RAJKOT MUNICIPAL CORPORATION

e - Tender No. RMC/ENGG/CZ/24-25/____-

Bid Documents For
Construction of U.P.H.C. & City TB Center at Railnagar, Rajkot Municipal Corporation (Central Zone)

VOLUME - II

Milestone dates for e-tendering are as under	
Downloading of e-documents	26-06-24 to 18-07-24 up to 17:00 Hrs.
Pre-bid meeting in the O/o CE	05-07-24 at 16:00 Hrs.
Last date for online submission of e- Tender	18-07-24 upto 18:00 Hrs.
Submission of EMD, Tender fee and other Documents for verification by Regd. Post. A.D. / Speed Post	23-07-24 up to 18:00 Hrs.
Opening of Technical Bid	25-07-24 at 11:00 Hours onwards
Verification of submitted documents (EMD, e-Tender fee, etc.)	26-07-24 at 11:00 Hours onwards
Agency to remain present with original documents for verification	26-07-24 at 16:00 Hours
Opening of Price Bid (For Technically qualified bidders only)	29-07-24 at 11:00 Hours
Bid Validity	180 Days from the date the e-Tenders are opened

OFFICE OF THE ADDL. CITY ENGINEER,
BANDHKAM SHAKHA,
CENTRAL ZONE OFFICE,
RAJKOT MUNICIPAL CORPORATION,
DR. AMBEDKAR BHAWAN,
DHEBARBHAI ROAD,
RAJKOT-360001 (GUJARAT)

ELECTRIC WORK

(Specification, Condition & Make List)

TECHNICAL SPECIFICATIONS FOR ELECTRICAL WORKS

1. Wiring Rules:

The installation generally shall be carried out in conformity with relevantI indian Standard Specifications and code of practices prevalent, Indian Electricity Rules,1956 and Indian Electricity Act,1910 as a mended from time to time.

2. Definition:

The definition of terms shall be in accordance with Indian Standard code of Practice for Electrical wiring Installation IS-732-1982 except for the definition of point in case of Internal Electrical Installation. For definition of point wiring and measurement of Electrical works IS-5908-1970 shall be referred to.

3. Voltage and Frequency of Supply:

All current consuming devices shall be suitable for frequency of 50C/sand system of voltage meant for unless otherwise specified.

4. Layout of wiring and its description:

(i)The wiring shall be carried out as per Schedule "power" wiring must be in screwed conduit and shall be kept separate and distinct from lighting wiring. All wiring must be done on the distribution system with main and branch distribution boards at convenient centers and without isolated fuses. All conductors shall be run as far as possible along the walls and ceiling as to be easily accessible and capable of being thoroughly inspected. The balancing of circuits will be arranged beforehand by the Ex. Engineer Electrical Division.

(ii)Within one month of the taking over the installation, the contractor shall supply to the Ex. Engineer, Elect. Division a complete set of wiring diagrams of the same on drawings to be supplied when available by the Executive Engineer, Electrical Division, and to the satisfaction of the Ex. Engineer, Elect. Dn. and these Wiring plans shall be "Drawings" within the meaning of the term as used in the General Conditions of contract.

5. Conductors:

All conductors unless otherwise specified shall not be less than 1.5 Sq.mm for point wiring and 2.5/4Sq.mm for mains Conductors for power and lighting circuits shall be of adequate size to carry the designed circuit load without exceeding the permissible thermal limits for the installation, and such sizes will be stipulated in specifications and or drawings.

6. Cables:

6.1 All cables shall conform to relevant Indian Standards.

6.2 Conductors of all cable except the flexible cable shall be of aluminum. The smallest aluminum conductors for the final circuit shall have nominal cross-sectional area of not less than 1.5Sq.mm. The minimum size of the aluminum conductors for power wiring shall be 4sq.mm

6.3.1 Conductors of flexible cables shall be of copper. The minimum cross-sectional area of such a cable shall be 14.0193 mm. The flexible cable shall have uniform and adequate insulation.

6.3.2 Unless the flexible cables and conductors are protected by armor or though rubber or PVC Sheath, these shall not be used in workshops and other places where they are liable to mechanical damage.

6.3.3 Core flexible cables shall be used for connecting Single phase Appliances for phase, neutral & earth connections.

7. Fall of Potential:

The cross-sectional area of all conductors inside buildings shall be so proportioned to their lengths that the drop in voltage between main fuses and the farthest point or any lamp shall not exceed three percent of the voltage of the consumer's With all the consuming devices in use.

7.1 If the cable size is increased to avoid the voltage drop in circuit current rating of the cable shall be more than that for which the circuit is designed. In each circuit or sub circuit every cable shall have a current rating not less than that of the fuse which protects the circuit or sub circuit respectively for current higher than the full load current.

8. Ratings of lamps and fans socket outlets: Points and exhaust fans

8.1 Incandescent lamps in stalled in residential and non-residential buildings shall be rated at 60 watt &100 watts respectively.

8.2 Table fans and ceiling fans shall be rated at 60 watts; exhaust fan shall be rated according to their capacity.

8.3 5 Amp. Socket outlet points and 15 Amp. Sockets outlet points shall be rated at 100 watts and 1000 watts respectively for the purpose of load assessment unless actual values of the load are know or specified.

9. Tests:

9.1 Before the installation is commissioned following tests shall be carried out.

(1) Insulation Resistance test

(2) Polarity Tests of Switches

(3) Earth continuity tests

(4) Earth electrodes Resistance test

9.2.1.1 The insulation resistance shall be measured between earth and the whole system of conductors or any section thereof with all fuses in place and all switches closed, and except in earthed concentric wiring all amps in position or both poles of the installation otherwise electrically connected together 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 wire D.C. or a Poly phase A.C. System, the neutral pole of which is connected to earth either direct or through added resistance, the working pressure shall be deemed to be that which is maintained between the phase conductor and the neutral.

9.2.1.2 The insulation resistance shall also be measured between all conductors to one pole or phase conductor of the supply and all the conductors connected to the neutral or. To the order pole or phase conductors of the supply with all lamp sin position and switches in 'OFF' position and its value shall be not less than in that specified in Sub Clause9.2.1.3.

9.2.1.3 The insulation resistance in Me ohms measured as above shall not be less than 50Me ohms divided by the number if outlet or when PVC insulated cables are used for wiring

12.5meohms divided by number10outlets

9.2.1.4 Where a whole. Installation is being tested; a lower value than that given by the formula, subject to a minimum of 1mega ohm is acceptable.

9.2.1.5 A preliminary and similar test may be made before lamps, etc. are installed and in this event the insulation resistance to earth should be not less than 100 mega ohms divided by the number of outlet or when PVC insulated. cables are used for wiring 25 mega ohm s divided by number of outlets.

9.2.1.6 The term "Outlet" includes every switch except that as witch combined with a socket outlet, appliance or lighting fitting is regarded as one outlet.

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

9.2.2 Polarity Test:

9.2.2.1 In a two-wire installation a test shall be made to verify that all switches in every circuit have been fitted in the same conductor through' out & such conductor shall be Labeled or marked for connection other phase conductor or to the non-earthed Conductor of the supply.

9.2.2.2 In a three wire or a four-wire installation a test shall be made to verify that every non-linked single pole switch is fitted in a conductor which is labeled or marked for connection to one of the phase conductors of the supply.

