correction slips.

- Clay fly ash non modular F.P.S. (Foot Pound Second) bricks shall conform to IS 13757. Clay fly ash bricks shall be used above 4th floor for external peripheral walls as specified (full brick 230mm or 115mm as specified) and where indicated in drawings. Masonry in clay fly ash brick of class designation 7.5 shall be used. Cement mortar 1:6 (1 cement: 6 Coarse sand) shall be used for 230mm wall and for 110mm/115 mm cement mortar 1:4(1cement: 4 Coarse sand) shall be used. All 110/115 mm walling shall be provided with 6mm ms rods every 3rd layer.
- The fly ash bricks shall be sound, compact and uniform in shape and colour. Bricks shall have smooth rectangular faces with sharp and square corners. Bricks shall be free from visible cracks, flaws, warpage, nodules of free lime & organic matter and shall be machine moulded. Bricks shall have frog of 100 mm. in length, 40 mm. in width and 10 to 20 mm. deep on one of its flat sides. Fly ash shall conform to grade I or grade II of IS 3812.
- 100mm AAC blocks shall confirm to IS code 2185(Part-III), grade I and with minimum strength 7N/mm2 and minimum density of 851kg per cubic meter. All internal walls as specified shall be done with mortar 1:4(1cement: 4 coarse sand) and 6mm rods shall be placed every 3rd layer of block.

4. A) DOOR FRAMES

Providing and fixing frames made of **Marandi wood** as specified in the drawings, size of sections for Main entrance and all Internal door frames shall be finished size of cross section as shown in drawings.

This item shall be executed as per Clause No. 9.3 of CPWD Specifications. Vol. I- 2014 with up to date correction slips.

Sr. No.	Item	Frame Size		
1	Main Entrance Door frame	100	X	62.5
2	Other door frames in the flat	100	X	62.5

B) DOOR SHUTTERS

Flush doors 35 mm thick conforming to IS : 2202 (Part-I) non-decorative type, core of block board construction with frame of 1st class hard wood and well matched commercial 3 ply veneering with vertical grains or cross bands and face veneers on both faces of shutters. All shutters shall be provided with Aluminum ironmongery (fittings for Doors & windows) as per CPWD specifications 2009

4.1 Window and Balcony doors :

- External Powder Coated Aluminum 2 track/ openable doors and windows with 5 mm thick plain glass shall be provided. The minimum weight of Aluminum shall be 5.0 Kg per sqm of window/door opening, wherever used and as per approved shop drawing.

4.2 Fixing Details for frames :

- Vertical members of door frames shall be embedded below finished floor level. The portions of the frames embedded in floors and these in contract with wall/concrete portions shall be given a coating of coal tar. All door shutters shall be fixed at floor level and the bottom edge of shutters shall be 10 mm above the finished floor.
- Priming shall be applied on the surface of wooden frames.
- Doors frames shall be fixed in position only after completion of masonry work but before commencement of plastering, necessary opening shall be left in the walls to receive the door frames. Hold fast for door frames shall be embedded in position by providing PCC (1:3:6) cast-in- situ blocks. PCC (1:3:6) to be provided as per relevant specifications.
- Whenever frames are required to be fixed adjacent to R.C.C. columns, the frame shall be fixed with dash fasteners as required in lieu of hold fast.
- MS flat iron 40mm x 5mm and 300mm long shall be provided for Hold fast. Hold fast shall be fixed to the frames with 10mm dia blocks, nuts in wooden plugs and embedded in CC blocks of 300 x 100 x 150 mm in 1:3:6 mix.
- Minimum of three holdfasts shall be fixed on each side of doorframes one at center point and other two at 30 cm from the top and bottom of the frames.
- Wherever the frame and wall is in the same plane, timber architrave of hard wood as filler shall be fixed as shown in drawings.

- Painting shall be done on door frames as per relevant clause of the tender documents.

5. RAILINGS AND GRILLS:

5.1 Staircase Railing

M.S. railing of height as specified in the drawings (minimum 1050 mm above floor) is to be fixed to staircase as per the fixing details as indicated in the drawing. This item includes fabricating, erecting, preparing the surface, cleaned with sandpaper to remove scales & rust and applying a coat of red oxide, zinc chromate primer confirming IS: 2074, finished with Synthetic Enamel paint of approved shade at all levels and positions wherever required.

5.2 Balcony Railing

Balcony railing in M.S. of 1050 mm high up to fourth floor and 1200 mm high above fourth floor fixed in position as per the fixing details as indicated in the drawing. This item includes fabricating, erecting, preparing the surface, cleaned with sandpaper to remove scales & rust and applying a coat of red oxide, zinc chromate primer confirming IS: 2074, finished with Synthetic Enamel paint of approved shade at all levels and positions wherever required.

