buildings, access and other temporary works.

- General information of all construction, pumping, washing of sand and aggregate, excavation, piling, haulage, erection and other plant and equipment
- Provisions for dealing with water encountered on the works.
- Order in which the Contractor proposed to executed the temporary and permanent works to be indicated by diagrams and descriptions. This will be subject to adjustment and approval by the Architect
- A bar chart indicating the work planning & programming by the contractor.

30. Blasting:

- Where blasting has to be resorted to for rock cutting, it shall be the responsibility of the contractor to arrange for the following at his entire risk, cost and responsibility.
- Permission from all the connected public authorities such as Municipal Corporation Inspector of Explosives, Police, and Highway Authorities etc. shall be obtained.
- Fees, Royalties and any other levies attendant on such blasting work shall be entirely borne by the contractor.
- All precautionary measures such as notices to adjoining property and other agencies working in and around the plot, sign alling and watch etc. Shall strictly adhere to according to the various regulations in force

- All Risk Insurance in respect of the blasting hazard s to men and materials within and in the vicinity of the plot. This insurance shall be apart from the Contractors All Risk Insurance Police stipulated under General Conditions unless the Contractor incorporates blasting hazards and its coverage in the said general policy.

Signature of the Contractor

SAFETY CODE

(I) Suitable scaffolds shall be provided for workmen for all works that cannot safely be done from the ground, or from solid construction except in the case of short duration work, which can be done safely from ladders. When a ladder is used, it shall be of rigid construction made either of good quality wood or steel. The steps shall have a minimum width of 450 mm and a maximum rise of 300 mm. Suitable hand holds of good quality wood or steel shall be provided and the ladder shall be given an inclination not steeper than ¼ to 1 (¼ horizontal and 1 vertical).

(II) Scaffolding or staging more than 4 m. above the ground floor, swung or suspended from an overhead support or erected with sanitary support shall have a guard rail properly bolted, braced or otherwise secured, at least 1 m. above the floor or platform of such scaffolding or staging shall be so fastened as to prevent it from swaying from the building or structure.

(III) Working platforms, gangways and stairways shall be so constructed that they do no sag unduly or unequally and if the height of the platform, gangway or stairway is more than 4 m. above ground level or floor level, they shall be closely boarded and shall have adequate width and be suitably fenced as described in (ii) above

(IV) Every opening in the floor of a building or in a working platform with suitable means to prevent the fall of persons or materials or railing whose minimum height shall be 1.00m. Whenever there are open excavations in ground, they shall be fenced off by suitable railing and danger signals installed at night so as to prevent persons slipping into the excavations.

(V) Safe means of access shall be provided to all working places Every ladder shall be securely fixed. No portable single ladder shall be over 9 m. in length while the width between side rails in rung ladder shall in no case, be less than 290 mm, for ladder up to and including 3 m. in length. For longer ladders this width shall be increased at least 20 mm for each additional meter of length.

(VI) A sketch of the ladders and scaffolds proposed to be used shall be prepared and approval of the Engineer obtained prior to construction.

Other Safety Measures

(VII) All personnel of the contractor working within the plant site shall be provided with safety helmets. All welders shall wear welding goggles while doing welding work and all metal workers shall be provided with safety gloves. Persons employed on metal cutting and grinding shall wear safety glasses.

(VIII) Adequate precautions shall be taken to prevent danger from electrical equipment. No materials on any of the sites of work shall be so stacked or placed as to cause danger or inconvenience to any person or the public.

(IX) Excavation & Trenching

All trenches, 1.25 m. or more in depth shall at all times be supplied with at least one for each 30 m. in length or fraction thereof. The ladder shall be extended from bottoms of the trench to at least 1 m. above the surface of the ground. Sides of trenches which are1.5 m. or more in depth shall be stepped back to give suitable slope or securely held by timber bracing so as to avoid the danger of sides collapsing.

(X) The excavated materials shall not be placed within 1.5 m. of the edges of the trench or half of the depth of the trench whichever is more. Cutting shall be done from top to bottom. Under no circumstances undermining or undercutting shall be done.

(XI) The contractor shall take all measures on site of the work to protect the public from accidents and shall be bound to bear the expenses of every suit, action or other proceedings at law that may be brought by any persons for injury sustained owing to neglect of the precautions and to pay any such persons or which may with the consent of contractor, be paid to compromise any claim by any such person.

Demolition

(XII) Before any demolition work is commenced & also during the process of the work.

- All roads open areas adjacent to the work site shall either be closed or protected.
- No electric cable or apparatus, which is liable to be a source of danger over a cable or apparatus used by the operator, shall remain electrically charged.
- All practical steps shall be taken to prevent danger to persons employed from the risk so over loaded with debris or materials as to render it unsafe.

Personal Safety Equipments

(XIII) All necessary personal safety equipment like helmets, safety belts etc as considered adequate by the Architect should be kept available for the use of the person employed on the site and maintained in a condition suitable for immediate use, and the contractor should take adequate steps to ensure proper use of equipment by those concerned.

- Workers employed on mixing asphaltic materials, cement and lime mortars shall be provided with protective footwear and protective goggles. Those engaged in white washing and mixing or stacking of cement bags or any materials, which are injurious to the eyes, shall be provided with protective goggles. Those engaged in welding works shall be provided with welder's protective eyesight lids.

Stonebreakers shall be provided with protective goggles and protective clothing and seated at sufficiently safe intervals. When workers are employed in sewers and manholes, which are in use, the contractor shall ensure that the manhole covers are opened and are ventilated at least for an hour before the workers are allowed to get into manholes and the manholes so opened shall be cordoned off with suitable railing and provided with warning signals or boards to prevent accident to the public

- The contractor shall not employ men below the age of 18 years. Women of any age shall not be engaged for the work of painting with products containing lead in any form. Whenever men above the age of 18 years are employed on the work of lead painting the following precautions should be taken. No paint containing lead or lead products shall be used except in the form of paste or readymade paint. Suitable facemasks should be supplied for use by the workers when paint is applied in the form of spray or a surface having lead paint dry rubbed and scraped. Overalls shall be supplied by the contractor to the workmen and adequate facilities shall be provided to enable the working painters to wash during the cessation of work. When the work is done near any public place where there is risk of accidents all necessary equipments should be provided and kept ready for use and all necessary steps taken for prompt rescue of any person in danger and adequate provision should be made for prompt first aid treatment of all injuries likely to be sustained during the course of the work.

Hoisting Machines

(XIV) Use of hoisting machines and tackle including their attachments anchorage and supports shall conform to the following standards or conditions.

(a) These shall be of good mechanical constructions, sound materials and adequate strength and free from patent defect and shall be kept in good working condition with necessary preventive maintenance

(b) Every rope used in hoisting or lowering materials or as means of suspension shall be of durable quality and adequate strength and free from patent defects.

(c) Every crane driver or hoisting appliance operator shall be properly qualified and no person under the age of 21 years shall be anchorage of any hoisting machine including any scaffolding without signals to operator

(d) In case of every hoisting machine and of every chain ring hook, shackle shovel and pulley block used in hoisting or as means of suspension the safe working load shall be ascertained by adequate means. Every hoisting machine and all gear referred to above shall be plainly marked with the safe working load, each safe working load and the conditions under which it is applicable shall be clearly indicated. No

part of any machine or any gear referred to above in this paragraph shall be loaded beyond the safe working load except for the purpose of testing.

(XV) In case of department machines, the safe working load shall be notified by the Engineer. As regards contractor's machines, the contractor shall notify the safe working load of the machine to the Engineer whenever he brings any machinery to site of work and get it verified by the Engineer concerned.

- Motors, gearing transmission, electric wiring and other dangerous parts of hoisting appliances should be provided with efficient safeguards, hoisting appliances should be provided with such means as will reduced to minimum of risk of any part of a suspended load becoming accidentally displaced. When workers are employed on electrical installations, which are already energized, insulating mats, wearing apparel such as gloves, sleeves and boots as may be necessary, should be provided. The workers should not wear any rings, watches and carry keys or other materials, which are good conductors of electricity.
- All scaffolds, ladders and other safety devices mentioned or described herein shall be maintained in safe condition and no scaffold, ladder or equipment shall be altered or removed while it is in use. Adequate washing facilities should be provided near the place of work.

(XVI) These safety provisions should be brought to the notice of all concerned by display on a notice board at a prominent place at work spot. The person responsible for compliance of the safety code shall be named therein by the contractor.

(XVII) To ensure effective enforcement of the rules and regulations relating to safety precautions the arrangements made by the contractor shall be open to inspection by the Labour Officer, Engineers of the Department or their representatives.

(XVIII) Notwithstanding the above clause from (i) to (xv), there is nothing in these to attempt the contractor from the operation of any other Act or Rule in force in the Republic of India

Witness

Signature of Contractor
Address

APPENDIX1
TIME SCHEDULE

1. Period of completion :	15(fifteen) months including monsoon season.
2. Defects Liability Period (DLP	12(twelve) months from the date of Completion of Work.
3. Date of Commencement	14th day from the date of issue of Work Order.
4. Liquidated Damages for Delay	As mentioned in the Clause no.15 of General Conditions of Contract.
5. Period of final measurement	60(Sixty) days from the date of virtual completion
6. Value of work for Interim Certificate	Minimum of Rs40.00(Fourty Laks) Lakh
7. Period of honouring interim Certificate	30 days from the date of receipt of certified bill by IBTRD from the Architect.
8. Period of honouring Final Certificate	3(three) months from the date of receipt of Architectects certificate for the final bill to the IBTRD.
9. Total Security Deposit (Maximum)	As per clause no.11 of general conditions of contract.
10. Initial Security Deposit	2% of Contract Sum(including EMD)
11. Retention Money	8% of interim bill amount subject to the ceiling of the total security deposit (see clause 11) of General Conditions of Contract.
12. Earnest Money Deposit	**Rs. 4,00,000/-**
13. Date of Pre Bid Meeting	**17 / 10 / 2019 at 11.00 Am**

SIGNATURE OF CONTRACTOR

APPENDIX2
RUNNING A/C BILL

BILL FORMAT

1. Name of work :
2. Name of owner :
3. Name of Contractor :
4. Accepted contract amount :
5. Date of commencement :
6. Stipulated date of completion :
7. Actual date of completion :
8. Extension, if any :
9. Insurance valid upto :
   a) Workmen Compensation Act :
   b)Contractor's all risk Comprehensive :
10. Labour license no. and date & valid upto :
11. Serial no. of this bill :
12. No. & date of this bill :
13. Ref. to agreement no. :
14. Earnest money deposit :
15. Total retention money excluding E.M. as per contract :
16. Total retention money excluding which this bill has been prepared (Date to be mentioned) :

Sr.No	Item Description	Unit	Rate (**Rs**)	As per tender		Upto previous R/A Bill		Upto date (Gross)		Present bill	Remarks
				Qty	Amount (**Rs**)	Qty	Amount (**Rs**)	Qty	Amount		

Note:

i) If part rate is allowed for any items, _____
It should be indicated with reasons alue (A) since previous bill
For following such rate.

ii) If adhoc payment is made, it should be mentioned specially.

Signature of the Contractor

MEMORANDUM FOR PAYMENT

RUNNING BILL NO. _____

Total amount due since previous bill (A+B). **Rs**_____

Total amount due to the contractor **Rs** _____ (C)

DEDUCTIONS

i. Secured advance paid in the previous R/A Bill. **Rs**_____
ii. Retention money on value of work as per accepted tenders upto date

Rs _____

Less: Already recovered ()
Rs _____
Balance to be **Rs** _____
Recovered **Rs** _____

iii. Mobilization Advance, if any

a) Outstanding amount (Principal + int) as on date. **Rs** _____

b) To be recovered in this bill. **Rs** _____

iv. Any other Departmental material cost to be recovered as per contract, if any

v. Any other Departmental Material service charges to be covered if any, as per contract
(water, power, etc.) Enclosed statements. **Rs**_____

Total Deduction as per contract **Rs** _____

() **Rs** _____ (D)

Net amount payable as per contract (CD) **Rs** _____

(Rupees _____) in words.

CERTIFICATE

The measurements on the basis of which the above entries in the Running Bill no. _____ were made have been jointly measured on _____ and are recorded at pages _____ to _____of measurements book no. _____. The work recorded in the above mentioned measurements have been done at the site satisfactorily as per tender drawn conditions and specifications

_____ _____ _____

Signature of Contractor Signature of Site engineer Signature of Architect

Date: Date: Date:
Place Place Place

We hereby certify that an amount of _____
(Rupees _____ only) may be paid to
M/s _____against bill No……..dated…….. as per details shown vide our letter no. ……
Dated……..subject to deduction towards previous payments, retention money and taxes.

_____
Signature of Architect

Date:
Place

STATUTARY DEDUCTIONS :

1. Total amount due **Rs** _____
2. Less: I.T. payable

Net payable **Rs** _____

The figures given in the memorandum for payment has been certified and the bill passed for
payment _____ towards and figures.

3_____
Signature of the Employer

Date: _____

APPENDIX3

FORMAT FOR RATE ANALYSIS OF ITEMS

MATERIAL

1. Basic Cost of Material	**Rs**_____
2. Wastage – 5%	**Rs**_____
II. Labour: As per Standard Labour output and labour input required for the Particular item using quoted labour rates	**Rs**_____
III. Machinery / Tools Inputs of Machinery / Tools requirements as per the item and hire charges as per market	**Rs**_____
TOTAL (I) + (II) + (III)	**Rs**_____
IV. Tax Liability [as per contractual clauses will be added]	**Rs**_____
V. Add – ½ % for water charges ½ % for Electricity	**Rs**_____
VI. Any other Expenditure (please specify)	**Rs**_____
TOTAL	
Contractor Profit & OH – 15%	**Rs**_____
GRAND TOTAL	**Rs** _____

TDS will be deducted as per standard norms and recovery shall be made for water and electricity as per tender conditions.

APPENDIX4

CONTRACT AGREEMENT FORMAT

(CONSTRUCTION OF BUILDINGS FOR INDIAN BANK TRAINING INSTITUTE)

This agreement made on this _____ day of the month of ____ in the year Two thousand Fifteen **(_____2019)** BETWEEN, INDIAN Bank Trust For Rural Development (IBTRD), a TRUST recognized under Section 12(A) of Income Tax Act, 1961 and enjoying IT benefit under Section 80(G) of IT Act, having its Trust Secretariat at Indian Bank, Rural Development Section, Corporate Office, Plot No.254 - 260 Avvai Shanmugham Salai, Royapettah,, Chennai 560 002 represented by the Managing Trustee its duly constituted attorney (hereinafter referred to as IBTRD Trust) of the ONE PART;

AND

M/s._____ duly represented by its Proprietor/Partner _____, aged _____years, S/o Sri _____, residing at _____ and having their office at _____ (hereinafter called the Contractor) of the other part.

WHEREAS IBTRD Trust is desirous of undertaking the Construction of buildings for its Training Institute at and has accepted the tender opened on _____ furnished by the contractor & the contractor has agreed to perform the services as set out and subject to the terms & conditions set forth in the said documents mentioned herein under

NOW THIS AGREEMENT WITNESSETH as follows:

1. In this agreement words and expression shall have the same meanings as are respectively assigned to them in the conditions of contract hereinafter referred to.

2. The following documents not inconsistent with these presents shall be deemed to form and be read and construed as part of this agreement viz,

a) Notice inviting Tender

b) The Tender Document comprising Tender Notice, instruction to tenderers, General Conditions of the Contract, Appendix 1 to 6 to General Conditions of Contract, Special Conditions of Contract, Technical Specifications (Schedules A, B & C), Notes to Schedule of quantities, preferred makes of materials, Schedule of quantities for Civil, Plumbing, Sanitary & Electrical works, Tender Drawings / Sketches

c) Safety code and Model rules for the protection of health, sanitary arrangements for workers employed

d) Corrigendum to tender document if any

e) Letter from contractor dt._____ in response to the negotiation meeting discussions held on _____

f) Letter of Acceptance issued to contractor by Bank – letter No._____ DT……..

g) Letters from and to the Contractor, if any, leading to and prior to acceptance letter

3. In consideration of the payments to be made by IBTRD Trust to the Contractor the Contractor hereby covenants and agrees with the Bank to construct, complete and perform the works in conformity in all respects and subject to all terms and conditions/rules as mentioned in the aforesaid documents which shall from part of this agreement.

In witness whereof, the parties hereunto have set their respective hands and seals the day and year first above written.

For & on behalf of the IBTRD Trust with seal

For & on behalf of Contractor with seal

APPENDIX – 5

INDEMNITY BOND FORMAT

(CONSTRUCTION OF BUILDING FOR TRAINING INSTITUTE OF INDIAN BANK TRUST FOR RURAL DEVELOPMENT (IBTRD) SITUATED AT _____)

THIS DEED OF INDEMNITY BOND is made on this _____ day of _____ month of year two thousand nine **(**_____**)** By M/s _____ duly represented by proprietor / one of its partners Sri _____, aged _____ years, son of Sri _____, residing at _____..

Where as I am the authorized partner of M/s _____, and had applied for prequalification of contractors for Construction of Buildings for Building for Training Institute of IBTRD Trust situated at_____.

Whereas My Company was short listed for issue of tenders and my company became successful in securing the subject work through competitive tendering and the work of Construction of Building for Training Institute of INDIAN Bank Trust For Rural Development (IBTRD) situated at _____ have been entrusted to M/s _____.

And whereas for undertaking the construction work, my company has entered into contract agreement on _____.

Now this Deed Witnessed that in pursuance of the aforesaid contract agreement **dt.**_____ and in consideration of IBTRD Trust having agreed to make payments on the running bills claimed by my company based on the works completed by my company in respect of Construction of Building for Training Institute of IBTRD Trust situated at , and referred to above,

I hereby undertake to indemnify and keep harmless the IBTRD Trust & its project Architect from any damages, prosecution, other legal suits and claims arising out of any mishaps occurring at the site due to faulty work, faulty construction and for violating rules and regulations for which I shall be solely responsible.

Signature of Contractor

Witness: With seal

1.

2.