9.2.2.3 The installation shall be connected to the supply for testing. The terminals of all switches shall be tested by a test lamp one lead of which is connected to the earth. Glowing of test lamp to its full brilliance when the switch is in 'on' position irrespective of appliance in position or not shall indicate that the switch is connected of the right polarity,

9.2.3 Earth Continuity Test:

The earth continuity conductor including metal conduits and metallic envelops of cables in all 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 earth leakage circuit breaker measured from the connection with the earth electrode if any point in the earth continuity conductor in the completed installation shall not exceed one ohm.

9.2.3.1 Earth Electrode Resistance Test:

Earth electrode Resistance test may be carried out by Meggar Earth Testers containing a direct reading ohm-meter a hand driven generator and auxiliary electrodes

9.3 On completion of an electric installation (addition and alteration) a certificate shall be furnished by the contractor counter signed by the certified Supervisor under whose direction supervision the installation was carried out. This certificate shall be in the prescribed form as given in Appendix-'B' in addition the test certificate required by Local Electrical Supply Authorities.

10. Joint and looping back:

Unless with the sanction of Ex, Engineer Electrical Divisions all joints in conductor shall be means of approved mechanical connector sin suitable and approved junction Boxes but looping back system shall be preferable. In wiring unless otherwise specified Phase and live conduct shall be looped at the switch box where a neutral conductor can be looped from light. Fan or socked. In non-residential buildings, neutral and earth continuity wire shall be brought to each of the switch boards should be of adequate size to accommodate at least one number of 5Amps socket outlet and control switch in future.

11. Switches:

Main Switchgears, Switch Board and their location:

11.1 All main switches (other than those of iron clad pattern) carrying current of 10Amp. And above shall be fitted for back connections land shall be suitably protected.

11.2 All switches and circuit breakers shall be constructed in accordance with thel.S.4237-
1967. General requirement for switch gear and control gear for voltage not exceeding 1000Volts and other relevant I.S. provided also that, spring shall be either of phosphor bronze or if steel shall be copper or Nickel plated and that handle shall be so fastened that they do not tend to unscrew or become loose.

11.3 All main switches hall be either of metal clad enclosed pattern or of any insulated enclosed pattern which shall be fixed at close proximity to the point of entry of supply.

11.4 Switch boards shall not be erected above gas Stoves', or sinks or within 2.5 m of any washing unit in the washing rooms of laundries or in the bathrooms, lavatories. Toilets or kitchens.

11.5 Switch boards, if unavoidably fixed in places likely to be exposed to weather .to drip or to abnormal moist temperature the outlet casing shall be weather proof and shall be provided with gland so r bushing of adopted to receives crewed conduit according to the manner in which cables are run, PVC and double flanged bus shall be fitted in the holes of the switches for entry and exit of wires.

11.6 A switch board not be installed so that its bottom is within 1.25 m above the floor Unless the front of the switch board is complete lyen closed by a door or the switch board is located in a position to which only authorized persons have access.

11.7 Switch boards shall be recessed in the wall if so specified in the schedule of work or in the special specification. The front shall be fitted with hinged panel of other suitable material such as Bakelite in wood frame with locking arrangement. the outer surface of door being flush with the walls. Ample room shall be provided at the back for connection at the front between the switch gear mounting on the door.

11.8 Equipment's which are on the front of a switch board shall be so arranged that in advertently personal contact with live parts is unlikely during the manipulation of switch gears, changing off uses or like operations.
11.9 No holes other than the holes by means of –which the panel is fixed, shall be drilled closer than 1. 3cms.from any edge of the panel.
11.10 The various live parts, unless they are effectively screened by substantial Barriers of non -hydroscopic, no- inflammable insulating material, shall be so spaced that spaces hall not be maintained between such parts and earth.
11.11 The arrangement of gear shall be such that they shall be readily accessible and their connections to all instruments and apparatus shall also be traceable.
11.12 In every case in which switches and fuses are fitted on the same pole, these fuses shall
Be so arranged that the fuses are not alive when their respective witches are in the off position.
11.13 No fuses other than fuses in instrument circuit shall be fixed on the back of or behind A switch board panel or frame.
11.14 All the metal switch gears and switch boards hall be painted, prior to erection with One coat of antirust primer, after erection they shall be painted with two coats of approved name or aluminum paint as required on all sides wherever accessible.
11.15 All switch boards connected to medium voltage and above shall be provided with 'Danger Notice Plate' conforming to relevant Indian Standards.

12. Control at Point of Commencement of Supply:

12.1 There shall be a linked main switch gear with fuse on each live conductor of the supply mains at the point of entry. The wiring throughout the installation shall be such that there is no break in the neutral wire except in the form of a linked switch gear the neutral shall also be distinctly marked. In this connection Rule 32(2) of the Indian Electricity Rules, 1966 (See Appendix-'A')shall also be referred.

12.2 The main switch gear shall be situated as near as practicable to be termination of Service line and shall be easily accessible without the use of any eternal laid.

12.3 On the main switch gear, where the conductor of at wo wire system or an earthed neutral conductor of a multi-wire system or a conductor which is to be connected there to, an indication of a permanent nature shall be. Provided to identify the earthed neutral conductor. In this connection Rule 32(1) of Indian Electricity Rules,
1956(see appendix. 'N) shall be referred.

13.0 Switch Board & Distribution Boards:

Metal clad switch gear shall preferably be mounted on any of the following types of Board.

13.1 Hinged type Metal Boards:

13.1 These shall consist of a box made of sheet metal not less than 2mm thick and shall be provided with a hinged covert open able the board to swing open for examination of the wiring at the back. The joints snail be welded. All wires passing through the metal board shall be bunched.

13.2 Fixed type Metal Boards:

These shall consist of an angle or channel of iron frame fixed on the wall or on floor and supported on the wall at the top if necessary. There shall be a clear distance of one meter in front of the switch board. If there are attachments of base connections at the back of the switch board Rules 51(1)(c) of Indian Electricity Rules,1956 is gall apply.

Note: Such type of boards are particularly suitable for large switch board for mounting large number or switch gears or higher capacity metal clad switch gears or both.

13.6 Arrangement of Apparatus:

a) Equipment which is on the front of a switch board shall be so arranged that in advertently personal contact with live parts is unlikely during the manipulation of switches, changing off uses or like operation.

b) No apparatus shall project beyond any edge of panel. No fuse body shall be mounted with in 2.5cm. of any edge of the panel and no hole other than holes by means of which the panel is fixed shall be drilled closer than 1.3 cm from any edge of the panel.

c) The various live parts, unless they are effectively screened by substantial barriers of non-hydroscopic, non—inflammable insulating material, shall be so spaced that an arc cannot maintain between such parts and earth.

d) The arrangement of the gear shall be such that they shall be readily accessible and their connections to all instruments and apparatus shall also be easily traceable.

e) In every case in which switches and fuses are fitted on the same pole, these fuses shall be so arranged that the fuses are not alive when their respective switches are in the "off' position.
f) No fuses other than fuses instrument circuit shall be fixed on the back of or behind a switch board panel or flame.