5.3 Plumbing Shaft Doors

- MS door Frame with shutter to be provided in plumbing shaft. Main frame shall be made/fabricated with MS angle iron frame 35 x 35 x 5 mm and fixed with MS Holdfasts as shown in the drawings. Holdfasts for doors irrespective of what is shown in the drawings shall be embedded in PCC 1:2:4 (type B-1) blocks built in brick work. The Door shutter Frame should be made/fabricated with MS angle frame 25 x 25 x 6.25 with 6 mm thick MS flat horizontally @ 150 mm c/c welded to angle iron frame and over that 3mm thick MS plain Sheet Welded to Frame. Horizontal member of 20 x 20 x 2.65 mm MS hollow section with including necessary fittings & fixers all complete as shown & detailed in drawing MS section shall conform to the relevant IS code. Two coats of anti-corrosive paint over a coat of primer shall be provided as per CPWD specifications.

6. WATER PROOFING & TERRACING

- Area as shown in drawings shall be rendered waterproof as per the treatment/process indicated in the drawings. Specifications for the work shall be as under for different type of treatment.

- Providing and laying water proofing treatment to vertical and horizontal surfaces of depressed portions of W.C., kitchen and the like consisting of:
  1) Providing and applying an acrylic polymer base cementetious coating in two coats as per manufacturer's instructions and applied over & including prepared concrete surface strictly maintaining the coverage specified by the manufacturer. Cost inclusive of material, labour for necessary surface preparation, etc complete. Testing of water proof by filling water for at least 7 days shall be done.
  2) Second course of 20mm cement plaster 1:4 (1 cement: 4 coarse sand) mixed with water proofing compound in recommended proportion including rounding off junction of vertical and horizontal surface.
  3) All sunken area to be filled with Cement Concrete consisting of 1:5:10 (1cement, 5 coarse sand, 10 brick aggregate 40mm nominal size)

6.1 Water Proof Plaster

- Exposed slabs of water tanks shall be treated with 6 mm thick cement plaster in cement mortar 1:3 (1 cement, 3 coarse sand) mixed with a waterproofing compound conforming to IS: 2645 in accordance with the manufacture specification stating the qty. of waterproofing mentioned in per 50kg of cement laid to slopes over R.C.C. slabs finished with floating coat of neat cement.
- It shall be cured for at least 7 days during which period it shall be suitably protected from damage. All aforesaid operations shall be deemed to be included in quoted rates.

6.2 Integral Cement Based Water Proofing for Terraces.

- Integral cement based water proofing treatment minimum 65 mm thick and average 150 mm thick consisting of following operations:

Providing and laying integral cement based water proofing treatment including preparation of surface as required for treatment of roofs, balconies, terraces etc consisting of following operations: a) Applying a slurry coat of neat cement using 2.75 kg/sqm of cement admixed with water proofing compound conforming to IS. 2645 and approved by Engineer-in-charge over the RCC slab including adjoining walls up to 300 mm height including cleaning the surface before treatment. b) Laying brick bats with mortar using broken bricks/brick bats 25 mm to 115 mm size with 50% of cement mortar 1:5 (1 cement : 5 coarse sand) admixed with water proofing compound conforming to IS : 2645 and approved by Engineer-in-charge over 20 mm thick layer of cement mortar of mix 1:5 (1 cement :5 coarse sand) admixed with water proofing compound conforming to IS : 2645 and approved by Engineer-in-charge to required slope and treating similarly the adjoining walls up to 300 mm height including rounding of junctions of walls and slabs c) After two days of proper curing applying a second coat of cement slurry using 2.75 kg/sqm of cement admixed with water proofing compound conforming to IS : 2645 and approved by Engineer-in-charge. d) Finishing the surface with 20 mm thick joint less cement mortar of mix 1:4 (1 cement: 4 coarse sand) admixed with water proofing compound conforming to IS : 2645 and approved by Engineer-in-charge including laying glass fiber cloth of approved quality in top layer of plaster and finally finishing the surface with trowel with neat cement slurry and making pattern of 300x300 mm square 3 mm deep. The whole terrace so finished shall be flooded with water for a minimum period of two weeks for curing and for final test. All above operations to be done in order and as directed and specified by the Engineer-in-Charge.