APPENDIX 6

PERFORMANCE GUARANTEE FORMAT

AGREEMENT TO BE EXECUTED BY CONTRACTORS FOR REMOVAL OF DEFECTS AFTER COMPLETION IN RESPECT OF WATER PROOFING WORKS

This Agreement made on this……..day of the month of…….year Two Thousand Ninteen (2019)between M/s……represented by Mr……..(hereinafter called the CONTRACTOR of the one part) and INDIAN Bank Trust For Rural Development (IBTRD), a TRUST recognized under Section 12(A) of Income Tax Act, 1961 and enjoying IT benefit under Section 80(G) of IT Act, having its Trust Secretariat at INDIAN Bank, Rural Development Section, Corporate Office, Plot No.254 - 260 Avvai Shanmugham Salai, Royapettah,, Chennai 560 002 represented by the Managing Trustee (hereinafter called IBTRD Trust on the other part), WHEREAS, this Agreement is supplementary to a Contract (hereinafter called the CONTRACT) dated ..20 12 and made between the Contractor of the one part and IBTRD Trust on the other part, whereby the

Contractor, interalia, undertook to render the works executed in in the said Contract recited completely water and leak proof, AND WHEREAS, the Contractor agreed to give a guarantee to the effect that the said water proofed areas will remain water and leak proof for FIVE YEARS from the date of giving water proofing treatment as certified by Architect of project i.e., from ..2011,

NOW, the contractor hereby guarantees that water proofing treatment given by them will render the structures completely leak proof and the minimum life of such water proofing treatment shall be five years to be reckoned from the date of giving water proofing treatment, mentioned herein above.

Provided that the contractor will not be responsible for leakage caused by earthquake or structural defects or misuse of roof or alteration and for such purpose:

(a) misuse of roof shall mean any operation which will damage proofing treatment, like chopping of fire wood and things of the same nature which might cause damage to the roof;

(b) alteration shall mean construction of an additional storey a part of the roof or construction adjoining to existing roof whereby water proofing treatment is removed in parts;

c) Alteration shall also mean construction of basement by adjoining building owners;

d) The decision of IBTRD Trust with regard to the cause of leakage shall be final.

During this period of guarantee, the Contractor shall make good all defects and in case of any defect being found, render the building water proof to the satisfaction of IBTRD Trust at their cost and shall commence the work for such rectification within seven days from the date of issue of the notice from the Engineer in charge calling upon them to rectify the defects, failing which the work shall be got done by the Department by some other party at the contractor's cost and risk. The decision of IBTRD Trust as to the cost payable by the contractor shall be final and binding.

AND WHEREAS, the contractor has agreed to deposit an amount **Rupees** being 5% of the actual cost of **Rupees** of such water proof works, with IBTRD Trust.
On successful completion of Guarantee Period, the deposited amount, along with accrued interest, shall be paid by IBTRD Trust to the contractor.

That if contractor fails to execute the water proofing or commits breach there under, the contractor will indemnify the Bank and its successors against all loss, damage, cost, expense or otherwise which may be incurred by the Bank by reason of any default on the part of the contractor in performance and observance of this Supplementary Agreement, INDIAN Bank shall forfeit deposit amount if contractor fails to execute the defects, if any, and may claim damages. As to the amount of loss and/or damage and/or cost incurred by IBTRD Trust, the decision of IBTRD Trust will be final and binding on the parties.

IN WITNESS WHEREOF these presents have been executed by the contractor M/s and by the Managing Trustee for and on behalf of IBTRD Trust on the day, month and year first above written.

SIGNED, Sealed and Delivered by CONTRACTOR.

SIGNED for and on behalf of IBTRD Trust

SCHEDULE A
TECHNICAL SPECIFICATIONS
FOR
CIVIL WORKS

1. GENERAL

a) The Technical Specifications in respect of all materials to be used, method of execution, workmanship and quality for each item of the work shall confirm to the latest Indian Standard.

b) In case where the specifications in the drawings or those given in schedule of quantities are found wanting, the latest IS specifications shall hold good.

c) Whenever reference has been made to Indian Standard or any other specifications, same shall mean to refer to latest specifications irrespective of any particular edition in the specifications below or in schedule of quantities.

2. WORKMANSHIP

The workmanship shall be the best of its kind and shall conform to Specifications as per relevant Indian Standard Specifications in every respect or the latest trade practice and shall subject to the approval of the Architect. All materials and / or workmanship which in the opinion of the Trust/Architect is defective or unsuitable shall be removed immediately from the site and shall be substituted with proper materials and/ or workmanship forthwith

3. MATERIALS

a) All materials shall be best of their kind and shall conform to the latest Indian Standards.

b) All materials shall be of approved quality as per samples and approved by the trust.

c) A set of specimen samples of all approved materials shall be kept at site as well as in the office of the engineer, the cost of which to be borne by the contractor.

i) Cement: Shall comply with the latest specifications confirming to IS: 8112 for 43 grade OPC and IS 12269 for 53 grade cement as per preferred makes listed in this document

ii) Reinforcement: High Yield Strength deformed bars conforming to IS 1786 – 1990 Fe 500(thermo mechanically treated bars) and Mild Steel confirming to IS432(part1).

iii) Coarse Aggregate: Shall be of the best quality, hard machine crushed stone free from earth or any organic matter etc. Suitably graded and shall conform to IS: 383-1990

iv) Sand: Shall be river sand clean, sharp, strong, angular and composed of hard silicious materials. It shall be free from any harmful materials such as iron pyrites, coal mica, shale, clay alkali, soft fragments, sea shale, organic impurities, etc. It shall be obtained from approved quarries and shall conform to IS:383-1990

v) Bricks: It shall be first class table moulded bricks approved by the Architect well burnt, sound, hard square and with sharp edges and shall conform to Indian Standards 1077 – 1992 having strength of 35 kg/sq.cm (3.5N/mm2) as specified in the item.

vi) Timber: Shall be of best quality as specified in the schedule of quantities perfectly dry, well seasoned and free from sap wood, sound straight, free from loose knots, cracks shakes and any appearance of root and any other defect and conforming to IS: 12896 – 1990 and shall be approved by the Architect. No wood work shall be placed in position covered in the wall unless it is approved by the Architect

vii) Flush Shutters: Flush shutter if required shall be factory made of solid core construction with frame lock rail and well balanced backings and faced with high quality commercial or teak veneering as specified. The shutters shall be chemically treated proofing against termites as per IS: 2202 – 1991

viii) Ceramic Tiles: Will be of approved make, colour, design and size conforming to IS: 777 – 1988

ix) Granite: Polished granite slab and tiles shall be of the kind specified in the schedule of quantities conforming to samples approved by the Architect for colour & texture. The slab shall be machine cut to required dimensions and shall conform to IS Standards

x) Plastic (Acrylic) Emulsion Paint and Enamel Paint: Plastic emulsion painting will be of approved brand of paint and colour conforming to IS: 5411 – 1991 & will be applied over a coat of primer & putty (including preparation of wall surface). Painting for the doors, windows, grills will be carried out with synthetic enamel paint of approved brand and colour over one coat of primer, metal putty all of relevant IS specifications 4511-1993.

xi) Hardware Fittings for Doors: All the doors shall be provided with MS powder coated hinges, tower bolts, locks etc or as specified in schedule of quantities. The external doors shall be provided with Godrej make locks. All the fittings shall be approved by the Architect.

xii) Water: Water used for mixing concrete and mortar and for curing shall be

clean and free from injurious amounts of oil, acid, alkali, salts, sugar, organic materials or other substances that may be deleterious to concrete or steel. The pH value of water shall be not less than "6". Water has to meet the requirements mentioned in clause 5.4 of IS: 456–2000. Water for construction purpose shall be stored in well protected and proper tanks.

xiii) Admixtures: Admixtures if used shall comply with IS 9103. Admixtures to concrete shall not be used without the written consent of the Architect. When permitted, the contractor shall furnish full details from the manufacturer and shall carry such test as the Architect may require before any admixture is used in the work to check particularly for Chlorides.

xiv) Admixture may be used to modify one or more of the following properties of **FRESH CONCRETE.**

a) To increase workability without increasing water content or to decrease the water content at the same workability.
b) To retard or accelerate both initial and final setting times.
c) To reduce or prevent settlement.
d) To increase slight expansion in concrete and mortar.
e) To modify the rate or capacity for bleeding or both.
f) To reduce segregation of concrete, mortars and grouts.
g) To improve penetration & or pump ability of concrete, mortars & grouts.
h) To reduce rate of slump loss

xv) Admixtures may also be used to modify one or more of the following properties of:

HARDENED CONCRETE:

(1) To retard or reduce heat generation during early hardening.
(2) To accelerate the rate of strength development.
(3) To increase the strength of concrete or mortar (Compressive, tensile Or flexural).
(4) To increase the durability or resistance to severe conditions of Exposure including the application of devising salts.
(5) To decrease the capillary flow of water.
(6) To decrease the permeability to liquids.
(7) To control the expansion caused by the reaction of alkaline with Certain aggregate constituents.
(8) To produce cellular concrete.
(9) To increase the bond of concrete to steel reinforcement
(10) To increase the bond between old and new concrete.
(11) To improve impact resistance and abrasion resistance.
(12) To inhibit the corrosion of embedded metal.
(13) To produce coloured concrete or mortar.

xvi) Integral waterproofed: Admixture used as integral waterproofed shall be free of chlorides sulphates and shall conform to IS: 2645, the application and doses shall be as per manufacturer's specification If there is any discrepancies in

specification of items of work in schedule of quantities and in specification schedule and also items not covered in technical specifications, latest. IS specification shall apply.

xviii) Whenever items of materials not covered in IS specification, the approval of Architect/employer will apply.

4. EARTHWORK:

4.01 Site Clearance: The site shall be free from rubbish of all kinds, rocks, trees, dirt and superfluous earth, all shrubs, brush wood, stumps of trees and saplings, grass and other rant vegetation etc. The serviceable material to be stacked at site in a manner as directed by the Architect. All cavities or holes formed shall be filled with good earth well rammed and leveled neatly. Site clearance shall be done all-round the proposed construction. The contractor shall provide all labour and material for site clearance at his own cost.

4.02 Profiles: Shall be with pegs, bamboos, strings or burgees to show the correct formation before the start of work and maintained till the completion of the work.

4.03 Bench mark and levels: The contractor shall layout one or more permanent bench marks in some central place before start of the work, from which all important levels exact bed levels for the excavation will be set

The contractor shall provide all labour and material for setting, levels and profiles at his own cost. All useful materials such as gravel, stone relics of antiquity, coins, fossils etc, met with during excavation shall remain the property of the employer and shall be handed over to the employer

All cutting shall be done from top to bottom. No undermining shall be permitted. Cutting shall be done to precise levels and any cutting taken deeper shall be made good with PCC 1:4:8 to the required levels without any extra cost. The final surface shall be neatly dressed.

Excavation in trenches: The foundation trenches shall be excavated to the exact width of the lowest step of foundation or footing as shown on drawings. The sides of the trenches shall be kept vertical and bottom horizontal both transversely and longitudinally as shown on the drawings. Steps shall squarely bench out as shown on the drawings or as directed by the Architect. The excavated earth shall be deposited at least three meter or 1/3 of depth away from the edge of excavation whichever is more. Working space on the outer periphery, if required, shall be provided by the contractor at his Cost.

The bed of the trenches shall be made level and compact by watering and ramming, any soft and defective spots detected shall be filled with concrete of the mix as specified for foundations or as directed by the engineer. Cost of such concrete shall be paid to the contractor. In case excavation is taken deeper than required, the extra depth shall be good with concrete as specified

foundation or as directed by the engineer at no cost to the Owner.

The contractor shall at his own expense shall make provision for all sorting, strutting, close or open timbering, pumping, dredging or bailing out water and the trenches shall be kept free from water until the work in foundation is completed and trenches refilled. The trenches shall be kept free from water until the work in foundation is completed and trenches refilled. The trenches shall be inspected and passed before concrete is placed.

4.04 The measurements shall be exact length and width of the lowest step of the trench of footings as shown on the drawings. The extra earthwork done by the contractor, providing steps etc and earth making ramps/steps as approach to work place shall not be paid for.

4.05 Earth filling: Filling can be in the sides of foundation trenches, under floors or for site formation.

4.06 The earth to be used for filling shall be free from salt, organic or other foreign matter. The space around the foundation in trenches and under floor shall be cleared of all debris, brick pieces or any other rubbish, surplus mortar falls etc. Filling shall be done in layers not exceeding 150 mm thickness. Each layer shall be well watered and rammed to the satisfaction of the Architect. Final surface shall be neatly dressed. **Black cotton soil shall not be used for filling in foundations and under floors.**

4.07 Where payment is to be made separately, the quantity of earth filling shall be computed from levels recorded before start of filling and after completion of filling. The quantity so computed shall be paid with standard deduction upon the type of compaction.

4.08 Sand filling: The sand shall be clean and free from any foreign matter. Sand filling shall be done measured and paid in the same manner as earth filling.

4.9 Hard core: Shall either be of stone ballast; gravel or stone rubble of size mentioned in the schedule of quantities and shall be free from dust and impurities.

4.10 Hard core of stone ballast not exceeding 40 mm gauge and shall be laid in required thickness dry rolled and consolidated with a power roller to satisfaction of the Architect unless otherwise specified in the schedule of quantities.

4.11 Hardcore or rubble stone shall be laid with stones of required height vertically, closely and hand packed with smaller pieces and/or ballast 40mm gauge as directed by the engineer and consolidated dry with a 10 ton power roller unless otherwise specified in the schedule or quantities to the satisfaction of the Architect/employer.

4.12 Disposal of excavated soil: Where in the schedule of quantities the disposal of excavated soil is specified to be measured and paid for separately, in such case the quantity of disposal earth, rock etc shall not exceed the quantity paid as excavation i.e. the element of bulk age is not to be reflected in the

measurements for disposal but is to be accounted for in the rates quoted for disposal. All the materials such as earth murum, soft/hard rock etc are to be kept separately for classification and payment for disposal contractor shall maintain detailed charts, showing the origin and place of disposal of soil for calculation of load for disposal.

4.13 No separate payment shall be made for re–excavation or loosening of excavated soil for disposal and transportation due to its having become hard consolidated due to passage of time, rains or other cause whatsoever.

The lead shall be measured by the shortest route possible.

5. CONCRETE:

Cement Concrete: For foundation concrete shall be mixed in proportion and with ingredients as specified in the schedule of quantities. The concrete shall be mixed in a mechanical mixer. No more concrete shall be mixed than can be consumed within half an hour. It shall be deposited gently in the trenches in horizontal layers not more than 10 cm thick and rammed and consolidated with steel rammers of 5 to 6 kg weight. After laying and consolidation is completed water for a week from the next day shall be done. The measurements shall be to exact length, breadth and depth ordered by the Architect or as shown or figured on the drawing and after the concrete is consolidated.

5.1 Reinforced cement concrete work:

General: It is the intent of these specifications to ensure that all concrete placed at various location in the job, should be durable, strong enough to carry the design loads, it should wear well and be practically impervious to water, it should be free from such defects as shrinkage, cracking, honey combing and spalling of the surface. Unless otherwise called for in this specification, all plain and reinforced concrete shall conform in all respect to IS: 456 – 2000.

Mix design: Mix design shall be as per guidelines in IS: 10262 – 1982 reaffirmed in 2009 subject to minimum cement content as per IS 456-2000. The contractor at his cost should get the concrete mix designed from reputed laboratories in consultation with Trust for further implementation in the site. Necessary weigh batchers, equipments should be used in the site to achieve required properties as per design mix and to enable the concrete to attain enquired compressive strength. The concrete should be tested for strength at 7days & 28 days period.

Any failure to achieve the strength needs removing such concrete and re concreting by the contractor. The mix design shall be subject to approval of the Architect/Trust.

c) Mixing: All concrete whether plain or reinforced, ordinary or controlled shall be mixed in a full bag mechanical mixer, having a minimum drum speed of 60 revolutions per minute. The cement and aggregates shall be first mixed dry until all particles of aggregate are coated with cement. Water shall be added and mixing continued for at least two minutes to result in a concrete of a uniform colour and consistency. The proportion of aggregate sand etc for various types of concrete shall be weighed in weigh batcher. The quantity of water used shall

be minimum with practical workability and shall be varied as required to suit the moisture content of the aggregate and to produce having specified slump. Moisture correction for fine and coarse aggregates shall be made regularly.

d) Compaction of Concrete: External, Internal (needle) and surface (screed board) vibrators of approved make shall be used for compaction of concrete a) External/internal vibrators shall be used for compaction of concrete in foundations, columns etc. For sections such as slabs, the concrete shall be compacted by external, internal and surface type vibrators, depending on the thickness of layer to be compacted. 25mm, 40mm and 60mm dia internal vibrators may be used. The concrete shall be compacted by use of appropriate diameter vibrator by holding the vibrator in position until

i. Air bubbles cease to come to surface
ii. Resumption of steady frequency of vibrator after short period of dropping the frequency, when the vibrator is first inserted
iii. The tone of the vibrator becomes uniform
iv. Flattened, glistening surface, with coarse aggregates particles blended into it, appears on the surface. After the compaction is completed, the vibrator should be withdrawn slowly from concrete so that concrete can flow in to the space previously occupied by the vibrator. To avoid segregation during vibration, the vibrator shall not be dragged through the concrete nor used to spread the concrete. The vibrator shall be made to penetrate into layer of fresh concrete below if any, for a depth about 150mm. The vibrator shall be made to operate at regular pattern of spacing. The effective radii of action will overlap, approximately half a radius to ensure complete compaction
v. To secure even and dense surfaces free from aggregate pockets, vibration shall be supplemented by tamping or rodding by hand in the corners of forms and along the form surfaces while the concrete is plastic.
vi. A sufficient number of spare vibrators shall be kept readily accessible to the place of deposition of concrete to assure adequate vibration in case of breakdown of those in use. 25mm diameter immersion vibrators shall be used in thin sections up to 125mm, 40mm diameter immersion vibrators in fairly wide sections like beams, slabs, columns etc. and 60mm diameter. Vibrators in foundations, pile caps or such large section members. Screed vibrators shall also be used for slab concreting.
vii. Plain concrete also shall be vibrated whenever and wherever directed by EIC to achieve full compaction, using needle and screed vibrators as necessary

Curing: Curing shall be started at the earliest by spreading wet jute cloth (hessian) and cover top with impervious sheet and subsequently cured with spraying water. In inaccessible area to start with, curing be started by spraying curing compound before starting membrane curing.