13.7 Marking of Apparatus:

a) Where a boards is connected to voltage higher than 250 volts, all the apparatus mounted on it shall be marked in the following, colors to indicate the different poles or phases to which the apparatus or its different terminals may have been connected.

Alternating Current	**Direct Current**
Three-phase-red,	Three wire system-2 outer wires
Yellow, & blue,	Positive red & negative blue
Natural-black	Natural- black

Where fuse-wire three phase wiring is done, the neutral shall be in one Color and the other three wires in another color.
b) Where a board has more than one switch each such switch shall be marked to indicate which section of the installation it controls.
c) All markings required under the rule shall be clear permanent.

13.7. A Main & Branch Distribution Board:

13.8.1Main and branch distribution boards shall be of any type mentioned in13.1

13.8.2 **Main distribution boards** shall be provided with a switch or air circuit breaker on each pole of each circuit, a fuse on the phase or live conductor and a link on the neutral or earthed conductor of leach circuit. The switches shall always be linked.

13.8.3 **Branch Distribution Board:**

Branch distribution boards shall be provided with a fuse or a miniature circuit breaker or both the adequate rating setting chosen on the live conductor of each circuit and the earthed neutral conductor shall be connected to a common link and be capable of being disconnected individually for testing purposes. At least one spare circuit of the same capacity shall be provided on each branch distribution board.

13.8.3.1 In residential installations, lights and fans may be wired on a common circuit such sub circuit shall not have more than total often points of lights, fans and socket outlets. The load of such circuit shall be restricted to 800 watts. If a separate fan circuit is provided, the number of fans in the circuit shall not exceed ten. Power sub- circuits shall be designed according to the load but in' no case shall there be more than two outlet so each sub-circuits.

13.8.3.2 In industrial and other similar installations requiring the use of group control of Switching operation, circuits, for socket outlets may be kept separate from fans and lights. Normally fans and lights may be wired on a common circuit, however, if need is felt separate circuits may be provided for the two. The road on any low voltage sub-circuit shall not exceed 3000 Watts .In case of new installation, all circuit sand sub-circuits shall be designed by making provision of 20.percent increase in load due to any future modification. Power sub-circuits shall be designed according to the load

.but in no case shall there be more than four outlets in each sub-circuits.

13.9 **Installation of Distribution Boards:**

13.9.1The distribution fuse-boards shall be located as near as possible to the center of the load they are intended to control.

13.9.2These shall be fixed on suitable stanchion or wall and shall be accessible for replacement off uses.

13.9.3These shall be of either metal-clad type, or all insulated type. But if exposed to weather or damp situations, they shall be of the weather proof type and, if installed where exposed to explode to explosive dust, vapor or gas, they shall be off lame proof type.

13.9.4 Where two or more distribution fuse boards feed low voltage these distribution boards shall be:

(1) Fixed not less than 2 m apart or,
(2) Arranged so that it is not possible to open two at a time, namely they are Inter locked and the metal case is marked 'Danger415Volts',or
(3) Installed in a room or enclosure accessible to only authorized persons.

13.9.5 All distribution boards shall be marked 'Lighting' ,'Power', as the case may be and also marked with the voltage and number of phases of the supply .Each shall be provided with a circuit list giving details' of each circuit which it controls. And the current rating of the circuit and size off use-element.
13.9.6Triple pole distribution boards shall not be generally used for final circuit distribution unless specific approval of Engineer-in-charge is obtained. In special cases where
Use of Triple pole distribution boards are inevitable they shall be of H.R.C. fuse type only.

13.10 Wiring and Distribution Board:

13.10.1 In wiring a branch board, total load of the consuming devices shall be divided, as far as possible, evenly between then number of ways of the boards leaving the spare circuit for future extension.

13.10.2 All connections between pieces of apparatus or between apparatus and terminals on a board shall be neatly arranged in a definite sequence following the arrangement of the apparatus mounted there on, a voiding unnecessary crossing.

13.10.3 Cables shall be connected to a terminal only by soldered or welded or crim ped lugs using suitable sleeve, lugs or ferrules unless the terminal is of such a form that it is possible securely clamp them without the cutting away of cable strands.

13.10.4 All bare conductor shall be rigidly fixed in such a manner that a clearance of at least 2.5cm. is maintained between conductor of opposite polarity or phase and between the conductors and any material othe than insulating material.

13.10.5 If required, a pilot lamp shall be fixed and connected through on independent single-pole switch and fuse to the bus bars of the board.

13.10.6 In a hinged type board, the incoming and outgoing cables shall be fixed at one or more points according to the number of cables on the back of the board leaving suitable pace in between cables and shall also, if possible be fixed at

the corresponding points on the switch board panel. The cables between these points shall be arranged to forma "U" or "S" shaped loop which shall be of such length as to allow the switch board panel to swing through an angle of not less than 90°.

14.0 Capacity of Circuits:

14.1 Lights and fans may be issued on a common circuits and such a circuit shall not have more than a total of ten points of lights, fan and socket outlets, or a load of 800 watts whichever is less. The power circuit shall be designed with a maximum of two outlets per circuits generally when load is not known or specified. In non-residential buildings at important District centers however one outlet per circuit may be preferred. The circuit shall be designed based on the loading of the circuit where not specified the load shall be taken as 1KW per outlet, Where the load is more than 1 KW it should be controlled by a isolator switch or miniature circuit breaker.

15.0 Passing through Walls and Floors:

15.1 Where conductors pass through walls one of the following methods shall be employed. Care shall be taken to see that wires pass very freely through protective pipe or box and that the wires pass through in a straight line without any twist or cross in wires, on other ends of such holes.

(a) A modular box extending through the whole thickness of the wall shall be buried in the wall and casings or conductors shall be carried so as to allow 1.3 cm. air space on three sides, of the casing conductor.

(b) The conductor shall be carried either in a rigid pvc conduit conforming to*IS: 9537 specification for Rigid pvc conduits of Electrical wiring.

(c) Insulated conductors while passing through floors shall be protected from mechanical injury by means of rigid PVC conduit

15.2 Where a wall tube passes outside a building so as to be exposed to weather, the outer end shall be belt mounted and turned downwards, and properly bushed on the open-end.

16.0 Branch Switches:

Where the supply is derived from a three-wire or four-wire source, and distribution is done on the two wire system, all branch switches shall be placed in the outer or live conductor of the circuit and no single-phase switch or fuse shall be inserted in the middle wire, earth or earthed neutral conductor of the circuit. Single- pole switches (Other than for multiple controls) Caring not more than15 amperes may be of tumbler type which shall be 'CN' when the handle known is down.

17.0 Fittings:

Where conductors are required to be threaded through tubes or channels formed in the metal work of fittings these must be free from sharp angles or projecting edges and such size that will enable them to be wired with the conductors used for the final sub Circuits without removing the boarding, taping or outer covering. As far as possible, all tubes and channels should be of sufficient size to permit' Looping back; of wires. Cables and flexible cords other than those designed for high temperature shall not be used for wiring fittings except for portable fittings. All fittings must have not less than a half inch male nipple. Fittings and lamp holders for gas filled lamps shall be adequately ventilated.