6.3 Khurra

- The Khurra shall be of 45cm x 45cm x 5cm deep provided in cement concrete of mix 1:2:4 (1 cement, 2 coarse sand, 4 graded stone aggregate 20 mm nominal size) at places shown in the drawings and the junction with the rain water pipes shall be treated with cement mortar 1:3 to provide a smooth flow of water. Cement concrete shall be laid to average thickness of 50 mm with its top surface lower than the level of adjoining roof surface by not less than 50mm. The concrete shall be laid to a size greater than the stipulated size of the khurra in such way that the adjoining terracing shall overlap the concrete

on its three edges by not less than 7.5 cm. The concrete will slope uniformly from the edges to the outlet, the slope being as much as possible and in no case less than 20mm cement concrete at outlet. The concrete shall be continued at the same slope through the width of the wall into the outlet opening to ensure watertight joint. The khurras and sides of the outlet shall then be rendered with 12 mm cement plaster 1:3 (1 cement, 3 coarse sand). This shall be done when the concrete is still green and shall be finished with floating coat of neat cement. The sides of the khurras and sides of the outlet opening shall be well rounded. Iron grating shall be provided at the outlet as a safeguard against choking. Iron gratings shall be of overall size 20 cm x 25 cm with an outer frame of 15mm x 3mm MS flat to which 4 nos. MS bars of 10 mm dia. shall be welded in the vertical direction keeping equal clear spacing of 2.5 cm. or as directed by the Architect. This item shall be executed and measured as per Clause No. 12.14 of CPWD Specifications Vol. I - 2009.

7. FINISHING

7.1 Plastering

7.1.1 Ceilings, Soffits & Waists

6 mm thick plaster in cement mortar 1:3 (1 cement, 3 fine sand) on Soffits of R.C.C. slabs, waist of staircases, bottoms of balconies, chajjas etc. and all ceilings. Plaster to be finished even and smooth including providing 10mm square grooves at the junction of wall and ceiling and provision of drip mould where ever specifically required by the Architect along with curing and scaffolding all complete at all levels. Any chiseling, chipping of wall or RCC surfaces to make the surface even and in plumb is deemed to be included in the rate quoted for the particular item including scaffolding, curing, etc. all complete at all levels and positions. Curing shall be started 24 hours after finishing the plaster. The plaster shall be kept wet for a period of seven days. During this period, it shall be suitably protected from all damages at the contractor's expense. The dates on which the plastering is done shall be legibly marked on the various sections plastered so that curing for the specified period thereafter can be watched. The plaster shall be finished to a true and plumb surface and to the proper degree of the smoothness as required. The work shall be tested frequently as the work proceeds with a true straight edge not less than 2.5 m long.

all jambs and corners with a plumb bob as the work proceeds. This item shall be executed as per Clause No. 13.1.4 CPWD Specifications Vol. II -2009. All aforesaid operations shall be deemed to be included in quoted rates.

7.1.2 Internal Plaster

Internal plaster 12 mm thick 1:6 mix (1 part cement, 6 parts fine sand) on walls of corridors, staircases walls or as mentioned in drawing. Chicken wire mesh of approved quality shall be fixed 6" on either sides of the junctions of R.C.C. and block/brick work with U-nails tightly and properly. Any chiseling, chipping of wall or RCC surfaces to make the surface even and in plumb is deemed to be included in the rate quoted for the particular item including scaffolding, curing, etc. all complete at all levels and positions. Curing shall be started 24 hours after finishing the plaster. The plaster shall be kept wet for a period of seven days. During this period, it shall be suitably protected from all damages at the contractor's expense. The dates on which the plastering is done shall be legibly marked on the various sections plastered so that curing for the specified period thereafter can be watched. The plaster shall be finished to a true and plumb surface and to the proper degree of the smoothness as required. The work shall be tested frequently as the work precedes with a true straight edge not less than 2.5 m long and with plumb bob. All horizontal lines and surfaces shall be tested with a level and all jambs and corners with a plumb bob as the work proceeds. All aforesaid operations shall be deemed to be included in quoted rates.

7.1.3 External Plaster

External Plaster 18mm thick, in two coats under layer 12mm thick cement plaster 1:5 (1 cement : 5 coarse sand) finished with a top layer 6mm thick cement plaster 1:6 (1 cement : 6 fine sand). Any chiseling, chipping of wall or RCC surfaces to make the surface even and in plumb is deemed to be included in the rate quoted for the particular item including scaffolding, curing, etc. all complete at all levels and positions. Curing shall be started 24 hours after finishing the plaster. The plaster shall be kept wet for a period of seven days. During this period, it shall be suitably protected from all damages at the contractor's expense. The dates on which the plastering is done shall be legibly marked on the various sections plastered so that curing for the specified period thereafter can be watched. The plaster shall be finished to a true and plumb surface and to the proper degree of the smoothness as

required. The work shall be tested frequently as the work precedes with a true straight edge not less than 2.5 m long and with plumb bob. All horizontal lines and surfaces shall be tested with a level and all jambs and corners with a plumb bob as the work proceeds. All aforesaid operations shall be deemed to be included in quoted rates.