Cubes of 15 cm x 15 cm x 15 cm size shall be cast on the first day and tested for compression at 7 and 28 days. Later on, if the Engineer so directs, 6 cubes shall be tested for every 50 cubic meters or part thereof of the concrete casted. The amount of water required for proper concrete consistency shall take into

account the rate of mixing, length of haul, time of unloading and ambient temperature conditions. Additions of water to compensate for slump loss should not be resorted to nor should the design maximum water cement ratio be exceeded. Additional dose of retarder/plasticizer/super plasticizer shall be used with prior approval of Engineer to compensate the loss of setting time and slump at contractor's cost. Re tempering water shall not be allowed to be added to mixed batches to obtain desired slump

5.02 Water Cement Ratio: Water cement ratio shall be carefully controlled throughout the work. This calls for a regular check on the equipment used for measuring water. Only graduated liter cans shall be used for the purpose. The water cement ratio as determined of approved mix design shall be strictly adhered to

5.03 Concrete placing: Concrete should not be dropped from a height greater than 2 meters. A properly constructed chute shall be used in such cases where it is necessary to exceed this height. Concrete must be thoroughly worked into the forms so that they are entirely filled, reinforcing bars adequately and tightly surrounded and entrapped air released from the mass of concrete. Placing shall be carried out by hand poking as well as vibrators. Concrete should not be moved through any considerable distance in the moulds, being consolidated as nearly as possible in the place where it is dumped. In casting beams or other deep sections concrete shall be laid in layers about 30cm, each layer being properly compacted.

5.04 Consolidation: All plain and reinforced concrete shall be consolidated by means of mechanical vibration. Adequate number of vibrators shall be used to ensure full compaction of concrete in about 10 minutes of placing. If needle vibrators are used, these shall be inserted at places not exceeding 0.5M apart until it is immersed to the full depth of concrete. Wherever possible shutter vibrators shall be used and the contractor shall design the shuttering so that this can withstand vibration. Care shall be taken to ensure that concrete is not over vibrated so as to cause segregation. In addition to mechanical vibration sufficient hand tools must be used to ensure full consolidation around reinforcement and at edge; and corners. All exposed faces of concrete shall be covered with Hessian, sand or similar materials which shall be kept continuously wet for a period of at least 7 days after casting.

5.05 Construction joints: Construction joints shall be made only where shown on the drawings or approved by the Architect. Such joints shall be kept to the minimum and shall not be located in valleys. The joints shall be at places where the shear force is the minimum and shall be at right angles to the direction of main reinforcement. In case of columns and walls the joint shall be horizontal and 8 to 15 cm below the bottom of the beam or slab running into the column or wall head or below the anchor reinforcement of beam and slab coming intothe column and wall and the portion of the column or wall between the stopping of level and the top of the slab shall be concreted with the beam or slab.

a) **Vertical joints:** At the end of any day's work or run of concrete the concrete shall be finished off against temporary shutter stopper which should be vertical

and securely fixed. This stopper should be removed as early as the weather permits.

b) **Horizontal joints:** Horizontal joints should be washed down two hours after casting in the manner described above for vertical joints. If the concrete has been allowed to harden excessively, the surface shall be chipped over its whole surface to a depth of at least 10mm and thereafter thoroughly washed. Before fresh concrete is added on the other side of a construction joint, the surface of the old concrete will be thoroughly wetted and covered with a thin layer of cement mortar 1: 2 or epoxy bond coat as directed by the engineer

c) **Expansion joint:** Expansion joint shall be provided where required as shown in drawing or as directed by the engineer. The filler to be used shall be of approved material.

5.06 Testing: The following tests shall be carried out on the materials and concrete used in RCC work.

Material	Test	Field / Lab test	Test Procedure	Frequency Quantity of concrete	
				Samples	No
Reinforced Cement Concrete	a) Slump test	Field	Standard	Regular intervals during concreting as per mix design.	Regular intervals during concreting as per mix design
	b) Cube test	Lab	Standard	As per IS 456:2000 clause 15.2.2	As per IS 456:2000 clause 15.2.2

1) **Slump tests:** The slump tests shall be carried out from time to time as directed by the engineer on concrete actually being placed in the works at the commencement of each period of concrete placing in accordance with the procedure laid down in the latest Indian Standards Specifications.

2) **Cube tests:** Whenever required by the Architect but subject to the minimum Requirement given in the table above, cubes shall be made in a manner as laid down in the latest Indian Standards Code of Practice (IS:456) and sent to an approved laboratory for testing and the results submitted to the Architect immediately on receipt. The cost of all such tests made shall be borne by the contractor. At least 6 cubes will be taken on each day of concreting when a minimum of 5cum of concrete is laid or as instructed by the. The contractor shall keep a record at site of all such tests identifying them with the portion of the work to which they relate. This record will be checked by the engineer from time to time.

Acceptance criteria As specified in IS 456:2000

5.07 Inserts and pipes: Inserts of any kind like fan hooks, sleeves, pipes, bolts and

nuts, anchor, bolts etc., are to be accurately placed in the concrete (and/or brick work) and concreted over, as and when required and directed. The word “insert” will

mean article like anchors beams, sleeves, pipes, bolts, nuts etc.

Pipes: All electric conduits and junction boxes and all sanitary pipes, water supply pipes and down pipes that lie within concrete slabs, beams or columns shall be laid in place and the Architects approval shall be obtained before the casting of concrete. No cutting of structural concrete will be permitted. All care shall be taken to ensure that conduit pipes are not damaged.

5.08 Formwork: Formwork shall be erected true to line the and to the shapes required in the work with tolerances as per IS 456 2 000 and shall carry without deformation, the full weight of wet concrete and other live loads. It should also withstand the effect of vibration without deflection, building, distortion or loosening of its component parts. The contractor shall be responsible for the sufficiency of all formwork, centering and moulds; formwork shall be applied with releasing agent/oil for easy de moulding wetted thoroughly before concreting. All form work, centering and shuttering used for concreting shall be rigid and straight, so as to produce all concrete members true to line.

a. Wire or similar items shall not be left in concrete having face exposed to weather. Bolts shall be permitted if they are greased/provided in sleeve pipe to allow for easy withdrawal and the holes subsequently made good.

b. The formwork shall be designed so that the soffits of slabs and the sides of beams may be removed first leaving the formworks to the soffit of beams and their supports in position. Wedges shall be provided to allow accurate adjustment of formwork and its easy removal.

c. Camber fillets shall be provided at all corners whenever called for on the drawings.

d. The boards shall be planned and straightened in order that the surface against the corner shall not be broken at joints between boards. All formwork shall be coated with approval oil before it is fixed in position.

e. Cleanout holes shall be provided at the bottom of all columns and care shall be taken to remove any rubbish, wood shaving or any other foreign material before concreting. Temporary supports shall be provided as required and/or ordered by engineer. The contractor shall provide steel/plywood formwork in place of timber boarding wherever called for by the engineer.

f. Design & Tolerance in construction: Form work shall be designed and constructed to the shapes, lines and dimensions shown on the drawings with the tolerance given as per IS 456:2000.

Removal of formwork: All formwork shall be kept in position until the expiry of minimum period after concreting as specified in IS: 456-2000

6. REINFORCEMENT: (Only TMT Steel shall be used)

All reinforcement bars to be used in construction shall be deformed high strength

TMT (thermo mechanically treated bars) reinforcement bars of FE 500 grade of high yield strength and percentage elongation, minimum 14.5% as per IS:1786 and obtained from approved manufacturer. Plain MS bars shall be used only for 6mm dia bars.

Fabrication of reinforcement

Reinforcement shall be fabricated as per the drawing. Bending shall be done mechanically or with hand nut to the correct radius with proper tools and platform and shall conform to IS. Bending of material shall be cold bending only. Material shall be inspected for visible defect such as cracks brittle excessive rust, loose mill scale, etc. Cracked ends of bars shall not be used in works. Also the bars should be free from any deleterious material and hence the best practice shall be o hose down reinforcement just prior to concreting.

It is important that bending straightening, cutting etc. shall be carried out in a manner not injurious to the material and the safety of the persons working.

Anchoring of bars and stirrup shall be provided exactly as detailed in the structural drawing or as directed by the Banks Engineer / Architect.

Cover to reinforcement

Reinforcement shall have concrete cover and the thickness of such cover (excluding of plaster or other decorative finish) shall be as specified in drawing or as directed by the Banks Engineer / Architect.

Fixing in position

Correctly cut and bent bars shall be accurately placed in position as detailed in the drawing unless otherwise specified by the Bank's Engineer / Architect reinforcement shall be positioned within the tolerance as under.

For effective depth 200mm or less +10mm
For effective depth more than 200mm +15mm

But in no case shall the cover be reduced by more than 5mm of that specified. There shall be no compromise on cover for foundation work.

Reinforcing bars shall be held in position during placing of concrete by use of concrete cover blocks (made of equal strength of well cured concrete in use) steel chair spacers steel hangers, supporting wires, etc. and secured by trying with an annealed binding wire or 16 to 18 gauge as approved by the Bank's Engineer / Architect.

Measurements
Reinforcement shall be measured as follows:

Lengths of different diameters of bars actually used shall be measured nearest to a centimeter and weight calculated.

If steel is procured by the contractor; respective unit weight per meter shall be

used for different diameter. If material is supplied by the owner on tonnage basis per meter weight for each diameter of the bar shall be fixed by the Architect from actual stock available at site.

Wastage, laps, Chairs and spacer bars shall not be measured and paid .The contractor shall account for all these in his quoted price.

In case of welded coupled points measurements for payment shall be equivalent to the Length of overlap as per design.

Price built up shall include in addition to cost of material.

For purpose of reconciliation, maximum wastage permitted shall be 5% of the actual material used.

The description of items of steel reinforcement has been completely elaborated with complete requirements, specifications & scope of work involved in main item of BOQ.

7. BRICK MASONRY:

BRICKS

The bricks shall be table moulded first quality of regular and uniform size, shape and colour, uniformly well burnt throughout but not over burnt. They shall have plane rectangular faces with parallel sides and sharp straight and right angled edges. They shall be free from cracks or other flows. They shall have a frog of 10mm depth on one of their flat faces.

They shall give a clear metallic ringing sound when struck.

They shall show a fine grained, uniform homogeneous and dense texture on fracture and be free from lumps of lime, lamination, cracks, air holes, soluble salts causing efflorescence or other defects which may in any way impair their strength, durability, appearance or usefulness for the purpose intended. They shall not have any part underburnt. They shall not break when thrown on the ground on their flat face in a saturated condition from a height of 60 cm.

The size of brick shall be 23 x 11.5 x 7.5 cm. Only bricks of one standard size shall be used on one work unless specially permitted. The following tolerances are permitted in the standard conventional size adopted on a particular work:

Length	plus or minus	3 mm (about 1/8”)
Breadth	plus or minus	1.5 mm (about 1/15”)
Depth	plus or minus	1.5 mm (about 1/16”)

After immersion in water, absorption by weight shall not exceed 20 per cent of the dry weight of the brick when tested according to I.S. S.No.10771957.

Unless otherwise specified the load to crush the brick when tested according to I.S.S. No. 1077 1957 shall not be less than 35 kg/ sq. cm

SAMPLING & TESTS

a. Dimensional Tolerance
b. Water Absorption}
c. Efflorescence} – PHYSICAL CHARACTERISTICS
d. Compressive Strength C

8.0 CONCRETE BLOCK MASONRY

Hollow and solid concrete blocks – Shall conform to the requirements of IS: 2185 1979. The blocks shall be sound, free from cracks, broken edges, honeycombing and other defects that would interfere with the proper placing of block or impair the strength or performance of construction.

Dimensions and Tolerances: The nominal size of the blocks shall be as specified. The maximum variation in the length of the units shall be not more than + 5 mm and maximum variation in height and width of unit, not more than + 3 mm.

Compressive Strength: The Minimum compressive strength for solid concrete blocks should be 40kg/sqcm.

Drying Shrinkage: The drying shrinkage of the blocks (average of three blocks), when
unrestrained, shall be determined in accordance with IS: 21851979 and shall not be exceed 0.1 per cent.

Moisture Movement: The moisture movement (average of three blocks), when determined in the manner described in IS: 21851979, shall not exceed 0.09 per cent.

Water Absorption: The water absorption (average of three blocks), when determined in the manner described in IS: 21851979 s hall be not more than 10 per cent by mass

HALF BRICK WORK

Half brick thick and brick on edge walls shall be provided with hoop iron or reinforcements as stated in BOQ for half brick thick wall and brick on edge wall wire netting shall be provided every third course and in alternate course respectively according to standard practice with galvanized staples.

9. FLOORING:

9.01 Cement Concrete Flooring: Shall be laid in thickness and with cement concrete as specified in the schedule of quantities laid in panels either by fixing AC or glass strips or any other class of strips as specified in the schedule of quantities or with wooden removable forms.

9.02 Before laying floor concrete the subgrade shall be properly cleaned, trimmed to give required thickness of floor and neat cement slurry to give proper bond of floor with the subgrade. No extra payment will be made for providing the cement slurry.

9.03 The cement concrete shall be laid and finished with towels and finished with a coat of neat cement on top to give a smooth and homogeneous surface. No extra mortar shall be laid over the concrete to make the floor in level or for drying the floor surface.

9.04 The joints shall be straight both ways i.e. along the length and width. No surplus mortar on the adjoining panel shall be allowed to spill from the other panel. The measurement shall be exact length and breadth from wall face to wall face.

9.05 Cement Skirting and Dados: Shall consist of 20 mm or as specified in the schedule of floating coat or neat cement including rounding of junctions with floors as directed. The measurement shall be from inside of skirting to inside skirting and height above floor vertically measured.

9.06 Granite/Jaisalmer Stone Slab Flooring: Specifications shall be the same as per marble stone slab flooring except for Granite slab and Jaisalmer stone slab of approved design, quality. Except granite shall be pre polished.

9.07 Marble stone flooring and steps of stairs:

a) Marble stone slabs: The Marble shall be of approved shade and sources as mentioned in the Schedule of Quantities and their size and the thickness shall be as shows on the drawings and as approved by the Architect. They shall be of selected quality, dense, uniform and homogenous in texture and free from cracks or other structural defects. It shall have even and cry stalling grains. The surface shall be machine polished to an even and perfectly plain surface and edges machine cut, true and square. The rear face shall be rough enough to provide a key for the mortar. No slab shall be rough enough to provide a key for the mortar. No slab shall be thinner than the specified thickness at its thinnest part. The dimensions of the slabs shall be as specified. A few approved samples of finished slabs to be used shall be deposited by the contractor in the office of the Architect. Unless otherwise mentioned the thickness of the marble shall be minimum 20mm.

b) Laying: Sub grade concrete or R.C.C. slab on which marble is t o be laid shall be cleaned, wetted and mopped. The bedding for the marble slab shall be cement mortar 1:4 (1 cement: 4 coarse sand) or as mentioned in the schedule of quantities

c) The bedding mortar shall be spread to required thickness. The slab shall be washed clean and then laid on top of the mortar layer, pressed, tapped with a wooden mallet and brought to level with adjacent slabs. It shall then be carefully lifted and laid aside. The top surface of the mortar shall then be corrected by adding fresh mortar at hollows. The mortar should be allowed to harden a bit. Cement slurry of 4.4 kg of cement per square meter shall then be spread. Edges of slabs already laid shall be buffered with white cement mixed with pigment. The marble slabs shall then be placed in position and tapped with a wooden mallet till the slab is properly embedded in line and level. The joints between slabs be as fine as possible. The surplus cement slurry oozing from joints shall be cleaned. The slabs shall be matched as shown in drawing. The flooring shall be cured for seven days.

d) Polishing and finishing: Finishing shall be of mirror polish conforming to CPWD specifications and as directed in the item of BOQ.

e) Measurements: Shall be in square meter correct to two decimal places. Length and breadth shall be measured correct to a cm from wall to wall as actually laid.

9.8 Marble stone in Risers of steps and skirting if required:

a) Marble stone slabs: Shall be the same as per marble flooring or thickness as specified in the schedule.

b) Preparation of surface: Where required the wall surface shall be cut uniformly to requisite depth so that the skirting face shall have uniform projection from the finished face of wall as per drawings or as directed by the engineer. The concrete walls shall be hacked and roughened with wire brushes. Masonry walls shall have joints racked at least 15 mm deep. The surface shall be thoroughly cleaned, washed and kept wet

c) Laying: The risers of steps and skirting shall, be set in grey or white cement with an admixture to match the shade of stone, with the line of slab at an average distance of 12 mm from the wall but not less than 10 mm. If necessary the slabs shall be held in position by temporary M.S. hooks at suitable intervals. The joints shall be left to harden then the rear of the skirting or riser slab shall be packed with cement mortar 1:3 (1 cement: 3 coarse sand). The fixing hooks shall be removed after the backing mortar is set. The joint shall be as fine as possible.

d) Polishing & finishing: The finishing shall be of mirror polish as specified in the description of item.

e) Measurements: Shall be in square meter correct to two decimal places: Length and height shall be measured correct to a cm actually laid at site above floor.

9.9 Granite Cladding on walls:

f) In case of reinforced cement concrete or brick work backing the lining shall be secure to the backing after it has set. The cramps shall be fixed in backing while laying at the required positions as specified in the description of items in the BOQ

g) The groutings for veneering work shall be full of mortar, hollows noticed shall be made good by taking out the marble slab and refixing.

h) Measurements: Shall be as laid in square meter correct to two decimal places. Length and breadth shall be measured correct to a cm as actually laid

9.10 Ceramic tile flooring

(a) Ceramic tiles shall be of approved Indian make unless otherwise specified in the description of item. The tiles shall be flat, true to shape, free from cracks, crazing spots, chipped edges and corners. The tiles shall be of thickness as specified by manufacturer and of size as specified in the items of work or as directed by the Architect and the tiles shall conform to relevant Indian Standards

(b) Preparation of surface and laying:

The subgrade concrete or RCC slab shall be cleaned, wetted mopped. The bedding for the tile shall be 12 mm average thickness not less than 10 mm at any place, consisting of cement mortar 1: 4 (cement: 4 coarse sand) or as specified.