17.1 Where light fitting is supported by one or more flexible cords, the maximum weight to which the twin flexible cords may be subjected shall be as follows:

Nominal cross sectional Area cord.	No. & Dia. In mm of wires.	Max. Permissible Weight
mm^2		Kg.
0.5	16/0.2	1.7
0.75	24/0.2	2.6
1.0	32/0.2	3.5
2.5	48/0.2	5.3
3.5	80/0.2	8.8
4	128/0.2	14.0

18.2 No inflammable shade shall form a part of light fitting unless such shade is well protected against all risks of fire. Celluloid shade or light fitting shall not be used under any circumstances.

18.3 Fitting of Wire:
The use of fitting wire shall be restricted to the internal wiring and the lighting fittings. Where fitting wire is used for wiring, for the sub-circuit" loads shall be terminated in a ceiling zone or connector from which they shall be carried into the fittings.

19.0 Lamp Holders:

Lamp holders for use on brackets and the like shall be in accordance with*IS: 1258 1967, specification for Bayonet lamp holders and all those for use flexible pendants shall be provided with cord grips. All lamp holders shall be provided with shade carriers. Where center contact Edison screw lamp holders are used, the outer or screw contacts shall be connected to the middle wire, the natural, and the earthed conductor. Of the circuit.

20.0 Outdoor Lamps:

External and road lamps shall have weather proof fittings of approved designs o as to effectively prevent the admission of moisture. An insulating distance piece of moisture proof materials shall be inserted in the fittings. Flexible cord and cord grip lamp holders shall not be used where exposed to whether. In verandahs and similar exposed situations where pendant are used, they shall be of fixed rod type.

21.0 Lamps:
All incandescent lamps, unless otherwise required and suitably protected, shall be Hung at a height of not less than 2.5 m above the floor level. They shall be in accordance with IS: 418:1957 specifications for Tungsten Filament General Service electric lamps.

TABLE-III MAXIMUM PERMISSIBLE NUMBER OF 250 VOLTS GRADE SINGLE-CORECABLE THAT MAY BE DRAWN IN TORIGID NON-METALLIC CONDUITS

Size of cable

		Size of conduit (mm)					
Nominal	No. Diameter in	16	20	25	32	40	50

Cross sectional Area	mm of wires				(No.of cable Max)		
mm^2							
1.0	1/1.12*	5	7	13	20	-	-
1.5	1/1.40	4	6	10	14	-	-
2.5	1/1.80	3	5	10	14	-	-
	3/1.06*						
4	1/1.24	2	3	6	10	14	-
	7/0.85*						
6	1/2..80	-	2	5	8	11	-
	7/1.06*						
10	1/3.55+	-	-	4	7	9	-
	7/1.40*-						
16	7/1.70	-	-	2	4	5	15
25	7/2.24	-	-	-	2	2	6
35	7/2.50	-	-	-	-	2	5
50	7/3.00+	-	-	-	-	2	3
	19/1.80						

*For Cu. Conductors only.

+For Al. Conductors only.

25.3.3 **Conduit joints**-shall be joined by means of screwed or plain couplers depending on whether the conduits are screwed or plain. Where there are long runs of straight conduit. Inspection type couplers shall be provided at intervals. For conduit fittings and accessories reference may be made to IS :3419-1965.

25.3.4 **Fixing of conduits** -The spacing between saddles or supports is recommended to be 60 cm for rigid non-metallic conduits.

25.3.5 **Bends in conduit**- Wherever necessary, bends or diversions may be achieved by bending the conduits or by employing normal bends, inspection bends, inspection boxes, elbows or similar fittings

25.3.6 Conduit fittings shall be avoided, as far as possible on outdoor system.

25.3.7 **Outlets**-All the outlets for fittings, switches, etc. shall be boxes of substantial construction. In order to mini second sensation or sweating inside the conduit, all outlets of conduit system shall be properly drained and ventilated, but in such a manner as top revent the entry of insects etc. as far as possible.

APPENDIX-'A'

Important Clauses of Indian Electricity Rules, 1956. Following clauses of Indian Electricity Rules,1956 shall in particular be Taken care of in the execution of electrical works

Clause No. Subject

3. Authorization:

29. Construction, installation, protection, operation and maintenance of electric supply lines and apparatus.

31. Cut-out on consumer's premises.

32. Identification of earthed and earthed neutral conductors and position of switches and cut outs there in.

33. Earthed terminal on consumer's premises.

34. Handling of electric supply lines and apparatus.

41. Distinction of circuits of different voltages.

42. Accidental charge.

43. Provisions applicable to protective equipment.

44. Instructions for restoration of persons suffering from electric shock.

45. Precautions to be adopted by consumers, owners, electrical contractors, Electrical work men and suppliers.

46. Periodical inspection and testing of consumer's installation.

48. Precautions against leakage before connection.

50. Supply to consumers.

51. Provisions applicable to medium, high voltage installations. Point of commencement of supply.

58. Point of commencement of supply.

59. Precautions against failure of supply; Notice of failures.

61. Connection with earth,(low and Medium Voltage system.

64. Use of energy at high and extra-high voltage system.

67. Connection with earth.(High & Extra-high voltage system.

68. General conditions as to transformation and control of energy. All clauses

under Chapter VIII on Overhead Lines.

137. Mode of entry.

138. Penalty for breaking seal.

SPECIAL CONDITION FOR ELECTRIC

1. Contractor should have to provide unconditional Warranty / Guarantee for 2 years on all electrical fittings and fixtures.
2. During defect liability period, Contractor shall have to attend any complaints regarding electrical works within 24 Hrs. after receiving the information on mail / telephone or by letter and responsible to solve it within 48 Hrs. Failing which, it is liable to impose a penalty of Rs. 500/- per day till the problem / complaint get solved.
3. An amount of Security Deposit @ rate of 5% of electrical works, will be deposited directly to the Electric Departments out of total amount of Security Deposit of the Contract Price. This will be released to the contractor without any interest after defect liability period is over.
4. All kind of procedure, formalities and liaison work with PGVCL to get a new electric connection on the name of RMC including the cost of meter, deposit amount of electric meter, fix charges, testing charges & NOC charges etc. will be in scope of Contractor. However, all charges, shall be reimbursed by RMC upon producing valid proof of actual receipt from PGVCL.

SPECIFICATIONS

All Specifications standard. Publication etc. specified mean the latest standards. Publication etc. pertaining to Electrical Installation and should conform to the following wherever applicable.

1) Indian Electricity Act, 1910 with it's amendments.
2) Indian Electricity Rules, 1956 and it's amendments.
3) Indian Electricity supply Act, 1948.
4) Regulation for Electrical Equipment in building by I.E.F. Landon.
5) The Factory Act.1948 and its amendments.
6) I.S.-732-1982Part-I,II&III code of practice for Electrical wiring and fittings in buildings for low and medium voltages.
7) I.S.4064-1967 H.D.Air break switches and fuses for Voltages not exceeding 1100 volts.
8) I.S.3043-Earthing code of practice for
9) I.S.-1554 Part-I-1970 PVC insulated (Heavy duty) Electrical Cables for working voltages up to and including 110 volts.
10) I.S.:694-1964 Part-II-PVC insulated cable with Aluminum conduits (revised) for voltages up to 110 volts.
11) I.S: 5908-1970-Electrical installations in buildings method of measurements of.
12) I.S.: 4237-1967 - General requirement for switch gear and control gear for voltage not exceeding 1000 volts.
13) IS:1653-1964-Rigid steel conduits for electrical wiring (revised)
14) IS: 2509-1973-Rigid steel conduits for electrical installation. (First revision).
15) IS: 1258-1967-Bayonetlamp holders (First revision).
16) IS: 418-1957-Tungston-Filament General service electric lamps (Third revision).
17) IS: 374-1966-Fans and Regulators. ceiling type, electric(second revision).
18) IS: 2667-1964-Fittings.for rigid steel conduits for electrical wiring.
19) IS: 3419-1976-Fitting for rigid non-metallic conduits (First revision).
20) National Electric Code, 1986.