8. FLOORING

8.1 Concrete Flooring

a) **Stilt/Ground Floor (No basement underneath)**

Sub floor in stilt floor (base concrete water floor finish) shall be 100mm thick P.C.C. 1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 40mm nominal size) laid over a layer of 40mm thick stone dust over 230mm thick dry stone rubble packing and void filled with stone chipping and the top of rubble packing truly leveled and dressed. These sub flooring shall be laid over well compacted earth.

b) **Plinth Protection**

Provision of plinth protection is made 750mm wide all around the building consisting of 75 mm thick CC 1:5:10 (1 cement :5 Coarse Sand: 10 Brick aggregate 40mm nominal size) as sub base over which 62 mm thick CC with cement hardener topping under layer 50mm thick cement concrete 1:2:4 (1 Cement: 2 Coarse Sand: 4 Graded stone aggregate) thick top layer of 12 mm thick with cement hardener consisting of mix 1:2 (1 cement & hardener compound mix:2 graded stone aggregate 6mm nominal size by volume). Hardener compound mixed at 2 liters per 50kgs of cement or as per manufactures specifications including finishing with cement slurry.

Brick edging laid length wise with half brick depth including excavation and refilling as protecting brick above flooring.

8.1.1 Kota Stone Flooring

a) Laying Kota stone flooring 20- 25 mm thick including providing stone, in staircases and as directed by the Architect to be used in flooring. To be laid over 20mm base of 1:4 cement mortar and jointed with gray cement slurry mixed with pigment to match the shade of stone over lean concrete sub-base

or R.C.C. slab as instructed by Architect including rubbing, polished to achieve mirror finish, cutting complete at all levels.

b) Laying Kota stone flooring 25 mm thick single piece including providing stone to be laid on treads and risers of staircase. To be laid over 20mm base of 1:4 cement mortar over vertical and horizontal surfaces of stairs at all levels including jointed with gray cement slurry mixed with pigment to match the shade of stone, rubbing, polishing to achieve mirror finish, cutting, nosing complete at all levels. Area of treads & risers of staircases shall be finished in one piece left after fixing of the border.

c) The complete job is to be done as per CPWD Specifications print including the cost of all materials and labour involved in all the operations described above cleaning of surface of RCC slab or base concrete, applying cement slurry, cutting, grinding, polishing to achieve mirror polish etc. all complete at all levels and positions. This item shall be executed as per Clause No. 11.21 of CPWD Specifications Vol. I - 2009 All aforesaid operations shall be deemed to be included in quoted rates.

8.1.2 Vitrified Tile Flooring

Providing & laying Vitrified tiles in all bed rooms, living rooms & common areas, as specified on the drawings, on 20 mm thick bed of cement mortar 1:4 (1 cement: 4 coarse sand) including grouting the joints with white cement and matching pigments etc. all complete. This item includes the cost of all materials and labour involved in all the operations described above including cleaning of surface of RCC slab, applying cement slurry, cutting etc. all complete at all levels and positions.

8.1.3 Anti skid Ceramic Floor Tiles

Providing & laying Self polished Anti skid tiles with cement mortar bedding 1:4 (1 cement, 4 coarse sand) 10mm thick over lean concrete sub-base cushion in all floors in toilets and balcony area including grouting, cleaning, complete at all levels in pattern as specified/directed.

This item includes the cost of all materials as supplied by the owner at issue rates and labour involved in all the operations described above including cleaning of surface of RCC slab, applying cement slurry, cutting etc. all complete at all levels and positions.

8.1.4 Ceramic Glazed wall Tiles

Laying Providing & laying Ceramic tiles in toilets & kitchen wall approximate thickness of about 9 mm of colours and shade as approved laid on 20 mm thick bed of cement mortar 1:4 (1 cement: 4 coarse sand) including pointing the joints with white cement and matching pigments etc. all complete at all levels. All aforesaid operations shall be deemed to be included in quoted rates.

8.2 DADOS

Providing & laying Glazed tiles to be laid over a bed of 15 mm thick cement mortar in coarse sand 1:3 finished with flush pointing including applying white cement on the joints, to be fixed in all toilets and in kitchens as indicated in the drawings.

This item includes the cost of all materials and labour involved in all the operations described above including applying cement slurry, cutting etc. all complete at all levels and positions

8.2.1 Skirting

Providing & laying 100mm high skirting on walls adjoining floor in all areas where ever the flooring has been provided as instructed by the Architects with the same finish supplied by the Development Authority to be laid over a bed of 10 mm to 12 mm thick cement mortar in coarse sand 1:3 as at the ends of floor as per CPWD Specifications Vol.- I civil work 2014 print. This item includes the cost of all materials and labour involved in all the operations including cleaning of surface, applying cement slurry, cutting, rubbing, polishing to achieve mirror finish, grinding, polishing etc. all complete at all levels. All aforesaid operations shall be deemed to be included in quoted rates.