Mortar shall be spread, and corrected to proper levels and allowed to harden. Over the bedding mortar neat grey cement slurry of honey thick consistency shall be spread @ 3.3 kg of cement for square meter. Tiles shall then be laid and gently tapped with a wooden mallet till it is properly bedded in line and level with adjacent tiles. The joints shall be as thin as possible and in straight line as to suit the required pattern. Where full size tile cannot be laid, it shall be cut (sawn) to required size edges rubbed smooth to ensure a true and straight joint. The floor shall be checked with a straight edge to obtain a true surface. The floor tile near the wall shall enter 10 mm under the striking or dado finish

(c) Pointing & finishing

The joints shall be cleaned of the grey cement grout with wire brushes to a depth of 5 mm and all dusts and loose mortar removed. The joint then be flush pointed with non shrink grout tile joint fillers mixed with pigment to match the colour of tiles and floor kept wet for 7 days. The floor shall not sound hollow when tapped with a wooden mallet.

(d) Measurement:

Shall be in square meter correct to two decimal places. Length & Breadth of the actual tile area laid shall be measured correct a cm. No extra shall be paid for the use of cut (sawn) tiles in the work.

9.11 Ceramic tiles in skirting and dados:

(a) Ceramic tiles shall be as specified in the schedule for wall cladding

(b) Preparation of surface

The joints of masonry walls shall be raked out to a depth of at least 15 mm. In case of RCC walls the surface shall be hacked & roughened with wire brushes. The surface shall be cleaned thoroughly washed with water & kept wet.

(c) Laying

The surface shall be plastered with cement mortar 1:3 (1 cement:3 coarse sand) or as specified to an average thickness of 12 mm and allowed to harden. The plastered surface shall be roughened with wire brushes or by scratching diagonal lines 1.5mm deep at 7.5 cm centers both ways. The back of tiles shall be buttered with grey cement slurry and edges with white cement slurry and set in bedding mortar. The tiles shall be lightly tampered and corrected to proper plane and lines. Tiles shall be set in required pattern with as fine as possible butt joints. Top of dados, skirting etc. shall be truly horizontal and joints truly vertical. Where full tiles cannot be used, cut (sawn) tiles of required size shall be provided as in flooring. At corners, edges of tiles shall be cut at 45o before fixing. The joints shall be cleaned and flush with white cement mixed with pigment to match the colour of tiles. The surface shall be kept wet for seven days. The finished work shall not sound hollow when tapped with a wooden mallet.

(d) Measurement:

Shall be in square meter correct to two decimal places. Length & Breadth of the actual tile area provided shall be measured correct to a cm. No extra shall be paid for the use of cut (swan) tiles in the work.

9.12 Vitrified Tiles Flooring – Skirting / Rectified Tiles flooring – Skirting

The specifications in respect of material and execution process for vitrified tiles and rectified tiles flooring and skirting shall be strictly in accordance with the description of items in the BOQ as under

Vitrified Tiles: Providing and fixing in position Premium quality mirror polished vitrified tiles in approved colour and shade conforming to IS 15622 of approved make in floors, skirting, dados at all heights depths and levels laid over 20mm thick cement mortar bed 1:4 (1 cement: 4 coarse sand) including grouting the joints with white cement mixed with matching pigment including cost of all material, labour as per directions / approval of the Architect / Bank's Engineer

Rectified Antiskid Tiles: Providing and laying rectified antiskid tiles of size 600x600x8mm of approved quality shade and brand in floors laid over 20mm thick cement mortar bed 1:4 (1 cement: 4 coarse sand) including grouting the joints with white cement mixed with matching pigment including cost of all material, labour as per directions / approval of the Architect / Bank's Engineer

10.0 FINISHING (WHITE WASHING, COLOUR WASHING & DISTEMPERING

i) WHITE WASHING:

a) <u>Material:</u>

White wash shall be prepared from 5 part of stone white lime and 1 part of shell lime. The lime shall be dissolved in a tub with sufficient quantity of water (about 4/5 liters/kg of lime) and the whole thoroughly mixed and stirred until it attains the consistency of thin cream. The wash shall be taken out of small quantities and strained thorough a clean coarse cloth suitable proportion of 2 kg of gum

per cum of lime to prevent, the white wash coming, off easily when rubbed, Indigo as necessary shall be mixed as per standard practice. If not directed otherwise, indigo (Neel) upto 3gm per kg of lime, dissolved in water shall be added and stirred wall.

b) <u>Scaffolding</u>

1.1 This shall be double or single according to requirements and as directed. If ladders are used pieces of old gunny bags or cloth rags shall be tied on their tops to avoid damage or scratches to the plastered surfaces, etc. Proper stage scaffolding shall be erected when white washing the ceilings.

c) <u>Preparation of Surface:</u>

The surface shall be prepared by removing all mortar droppings and foreign

matter and thoroughly cleaned with wire or fiber brush or other means as may be ordered by the Employer/Architect to produce an approved clean and even surface. All loose pieces and scales shall be scrapped off and holes, cracks etc. filled with mortar to match with the surrounding finish.The mortar should be cured sufficiently. In case where the surface have been previously white washed or colour washed, the old white or colour wash shall be entirely removed and surface broomed down before the new white wash applied, in case the old white wash cannot be removed by brooming, the surfaces shall be cleaned by scrapping. Where efflorescence is observed the deposit may be brushed clean and washed. The surface shall then be allowed to dry for at least 48 hours before white washing is done.

d) <u>Application of white wash:</u>

On the surface so prepared the white wash shall applied with a brush. The first stroke of the brush shall be from top downwards, another from bottom upwards over the first stroke, and similarly one stroke from the right and another from one the left over the first brush before it dries. This will form one coat, each coat must be allowed to dry and shall be subject to inspection and approval before the next coat is applied, when dry, the surface shall show no signs of cracking. It shall present a smooth and uniform finish free from brush marks and it should not come off easily when rubbed with a finger. Minimum 3 coats of white wash shall be applied.

No portions in the surfaces shall be left out initially to be patched up later on.

For new work, the white washed surface shall present a smooth and uniform finish

For old work, patches, and repairs shall be white wash first. Therefore, the whole surface shall be white washed with the required number of coats. Doors, Windows floors and other article of furniture etc. shall be protected from being splashed upon. Splashing and dropping, if any shall be removed and the surface cleaned.

e) Rates to include:

Apart from other factor mentioned elsewhere in this contract, the rate for white wash shall included for the following:

i) All Labour, materials, equipment required for white washing.
ii) Scaffolding including erection and removal.
iii) Providing and preparing the white wash.
iv) Preparing the surface for white wash including the scaffolding, minor repair etc.
v) Applying the white wash in three coats (minimum). If a proper even surface is not obtained to
the satisfaction of the Employer/Architect in 3 coats contractor shall carry out additional coat of white wash to approval, at contractors expense

f) Mode of Measurement:

The measurement shall be square meter. The mode of measurement shall be as applicable to that for plaster.

ii) OIL BOUND DISTEMPER:

The specifications and conditions for this shall be the same as that applicable for dry distemper above except that oil bound distemper of approved make, shade and colour shall be used after applying priming coats with primer of the manufacturers of distemper or as directed.

iii) INTERIOR EMULSION PAINT:

a) MATERIALS:

The emulsion paint & primers in general shall be of approved quality colour & shade.

b) SCAFFOLDING:

This shall be double as required and directed. If gunny bags of loth bags shall be tied on their scratches to the plastered surfaces etc. Proper erected when painting the ceilings.

c) PREPARATION OF THE SURFACE:

New Surface

The surface to be painted shall be cleaned and all cracks, holes and surface defects shall be leveled with Plaster of Paris or the surface shall be prepared as specified in bill of quantities and with filler prepared.

d) PRIMING COAT

The priming coat of the approved shade shall be applied over the completely dry surface in the manner as recommended by the paint manufactures. The emulsion paint, in the priming coat, may be thinned down with 20% water or as recommended by the paint manufacture. Turpentine or any other solvent shall not be used for thinning the paint.

e) APPLICATION OF EMULSION PAINT:

The recommendation of approved paint manufacturer, whose product is used, shall be followed regarding the preparation of the surface and the application of the priming and finishing coat. The contractor shall arrange for technical assistance and supervision from the paint Manufacturer, during the execution of the painting work. After the priming coat has been applied and perfectly dried, all holes, scratches, if any shall be repaired as mentioned in preparation of surface and then the second coat of approved shade and manufacture shall be evenly applied and allowed to dry. The third coat shall be carefully supplied to achieve smooth and even surface after the previous coat has dried up. Minimum 3 coats of paint shall be applied inclusive of primer coat. If a proper and even surface is not obtained to the satisfaction of the Employer/Architect in 3 coats, contractor shall carry out additional coats of painting to approval, at contractors

expenses. Care shall be taken that dust or other foreign materials do not settle or disfigure the various coats.

f) RATES TO INCLUDE:

Apart from other factors mentioned elsewhere in this contract, the rates for the item of plastic emulsion point shall include for the following

i. All labour, materials and equipment necessary to carry out the work.

ii. Supplying the approved emulsion paint for priming and finishing coats.

iii. Repairing the surface and applying one or more coats of approved quality filler for receiving the primer and finishing coats.

iv. Scaffolding including its erection, dismantling

v. Application of one primer coat and minimum two coats of finishing. If a proper and even surface is not obtained to the satisfaction of Employer/Architect, the contractor shall carry out additional coats of painting to approval at contractors expense.

vi. Protection to painted surface till dried and handed over

vii. Expense, if any for supervision and technical assistance supplied by the approved paint manufacturers.

g) MODE OF MEASUREMENT

The measurement shall be in sq.m. The mode of measurement shall as applicable to that for white washing.

h) EXTERNAL ACRYLIC PAINT IF REQUIRED

a) Material:

External acrylic paint shall be of approved colour & manufacture as per makes / brands shown in the list of material.

b) Preparation of surface:

Before painting is commenced on surface, all dirt, oil, grease, efflorescence and organic material shall be completely removed by sand papering and rubbing and there after all cracks, holes and surface defects shall be repaired with Birla White putty and allowed to set hard. All irregularities shall be sand papered smooth and wiped clean. The surface so prepared must be completely dry and free from dust before painting is commenced. In the case of the walls newly plastered special care shall be taken see that it is completely dry before any treatment is attempted.

c) Application:

The instruction of the makers shall be followed regarding the preparation of the surface and application of priming and finishing coats. Paint shall not be mixed in a larger quantity than is actually required for a days work. Normal water should be used to prepare the mixture. Paint shall be applied in dry weather with broad stiff brush in long parallel strokes. The treated surfaces shall be allowed dry and harden, Second or succeeding coats shall not be applied until the preceding coat has been passed by the Employer/Architect. Two more coats of paint shall

be given in exactly the same manner as the first one but only after the earlier coat laid has thoroughly dried.

d) Rates of include:

Apart from other factors mentioned elsewhere in this contract, the rate of providing paint shall include for the following.

i. All labour, materials and equipment to provide paint.

ii. Scaffolding, including erecting and removing.

iii. Preparing the surface as stated above.

iv. Applying 2 finishing coat of approved paint. If a proper and even surface is not obtained to the satisfaction of the Employer/Architect in the coats in the applied, the contractor shall provide additional coats of painting to approval, at contractor's expenses.

v. Curing as stated above.

f. Mode of Measurement shall be in square feet and as applicable to white wash. Nothing extra shall be allowed for painting on rough surface, for example, external sand faced plaster/rough cast plaster etc

11.0 WOOD WORK AND JOINERY:

11.01 Timber:

(a) **Unless** otherwise specified, all timber for frames and shutters for Doors, windows, ventilators, cupboards etc. Shall be first class, sound, well seasoned, approved/ without any flews, sun cracks and other defects. The planed surface shall be smooth and free from blemishes and discolorations.

(b) All timber for carpentry and joinery in touch with masonry or concrete shall be coal tarred or creosoted before fixing. All rough frame work in partitions, suspended ceiling and veneering to walls, etc shall be treated with approved wood preservative/antitermite treated as per manufacturer's instructions and specifications. The rate quoted shall provide for such treatments.

(c) The timber members shall be fabricated out of well seasoned timber. The preparation of timber for joinery is to commence simultaneously with the beginning of the project work generally and should proceed continuously until all the work is prepared and fixed/stacked on or the site as the case may be

(d) Carpentry work: The timber shall be properly planed and wrought in a workman like manner. Joints shall be true and fit properly, assembled, accurately and clamped together so as to be square, flat and close jointed. The combed joints shall have two tongues on each member to be joined and shall be glued and joined together with wooden pegs. Pegs shall engage all tongues and no tongue shall be less than 6 mm thick.

(e) In mortise and tenon joints all tenons shall not be less than 12 mm thick and shall be the full width of the members. Tenons shall be glued into the mortises. Through tenons shall in addition be pinned with wood dowels of not less than 6 mm dia, or with nonferrous metal dowels of not less than 6 mm dia. Alternatively through tenons may be wedged if the mortises are tapered. All the joints shall be coated with fevicol or equivalent jointing compound as per supplier's instructions.

f) All exposed faced of timber shall receive a primer coat of wood primer wherever
required.

11.02 Holdfasts:

Six holdfasts shall be fixed to each post of the door frame. The M.S hold fasts shall be of the size 300 mm x 40 mm x 5mm and shall be fixed to the frames by means of screws and/or bolts and nuts and not nails. The other end of the holdfast shall be fixed into jambs with cement concrete blocks of dimensions 22cm x10cmx15cm or as directed. Horns in frames shall be cut and shall not be used as holdfasts. Whenever asked for. Rawl plugs or bolts as directed shall be used for Rough grounds framing, hangers etc.

11.03 Workmanship:

a) The workmanship shall be first class and to the approval of the Engineer. Scantlings and boarding's shall be accurately sawn and shall be of required width and thickness. All carpenter's work shall be wrought except where otherwise described. The workmanship and joinery shall be accurately set out in strict accordance with the drawings and shall be framed together and accurately fixed in approved manner and with properly glued with approved glue/fevicol to the satisfaction of the engineers.

b) **Screws:** All screws to be used in woodwork and joinery shall be of brass or as specified or as directed by the engineer.

c) **Tolerances:** 1.5mm will be allowed for each wrought face of the sizes specifications except where described as 'finished' in which case they shall be hold to be full dimensions.

d) **Protection:** All wood work and joinery edges of timber frames etc shall be protected from being damaged during construction by providing rough timber casings securely fixed and with other adequate protective measures

e) If decided by the owner to provide anti termite treatment, the contractor shall Co ordinate his work suitably as directed by the engineer

f) Door Window frames shall have cut rebates. Slanted rebates hall not be permitted

g) Where door frames are fixed flush with plaster to wall, teak wood cover mould 40 x 12 mm as per drawing shall be provided all round where the plaster is flush with the frame, painted or finished as in doors and rates quoted shall include for the same, unless otherwise specified.

h) **Mortise lock:** Mortise lock latch and a pair or lever handles shall have di casting, brass body and brass bolts and shall be right or left handed as required. It shall be of approved make and quality. The lock for single leaf door shall have plain face and for double lead floor a rebated face. The lever handles with spring shall be mounted on plates and shall be bright brass finished or chromium plated or anodized as approved.

12. WATER–PROOFING

INDIAN STANDARDS:

All relevant Standards as specified elsewhere in this Volume are applicable. Indian Standards to be followed are: IS 1322, IS 384, IS 5871, IS 6494.

MATERIAL:

Stone aggregate, lime, sand, cement, Brick, Brick Aggregate and shall conform to previous chapters discussed in this Volume.

China Mosaic shall be prepared from broken pieces of white glazed tiles. No pieces shall be larger than 40 MM and smaller than 10 MM in any dimension. Plain cement tiles, Kota or Shahabad type stone slabs shall conform to previous chapters as discussed in this Volume.

PROPRIETORY TREATMENTS:

Various experienced water proofing specialists shall carry out the following or similar types of water proofing treatments. Final finished surfaces may be laid with paving tiles, stones or finished smooth in Cement and marked with false chequered marking. Points given below are just for guide lines. The actual steps and details shall be submitted by the Contractor for approval of the Employer.

The surface to be treated shall be cleaned and well defined cracks grouted by making 'V' Notches with cement slurry.

Average 75-115 MM thick brick bat coba cement concrete with 25 MM nominal size brick aggregate, 50% cement mortar mix in a ratio of 1:4 (1 cement:4 sand) shall be laid to slopes about 1 in 120 and rammed. The minimum thickness shall be 30 MM. This shall be treated with a 12 Kg bar soap and 4 Kg alum dissolved solution per Cum. Consolidation shall be carried out by beating the surface with wooden beaters till the beaters rebound readily and do not make any impression on the surface. During beating operation, the surface shall be kept wet by sprinkling liberally by mixing cement with a solution prepared by mixing with 3 kg of jaggery and 1.5 kg of Beal fruit to100 liters of water. The solution shall be made in hot boiling water at least 10 days before it is used. On completion of beating operation, the mortar coming out at the top shall be trowel led with the addition of sugar solution (if necessary), finished and cured for 7 days.

The treatment shall also be carried out over parapet walls which are minimum 300 MM in height.

The surface shall be finished neatly with cement mortar in a ratio of 1:3 and

marked with false marking. It may be covered with paving precast cement, tiles or stones in specified sizes. These shall be bedded in 12 MM thick cement sand mortar. Joints shall be pointed with CM in a ratio of 1:3 mixed with 5% crude oil by weight.

MEASUREMENTS:
Measurements shall be in Square meter for finished surface area. Rates shall

include all items right from cleaning of surface to completion and required guarantee.

Following points to be noted.

The treatment shall be guaranteed against any seepage/leakage dampness etc. for a period of 5 years from the date of handing over the buildings to the Employer. The guarantee shall have to be given by the proprietary specialist firms or Contractor carrying out the treatment directly to the Employer on judicial stamp paper in approved proforma.

The treatment to be undertaken in coordination with sanitary and plumbing works.

All the treated areas shall be tested by ponding with water. The water shall be made to stand for 72 hours in 50 MM depth throughout the period of testing. In case of any leakage/dampness/seepage the same shall be rectified completely and testing shall be redone until all treated surfaces are found to be free from any leakage/dampness/seepage.

FOR FLAT ROOFS:

The minimum thickness of treatment shall not be less than 75 MM. The slope of the finished treatment on terrace shall not be flatter than 1 in 80

FOR SLOPING SLABS:

The sloping slab surface to be thoroughly cleaned and applied with a slurry coat of cement and proprietary water proofing compound 3% by weight of cement. The brick bat coba 1:3:6 with proprietary water proofing compound 3% by weight of cement to be laid over the slurry to a thickness of 50 to 70 MM over which 20 MM thick cement mortar 1:4 proportion mixed with proprietary water proofing compound 3% by weight of cement is laid and finished smooth in required colour and in steps of 450 MM size and 20 MM height. Final curing shall be done by covering the surface by gunny bags or grass. The total minimum thickness of treatment to be 70 MM minimum and 90 MM maximum. The water proof finish to be turned over the eaves board.