SECTIONF-1A

GENERAL REQUIREMENT

1.1 Scope of works:

The work covered by electrical specification consists supplying and installing, electrical wiring system complete in'strict accordance with this specification and the applicable drawing and subject to the terms and conditions of the contract. It includes.

(a) Conduit a wiring system far fans, lighting paints bells, clacks sockets, etc. including fixing of lighting fixtures and fans etc. and miscellaneous paints.

(b) Conduit and wiring system' far exhaust fans, power sockets.
(c) Panel boards, distribution boards. Switch fuse units.
(d) Complete power and lighting cable systems. Grounding system.
(e) Grounding system.
(f) Conduit's system.
(g) Bollard lights
(h) Split AC
(I) Other miscellaneous electrical work.

1.2 Completeness of Contract:

Any work fittings accessories or apparatus which may not have been specifically mentioned in the specification but which are necessary in the equipment for efficient working of the plant should be deemed to be included in the contract and should be executed and provided by the contractors. All plant and apparatus should be complete in all the details, where such details, are mentioned in the specifications or not.

Three prints and one permanent negative of each' of the finally approved drawings incorporating all the modifications proposed by the Department should be submitted. No modifications should be made in a drawing already approved by the Engineer-in-charge without his prior consent.

Approval of the contractor's drawing will not relieve the contractor of any part of his obligation to meet all the requirements of the contract.

1.3 Guarantee:

The performance of all the equipment and the installations should be guaranteed at least for a minimum period of one year from the date of taking over the installation by the Department'. All equipment must comply with the relevant IS-BS specifications.

1.4 Inter change ability:

All corresponding parts of similar plant and equipment should be inter changeable in every way.

1.5 Tools:

All special tools required for dismantling and assembly of the equipment covered by the contract shall be supplied as obligation under the contract.
A list of items to be supplied by the Contractor should be submitted along with the tender.

SECTIONF-2A

Specifications for Electrical Installation in Buildings

1. GENERAL:

1.1 These specifications relate to the electrical installations in' the buildings of P.W.D. Electrical. The specifications cover general requirements to be fulfilled. These general specifications are supplemented by the specifications for the particular buildings separately attached.

1.2 These specifications are governed by the General conditions of the contract attached here to.

1.3 APPLICABLE RULES AND REGULATIONS:

1.3.1 Installation shall be carried out in conformity with the regulations for electrical equipment of buildings, published by the Institute of Electrical Engineers London (14thEdition1966 and as a mended up to date) here in after referred to as thel. E.E. wiring regulations. Where these specifications. Or the special specifications for the particular building attached here to are at variance with the I.E.E. regulations these specifications or special specifications the case may be, shall be followed. The installation shall also comply with the requirements of the Indian Electricity Act, 1910 as a mended up to date and rules issued here under and also the regulations for the Electrical Association of India. Where not specified otherwise, the installation should generally follow the Indian standard codes of practice and in their absence the relevant British Standard of practices. All the materials shall comply with the relevant Indian Standard of British Standard specifications.

1.4 DEFINITIONS:

1.4.1 The definitions of terms in the I.E.E. Regulations shall apply in general.

1.5 DRAWINGS:

1.5.1 The preliminary drawings only indicate the general scheme of requirement.

The exact position of all points, control switch boxes, runs of wiring and/or conduits joint boxes, inspection boxes, mains, and sub-distribution boards, mains etc .shall be got approved by the Engineer-in-charge. All circuits shall be clearly numbered in wiring diagrams and building plans. The detailed design of a switch-board, special fixture or any other part of the electrical installation as may be called for by the engineer-in-charge shall also be supplied by the Contractor and should be got approved by the Engineer-in-charge. Three sets of completion drawings am wiring diagrams showing the installations as executed shall be supplied by the contractor along with the completion certificate.

1.6 MATERIALS:

i) The system of wiring shall consist of ISI marked single core, PVC insulated, FRLS, 1100 volt grade, stranded, flexible copper conductor wires as per IS : 694 amended up to date.

ii) The Conduit and accessories shall be of Rigid PVC Type. The wall thickness of conduits shall be 16 SWG for 20, 25 and 32 mm dia conduits and 14 SWG for 40 and 50 mm dia conduits. OR, ISI marked (IS: IS:9537-III, 3419 & 2509) heavy duty Rigid PVC. The wall thickness shall be 2 mm. (As mentioned in the respective BOQ)

iii) CONDUCTOR SIZE:- Wiring shall be carried out with following sizes of wires – a. Light/fan/call bell/ exhaust fan point - 1.5 sq mm.

b. 5 amp plug points - 1.5 sq mm.

c. 15amp plug point – 2.5 sq mm.

d. Light circuit - 1.5 sq mm.

e. Power point - 4.0 sq mm.

f. Power point for AC – 2.5.0 sq mm. (UP TO 2TON)

iv) 1.5 Size of Earth wires shall be as per following table –

Size of point/ circuit / sub-main wires	Earth wire
2x1.5 sqmm. -	1x1.5 sqmm.
2x2.5 sqmm. -	1x2.5 sqmm.
2x4 sqmm. -	1x4 sqmm.
2x6 sqmm. -	1x6 sqmm.
2x10 sqmm. -	1x10 sqmm.
2x16 sqmm. -	1x16 sqmm.
4x6 sqmm. -	2x6 sqmm.
4x10 sqmm. -	2x10 sqmm.
4x16 sqmm. -	2x16 sqmm.

All materials shall be new and of the best quality conforming to there levant I.S.B.S. specifications. They must be the products of reliable manufacturers of many years or standings. All like parts of materials shall be inter changeable. In case pf equipment such as circuit breakers, switch fuses etc. a descriptive and illustrated literature shall accompany the tender.The names of manufacturers of various materials shall be furnished in proforma in Appendix. Samples of materials wherever required should be approved by the Engineer-in charge before use in the installation. One set of such approved samples shall be deposited with the Engineer-in-charge. All materials shall berust- proof or rendered rust proof by application of suitable paints. The supply of all equipment, switch gears etc. 'shall be complete with accessories. Fittings and mountings as may be required for their proper performance, and as specified in the relevant IS-BS Code of Practice and standards.

1.7 WORKMANSHIP:

1.7.1 Good work man ship and neat finished appearance are the prerequisites for complying with the clauses of these specifications. With a view' to ensure fine work man ship the tenderers shall employ licensed ‘wiremen, with an experience of not less than 5years in the type of work’ they a reengaged. The work should be done under supervisions of licensed Electrical Supervisors with good educational qualifications and considerable experience.

1.7.2 Tenderers shall furnish the names of Supervisor and their wire men who will be engaged in this work with details Of their experience.