8.3 Chequered Precast Concrete Tiles

Providing & laying Chequered Precast concrete tiles 30 mm thick jointed with neat cement slurry mixed with pigment to match the shade of tiles including rubbing and cleaning etc. complete on 20 mm thick bed of cement mortar 1: 4 (1 cement : 4 coarse sand) including the cost of making pattern given by the Architect etc. all complete at parking space.

8.4 GRANITE OVER KITCHEN PLATFORM

Fixing 18 mm thick polished Granite including providing stone over 50 mm thick R.C.C. slab to be laid over 20 mm base of 1:4 cement mortar over R.C.C. slab in two pieces as indicated in the drawings including rubbing, polishing to achieve mirror finish, edge moulding, cutting hole for gas pipe, making provision for fixing of sink or wash basin (oval or circular type) all complete as indicated in drawing. The slab will be finished in front with Granite strips and the bottom shall be plastered as per drawings and as per standard Engineering practice.

8.5 LIFT FASCIA

Lift Fascia shall be provided by Vitrified Tiles of size 600 mm x 600 mm, as specified & approved at location as shown in drawing. The base shall be 20 mm thick cement mortar 1:2 (l cement: 2 coarse sand). The joints shall be grouted with white cement with an admixture of pigment to match the colour of the tiles. The cut out in the tiles for switches, floor indicator lights etc. shall be provided and edges dressed neatly as directed by Architect. The work will be executed as per CPWD specifications.

9. ELECTRICAL WORK

9.1 Internal Electrical work (Scope):

General

The scope of work is limited to the provision of non-metallic (PVC) concealed conduits in slabs and walls and the scope also includes provision of metallic concealed boxes and fish wires at location as shown in drawing.

Checking of Drawings

Before commencing the conduiting work, the Contractor carefully examine the drawings indicating the layout of the conduits, check the number and size of the conduit with respect to number of wires, location of junction boxes, sizes and location of switch boxes and other relevant details, Any change suggested by the contractor shall be got approved from the Architects before the actual laying of conduits, Any discrepancy found in the drawings shall be brought to the notice of the Engineer-in-charge/Architect promptly before execution of the work.

9.2 Material

Conduits

All non-metallic (PVC) conduit pipes shall be of suitable material complying with IS: 2509- 1973 and IS : 3419-1976 for rigid conduits and IS : 6946- 1973 for flexible conduits. The interior of the conduits shall be free from obstruction. The rigid conduit pipes shall be ISI marked. No PVC conduit less than 25 mm diameter shall be used. The maximum number of PVC insulated copper conductor wire of 650/1100 volts grade that can be drawn in one conduit of various sizes is given in table below. Conduits sizes shall be selected accordingly.

Area of the wire Sq. mm	**Size of conduits (PVC)**			
	25	32	40	50
	Number of wires maximum(copper wire)			
1.5	8	14	-	-
2.5	6	12	-	-
4.0	6	10	14	-
6.0	5	8	11	-
10.0	4	7	9	-
16.0	2	4	5	12
25.0	-	2	2	6
35.0	-	-	2	5

- All the electrification would be done in insulated copper wiring in accordance with I.S.I. code and according to the approved drawing issued by the Architect including distribution board with approved make MCB's upto the electrical meter board.

  All the electrification works shall be executed as per following few specifications :-

  1. Copper wiring — Plaza, National
  2. Switches — Anchor (ordinary)
  3. MCB — Indo kopp, Havells
  4. PVC Conduit — AKG or Equivalent I.S.I. make

- **Street Light/LT Panels/HT Panels/Transformers :-** Shall be provided as per requirement with ISI marked components.

- **Power backup :-** Shall be provided only for common area lights, elevators and pumps.

9.3 Installation

- **Lift Elevator :**

  Providing and fixing of 02 Nos. elevators for each tower (One no. - 8 passenger capacity and one - service lift 13 passenger deeper car of OTIS/KONE/SCHINDLER make) with 1 m/sec. speed as per drawing. The lift shall be provided with powder coated doors and car, vinyl flooring, false ceiling, AC variable voltage and variable frequency type traction control, electromagnetic brake system, simple operation, operating panel with luminous buttons, over load warning indicator, battery operated alarm bell, CFL type emergency light, intercom suitable for hook upto Society EPBAX, infrared rays sensing door protection for suitable height, reverse phase relay on controller, fireman's switch at ground floor, car position indicator in car and at all positions indicator in car at all floors with UP/DOWN directions, light fixtures, ventilation fan etc. complete with all accessories including automatic rescue device.