FOR SUNKEN FLOOR

Providing water proofing treatment to sunken floors, kitchen sink bath/W.C. toilets etc. The surface to be applied with a slurry coat of cement and water added

with proprietary water proofing compound 3% by weight of cement. The floor and side wall shall be provided with 20 MM thick 1:4 cement mortar added with 3% proprietary water proofing compound by weight of cement. Plastering to be done in two coats. The plastered surface shall be applied with a coat of proprietary polymer coating on floor made ready to receive final floor level. The sunken portion to be filled in with brick bat coba of 1:3:6 cement concrete with 3% of proprietary water proofing compound by weight of cement.

TERRACE WATER PROOFING:

The surface is cleaned and roughened and a slurry coat made out of cement water and proprietary water proofing compound 3% by weight of cement is applied on terrace and brick bat coba of 1:3:6 cement concrete added with 3% of proprietary water proofing compound by weight of cement shall be laid with a slop of not flatter than 1 in 80 and a minimum thickness of 75 MM this layer is allowed to take initial setting with proper curing for 3 days. On the brick bat coba a layer of 25 MM thick I.P.S. in C.C. 1:2:4 added with 3% proprietary water proofing compound will be laid. The joints of brick bat coba will be properly filled with cement mortar and finished smooth with false markings of 300 MM*300 MM. The treatment shall be continued to a height of 300 MM on parapet walls. Inverted beams and columns. The finished surface to be applied with a coat of proprietary polymer coating.

WATER TANKS, SUMP, SEPTIC TANK:

Minimum 20 MM thick water proof cement plaster 1:3 with proprietary water proof compound as per specialist firm's specifications including injections/grouting of the walls/slabs as may be required for any honey combed surface, hollows in RCC works as per specialist firm's specifications and finishing the surface smooth as directed.

CANOPY CHAJJA ETC.:

It shall be given with 1:2:4 IPS finish a average 2540 MM thick including 3% proprietary water proofing compound laid in approved bays to be carried over to the adjoining walls/bunds etc. upto a height of 300 MM with all junctions well rounded off.

RAIN WATER FROM TERRACES, BALCONY AND VERANDAH:

Surface water disposal vertical stacks in PVC or CI (as specified in the drawings and Bills of Quantities) pipes of required diameters laid upto 150 MM above GL. Surface water disposal from Verandahs / Balconies will be through G.I. pipes spouts as provided in the Bills of Quantities. The opening made in the terrace parapet and balcony walls to be closed with special care and tested for water tightness before making payments.

FLOWER BEDS:

With average 20 MM thick cement plaster 1:3 inclusive of 3% proprietary water

proofing compound laid to required slope to be carried over to adjoining walls and sides upto 150 MM height or to full depth of the flower bed and junctions well rounded off.

BOX TYPE WATER PROOFING TREATMENT:

This shall also be carried out under a proprietary treatment. The Contractor shall submit the complete proposal for approval of the Employer

Basic steps are:

Plain cement concrete raft, minimum 100 MM thick or as specified shall be laid . The mix of PCC shall be cement concrete in the ratio of 1:4:8. The raft shall project about 300 MM than the finished size of RCC structure.

20 MM thick cement sand mortar mixed with water proofing powder 4% by weight of cement shall be laid on PCC and 20 MM graded aggregate free from impurities shall be spread on the floor. It shall be cured for 3 days.

Then 25 MM thick rough kota or Shahabad or similar stones 600*600 MM in size shall be laid flat and joined with cement sand mortar . This shall project 300 MM all around RCC raft.

Then the surface shall be screeded with cement sand mortar and finished smooth.
RCC raft, walls, or masonry shall be constructed as designed.

Well –cured walls shall then be treated in the vertical direction by fixing a layer of Kota or Shahabad or similar stones. Treatment shall be carried out 300 MM above the finished Ground Level.

Treatment to floor and wall shall be scaled such that it is continuous. It shall be the responsibility of the Contractor to a achieve correct slopes, chamfers, etc. by providing PCC in the ratio of 1:4:8 in required locations as part of items.

MEASUREMENT:

The measurements shall be in Square Meters for the area treated. Rates shall included all items right from cleaning of surface to completion and the required guarantee.

The following type of failure will be judged as defective work:

- **Dampness**
- **Leakage**
- **Failure to stay in place Splitting**
- **Pulling loose Tearing**
- **Undue expansion and contraction Alligatoring etc**

GUARANTEE:

All waterproofing systems described above are to be re ferred as guidelines only. The Contractor shall propose the system giving full descriptions. The system shall be guarantee for 5 years against all defects and liabilities thereof from the date of completion of the project. The guarantee shall be on Stamp paper of required value in proforma to be approved by the Employer. The cost of the Stamp Paper shall be to the Contractor's Account. Work shall be carried through approved specialist agency as per method of working approved in writing by the Employer.

ANTI TERMITE TREATMENT

a. Codes : Antitermite treatment shall be carried out in accordance with thefollowing standards unless specified otherwise

IS 6313 Code of practice for Anti Termite Treatment
(Part1) Constructional measures
(Part II) Code of practice for antitermite measures in Building (pre constructional chemical lTreatment.
b. Materials Antitermite chemicals in water emulsion shall be used as specified

Below:

Chemical	Concentration by weight, percent
Chloropyriphos	As per manufacturer's instructions
Indosulfon	As per manufacturer's instructions

C. Workmanship

C1. Conditions of formation The Antitermite barr ier shall be complete and continuous under the whole of the structure to be protected. All foundations shall be fully surrounded by and in close contact with the barrier of treated soil. Each part of the area treated shall receive the prescribed dosage of chemical Time of application.

C2. Soil treatment should be done immediately prior to placing concrete or sub grade in foundations, ground beams, floor slabs, etc. Concrete works should start when the chemical emulsion has been absorbed by the soil. Treatment must not be done when the soil is wet or saturated

C3. Disturbance Once formed, treated soil barriers shall not be disturbed. If treated soil barriers are disturbed, immediate steps shall be taken to restore the continuity and completeness of the barriers system.

C4. Termite mound treatment If termite mounds are found within the plinth area, these shall be destroyed by breaking open the earthen structure and pouring into the mounds at several places, after, emulsion at the rate of 4 liters per cubic meter of mound**13.1 TREATMENT OF COLUMN PITS WALLS TRENCHES AND BASEMENT**

EXCAVATIONS:

The bottom surface and slides (up to a height of 30 cm, from the bottom) of the excavations made for column pits, trenches and basements shall be treated with to chemical emulsion mentioned above at 5 liters per. Sq. meter of surface area.

13.3 TREATMENT TO BACKFILL EARTH:

After the column foundations, wall foundations and retaining walls of the basement come up, the backfill in immediate contact with the foundation structure shall be treated with the chemical emulsion at the rate of 15 liters/m2 of the vertical face of the substructure of each side. The earth is usually returned in layers and treatment shall be carried out in similar stages. The chemical emulsion shall be directed towards the concrete or masonry surface of the columns and walls so that the earth in contract with these surfaces is well treated with chemicals.

13.4 TREATMENT TO R.C.C. FRAMED STRUCTURES:

The treatment described above applied essentially to masonry foundations where there are voids in the joints through which termites can seek entry into the superstructure. Hence the foundations require to be completely enveloped by a chemical barrier. In the case of R.C.C. framed structures with columns and plinth beams and R.C.C. basements the concrete mix is rich and dense (being 1:2:4 or M 150 or richer), it is unnecessary to start the treatment from the bottom of excavation for start at a depth of 50 cm. Below ground level from this depth, the backfill around the columns beams and R.C.C. basement walls shall be treated at the rate of 15 litres/m2 of the vertical surface. The other details of the treatment shall be as laid down in 3 above.

13.5 TREATMENT OF TOP SURFACES OF PLINTH FILLING:

After the earth filing is completed within the plinth area and before the dry rubble packing or sub grade is laid, the entire surface of the filled earth shall be treated with chemical emulsion at 5 liters per sq. meter. Light rodding of the surface may be carried out to facilitate proper absorption of the emulsion.

13.6 TREATMENT AT JUNCTION OF WALLS AND FLOOR:

Special care shall be taken to establish continuity of the vertical chemical barrier on inner wall to surfaces from the ground level (where it had stopped with the treatment described in 3 above) up to the level of the filled earth surface. To achieve this, a small channel 3 x 3 cm., shall be made at all junctions of wall and columns with the floor (before laying the sub grade) and rod holes made in the channel up to the ground level 15cm. Apart and the rod moved backward and forward to break up the earth and chemical emulsion poured along the channel at the 5 liters per linear meter so as soak the soil right to the bottom. The soil should be tamped back into place after this operation.

13.7 TREATMENT TO SOIL ALONG EXTERNAL PERIMETER OF BUILDING:

Finally the earth round the external perimeter of the building up to a depth of 30cm shall be treated at the rate of 4.5 liters per running meter of plinth wall. To facilitate this treatment, solid M.S. rods should be driven into the soil as close as possible to the plinth wall at intervals of 15 cm. and up to a depth of 30 cm. And the rods moved backwards and forwards in a direction parallel to the wall to break up the earth so that the chemical emulsion mixed intimately with the soil.

13.9 TREATMENT OF SOIL SURROUNDINGS PIPES, WASTES AND CONDITS:

When pipes, wastes and conduits enter the soil inside the area of the foundations, the soil surroundings the point of every must be loosened around each such pipe, waste or conduit for a distance of 15 cm. and up to a depth of 7.5 cm. Before treatment is commenced. When they enter the soil external to the foundation, they shall be similarly treated unless they stand clear of the walls of the building by about 7.5 cm for a distance of over 30 cm.

SPRAYING EQUIPMENT: A pressure pump shall be used to carry out spraying operations to facilitate proper penetration of chemical into the earth.

13.9 The above specifications are in the line with the I.S. code of Proactive for Antitermite Measures in Buildings, I.S.: 6313 (Part ii) 1971.

14. DESIGNER CONCRETE INTERLOCKING CONCRETE PAVER BLOCKS: Medium duty interlock pavers of approved size, thickness and make and laying to be as per the following instruction.

(a) SUBSTRATE PREPARATION – FLOOR

1. The ground is to be watered and rammed thoroughly to create a firm base.
2. Over this 3" of river sand is to be laid and rammed thoroughly.
3. On top of the sand cushion, for pedestrian traffic, 4"of 1:5:10 brick jelly concreting
   has to be done and for heavy traffic, 4" of 1:4:8 PCC concreting to be done.

(b) PAVER BLOCKS:

1. Prepare base mortar with cement and sand in the ratio 1:4.

2. The total mortar thickness should not be more than 1" in case where tiling is to be done on RCC slabs, finished floor levels would have to be marked using tube levels. In this process, if it is observed in some area mortar thickness is likely to be in excess of 1" in those areas PCC work will have to be done to raise levels, so that thickness is not more than 1".

3. Set the levels for the finished floor (i.e., dead level or slope as specified by the Architect /Contractor.

4. Prepare cement slurry (i.e., mixture of cement and water to form a thick

paste) and spread it on the leveled base mortar.

5. Wet the reverse of the tile with water. Complete immersion of tile in water is not required.

6. If tiles are square or rectangle in shape, set the right angles for the rooms and place the first tile along the right angle lines and place it in a base mortar. Tap gently and uniformly only with a rubber or wooden mallet covered with cloth to obtain perfect levels.

7. Clean the surface of the tile with a wet sponge immediately after laying. Ensure that the base mortar cement, which squeezes through joints does not settle on the tile. Also ensure that the water used is clean and not sally, hard or brackish.

8. It is suggested to leave a fine gap of 1mm all around for external tiles like Regolia, Aquarius etc., for fast and proper laying.

9. For the tiles like Macedonia, Basel and Magnifique, offset laying shall be followed:
    - While placing Macedonia, a groove of 68 mm must be left all around the tile.
    - In the case of Basel, the second tile should be placed exactly at the bottom of the first diamond and ensure the grooves match perfectly.
    - Likewise, when following offset laying for Magnifique, the second tile should be placed exactly at the midpoint of the other tile.

10. For external tiling completely open to sky, the tiles should be laid in such a way that for every 10' x 10' area laid, there should be an expansion gap of 2 mm on all sides. This should be followed throughout the area of laying to provide for the expansion for all tiles. Absence of expansion gaps may result in lifting / chipping / cracking of tiles.

11. In site where multiple levels are encountered, the tiles on the ridge will have to be adequately protected with mortar cushion.

12. When large span tiles are laid on curved substrate, it is suggested that the tiles be cut to take the contour of the slope ensuring proper bedding.

13. Fill in the joints with pointing material, which is a mixture cement and desired colour of pigment. To arrive at the desired colour / shade, mix the same with water to form a smooth paste which should be applied to the joints preferably with the use of rubber squeeze or rubber sheet. For higher quality of finishes you could use if required a polymer based cementations tiling joint filler. Do not apply the pointing material all over the tile surface.

14. Allow pointing material to set, for 15 minutes and then clean the surface of the tile with wet sponge, removing the excess pigment on the tile surface.

Century Gothic Wash the surface with soap water or mild detergent to obtain a clean surface Do not use the area laid for 3days for pedestrian traffic areas, 7 days for light traffic areas and 10 days for heavy traffic.

15. ALUMINUM DOORS, WINDOWS AND VENTILATORS

MATERIAL

Aluminium alloy used in the manufacture of extruded doors and window sections shall correspond to IS designation HE 9 WP of IS 733. Hollow aluminium alloy sections used shall conform to IS designation HV9WP of IS 1285. Machine screws used shall conform to the requirements of IS 1362. Also cadmium plated screw, nuts, washers, bolts lugs of steel shall be used on direction of the Employer/ Architect.

Specially designed and extruded sections may be permitted if supporting design calculations for wind load are submitted to the Employer/ Architect for approval.

All aluminium material used shall be anodized for protection against corrosion in marine atmospheres. A thick coating of 15 microns from a sulphuric acid bath shall improve its corrosion resistance. Further, anodized sections should be double sealed or alternatively sealed by exposure to steam. Anodized material received at site shall be with a certificate confirming anodic coating of 15 micron. Employer/ Architect may get the same tested from outside at the cost of the Contractor as per IS 1868.

FABRICATION:

Frames shall be square and flat, with the corners fabricated to a true right angle.

The fixed as well as open able frames shall be constructed by cutting sections to exact length, with corners mitered and welded. Mitered shutter frame joints must be clitted mechanically with aluminium clits if approved by the Employer/ Architect.

Where hollow sections are used with welded joints, argonarc welding or flash butt welding shall be employed or if approved mechanical connection assembly.

Subdividing bars of units shall be tenoned and riveted into the frame. Sections used shall conform to IS 1948 for respective location or as approved by the Employer Similarly, the specifications of 12mm thick pre laminated particle board flat pressed three layers or graded wood particle board confirming to IS:12823 Grade I Type II, in panels and glazing (glass panes) including all other allied material required to be provided in the aluminium doors and windows shall be as per latest Indian Standard and as described in the respective item of the BOQ.

MEASUREMENTS:

Measurements shall be in square meter. Glass shall be measured as part of aluminium window and doors.

16. ROLLING SHUTTERS

MATERIAL

Steel used in the fabrication of lath, M.S. sections, guide channels, suspension shaft, pulley wheels, locking ships, U clamps gears, counter balancing roller spring, helical spring and flat spring shall conform to various grades as detailed in Indian Standard specifications for metal rolling shutters and rolling grills.

FABRICATION

Interlocking lath shall be of minimum 1.25mm thickness. They shall be securely riveted at ends. Lock plat must be of 3.15mm thickness with M.S. angle section of not less than 35X35X5 mm at bottom. Lock plate shall be provided with sliding bolts at both ends and with pull handles both inside and outside of shutter. Guide channels shall be pressed out of a 3.15 mm and become proportionately higher upto at least 7mm for large size shutters. Suspension shaft shall be of sufficient dia and defection shall not be more than 5mm per meter width. Required C.I. pulleys, helical wire springs flat spiral springs and selfalighting double row ball bearings shall be provided. Hood cover stiffened with angles and flats and of minimum 0.9mm thick M.S. sheet shall be provided. Required gears worms etc. used shall be machine cut and of the specified material.

The rolling shutters supplied shall meet the requirements of IS 6248 in every respect and shall be to the approval of the Employer/ Architect.

Intermediate post or mullions may be of the fixed or removable or sliding types and shall be provided if asked for or required for rigidity and safety. Wicket gate also shall be provided if specified. Rolling shutters shall be pull and push types, up to 8 sqm. they shall be mechanically or electrically operated as specified.

MEASUREMENTS:

Measurements shall be in square meters for actual clear opening

18. M.S. GRILLS, RAILING & GATES:

M.S Grills, railings and gates shall be fabricated and fixed in position strictly as per design and drawings. All intersection or meetings of all members shall be welded and the workmanship shall be high grade quality to the entire satisfaction of the Architect/Bank's Engineer. After fixing in position, these shall be cleaned off dust, rust or scales and rubbed with emery and unless otherwise specified an steel priming coat with enamel paints shall be applied. The rate for M.S Grills to window where required shall also include the cost of screws to be used for fixing, for M.S. railing the cost of 1:2:4 cement concrete for jamming the hold fasts of the railing. The rate is for the completed work in all respects.

19. COLLAPSIBLE GATES

Collapsible steel gates shall be provided and fabricated with vertical channels 20x10x2mm and traced with flat iron diagonals 20x5m size with top and bottom rail of Tiron 40x40x6mm with 40mm dia, steel pulleys complete with bolts, nuts, locking arrangement, stoppers, handles including applying a priming coat of approved steel primer inclusive of all materials and labour as per directions and approval of the Architect / Bank's Engineer.

20. GLAZING

PLATE GLASS:

Plate glass shall be flat, transparent and clear when judged by the unaided aye. It may however possess a tint when viewed edgewise. It shall be free from cracks, blisters, stones, scratches; bubbles sheet glass shall not show any distortion of light when tested to Indian Standard. Plate glass shall not have defects greater than those given in Indian Standard. Test shall be conducted as specified in Indian Standard. Classification of glass shall be as per Indian Standard.