1.8 CO-OPERATIVE WITH CIVIL AND OTHER WORKS CONTRACTORS:

1.8.1 The tenderer, after the award of the contract shall co-operate with the civil and other contractors and shall co-ordinate his work with the work of other contractors with the least amount of dislocation and interference to the other works. Tenderers shall go through the drawings carefully and shall furnish the Engineer-in-charge with all the details of openings in the walls etc. they may be required for concealing any of the electrical equipment or accessories. Where the contractor fails to furnish such information as may be required for the purpose of concealing the equipment etc. they shall be made at his (Contractor) cost and expense. Any alteration to parts of the building shall be carried out with prior permission of the competent authority. All chaises of the structural work shall be made good at the contractor's expense and brought to the original shape finish and concur.

1.9 TESTING:

The electrical contractor shall be completely responsible other testing and commissioning of those installations covered by these specifications in compliance with the standard procedure, in/obtaining permission of the Government Electrical Inspector. Any modification which is demanded by Government Electrical Inspector shall have to be carried out within the scope of the contract. The contractor shall submit four copies of drawings of installations as per regulations for shall be provided by the contractor for carrying out the installation work. All tests shall be carried out in the presence of the Engineer-in-charge or his authorized representative and his approval obtained for the test results.

1.10: COMPLETION CERTIFICATE AND MAINTENANCE GUARANTEE:

1.10.1 After the completion of the installation and testing, the contractor should furnish a certificate in the Performa In Appendix-III, at the time of taking over the installation by the Department. The installation shall be guaranteed for period of 12 months from the date of taking over by the Department. During the period of guarantee all defects in material or in workmanship shall be rectified or replaced free of cost to the Department.

1.11 TENDERER'S ABILITY:

1.11.1 In order to enable the Department to assess the ability of the tenderer to execute the work. The tenderer shall furnish evidence of his experience and capacity to carry out the work of the magnitude and nature.

1.12 RATES:

The rates of items shall include all taxes, transport, loading and unloading charge and all such charges that may be required to be incurred for the supply and installation of the materials at site. The rates shall be firm and variations in the market are not entertained. Break up figures as required in the schedule of work shall also be furnished. As far as possible indigenous materials only shall be included for supply. Where it is unavoidable, imported items may be included and tenderer should clearly indicate materials, quantity, rate and amount of these items.

1.13 STORAGE SPACE:

No covered storage space will be provided by the Department. The contractor has to make his own arrangement. However, the Department may give an open space near the place of execution where the contractor can build his own stores for exe cutting the work.

1.14 DEPARTURE FROM SPECIFICATIONS:

The tenderer should clearly indicated eparture, if any, from the specifications with reasons for the same.

2 TECHNICALSPECIFICATION:

1.0 Point wiring for Light / Bell with 2-1.5 sq.mm & earth wire of 1.5 sq.mm (Green) both are of ISI marked 1.1 KV grade FRLS PVC insulated multi strand copper wires up to 10 mtr length , in below type of pipe erected with 6A Modular type switch / bell push & accessories and earth continuity of following type, erected on PVC / Metallic/Wooden box, single mounting base frame covered with textured/metallic/white front plate modules erected on / in wall / ceiling as per pipe erected, with necessary Lamp holder/ceiling rose / H.D. Connector as directed. With medium class rigid PVC pipe and accessories erected flushed on wall/ceiling complete.

2.0 Point wiring for FAN with 2-1.5 sq.mm & earth wire of 1.5 sq.mm (Green) both are of .ISI marked 1.1 KV Grade FRLS PVC insulated multi strand copper wires up to 10 mtr length, in below type of pipe erected with 6A Modular type switch and hum free EME step type electronic fan regulator mounted and accessories with earth continuity of following type erected on PVC / Metallic/Wooden box, single mounting base frame covered with textured/metallic/white front plate modules erected on / in wall / ceiling as per pipe erected. with necessary ceiling rose / H.D. Connector as directed. with medium class Rigid PVC pipe and accessories erected flushed on wall/ceiling complete

3.0 Point wiring for Individual Plug with & earth wire of 1.5 sq.mm (Green) both are of ISI marked 1.1 KV grade FRLS PVC insulated multi strand copper wires up to 10 mtr length, in below type of pipe erected complete with Modular type switch & 5 pin Plug erected on PVC / Metallic/Wooden box covered with appropriate front plate modules erected on / in wall / ceiling as per pipe erected with following type of accessories.
For 6A Plug and 6 a switch with 2-1.5 sq.mm Cu. Wire from nearby switchboard/mcb db board with medium class Rigid PVC pipe and accessories erected flushed on wall/ceiling complete For 16A Plug and

16 amp switch with 2-4 sq.mm Cu. Wire with 2.5 sq.mm (green) earthing wire from mcb d b board. with medium class Rigid PVC pipe and accessories erected flushed on wall/ceiling complete

4.0 Point wiring for on board Looped Plug with 6A Modular type switch & 5 pin socket erected on PVC / Metallic/Wooden box, single mounting base frame covered with textured / metallic/white front plate modules erected on / in wall / ceiling with following type accessories

5.0 Providing following type of Modular Type Accessories mounted with PVC / metallic/Wooden box, single mounting base frame covered with textured / metallic/white front plate , modules erected with necessary connections as per site situation directed by Engineer In charge.

(A)For One Gang

(B) TV Co-axial Socket outlet

(C) Computer RJ-45 socket

(D) 6A/ 10A/ 16A/ 20A/ 25A/ 32A Double Pole Modular MCB Switch

6.0 Providing and erecting ISI mark Medium class RIGID PVC PIPES of following size complete to be erected on/in wall or ceiling erected with necessary PVC fittings & Junction boxes fixed with adhesive solution & Clamps with following dia of pipes, in approved manner as directed

20 mm, 25mm, 32mm, 40mm

7.0 Providing & erecting approved make OVAL CONDUIT with necessary fittings fixed with adhesive solution and suitable clamps erected on wall / ceiling of following size.

20 mm, 25mm, 32mm, 40mm

8.0 Providing and erecting Mains with 1.1 KV grade FRLS PVC insulated ISI marked stranded Copper conductor wire in following type of pipe to be erected concealed in /flushed on wall/ceiling, with 1.5 sq. mm copper conductor FRLS PVC insulated stranded wire of green colour for earth continuity of following size With medium class Rigid PVC pipe and accessories

(a) 2 wire 2.5 sq. mm

(b) 4 wire 2.5 sq. mm

(C) 3 wire 2.5 sq. mm

9.0 providing and erecting Mains with 1.1 KV grade FRLS PVC insulated ISI marked stranded Copper conductor wire in following type of pipe to be erected in / on wall / ceiling with 2.5 sq. mm copper conductor FRLS PVC insulated stranded wire of green colour for earth continuity of following size

(a) 3 wire 4 sq. mm

(b) 3 wire 4 sq. mm

(C) 4 wire 10 sq. mm(use earth wire of 4 sq.mm)

10.0 Supplying & erecting approved make Telephone Cable electrolytic copper conductor PE insulation twisted in two pairs, & wrapped with FRLS PVC tape & sheathed with FRLS PVC or HFFR outer Jacket suitable for telephone wiring & confirming to C-DOT erected in existing pipe. of following size of conductors & nos. of pairs. With necessary connections.