- **Fire Fighting System :**

  Shall be provided as per fire fighting norms, as shown in drawings. The complete installation of Fire Fighting System shall strictly confirm to the minimum specifications and guidelines given in NBC-2005 (Part-IV), IS:13030 for external hydrant system, other relevant IS code of practice and CPWD specifications (Part-V) amended up to date.

- **Conduit Connections**

  All joints shall be sealed/cemented with approved cement. Damaged conduit pipes shall not be used in the work. Cut ends of conduit pipes shall have no sharp edges or any burrs left to avoid damage to the conductors.

- **External Development Work :-** Cement concrete roads, pathways, storm water drain, greenery with good soil, dumping manure, sludge and grass etc complete within the campus/boundary shall be provided as per drawing.

  1800 mm high Boundary wall all around shall be provided apart from Gate House/Guard Room, 6’ Brick work upto 4’ and grill 2’ height :-

- Pump Room and pumps of required capacity as per Architect suggestion and drawing supplied.
- Water harvesting system shall also be provided as per drawing.
- All aforesaid operations shall be deemed to be included in quoted rates.

10. MISCELLANEOUS

10.1 Precast RCC Jali

Providing and fixing precast cement concrete jali 50mm thick, in CC 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 6mm nominal size) reinforced with 1.6mm dia. mild steel wire including centering and shuttering, roughening cleaning, fixing and finishing in cement mortar 1:3 (1 cement : 3 fine sand) etc. complete excluding plastering of jambs, sills and soffits.

10.2 M.S. Door (only to Mumty & Machine rooms)

Providing and fixing 1mm thick M.S. sheet door with frame of 40x40x6mm angle iron and 3mm M.S. gusset plates at the junctions and corners, using flats 30x6mm for diagonal braces and central cross piece, all necessary fittings like locking arrangement, hinges, etc. including welding with existing frame complete, including applying a priming coat of approved steel primer. All aforesaid operations shall be deemed to be included in quoted rates.

11. TANKS OVER TERRACE & UNDER GROUND TANKS

Are included in the scope of work and shall be executed without any extra cost. These structures and other water/liquid retaining structures shall be made water proof by providing injection grouting, 12mm plaster mixed with water proofing compound and finished with commercial tiles.

TABLE – I

Basic rates of various items, after discount, are mentioned in the following Table. Contractor is supposed to quote his turnkey rate considering these basic rates.

Sr. No.	Item	Rate (in Rs.)	Unit per
1.	Vitrified floor tiles 600x600x10 mm	40.00	Sq.Ft.
2.	Vitrified floor tiles 600x600x10mm (Common Area)	40.00	Sq.Ft.
3.	Ceramic glazed wall tiles	30.00	Sq.Ft.
4.	Anti skid ceramic floor tiles (Toilet & Balcony)	25.00	Sq.Ft.
5.	35 mm thick Flush Door Shutter	2600.00	Sqm.
6.	Mortice Door lock with handles(Entrance Door)	800.00	For Door shutter
7.	Mortice Door lock with Latch (Bed rooms & Toilets)	400.00	For Door shutter
8	Polished Granite 16-18 mm thick	90	Sq. Ft.

TABLE – II

Makes and Model reference nos. of various Chinaware, C.P. fittings and S.S. kitchen sink are mentioned in the following Table. While quoting the rates of relevant items, Contractor shall consider the rates of the makes & models as per the given Table.

Sr. No.	Item	Make	Model Reference no.
1.	C.P. Shower Head	Jaquar	OHSCHR-1989
2.	C.P. Shower Arm	Jaquar	SHA-CHR-477P
3.	C.P. Health Faucet	Jaquar	Jaquar
4.	C.P. Angle Stop Cock	Jaquar	AQT-CHR-3057N
5.	C.P. Bath Mixer	Jaquar	KLN-CHR-19273 UPR
6.	C.P. Wash Basin Mixer	Jaquar	KLN-CHR-19167B
7.	C.P. Sink Mixer	Jaquar	KLN-CHR-19309
8.	C.P. Long Body/Short body Bib Cock	Jaquar	Jaquar
9.	S.S. Kitchen Sink	Neelkanth	Neelkanth
10.	W.C. (Floor Mounted Commode)	Hindware	SLICK-20011 with Cistern & Seat Cover
		Cera	Conventional 2008 with Cistern & Seat Cover
11.	Wash Basin without Pedestal	Hindware	CLEO-10012
		Cera	CADAL-2810