21. FALSE CEILING

False ceiling shall be of 12mm thick tapered edge gypsum board conforming to IS 2095 part I with frame work made of special sections power pressed from M.S sheet and galvanized in accordance with zinc coating of grade 350 as per IS:277 and consisting of angle cleats of size 25mm widex1.6mm thick with flanges of 22mm and 37mm at 1200mm centre to centre one flange fixed to the ceiling with dash fastener 12.5mm dia x 40mm long with 6mm dia bolts to the angle hangers of 25x25x0.55mm of required length and other end of angle hanger being fixed with nuts and bolts to G.I. channels 45x15x0.9mm running at the rate of 1200mm centre to centre to which the ceiling section 0.5mm thick button wedge of 80mm with tapered flanges of 26mm each having clips of 10.5mm at 450mm centre to centre shall be fixed in a direction perpendicular to G.I. channel with connecting clips made out of 2.64mm dia x 230mm long G.I. wire at every junction including fixing the gypsum board with ceiling section and perimeter channels 0.5mm thick 27mm high having flanges of 20mm and 30mm long, the perimeter of ceiling fixed to wall/ partition with the help of rawl plugs at 450mm centre to centre with 25mm long drive all screws @ 230mm interval including jointing and fixing to a flush finish of tapered and square edges of the board with recommended filler, jointing tapes finisher and two coats of primer suitable for board as per manufacturers specification and also including the cost of making openings for light fittings, grills, diffusers, cutouts, made with frame of perimeter channels suitably fixed including cost of all materials, labour, machinery, T & P, sampling and testing with all leads, lifts, and de lifts, for all materials complete in all respects as per drawings, requirements, specification and as directed by the Architects/ Bank's Engineer.
(Frame work shall be supplied by the same manufacturer/ brand as of Gypsum Board)

22. OTHER ITEMS

All materials to be used and workmanship for all the other items (not covered above) but taken and described in the BOQ including items beyond BOQ shall also be the best of its kind and shall be conforming to the CPWD specifications and latest Indian Standard Specifications in every respect and to the approval of the Bank's Engineer / Architect.

All materials / or workmanship which in the opinion of the Bank's Engineer / Architect are / is defective / under specifications or unsuitable, shall be remove immediately from the site and shall be substituted with proper material and / or

workmanship forth with as per drawings, requirements and as per approval / directions of the Bank's Engineer / Architect.

All material shall be of approved quality, brands / makes as per list preferred makes and as per sample got approved from the Bank's Engineer / Architect. A set of specimen samples of all approved materials shall be kept at site as well as in the office of the Bank's Engineer / Architect.
The cost of which shall be borne by the Contractor.

23. MEASUREMENTS

All Measurements shall inconformity with IS : 1200 and its Various parts.

SCHEDULE B

TECHNICAL SPECIFICATIONS FOR WATER SUPPLY, SANITARY & DRAINAGE WORKS

PLUMBING & SANITARY WORKS

The general character and the scope of works to be carried out under this contract is illustrated in the drawings and specifications attached herewith. The contractor shall carryout and completes the said work under this contract in every respect in conformity with the rules and regulations of the local authority. The contractor shall furnish all labour, supply and install all materials appliances, tools, equipment necessary for the complete provision and testing of the whole plumbing and services installation as specified herein and as per the relevant ISI codes and shown on the drawings. This also includes any material, appliances, equipment not specifically

mentioned herein or noted on the drawings as being furnished or installed but which necessary and customary to make complete installation as shown on the drawings or described herein properly connected and in working order.

In general the work to be performed under this contract shall comprise of the following.

All incidental jobs connected with plumbing services installation, such as excavation in trenches and back filling, cutting chases in concrete and brick and making good, cutting/ drilling holes through walls, floors and grouting and for fixing of fixtures equipment etc.,

Furnish and install a complete workable, plumbing services installation as shown on the drawings and described in this specification and as per the latest ISI specifications including all that which is reasonably inferred.

Complete installation of internal & external water supply system. Complete installation of sewerage and sewerage appurtences internally as well as around the building.

Complete installation of all sanitary and plumbing fixtures. Co operation with other crafts in putting the installation in place. Any work done without regard or consultation with other trades, shall be removed by the contractor without additional cost to the owner to permit proper installation of all other work, as desired by the Architects.

Repair all damages done to the premises as a result of this installation and remove all debris left by those engaged for this installation to the satisfaction of Employer.

Cleaning of plumbing fixtures, showing the satisfactory performance of all the fixtures at the time, the building is handed over to the owners.

It is the responsibility of the contractor to take care of all the fixtures fitted until the time of handing over to the owners. Painting of all concealed & exposed pipes

as specified.

Assume full responsibility of all required applications and cost, to connect to corporation water mains, sewers and storm water drains to the extent these are applicable to this installation.

REGULATION AND STANDARDS

The installation shall conform in all respects to the following broad list of standards in general.

IS1726	1960	Code for cast iron manhole and cover
IS1742	1960	Code for practice building drainage
IS 2064	1962	Code of practice for selection, installation & Maintenance of sanitary appliances.
IS1172	1971	Code of basic requirements for water supply drainage & sanitation(revised)
IS2065	1963	Code of practice for water supply in buildings.
IS4985	2000	Code of practice for laying PVC pipes.
IS 4111	1967	Code of practice for ancillary structures sewerage systems.
IS4127	1967	Code of practice for laying glazed stoneware pipe.
IS7834	1998	Code of practice for fitting of PVC specials
IS 3989	1970	Centrifugally cast spun iron & socket soil & ventilating pipe, fittings & accessories.
IS1239	1968	Specification of mild steel tube, tubular & part I other steel pipe fittings.
IS1239	1969	Specification for mild steel tube, tubular & Part II & other steel pipe fittings.
IS 651	1965	Specification for salt glazed stone ware pipe & fittings (first revision)

The installation shall also be in conformity with the byelaws and requirements of the local authority in so far as these become applicable to the installation. Wherever these specification calls for higher standard of materials and / or workmanship than those required by any of the above regulations and standards, then the specification shall take precedence over the said regulations and standards. Wherever drawings and specifications require something which will violate the regulations, the regulations shall govern.

FEES PERMITS AND TESTS :

The contractor shall obtain and pay for all fees and permits required for installation of this work. On completion of the work, the contractor shall obtain and deliver to the owner, certificates of the final inspection and approval by the local authority. The owner shall have full power to require the materials or work to be tested by an independent agency at the contractor's expenses in order to prove their soundness and adequacy.

DRAWINGS AND SPECIFICATIONS

The drawings and specifications shall be considered as part of this contract and any work or materials shown on the drawings and not called for in the

specifications or vice versa shall be executed as if specifically call for in both. The contract drawings indicate the extent and general arrangement for the fixture drainage systems.. and are diagrammatic. The drawings indicate the points of supply and termination of pipe runs and broadly suggest the routes to be followed. The work shall be installed as indicated on the drawings, however any changes found essential to coordinate this work with other trades shall be made without any additional cost. The date given herein on the drawings is as exact as could be secure, but its complete accuracy is not guaranteed. The drawings and specifications are for the assistance and guidance for the contractor, and exact location, distance and levels will be governed by the individual building and site condition. Therefore approval of the Architects shall be obtained before commencement of work. After completion of the work, the contractor shall furnish necessary information like invert levels and layout of pipe line etc., and prepare final completion drawings and hand over to the owner on tracing cloth.

MANUFACTURER'S INSTRUCTIONS

Where manufacturers have furnished specific instructions, relating to the materials issued in this job, covering points not specifically mentioned in this documents, instructions shall be followed in all cases.

CHANGE IN DIMENSIONS

If the size of fixtures mentioned is not available then nearest available size shall be fixed with due considerations of the employer/ Architect.

MATERIALS

Materials shall be of the best approved quality obtainable and unless otherwise specified, they shall conform to the respective Indian Standards specifications. Samples of all materials shall be as per the list of approved brand manufacture which shall be got approved before placing order and the approved samples shall be deposited with the owner. For purchases coming under the contractor shall furnish a blank copy of order placed with the supplier.

In case non availability of materials in metric sizes, the nearest size of FPS units shall be provided with prior approval of the Architects, for which no extra amount will be paid

DRAINAGE

STONEWARE PIPE AND FITTINGS

Stoneware pipe and fittings shall comply with IS 6511 965 in every respect and all stoneware pipes, bends, etc., shall be of the best salt glazed variety, glazed inside as well as outside, hard smooth, even textured, free from fire cracks, air blows and blisters. The pipe shall be truly circular in cross section perfectly straight and of standard nominal diameter, length and depth of socket.

LAYING AND JOINTING S.W. PIPES:

LAYING : The pipes shall be carefully laid to the levels and gradient shown on the plans and sections by making use of sight rails and boning rods, with socket up the gradient.

JOINTING: Hemp rope soaked in neat cement was shall be passed round the joint and inserted in it by means of caulking tool. More skins of yarn shall be added and well rammed home. Cement mortar with one part of cement and one part of sand and with minimum water content but on no account soft or sloppy, shall be carefully inserted by hand into the joint and more cement mortar added until the space of the joint has been filled completely with tightly caulked mortar.

The joint shall be then finished off neatly outside the socket at an angle of 450.

CURING: The joint shall be cured at least for seven days.

TESTING: All lengths of the sewer and drain shall be fully treated for water tightness by means of water pressure maintained for not less than 30 minutes. Testing shall be subjected to a test pressure with at least 1.5 m head of water, at the highest point of the section, under test. The pipes shall be plugged preferably with standard drain plugs (with rubber rings) on both ends. The upper end shall, however be connected to a pipe for filling with water and getting the required head. The contractor shall give a smoke test to the drains and sewers at his own expenses and charges as directed by the Architects

PAINTING

Pipes laid under floor/ground, concrete etc shall be given two coats bitumastic paint.

SEWER APPURTENANCES, INSPECTION CHAMBERS AND MANHOLES:

SIZE OF CHAMBERS: MANHOLE: The size given in bill of quantities and drawings shall be internal size of chamber. The work shall be done strictly as per standard drawing and following specifications.

BED CONCRETE: Shall be in 1:5:10 cement concrete 150 mm thick for inspection chambers, 230mm for depths upto 2.1 m and 300 mm for greater depths in case of manhole.

BRICK WORK: Brick work shall be with best quality table moulded bricks in 1:5 cement mortar as per specifications for brick masonry.

PLASTER: Inside of the wall of chamber / manhole shall be plastered with 12mm thick cement plaster 1:2 and finished smooth with a floating coat of neat cement.

BENCHING: Channels and benching shall be done in cement concrete 1:2:4 rendered smooth with neat cement.

CHAMBER/MANHOLE COVERS

Covers shall be of medium duty concrete with lifting hooks details given in the drawing and fixed on the C I frame embedded in concrete. Cover placed on the frame shall be air tight. Weight of the cover on frame shall be as specified in the schedule of quantities.

GULLY TRAP CHAMBERS

C.I. gully traps of specified size shall be provided. It shall be fixed on 15 cm thick and 70 cm square 1:5:10 cement concrete bedding and the gully outlet shall be jointed similar to the jointing of stoneware pipes. A brick masonry chamber 300x300 mm (internally) shall be constructed in ½ brick masonry with 1:5 cement mortar and the spaces between the trap and the wall shall be filled up with 1:3:6concrete and upper portion of the chamber shall be finished with neat cement. The corner and the bottom of the chamber shall be rounded off so as to slope towards the grating. The clear space between the top of the grating and the bottom of inspection cover shall

not be less that 230 mm. In addition to 15cm x 15cm C.I grating the chamber shall have addition and C.I.FRAME COVER (30 cm X 30 cm). It shall then be placed on the top of brick masonry.

MODE OF MEASUREMENT

The inspection chambers shall be measured per number and the rate quoted also shall be number only. The quoted rate shall include the cost of all the items, specified in the bill of quantities and specifications viz.

Bed concrete Brick work Plastering
Concrete benching and channelling

Inspection chamber cover and frame including PCC bed for fixing the frame Keeping holes and embedding pipes for all connections

Excavation, refilling necessary dewatering and disposing of extra stuff to a place as directed by the Architects
Testing
Curing

SANITARY INSTALLATION AND FIXTURES

All fixtures shall be fixed in neat workmen like manner true to line and as recommended by the manufacturer or shown on the drawings. Care shall be taken to fix all fixtures, brackets and accessories by proper wooden cleats, rawl plugs, bolts and nuts., as such fixtures will warrant with the correct size of screws nuts and bolts.

Care shall be taken in fixing all chromium plated fixtures and accessories so as not leave any tool marks or damages on the finish. All such fixtures shall be tightened with fixed spanners.

All fixtures shall be thoroughly tested after connecting up the drainage and water

supply system. All fixtures shall be thoroughly finished and any leakage in piping, valves and waste fittings corrected to the entire satisfaction of the Architects.

Upon completion of the work all labels, stickers, plasters etc., shall be removed from the fixtures and all fixtures cleaned thoroughly with soap water, so as present a neat and clean toilet.

MODE OF MEASUREMENTS

All the items above shall be measured per number and quoted rate per number only which shall include:

The cost of respective materials Necessary fixtures
Fixing in position

SANITARY INSTALLATIONS:

EUROPEAN WATER CLOSET:

It shall be of best quality Parryware/Hindware white chinaware water closet suite 'P' or 'S' trap confirming to IS: 2556 with ISI marked, vitreous chinaware 10 l capacity cistern with original fittings and all the CP brass fittings and other items required as specified in the Item No.1 European type water closet shall be fixed with brass screws of suitable length to PVC plugs or rawl plugs embedded in the floor after drilling hole in floor.

URINALS:

The urinals shall be of white or coloured vitreous chinaware conforming to I.S.2556 Part VI. SectionI It shall be flat back ha lf stall urinal as specified. It shall be provided with push cock for flushing , CP brass waste dome grating and other CP brass fitting and other fittings as specified in respective item of urinals.

WASH BASIN:

Best quality Parryware/Hindware washbasin shall be of white vitreous chinaware (or coloured) with Parryware make CP brass pillar tap (push type) as specified in the Items. It shall be provided with 1st quality vitreous chinaware pedestals where so specified. Pedestals shall accommodate supply and waste pipes fittings. The wash basin shall be placed on pedestal and firmly fixed on wall using nutbolt & washers. All the waste fittings shall be br ass chromium plated as specified.

PARTITION PLATE:

It shall be best quality 1820mm thick granite partition plate size 600x1200mm as specified in the BOQ. It shall be fixed with cement concrete 1:2:4 supporting with CI/MS special types brackets and cutting / making good the walls.

SINK:

Kitchen sink with drainage board shall be of stainless steel (Salem Stainless Steel IS:304) 1mm thick. The sink and drainage board shall be in one piece as specified size with rectangular compartment/ bowl. Each sink shall be provided with one

stainless steel waste and GI 'B' class waste pipe. Sink shall be supported on RCC platform having suitable cut for the bowl of the sink.

MIRROR:

Best quality Saint Gobin / Asahi make mirror of size 600x600mm with bevelled edged over wash basin. The mirror shall have 5.5mm thick hard board 6mm thick sheet backing complete fixed on wall with PVC plug and CP brass concealed screws and washers. The bevelled edge of the mirror shall be 3mm thick with bevelled width of 25mm.

TOWEL RAIL:

CP brass towel rail rod 20mm dia 16 gauge 450mm long including CP brass brackets.

SOAP DISH:

Best quality Parryware/Hindware make chinaware coloured recessed type soap dish/ cake holder. The colour should match with the tiles.

STEEL SHELF:

Prefabricated best quality 600mm long chromium plated st eel frame with 6mm thick glass shelf tray with all edges neatly grinded and polished as specified in the item. The steel shelf / tray shall be fixed with PVC plugs and CP brass screws.

SOAP CONTAINER:

Best quality CP brass liquid soap container. It shall be fixed to PVC plugs with CP brass screws.

PVC SOIL, WASTE AND VENT PIPES AND FITTINGS:

PVC soil, waste and vent pipes Class3 and fittings (PVC specials) shall be of heavy quality conforming to I.S. 49852000 for PVC pipes and PVC fittings conforming to IS 78341998. The standards weights a nd thickness of pipes shall be as per I.S. codes.

All soil waste and vent pipes shall be carried above the roof (90cms Beyond the tops of parapet.) and fitted with PVC terminal guard at top. The pipes shall have with coupler. The pipes and fittings shall be true to shape, smooth and cylindrical. Their inner and outer surface shall be concentric. They shall be sound and be free from cracks, taps, pinholes and other imperfections. The pipes and fittings shall ring clearly when struck over with a light hand hammer.

FIXING:

The pipes and fittings (specials) shall be fixed to walls at least 2.5cm clear of the finished surface of wall by using proper PVC clamps. Pipes shall be fixed vertically in a line as directed. Connection between main pipes and branch pipes shall be made by using proper bends invariably with access doors for cleaning.

All PVC pipe fittings like bends, tees, heal rest bend, single junction with door etc in soil waste & vent pipes shall be ISI marked

JOINING

Jointing the pipes and specials with solvent cement complete as per requirement

FLOOR TRAPS:

Floor traps shall be PVC, deep seal with an effective seal of 50mm. These shall be ISI marked. The trap & waste pipe shall be set in cement concrete blocks firmly supported on Ground Floor. The blocks shall be cement concrete 1:2:4 and extended to 40mm below finished floor level and size of the blocks shall 300x300mm and of required depth. The floor trap shall be 100mm dia inlet and 75mm dia outlet. Floor traps shall have extension piece to receive waste lines as indicated in the plan. All floor traps shall be provided with CP brass trap round of approved design and shape.

MONOBLOCK PUMPING SET:

Monoblock pumping set shall be ISI make, the relating parts of pump shall be dynamically. The pumps shall be designed for automatic air release during priming. The impeller of the pump shall be made of bronze. The shaft of pump shall be made of stainless steel. Suction pipe and delivery pipe size 50mm internal dia, CI non return valve with brass seat CI foot valve, cables etc shall be included in the items. Only suction and delivery pipes will be measured and payable in respected item. Electric motor shall be covered with tin shed if required.

PERFORMANCE GUARANTEE

The motor and pump shall be based on laboratory test corrected for site performance. The test report shall be submitted to Architect. The machinery shall be guaranteed for a period of 12months from the date of installation against any manufacturing defect or bad workmanship.

OVER HEAD TANK

a. All overhead tanks shall be of PVC water tank made of three layers (outer coloured layer, second sun shielded layer, third antibacterial inner layer) as per details shown in drawings.

b. These tanks shall be placed and located on the roof terrace as shown in drawing

c. Each over head tank shall be complete with the following.