Unarmored, Two Pairs

11.0 Supplying & erecting approved make LAN cable of following size in existing pipe as per direction

CAT - 6

12.0 Providing & erecting Switch board for Computer or electric apparatus consisting of following items in single board erected on PVC / Metal/Wooden board concealed/open with 3 mm thick PC (Polycarbonate) / Acrylic sheet erected as directed with modular type accessories
1 no. 6A/16A universal plug-switch combined.
3 nos. 6A Switch
3 nos. 6A 5 pin Plug

13.0 Supplying and erecting LED indoor fittings with LEDs of wattage 0.2 Watt to 0.5 Watt assembled on single MCPCB, with housing used as a heat sink shall be made of co-extruded polycarbonate channel with diffuser part in needed opal finish with company mark/name 160V to 270V, Power Factor more than 0.9, THD < 15%,
CCT 3000 K to 6500K,
Luminaries efficacy> 85 lumens/watt ,LED
LED driver efficiency > 85 %
(fitting required LM-79 & LM-80 Certificates)
(NOTE: Below description have shown ranges of Wattage capacity of LED fittings.The Engineer incharge may select any wattage capacity between the ranges shown.)
(A)18-20 Watts, Surge - 2KV,IP-20, conventional 4 feet

14.0 Supplying and erecting led lamps with following wattage capacity of 220 to 240 voltage, minimum 15000 burning hours life, 500 V in built-surge protection,Polycarbonate diffuser, mounting suitable for E14 / E27 / B22 lamp holders, pf >= 0.5
5-10 Watt, Surge-2KV,

14.00 Supplying and erecting LED indoor fittings with LEDs of wattage 0.2 Watt to 0.5 Watt assembled on single MCPCB, with housing used as a heat sink shall be made of thick sheet Steel conforming to IS: 513/CRCA/aluminium pressure die cast powder coated and high U.V. & corrosion resistance with diffuser housed in aluminium casted body with company mark/name
160V to 270V,Power Factor more than 0.9, THD < 15 %,
CCT 3000 K to 6500K,
Luminaire efficacy> 85 lumens/watt ,
LED driver efficiency > 85 %
(fitting required LM-79 & LM-80 Certificates)
(NOTE: Below description have shown ranges of Wattage capacity of LED fittings.The Engineer incharge may select any wattage capacity between the ranges shown.)
(A) Square/ Circular shaped Surface/Recessed Mount Downlight with provision for spring loaded mounting clips complete.IP20
(i) 5-9 watts,Surge-2 KV
(ii) 11-15 watts, Surge-2 KV
(iii) 16-20 watts, Surge-2 KV

15. providing and erecting Miniature circuit breaker single pole 6A to 25A suitable to operate on 240 V A.C. system and having breaking capacity 10 KA to be erected in existing box. confirming to IS 8828/1996

16.0 Providing & erecting 415 V MCB Four Pole for Motor & Inductive Load (C Curve) having 10KA breaking capacity & confirms to IS :8828 in existing box having following capacity
(a) 6 to 32 Amp.
(b)40 Amp
(c)63 Amp.

17.0 Providing & erecting 240 V MCB double pole switch for lighting Load (B Curve) having 10 KA breaking capacity & confirms to IS : 8828 in existing box having following capacity
(A) 6 to 32 Amp.
(B) 40 Amp

18.0 Plastic enclosure fitted with DIN rail suitable for incorporating Three /Four nos. MCB

19.00 Providing and erecting Sheet Steel powder coated MCB distribution board - flush / surface mounted fitted with busbar, neutral link, earth bar and DIN rail, Conforms to IS 8623-1 & 3, IEC 61439-1 & 3 without MCB to house appropriate nos. of MCBs.(The DBs should be used of same company of MCB to be used) suitable for
B) three phase incoming and single phase horizontal type outgoing Per phase isolation type (PPI)
(a) single door
(i)8 way
(ii)12 way

20.0 providing and erecting Approved make RCCBs conforming to IS: 12640 and having sensitivity of 30 mA and Short Circuit withstand capacity of 10 KA and suitable for operation on single phase 240 V,50Hz. having characteristic of quick action & tripping with all advance feature & do not incorporate any electronic component. for following Max. rating erected as directed
(ii) 40Amps. DP
(iii) 63 Amps. DP

21.0 Providing and erecting Approved make Four pole moulded case circuit breaker having breaking capacity ICU of 35 KA. at 415 V. having Normal current rating 200A.with variable Thermal & magnetic release suitable to work on A.C. supply 50 c/s. with all internal connections, spreader tinned copper & complete erected in existing 16 G.M.S. housing
ICS=100% of ICU only

22.0 Supplying and erecting triple pole & neutral 440V / 500V panel mounting Copper Busbars with four equal Nos. of electrolyte bus having current density not more than 1.6 Amp. / sq.mm (Rated current / cross section area) duly wrapped with colour insulating

tape for phase sequence of following current carrying capacity, erected with necessary bus bar supports /insulators, main cable socket to each bar, erected in existing cubical panel with necessary connections.
(A) Suitable for 100 Amp. Capacity
(B) Suitable for 200 Amp. Capacity

23.0 Providing & erecting weather proof, dust & vermin proof, floor mounted front operated indoor type cubical panel board necessary IP-42 and above protection as per approval from engineer incharge made from 14 SWG thick CRC M.S. sheet for outer body & doors, 16 SWG thick CRC M.S.sheet for internal partitions with necessary accesories , supporting angles/ flats channel including cutting, bending, drilling, welding, riveting with internal partitions & cable alley as per requirements & instruction of engineer-in-charge with erection of instruments, earth bus & earth bolts, foundation flange - bolts-base Plates, sufficient nos. of hinged doors, handles with locking arrangement and rubber gasket, heavy duty end terminal connection, danger notice board, necessary ventilation, earthing strip complete. The Panel shall be painted with epoxy powder coating. (The rates excludes the cost of switchgears, bus bars, inter connecting mains & Copper Aluminium strips, meters, Fuses etc. The dimension shall be measured excluding base beams) The panel shall be supplied with following approved manufacturers with following size.
(A) locally fabricated panel board
(i) with 350 mm depth
(ii) With 550 mm. Depth

24.0 Supplying and erecting triple pole & neutral 440V / 500V panel mounting Copper Busbars with four equal Nos. of electrolyte bus having current density not more than 1.6 Amp. / sq.mm (Rated current / cross section area) duly wrapped with colour insulating tape for phase sequence of following current carrying capacity, erected with necessary bus bar supports /insulators, main cable socket to each bar, erected in existing cubical panel with necessary connections.
(A) Suitable for 100 Amp. Capacity
(B) Suitable for 200 Amp. capacity

25.0 Supplying & erecting earth pit of minimum bore dia.150mm size approved make Earthing Electrode consisting Pipe-in-Pipe Technology as per IS 3043-1987 made of corrosion free hot dipped G.I.Pipes having Outer pipe dia of 50mm having 80-200 Micron galvanising, Inner pipe dia of 25 mm having 200-250 Micron galvanising, connection terminal dia of 12mm with constant ohmic value surrounded by highly conductive compound with high charge dissipation suitable for following type of applications with chamber and heavy duty cover.(approved make OEM has to submit test certificate) & having back filling compound of (B) Inner chemical (CCM Compound)- Resistivity:- 0.2 □/ meter testing as per IEC 62561-2017, Voltage drop:- < 1 volt at no load & dry form, Sulphar content:- <2%(C) Back fill Compound :- Earthing compound should be capable to retain moisture for long time
(A) Length of pipe -1.0 Meter (Minimum)
(B) Back filling compound - 01 Nos. of bag 15 Kg.