TABLE – III

APPROVED MAKES

CIVIL WORK

SL. NO.	ITEM	MAKE
1.	GREY CEMENT	BIRLA / JK / ACC / ULTRATECH / L&T
2.	WHITE CEMENT	BIRLA CEMENT / JK CEMENT
3.	REINFORCEMENT/STRUCTURAL STEEL TMT Fe 500D	SAIL / RINL / TISCO
4.	ANTI-TERMITE TREATMENT	PEST CONTROL INDIA LTD / PEST CON INDIA / PEST CONTROL INCORPORATED
5.	CONCRETE ADDITIVE	FOSROC / CICO-TL / SIKA
6.	FLUSH DOORS	DURO / CENTURY / ALPRO / ARCHIDPLY
7.	MORTICE LOCKS & LATCHES	GODREJ / HARRISON
8.	ALUMINUM SECTIONS	JINDAL / HINDALCO / INDAL
9.	ALUMINUM FITTING	CLASSIC / ARGENT
10.	GLASS	SAINT GOBAIN / ASAHI
11.	CERAMIC TILES	KAJARIA / SOMANY / JOHNSON
12.	VITRIFIED TILES	KAJARIA / ORIENT
13.	PRIMER	BERGER / ASIAN
14.	SYNTHETIC ENAMEL PAINTS	BERGER (LUXOL GOLD) / ASIAN (APCOLITE)
15.	TEXTURED PAINT	BERGER (LUXOL GOLD) / ASIAN / SPECTRUM
16.	OIL BOUND DISTEMPER	ASIAN (TRACTOR) / BERGER (BISON) NEROLAC (SUPER ACRYLIC)
17.	CEMENT PAINT	SNOWCEM PLUS / BERGER (DUROCEM EXTRA) / NEROLAC (NEROCEM WITH TITANIUM)
18.	PLASTIC EMULSION PAINT	ASIAN / BERGER
19.	INTERNAL ACRYLIC PAINT	ASIAN PAINTS / ICI (DULUX) / BERGER
20.	NON METALLIC HARDENER COMPOUND	FOSROC / STP / CICO / SIKKA
21.	CEMENT CONCRETE PAVER BLOCKS	NITCO / UNISTONE / OR AS APPROVED BY ENGINEER-IN-CHARGE
22.	POLYETHELENE FILLER BOARD	SUPREME / SOFTEX / IMPERIAL IMPEX
23.	POLYURETHANE SEALANT	STP / SAB FLEX PU / BOSTIK INDIA PVT. LTD. / ANABOND / I BOND
24.	WATER PROOFING COMPOUND	CICO / SIKA / STRUCTURAL WATERPROOFING
25.	FIRE DOORS	AGNI SURAKSHA / NAVAIR / PACIFIC FIRE CONTROL
26.	uPVC PIPES & FITTINGS (UNPLASTICIZED POLYVINYL PIPES)	SUPREME / PRINCE
27.	cPVC PIPES (CHLORINATED POLYVINYL PIPES)	ASTRAL / FLOWGUARD
28.	TELEPHONE CABLES	VARSHA / SIGMA / SELTON
29.	TELEPHONE TAG BLOCKS	KRONE
30.	TELEPHONE SOCKET RJ11	ISI MARKED

SL. NO.	ITEM	MAKE
31.	VALVES	ZOLOTO / SANT
32.	MEDIUM DUTY CI MANHOLE COVER	NECO / BIC
33.	STONEWARE PIPES	ISI MAKE
34.	HUME PIPES OF NP2 CLASS AS PER IS-458:2003	ISI MAKE