- Cover at top with locking arrangement.
- Inlet &outlet with ball valves, overflow, air vent, scour pipe with all fittings.
- Mosquito proof coupling shall be provided to overflow and air vent pipes.
- The inlet pipe inside the tank shall be provided with ISI marked 40mm, 32mm & 25mm dia brass body all valve with polythene ball
- The inlet pipe to the over head tank shall be 50mm dia with ISI marked full

- Way gunmetal valve and all outlet pipes shall be 40mm, 32mm, 25mm dia with marked full way ball valves.
- 20mm dia GI pipe for over flow of each tank shall be brought down upto the Finished terrace level and laid upto the nearest khurra on terrace.
- Ball valves at location on terrace as shown in Layout plan drawing.

INTERNAL WATER SUPPLY:

WATER SUPPLY

GI PIPES AND FITTINGS: The pipes shall be of medium quality (ClassB) and shall be galvanized iron, screwed socketed and shall conform to IS 1239. They shall be manufactured by a firm of repute. All fittings shall be malleable iron galvanized fittings of approved best Indian make.

LAYING AND FIXING: Where pipes have to be cut or reth readed, ends shall be carefully filled out so that no obstruction to bore is offered. For internal work all pipes and fittings shall be fixed truly vertical and horizontal, either by means of standard pattern holder bat clamps keeping the (12 mm) clear of the wall everywhere or concealed as directed. For external work, G.I. Pipes and fittings shall be laid in trenches. The width of the trench shall be the minimum width required for working. The pipes laid underground shall not be less than 60 cm from the finished ground level. The work of excavation and refilling shall be done as specified elsewhere, or concealed as directed

PAINTING: The buried pipes shall be painted with two coats of bitumastic paint.

TESTING: Before any pipes are painted or covered, they shall be tested to a hydrostatic pressure of 7 kg/cm2. Pressure shall be maintained for al least eight hours without appreciate drop in pressure. In addition to the sectional testing of water supply pipes, the contractor shall test the entire installation to the entire satisfaction of Architects. He shall rectify and leakages, failure of fittings or valves.

MODE OF MEASUREMENT

G.I. pipes above ground shall be measured along the center line of the pipes and fittings. The quoted rate for respective item shall be per Rmt and shall include the following:

Cost of respective pipes and specials
Laying, fixing and jointing with necessary clamps

Cutting holes and chases in walls, floors etc. and making good the same. Testing and making good the defects if any
G I pipes below ground shall be measured as stated above.

WATER FITTINGS (TAPS STOPTAPS, ETC..,)

All water fittings shall be of approved quality and design and generally comply to latest I S specifications. The fittings and joints shall be tested as specified for pipeline to ensure that the joints are leak proof. Defective fittings and the joints

shall be repaired or redone replaced as directed.

MODE OF MEASUREMENTS

These items shall be measured in number, unless not included in other items viz. Wash basins Inlets to cisterns, etc...
Cost of materials
Cost of fixing accessories like bolts, nuts, washers

ALL TAPS: Ball taps used for storages tanks shall be high pressure brass/GM. Ball taps with brass lever rods and PVC floats.
Measurements Ball taps shall be measured by the number unless called for, with the item in the schedule of quantities.

BALL VALVE:

It is required to be provided in the over head tank at end G.I. pipe. It will conform to IS 1703. The ball valve shall be of brass (as specified) of required diameter. The float shall be of polythene. The body of ball valve shall be capable of withstanding a pressure of 14kg/sq cm. A bal l valve when assembled in working condition with float immersed to not more than half of its volume shall remain closed against a test pressure of 10.5 kg/sq cm. The standard weights of ball valves shall be as given in the I.S. standards.

BIB TAP:

All bib taps short body, long body, bottle traps, spray jet and copper pipe connection and other minor fittings shall be brass chromium plated. These shall be ISI marked. For fixing of CP brass fittings wherever required CP brass extension piece shall be provided.

RAIN WATER PIPES & SPOUTS:

The rainwater pipes where shown on the drawings shall be PVC pipes (Class3) of the diameter a specified in the schedule of quantities/drawings of approved manufacturer confirming to IS4985 with coupler:

a) For PVC pipes and PVC fittings jointing shall be provided as B.O.Q.

Where required these are to be run in the chase left or cut in wall, columns, slab. For exposed lengths of pipes these are to be neatly secured clear from the finish wall face with clip or bracket, nailed or screwed to hard wood tapering plugs embedded in walls.

The mouth of the rainwater pipe shall be fixed with PVC grating and the pipe jammed in position in 1:2:4 cement concrete.

The rate for the work shall include supplying and fixing of materials cutting, making chases etc. and is for the complete work in all respects. Unless otherwise specified in the schedule of quantities, the rate shall also include supplying, fixing and jointing all the specials like bends tee, junction etc. required for the complete work.

CONNECTIONS FOR WATER SUPPLY, SEWER LINE & STORM WATER

The approval of connections (Water supply, sewer and storm sewer) shall be got by the contractor from the concern authority under the name of the concerned institute of IBTRD Trust and all the legal fees shall be borne by the Employer. Incidental expenses if any shall be borne by the Contractor.

SCHEDULE C

TECHNICAL SPECIFICATIONS FOR ELECTRICAL WORK

1. ELECTRICAL INSTALLATIONS:

1.1 The following specification will apply under all circumstances to the equipment to be installed against this contract and it is to be ensured that the contractor shall obtain for himself at his own expenses and no his own responsibility the information which may be necessary for the purposes of entering into a contract keeping in view of the purposes of entering into a contract the specifications detailed here under, drawings and design of the electrical installation and inspection of site etc.

Test certificate from individual manufacturers of all cables, wires, fittings etc. shall be furnished by the contractor and responsibility of getting the approval from electrical authorities and fire department shall lie with the contractor.

1.2. Scope

The contractor is required to complete the work in full and comply with all the relevant specifications and scope of work. All electrical tests to be carried out for the entire electrical works i.e. testing of the existing incomplete work and additional work undertaken to make the entire electrical system functional and operative under the electrical rules and regulations. Tests sheets for the entire work along with drawings shall be submitted to the Architect before the complete certificate.

The contractor shall supply, store, erect test and commission all the equipment required for electrical installation. The contractor shall furnish all the materials, labour, tools and equipment for the electrical work, as shown in the accompanying drawings and in the bill of quantities and specifications hereinafter described.

The electrical installation shall comply with the requirements of Indian Electrical Supply Act and Rules make there under and also with any other regulation, such as those made under Fire Insurance Act that may be applicable. The electrical installation shall be carried out only by authorized and qualified persons competent to undertake such work.

1.3. Contractor

The contractor shall engage 'A' licensed electrical contractor, possessing a valid electrical contractor's license in the State, employing licensed supervisors and skilled workers having valid permits as per the Regulation of Indian Electricity Rules and Local Electrical Inspector's requirements.

The following abbreviations used in the bill of quantities specifications and drawings represent.

ISS	Indian Standard Specification
IEE	Indian Electricity Rules, 2003
BS	British Standard
BSCP	British Standard Code of Practice
HRC	High Rupturing Capacity
GI	Galvanized Iron
MS	Mild Steel
CI	Cast Iron
APLSTS	Aluminium conductor, Paper Insulated Lead Sheathed, Double Steel Tape Armoured & Serving
PVC	Polyvinyl Chloride
XLPE	Cross Linked Polyethylene
HT	High Tension
LT	Low Tension
A Amp	Ampere
KV	Kilo Volts
PT	Potential Transformer
CT	Current Transformer
OCB	Oil Circuit Breakers
SFU	Switch Fuse Unit
ACB	Air Circuit Breaker
CFS	Switch Fuse Switch
MCCH	Moulded Case Circuit Breaker
MCB	Miniature Circuit Breaker
IC	Iron Clad
ICPTN	Iron Clad Triple Pole ad Neutral
ICDP	Iron Clad Double Pole
DB	Distribution Board
KVA	Kilo Volts Ampere
KVAR	Kilo Volts Ampere Reactive
NC	Normally Closed
NC	Normally Open
SWG	Standard Wore Gauge

1.4 Regulation & Standards

The installation shall confirm generally to Indian Standard code of practice for electrical wiring installation IS 732. It shall also be in conformity with the Current Indian Electricity Rules and Regulations and requirements of the local electric supply authority in so far as these become applicable to the installation. Whenever this specification calls for a higher standard of materials and / or workmanship then those required by any of the above regulations, these specifications shall take precedence over the said regulations and standards. In general, the materials, equipment and workmanship not covered by the above shall/conform to the following Indian Standards (Latest Edition) unless otherwise

called for:

1.	SWITCH GEAR	
a)	Requirements of AC Circuit breaker	IS 2516 (Part I) Sec 1,2 & 3 PartIII)
b)	Switches and switch isolators above 1000 V but not exceeding 1.1 KVA	IS4710
c)	Markings & arrangements for switch gear busbars main connection & auxiliary writing	IS375
d)	Specifications for normal duty air break switches & composite units for air break switches & fuses for voltage not exceeding 1000 volts	IS4064
e)	Heavy duty air break switches and composite units of air break switches and fuses for voltage not exceeding 100 volts	IS4047
f)	Specifications for miniature circuit breakers	IS8838
g)	Specifications for enclosed distribution fuse board & cutouts for voltage not exceeding 1000 volts	IS2675
h)	Installation & maintenance of switch gear	IS3072
i)	HRC cartridge fuse links 650 volts	IS2208
2	CABLES	
a)	Specification for PVC insulated (Heavy Duty) electricity cables (Partl) for voltage upto 1100 volts	IS1554
b)	Specification for PVC insulated cables (for voltage upto 1100 V) (Partll) with aluminium conductors	IS694
3.	3 pin plugs and socket outlets.	IS1293
4.	Ceiling roses	IS 371
5.	General and safety requirements for electrical 1913 lighting fittings.	IS1913
6.	Propeller type AC ventilating fans	IS2312
7.	Code of practices for earthing	IS3043
8.	Glossary of term for electrical cable and conductors	IS1885
9.	Code of practice for building (General) electrical installation	IS1646
10.	Protection of buildings and allied structures against lighting	IS2309
11.	Current Transformers	IS2705(Part I to III)
12	Voltage Transformers	IS3156(Part I to III)
13	Power Transformer	IS 2926 1977 (Part I IV)

14	Shunt capacitors for power system	IS2834
15	Direct acting electrical indicating instruments	IS 1248

ISI marking for materials/equipment is not necessary unless otherwise specifically called for.

1.5 Inspection & approval of the work by Local Authority

On completion of this work, the contractor shall obtain and deliver to the Architect the certificates of inspection and approval by the Electrical Inspector of Local Administration. The Architect shall have access to the manufacturers premises for inspection of any items of the tender for which contractor has to make arrangement with different manufacturers 15 days notice to be given to the Architect/Consultant for the same.

1.6 Drawings

The drawings, specifications and bills of quantities shall be considered as part of this contract and any work or materials shown on the drawing and not called for in the specifications or vice versa, shall be executed as if specifically called for in both. The contract drawings indicate the point of termination of conduit runs and broadly suggest the routes to be followed. The work shall be installed as indicated on the drawings, however, any minor changes if found essential to co ordinate installation of this work with other trades shall be made without any additional cost to the owners/employers. The data given herein and on the drawing is as could be secured but its complete accuracy is not guaranteed. The drawings and specifications are for the assistance and guidance of the contractor. The exact location, distance and levels, etc. will be governed by the space conditions. The contractor shall examine all architectural, structural plumbing and sanitary and air conditioning drawings before starting the work and report to the Architect / consultant any discrepancies which in his opinion appear on them, and get them clarified, he shall not be entitled to any extras for on missions or defects in electrical drawings or when they conflict with other work.

1.7 As Built Drawings

At the completion of the work and before issuance of certificate of virtual completion, the contractor shall submit to the Architect/consultant layout drawn on tracing film and at approved scale indicating the complete wiring as installed.

1.8 Foreman/Supervisor

The contractor shall employ a competent, licensed qualified full time electrical foreman/supervisor to direct the work of electrical installation in accordance with the drawings and specifications. The foreman/supervisor shall be available at alltime on the site to receive instructions from the Architect/Consultant in the day to day activities throughout the duration of the contract. The foreman/supervisor shall correlate the progress of the work in conjunction with all the relevant requirements of the supply authority, the skilled worker employed for the work should have requisite qualification and should possess competency certificate from the electrical inspector of Local Administration.

1.9 Application for Electric Supply/Liaison

The contractor shall be responsible for filing and follow up of application for electric supply to the project. The contractor shall carry out all the liaison work required for obtaining electric supply commencing from filing of application. This liaison shall be deemed to be a part of this contract and no separate payment will be made on this account.

1.10 Samples

Sample of all materials that the contractor intends to use shall be mounted on wooden frame and submitted to the architects for approval. After the samples are approved the sample based shall be exhibited in the office of the site engineer of the bank at the site of works.

2. SWITCH FUSE UNITS

2.1 General

Switch fuse units shall be incorporated in the switch board panels wherever, specified. Switch board shall conform in all respects to IS: 4064 or BS: 3185. Switch fuse unit shall be suitable for 415 volts, 3phase, 50 HZ AC supply.

2.2 Construction

The unit housing shall be of robust construction designed to withstand arduous conditions encountered in the electrical system. Sheet steel materials used for switch fuse shall be given a rigorous rust proofing treatment before it is fabricated and painted. Unit shall preferably have double break per phase in order to isolate fuse links when the switch is in 'OFF' position.

2.3 Fuses

The units shall contain fuse based and carriers for accommodating HRC fuse units. HRC fuse units of specified rating and conforming to IS: 2208 or BS:88 shall be provided.

2.4 Operation Mechanism

The operating mechanism of the unit shall be crisp and positive in action with quick make, silver plated contacts. The operating handle shall be suitable for rotary operation unless otherwise specified. Position of the handle as 'ON' 'OFF' shall be clearly indicated, operating handle shall be of retractable type.

2.5 Shrouding

All the live parts inside the switch fuse unit shall be shrouded to prevent any accidental contact.

2.6 Terminals

All the terminals shall be liberally designed. All the units above 100 A shall be provided with integral cable sockets.

2.7 Interlocking

All switch fuse unit shall be provided with suitable interlock such that the donor of switch board panel shall not open unless the switch is in 'OFF' position. Provision for pad locking the switch in 'OFF' position shall also be provided.

3. MEDIUM VOLTAGE DISTRIBUTION BOARDS FOR POWER & LIGHTING DISTRIBUTION

3.1 General

Distribution board shall be suitable for 415 volts, 3 phase AC supply or 230 volts single phase AC supply, as required. Distribution boards shall generally conform to IS2675. However, the specifications hereinafter described shall take precedence over the above wherever this workmanship.

3.2 Type and Construction

Distribution board shall be of totally enclosed dust/vermin proof factory fabricated. The enclosure shall be made of the best quality sheet steel shall be treated with a rigorous rest inhibited process before fabrication. The distribution boards shall comprise of MCB unit as incoming and required number of miniature circuit breakers as outgoing shall have rating as specified on the drawings and schedule

3.3 Bus bars

Suitable bus bars made of aluminium conductivity copper strips and mounted on non hydroscopic insulating supports shall be provided.

3.4 Circuit Breakers

Miniature circuit breakers shall be of approved design and make. Circuit breakers shall be equipped with individually insulated and segregated terminals. The position of handle of the breakers shall clearly indicate the condition of breaker such as ON/OFF.

3.5 Testing

Distribution boards shall be tested at factory as per IS: 2675. The test shall include insulation test high voltage tests, etc. Original test certificate from the manufacturer shall be furnished.

4. MEDIUM VOLTAGE DISTRIBUTION SYSTEM (INTERNAL, LIGHTING & POWER WIRING)

4.1 General

Medium voltage distribution system shall be applicable for wiring 3 phase, 4 wire 415 volts, 50 HZ AC supply and single phase, 2 wire 240 volts, 50 HZ AC supply.

4.2 Regulation & Standards

The system shall be governed by the requirements of IS: 712 and IE Rules, IS standards and codes applicable for medium voltage distribution is also listed in standard specification No.

4.3 PVC Conduit and Accessories

Installation of conduits

a. Open / surface conduit system: Wherever, specifically called for, surface conduit system shall be adopted. Conduits shall be run in square are and symmetrical lines. Before the conduits are in exact route shall be marked at site and approval of the Architect shall be obtained. Conduits shall be fixed be heavy gauge saddles, secured to suitable raw plugs, at an interval are used, the saddles shall be provided on either side at a distance of 30cm from the centre of such screwed couplers and screwed accessories only. In long distance straight rungs of conduit inspection type couplers of running type couplers with jam nut shall be provided.

All the conduits opening shall be properly plugged with PVC stoppers/bushes Wherever conduits terminate into/point control box, outlet box, distribution boards, etc. conduits shall be rigidly connected to the box/board.

(b) Recessed conduit system: All the conduits including, bends, unions, junction boxed etc. shall be cleaned, before they are fixed in position. Conduits which are to be taken in the ceiling slab shall be laid on the prepared shuttering work of the ceiling slab before concrete is poured. The conduits shall be properly threaded and screwed into sockets, bends, junction boxes, outlet boxes.

The conduits in ceiling slab shall be straight as far as possible to facilitate easy drawing of wires through them. Before conduits are laid in the ceiling the positions of outlet points, point control boxes, junction boxes, shall be set out clearly so as to minimize offsets and bends. Conduits recessed in walls shall be secured rigidly by means of steel hooks/staples at 0.6 m intervals. Before conduit is concealed in the walls, all chases, grooves shall be neatly made to proper dimensions to accommodate the required number of conduits. The outlets boxes, point control boxes, inspection and draw boxes shall be fixed as and when conduit is laid. The recessing of conduits in cover on the same. All grooves, chases etc. shall be refilled with cement mortar and finished upto the unfinished wall surface before plastering of walls is taken up by the general contractor. Where conduits pass through expansion joints in the building, adequate expansion fittings or other approved devices shall be used to take care of any relative movement. Wherever conduits devices shall be used to take care of any relative movement. Wherever conduits terminate into point control boards etc. with check nuts on either side of the entry to ensure electrical continuity.