EXTERNAL ELECTRICAL WORKS

SL. NO.	ITEM	MAKE
1.	MCCB	ABB (TMAX) / L&T (D SINE) / SCHNEIDER (COMPACT NXS/NS)
2.	MPCB	ABB / L&T / SCHNEIDER
3.	AIR CIRCUIT BREAKER	ABB (E MAX) / L&T (U POWER OMEGA) / SCHNEIDER (MASTERPACT NW)
4.	SWITCH FUSE UNIT WITH HRC FUSES	L&T / ABB / SCHNEIDER
5.	CONTACTORS/RELAYS	L&T / ABB / SCHNEIDER
6.	CURRENT TRANSFORMERS	KAPPA / AE
7.	VOLTAGE TRANSFORMERS	KAPPA / AE
8.	AMMETERS/VOLTMETERS AND METERING EQUIPMENTS	L&T / SIEMENS / AUTOMATIC ELECTRIC
9.	SELECTOR SWITCHES	KAYCEE / L&T
10.	LED LAMPS	L&T / VAISHNO / SIEMENS
11.	CHANGE OVER SWITCHES	GE / L&T / HH ELCON / ABB
12.	PVC/XLPE INSULATED 11 KV CABLES	UNIVERSAL (SATNA) / POLYCAB / SKYTONE
13.	PVC/XLPE INSULATED 1.1 KV CABLES	UNIVERSAL (SATNA) / FINOLEX / POLYCAB
14.	CONTROL CABLES/WIRES	UNIVERSAL (SATNA) / FINOLEX / POLYCAB
15.	H.V. CABLE TERMINAL JOINTS	RAYCHEM / 3M / M-SEAL
16.	LUGS	DOWELLS / COMET / HEX
17.	CABLE GLANDS	SIEMENS / COMET / GRIPPWEL
18.	CABLE TRAY	INDIANA / BHARTI / SLOTCO
19.	EXTERNAL LIGHTING FITTING	PHILIPS / WIPRO / SCHREDER / BAJAJ / LIGMAN
20.	ELECTRONIC ENERGY METERS	SECURE / CRYSTAL
21.	DUAL METERING SYSTEM WITH SOFTWARES	SECURE / CRYSTAL
22.	ENERGY ANALYZER (WITH RS 485 PORT)	ENERCON / L&T / CONZERV
23.	UPS/INVERTOR	EMERSON / POWERWARE / APC
24.	11 KV/0.4 KV – COMPACT SUBSTATION	ABB / SCHNEIDER
25.	11 KV RMU PANEL	ABB / SCHNEIDER
26.	DG SETS (OEM)	JAKSON / STERLING / TIL {ENGINE - CUMMINS, MTU, PERKING AND CATERPILLAR, {ALTERNATOR - STAMFORD/LEROY SOMER}
27.	MAIN L T PANEL, SUB PANELS & BUS DUCT/RISING MAINS FABRICATORS	TRICOLITE / AMBIT / VIDUT CONTROL (GHAZIABAD)
28.	PLC	ALLEN BRADLEY / MITSUBISHI

SL. NO.	ITEM	MAKE
29.	ALUMINUM BUS BARS (ELECTROLYTIC GRADE)	HINDALCO / CENTURY / JINDAL
30.	CAPACITOR	DUCATI / EPCOS
31.	APFC RELAY	DUCATI / EPCOS
32.	BATTERY CHARGING PANEL	KELTRON / NELCO / VOLT STAT
33.	BATTERIES	EXIDE / AMCO / STANDARD
34.	FIRE SEALANT	BIRLA 3M / HILTI / NU GREEN
35.	ANY OTHER ITEMS	ON APPROVAL OF ARCHITECT OR ENGINEER-IN-CHARGE

FIRE FIGHTING SYSTEM

SL. NO.	ITEM	MAKE
1.	HYDRANT VALVES/FIRE BRIGADE INLET/DRAWOUT	NEWAGE / SAFEGUARD / PADMINI / GETECH
2.	SLUICE VALVES/BUTTERFLY VALVES/NON RETURN VALVES	IVC / VENUS / AUDCO / ADVANCE / SKS / CRI / AIP
3.	AIR RELEASE VALVES	NEWAGE / CIM / LEADER / SANT
4.	STRAINERS	ADVANCE / AUDCO / SKS / AIP
5.	FIRE EXTINGUISHERS	MINIMAX / CEASE FIRE / SAFEX / SAFEGUARD / UFS
6.	FIRE MANS AXE	NEWAGE / SAFEGUARD / PADMINI / GETECH
7.	BRANCH PIPE AND NOZZLE	NEWAGE / SAFEGUARD / PADMINI/GETECH
8.	GALVANIZED IRON PIPE/MS PIPE - IS : 1239	JINDAL (HISSAR) / PRAKASH SURYA
9.	G.I./MS/M.I. FITTINGS	UNIK / JAINSONS
10.	DUCTILE IRON FITTINGS	JAINSONS INDUSTRIES
11.	FIRE HOSE PIPE	NEWAGE / JAYSHREE / PADMINI / SAFEGUARD / GETECH / MITRAS
12.	HOSE REEL	NEWAGE / SAFEGUARD / PADMINI / GETECH / MITRAS
13.	ANCHOR FASTENER/U CLAMP/CELVIS/SPRINKLER HANGERS	HILTI / INTELLO TECH / HIGHTECH / FISHER / EASYFLEX
14.	EXIT SIGN	GLOW LIGHT / LEGRAND / AUTOGLOW / PIERLITE / AGNI SURAKSHA (ASES) / AGNI DEVICES
15.	PAINT	ASIAN / BERGER / NEROLAC / ICI
16.	ANY OTHER ITEMS	ON APPROVAL OF ARCHITECT OR ENGINEER-IN-CHARGE