Running joints in conduits wherever necessary shall be rigidly held in aligned position by a check nut tightened on running side. After conduits, junction boxes, outlet boxes etc. are fixed in position their outlets shall be properly plugged with PVC stoppers or with any other foreign material do not enter into the conduit system.

All conduits ends terminating into an outlet, draw box, junction box, point control boxes, etc. shall be provided with bushes of PVC or rubber. Necessary pull wires shall be inserted into the conduit for drawing wires and proper size

earth continuity wire shall be run throughout the lengthy of the conduit with the earth wire being efficiently fastened to the conduit by means of special clamps. Copper clamps shall be sued for copper earth wire and GI clamps for GI wires. Earth continuity wires may also be brought inside the conduits.

4.4 Enclosure for Electrical Accessories

i) Enclosure for electrical accessories such as switches, sockets, fan regulators etc. shall be mild steel conforming to IS: 5133Part I. The dimensions of the enclosures shall be as per clauses 3.1 of IS5133. Th e wall thickness of enclosures shall not be less than 1.6mm. The enclosure boxes shall be provided with a minimum of four fixing lugs located at the corners for fixing the covers. All fixing lugs shall have tapped holes to take machines brass screws.

ii) Sufficient number of knockouts of 32 mm / 25 mm/ 20 mm dia shall be provided for conduit entries. Enclosures shall be sufficiently strong to resist mechanical damage under normal service conditions. Provisions shall be made for bonding the enclosures to the earth. The enclosures shall be adequately protected against rust and corrosion both inside and outside with suitable air drying paint. The phenolic laminate cover with bevelled edges for mounting switches, sockets, etc. wherever different phase conductors are brought into the same enclosure, phase barriers shall be provided. Phase barriers shall be of MS

5. WIRING CONDUCTORS

5.1 All wiring conductors shall be PVC insulated, single/stranded copper conductors of 1100 V grade. Wiring conductors shall generally conform to IS:694

The current ratings for wiring conductors shall be based on the following parameters.

i. Ambient temperature 40°C
ii. Conductor temperature 70°C

Wiring conductors shall be supplied in various colours for easy identification of wires. The wiring conductors shall be supplied in sealed coils of 91.44 m length.

The wiring conductor shall bear manufacturer's trade mark, name, voltage grade etc.

5.2 Installation of Wiring Conductors/Cables

The wiring conductors shall not be drawn into the conduits until the works of any nature that may cause damage to the wires are completed. Before drawing the wires the conduits shall be thoroughly cleaned and drained, proper care shall be taken in pulling the wires. The installation and termination of wires shall be carried out with due regard to the followings:

a) While drawing the wiring conductors, care shall be taken to avoid scratches and kin's which cause breakage of conductors. There shall be no sharp ends in the conduit system.

b. Insulation shall be shaved off like sharpening a pencil.

c. Strands of the wire shall not be cut for connecting to the terminals or lugs. The terminals shall have adequate cross section to take all the strands.

d. Brass flat washers of large area shall be used for bottled terminated

5.3 Wiring for power and lighting circuit shall be carried out in separate and distinct wiring system. Wiring for emergency system shall also be carried out in a separate and distinct wiring system. Balancing of circuits in a three phase system shall be arranged before the installation is taken up.

5.4 The wiring system envisaged is generally shown on the layout drawings and line diagrams, however, a brief account of the general wiring system is given below

Sub main wiring: Wiring from switch boards to the individual distribution boards.
Circuit wiring: This shall be included in point wiring.

5.5 The sub main wiring shall be either in 3phase, 4 wire, or single phase, 2 wire system. Each sub main wiring circuit shall also have its own copper earth continuity wire. The number and size of copper earth continuity wire shall be as per BOQ.

The load per circuit shall not exceed 800 watts. The minimum size of conductor for wiring of lighting circuits shall not be less than 3/20 mm. Power wiring shall not have more than two sockets connected to one circuit.

The maximum number of various size conductors that could not be drawn into various sizes of conduits shall be as per table of IS732 (Latest Edition) the wiring shall be colour coded for easy identification of phase and neutral generally the following colour coding may be adopted.

Phase	R	=	Red
	Y	=	Yellow / White
	B	=	Blue
Neutral		=	Black
		=	Green

6. SWITCHES, SOCKETS AND ACCESSORIES

6.1 General Requirements

Light control module switches shall be 6A rating for controlling upto four light points and 16A rating for more than four light points. Light control switches shall be of module type design suitable for flush mounting for general lighting. Wherever specifically called for tumbler type switches shall be used for surface mounting. Light control switch shall 3 mm thick phenol in laminated sheet covers

All sockets 6A and 16A rating shall be flush mounting module type with control switches of module type design of the same rating as that of the sockets. All sockets outlets shall be of 3 pin module type. The base of the socket shall be high

quality porcelain with pins made of brass alloy and plated with a noble metal. Socket module shall be provided.

6.2 **Lamp Holders, Ceiling Roses, etc.**

Accessories for light outlets such as lamp holders, ceiling roses, etc. shall be in conformity with requirements of relevant IS specifications. Only approved make of accessories shall be supplied.

6.3 **Installation of Switches module, Sockets module and Accessories**

All the switches shall be wired on phase. Connections shall be made only after testing the wire for continuity, cross phase etc with the help of megger switches module sockets module fan regulator etc. shall be housed in proper sheet enclosures. The arrangement of switches and sockets shall be neat and systematic. Covers for enclosures accommodating module switches, sockets, etc (point control boxes) shall be of module type. For termination of wires PVC connections shall be provided wherever essential. For wall plug sockets, the conductors may be terminated directly into the switches module and sockets module. The outlets, point control boxes etc. shall be set out as shown on the drawings. Before fixing these, the contractor shall obtain clearance from the Engineer/Architect with regard to their proper locations. The enclosures of sockets and 3rd pin of the socket shall be connected to the ground through a proper size earth continuity wires as laid out in standard specifications.

7. POINT WIRING

Point wiring shall commence from distribution board to outlet through point control board or switch. Circuit wiring from DB to switch board is included in point wiring and no separate circuit wiring will be paid by the employer

Point wiring for lights, fans, module sockets, call bell etc. shall be carried out with

copper conductor PVC insulated wires of 3/20 and 3/22 cross section as per BOQ. The point wiring shall be inclusive of 20 mm / 25 mm / 32 mm sheet steel conduits of standard and approved make (as specified) along with approved quality conduit accessories such as bends, inspection bend, reducers, junction boxes, etc. together with wiring accessories such as ceiling, roses, lamp holder connections, point control boxes (enclosure for electrical accessories) etc. point wiring shall provided with 16 SWG copper earth continuity wires for earthing 3rd pin of light sockets and fan fixtures

A max of 800 watts or 8 points whichever is lower shall be on one circuit

8. TESTING AND ELECTRICAL INSTALLATION

8.1 Testing and installation shall be as per IS173 21963

a. The insulation resistance shall be measured by applying between earth and the whole system of conductors or any section thereof with all fuses in places and all switches closed and except in earthed concentric wiring all lamps in

position or both poles of the installations otherwise electrically connected together, where a direct current pressure of not less than twice the working pressure provided that it need not exceed 500 volts for medium voltage circuits. Where the supply is derived from the three wires (AC & DC) or a poly phase system, the neutral pole of which is connected to earth direct or through added resistance, the working pressure shall be deemed to be that which is maintained between the outer or phase conductor and the neutral

b. The insulation resistance measured as above shall not be less than 50 divided by the number of points on the circuits that the whole installation shall be required to have an insulation resistance greater than one meg ohm

c. Control rheostat heating and power appliances and electric signs may, if required, be disconnected from the circuit during the test, but in event the insulation resistance between the case of frame work and all live parts of each rheostats appliance and sign shall not be less than that specified in the relevant Indian Standard Specification or where there is no such specification shall not be less than half a meg ohm

d. The insulation resistance shall also be measured between all conductors connected to one pole or phase conductor of the supply and all the conductors connected to the middle wire or the neutral or to the other pole or phase conductors of the supply and its value shall not be less than specified in sub clause.

e. On completion of all electric installations (or an extension to an installation) a certificate shall be furnished by the contractor counter signed by the qualified supervisor under whose direct supervision the installation was carried out. The certificate shall be in prescribed form as required by the local electric supply authorities. One such recommended form is given in Appendix.

8.2 Testing of Earth Continuity Path

The earth continuity conductor including metal conduits and metallic envelopes of in the cases shall be tested for electric continuity and the electrical resistance of the same along with the earthing lead but excluding any added resistance or leakage circuit breaker measured from the connection with the earth electrodes to any point in the earth continuity conductor in the completed installation shall not exceed one meg ohm.

8.3 Testing of Polarity of nonlinked Single Pole Switc hes

a. In a two wire installation a test shall be made to verify that all non linked single pole switches have been fitted in the same conductor throughout and such conductor shall be labelled or marked for connection to an outer on phase conductor or to the non earthed conductor of the supply.

b. In a three wire or four wire installation a rest shall be made to verify that every non linked single switch is fitted in a conductor which is labelled, marked for connection to one of the outer
conductor of the supply.

9. EARTHING FOR ELECTRICAL WORK

All noncurrent metal parts of the electrical instal lation shall be earthed as per IS: 3043. The materials to be used are described in the BOQ

9.1 Earthing Conductors

All earthing conductors shall be of bare solid copper conductor and shall be protected against mechanical damage and corrosion. The connection of earth continuity conductors to earth bus and earth electrodes shall be strong and shall easily accessible. The earth strip shall be rigidly fixed to the walls. Conduits and cable by using suitable clamps made of non ferrous metals compatible with the earthing conductor, the following earthing conductors are required to be used for various sections of the installations.

a. All fixture lighting, fan and switch enclosures, lighting conduits shall be earthed with bare solid copper conductor of 16 SWG

b. Third pin power socket outlets upto 20A shall be earthed with bare solid copper conductor of 14 SWG.

All the sub mains and sub circuits shall be provided with earth continuity conductors as specified and connected to main earth bus. Earthing conductors for equipment shall be run from the exposed metal surface of equipment and connected to a suitable point on the sub main or main isolator earthing bus. All switch boards, distribution boards and isolators, shall be connected through double earthing, double earthing, and conductor to the earth bus. Earthing conductors shall terminate at the equipment using suitable lugs, bolts, washers and nuts.

i. All the single phase switch and DB's above 30 amp rating shall be earthed with one run of 10 SWG bare copper earth wire and above 30 A upto 63 amp with one run of 8 SWG bare copper earth wire as per BOQ

ii. All the 3 phase switch / DBs upto 30 A rating shall be earthed with 2 runs of 10 SWG
copper wires and above 30 A upto 63 amp with 2 runs of 8 SWG copper wires or as per BOQ

iii. The computer points shall 1/18 PVC insulated copper wire or as mentioned in BOQ

All conduits, cables armouring etc. shall be connected to the earth all along their run by Earthing conductors of suitable cross sectional area. Water pipes, steel structural elements, cable trays/racks lighting conductors shall not be used as a mean of earthing an installation. The electrical resistance of earthing conductors shall be low enough to permit the passage of fault current necessary to operate a fuse/ protective device a circuit breaker and shall not exceed 2 ohms.

All single phase wiring shall have one run of copper earth wire and three phase wiring shall be provided with two run of copper earth wires.

9.2 Earthing Electrode

Earthing electrodes shall be designed as per the requirement of IS: 3943. The number and size of earth electrodes shall be calculated so that under fault conditions no electrode is loaded above its maximum permissible current density. The resistance of earth electrodes shall be as low as possible, the maximum allowable value being one ohm. Earthing electrodes of plate type be adopted GI earth electrode shall be used to arrest the lighting.

9.3 Plate Electrodes

Plate electrodes shall be made of copper plates of 3.15mm thick and 60x60 cm size. The plates shall be buried vertically in ground at depth of not less than 2 m to top of the plates, the plates being encased in charcoal to a thickness of 15cm all around. It is preferable to bury the electrodes to a depth where sub soil water is present. Earth leads to the electrodes shall be laid in a GI pipe and connected to the plates electrode with brass bolts, nuts and washers, GI pipe and connected to the plates electrode with brass bolts, nuts and washers, GI pipe of not less than 19 mm dia shall be placed vertically over the plates and terminated in funnel. The funnel shall be enclosed in masonry chamber of 30x30 cm dimensions. The chamber shall be provided with CI frame and CI cover. The earth station shall also be provided with permanent identification label/tag.

9.4 Precautions

Earthing system shall be mechanically robust and the joints shall be capable to retaining low resistance even after passage of fault currents. Joints shall be solders, tinned and double riveted in case of copper and joints shall be filled and double riveted in case of GI. All the joints shall be mechanically electrically continues and effective. Joints shall be protected against corrosion.

9.5 Testing

On the completion of the entire installation, the following tests shall be conducted.

a) Earth resistance of electrodes.

10. LT CABLES

LT cables shall be of copper/aluminium conductor PVC insulated PVC sheathed steel taps/ wire armoured construction. Cables supplied in smaller lengths or otherwise shall bear manufacturers identification mark at regular intervals.

11. ELECTRICAL CONNECTION

The Contractor is responsible for abstention of permanent electricity connection to the building in liaison with TANGEDCO as per the norms.

LIST OF APPROVED MAKE FOR CIVIL, PLUMBING / SANITARY & ELECTRICAL

1	Cement	ACC / Ultra Tech / Ramco (OPC 43 grade & 53 grades) as per requirement.
2	Reinforcement Steel	TMT bars of Tata steel, SAIL/ RINL or Equivalent approved by Trust)
3	Structural Steel	Structural steel of Tata steel, SAIL/ RINL or Equivalent approved by Client / Architect
4	Teakwood	Second Class Quality Indian Teak
5	Paints	Asian paints / Berger /ICI / Nerolac
6	Glass	Modifloat / Saint Gobin / Asahi India glassworks Ltd
7	UPVC Pipes and fitting	Finolex/ Supreme/Prince
8	Bricks	Table moulded bricks of crushing strength not less than 35 Kg/Sq cm to be approved by the Trust/ Architect
9	Solid concrete Blocks	APCO or Equiv approved by Trust/Architect
10	Granite slabs	18mm as per Basic rates
11	Vitrified tiles	Johnson /Nitco/ Somany /Kajaria / Euro
12	Ceramic & glazed tiles	Johnson/ Kajaria/ Somany / Bell
13	Plywood	Green Ply/ Century/ Uniply or Equivalent as approved by Trust/ Architect.
14	Integral Water Proofing	India water proofing company or equivalent as approved by Trust / Architect.
15	Waterproofing compound	Fosroc chemicals / Roffe construction chemicals/ Pidilite Company Ltd./ Dr.Fixit.
16	Flush Door	Jackson/Kutty flush doors/as approved by Trust/Architect.
17	Aluminium	Jindal, Hindalco, Indo Alusys
18	Galvalume sheets	JSW /Lloyd's / Gangaroof / Japan metal or Equivalent approved by Trust/ Architect.
19	Hardware	a) Door andles Dooma / Godrej / Haffle b) Ball Catch(M) Eagle c) Ball Catch (P/T) Venus d) Door locks Godrej
20	Door Closer	Dorma, Godrej, Haffle
21	IWC/ EWC / Wash Basins	Hindware/ Parry ware / jaquar
22	Chromium plated (CP) bath	Parry ware / Jaguar (Continental range) room fittings
23	Gate Valves	Neta/ Zolata
24	Taps	Parryware / Jaguar (continental range)
25	GI Specials	R Brand or Equivalent
26	Pumps	Crompton Greaves or Suguna / CRI
27	Kitchen Sink	Nirali or as approved by Trust/ Architect.
28	PVC conduits	Aranplast / Balco or as approved by Trust/ Architect.
29	PVC Copper Wire.	Finolex/ Havells/ Anchor (FRLS grade)

30	5/6 Amp. Switches / Sockets	Havells/ Anchor / Legrand (Mosaic) Modular.
31	5/15 Amp. Switches / Sockets.	Havells/ Anchor / Legrand (Mosaic) Modular.
32	Ceiling Rose /Battern Holder	Havells/ Anchor /Legrand (Mosaic) – Modular
33	LED Lights	Phillips/ Havells/Bajaj
34	Change over switches	L&T / Havells/ Indo Asian
35	Switch fuse unit	Siemens / Havells/L&T/ Indo Asian Switch units HRC fuses MCB
36	M.C.B. / D.B.	MDS (Legrand) / Schneider / Siemens / L&T / ABB
37	M.C.B.	MDS (Legrand) / Schneider / L&T
38	MCCB.	Schneider / Siemens / L&T
39	Elcb	Schneider / Siemens / L&T
40	Aluminium conductor cables	Poly cab / Havells / Finolex
41	G I pipes	Tata/ Zenith/Jindal.
42	Ammeter / voltmeter	Havells/ L&T / Schneider .
43	Selector switch	L&T/ Havells / Schneider.
44	CT'S	Kappa/ L&T.
45	Indicators	Siemens / L&T / Anchor.
46	HRC fuse/ fuse base/ fuse	Standard / Siemens / L&T.
47	Matel Box	MK / Legrand (Mosaic) / Modular.
	Fan Box	Aranplast / Balco or as approved by Trust/ Architect.
48	Switch board Box.	M.S. Box.(Legrand Mosaic) / MK
49	Holder Plate with Brass Screw.	Acrylic Type (Off white Colour)
50	H.T.Switchgears	ABB / Schneider / Siemens.
51	Unitised Substation	ABB / Schneider / Siemens.
52	D.G.Set.	Kirloskar / Powerica / Ashok Leyland.
53	H.T.Kiosk	Hyphen.
54	H.T.Cable.	Polycab / Finolex / Havells .
55	L.T.Cable	Polycab / Finolex / Havells .
56	Indicating Lamps	Philips / Havells.
57	Lugs & Glands	Lugs Dowells / Lotus.
58	Meters	L&T / Sneider / HPL.
59	Power Contactor	Schneider / Siemens / L&T
60	Fire Extinguisher	Firex / Safex / Minimax / Ceasefire.
61	Rubber Mat	Bhor / Atlas
62	Capacitors	Shreem / L&T / Prabhodhan / Epcos
63	APFC Relay	Shreem / L&T / Prabhodhan / Epcos
64	Protection Relay	Alstom / L&T / Sneider
65	Outdoor/Indoor termination	Reychem/ 3M.

NOTE: ARCHITECT / IBTRD TRUST RESERVE THE RIGHT TO PE RMIT EQUIVALENT BRAND ONLY IF REQUIRED.