26.0 Supplying & erecting approved make low noise decorative exhaust fan having square frame ABS body with inbuilt lowers & square frame.
200mm with 1350 RPM
250mm with 1350 RPM

27.0 Providing window frame suitable for erection of Exhaust fan complete covering the remaining portion of window with 15 mm. thick plywood and colour washing to match the colour of the wall or window complete with expanded metal in order to render the fitting in accessible and the room water proof.

28.00 Providing and erecting Inverter based approved make split air-conditioning unit consisting of condensing unit with variable speed fan motor, inverter type hermetically sealed rotary compressor with accessories etc. duly connected separately erected evaporating unit and blower motor with its accessories by means of extra supplied proper insulated copper tubing, drain PVC pipes suitable for (cost includes Eco Friendly green gas charging Remote Control) with necessary core cutting.

29.0 Providing & erecting water cooler having storage capacity 150 Ltr. & cooling capacity 150 Ltr.per hour @ an ambient temp of 45˚ C. The outlet temp. of the water should drop by 15˚C within a hour, The water cooler should be comprising of hermetically sealed compressor, fan motor, condensing unit, water tank surrounded by evaporating, coil, thermostats, relay etc. complete with necessary inlet & outlet connection. The body of water cooler will be made from Stainless Steel.

30.0 Supplying, installing, testing & commissioning of digital pure sine wave INVERTOR of approved make single phase 230v complete with overload relay & necessary protection with following size of batteries, erected with battery terminal wire, copper lead wire to be connected to load with 10 Amp., 10 kA MCB.

DISTRIBUTION BOARDS AND PANELS:

General Requirements:

2.5.1 All distribution panels shall comply with I.E.E. Rules 60-61.A clear distance of 0.91 b meter in front of the switch board shall be kept. Where bare connection so attachments are provided 8t the back of the 'Switch board the space behind the panel shall be either less than 0.299 meter or more than 0.762 main width there shall be a passage way from the further rest outstanding part of any attachment or conductor. If the space behind the switch board exceeds 0.70 main width there shall be a passage way from either end of the switch board clear to height of 1.928 m width 0299,m. All wiring connection shall be made neatly and securely.
2.5.2 For circuits carrying more than 10Amps.tinned cable sockets shall be used.

All connections shall be so made as to form their own diagram Circuit shall be clearly numbered to correspond 1 wiring diagram Names of the distribution boards shall be painted as directed by the Engineer-in-charge. All the switch fuse unit sand isolators D.Bs. shall be complete with earthing studs lugs neutral bar link, H.R.C. fuses and of approved make.

2.5.3 Skeleton type panels shall have a rigid formwork adequately braced and Supported. The switch and distribution boards shall be neatly arranged in the frame. The details of the frame work and the arrangement of switches shall be got approved by the Engineer-in-charge before the panel is fabricated:

2.5.4 All cubical type panels shall have rigid supporting frames adequately braced over which sheet metal shall be nearly secured. All switches, distribution boards etc. shall be neatly arranged en the panels and all connections made from the back of switches. The panels shall be rendered dust and vermin- proof. The interior of the panels shall not be accessible to unauthorized persons.

2.5.5 The recess type boards shall be embedded in wall in a cupboard with a metal hinged door with locking arrangement. In all recessed conduit work all distribution boards shall be recessed. When recessing is not possible, free standing panel may be provided as approved by the Engineer-in- charge.

2.5.6 All individual components i.e. switch fuse units D.Bs. etc. shall be connected by earth continuity wire of appropriate size with the main earth bus of the panel D.H. etc. The panel switches or').Bs. shall be earthed by the less than 2 distinctive paths to earth. Earthing of metallic parts of exposed metal shall not be effected through any structural metal work which houses the installation. Where metallic parts are not required to be earthed and are liable to become a live should the installation of the contractor become defective such metallic parts shall be separated by durable non-conducting material from any structural work.

(a) Power panels shall be 3 phase, 4 Wire, 400.230 volts for the Distribution of 3 phase. 01' single phase power loads. Lighting panels shall be 3 phase 4 wire 400/230 volts for single phase lighting load distribution on all 3 phase.

(b) All panels shall be done or protected front type with no mechanical or electrical defects.

(c) Bus bars shall be of electrolytic copper or aluminum as specified and the properly tinned sizes as indicated on applicable drawings as required.

(d) AU knock outs for branch circuits, conduit entries shall be drilled in

Und filled as required. For lighting panels the top and bottom cover plates shall be removable type.

(e) Main disconnect device for all panel boards shall be of switches of

Disconnect type and of the size as indicated shall be mounted directly below the panel or through ha short thread conduit of required size.

(f) The main disconnect for all panel boards shall have an entry suitable for PVC arm or educable from bottom.

(g) All panel boards shall be provided with an earthing terminal and lug for connection to the grounding system.

(h) Temperature rise of all electrical parts shall not be more than 3000 with full load amperes at room temperature. Buses shall be securely supported so that ordinary vibrations will not cause any of the parts to become loose.

(i) All barriers and supports of current carrying parts shall be of moisture resistant insulating material and shall not be adversely affected by arcing.

(j) The locations of panels shown in the drawings are only tentative.

Panels nay be located at a place approved by the Engineer-in- charge.

(k) All civil works connected with fixing such as grouting chasing and making good shall be the tenderer's responsibility.

(m) Wires adequate capacity with proper size of lugs shall be used for inter connections.

(n) Panel should be self supported on angle channel iron frame work. It should be preferably of bolted construction in case of transportation and flexibility. The frames shall be of the required size for the mounting of the equipment on it. It shall be bolted or grouted rigidly alter leveling and alignment.

(o) The cupboard and D.B. should be of such size so to be accommodated in the excising room as per I.S. rules and I.S. codes of practice for installations of medium voltage switch gear.

(p) Fabrication drawing showing the detailed dimensions and panel sand its components indicating the framework. Earthing positioning of switches. D.Bs .cable boxes. Adopter chambers etc. shall be furnished to the Engineer-in-charge for his approval. All material to be got approved by the Engineer-in-charge. Panel should be guaranteed for satisfactory operations for a period of one year after handing over.

(q) The panel should be painted with anti corrosive paint suitable for humid and salty atmosphere on two coats of primer.

2.7 FIXING OF LIGHTING FIXTURES:

1. Location of fixtures their manner of fixing mounting height etc. are indicated in relevant drawing. Actual location and levels shall however be arrived at site in co-ordination with other service etc and prior approval of the Engineer-in- charge regarding the actual location. Manner of fixing shall be obtained be fore the work is taken up in hand.

2. In all cases the contractor shall provide necessary interconnection wiring earthing painting etc. all necessary for complete installation. The contractor shall also test and commission the fixtures during completion of the work.

3. The inter-connections wiring from the light outlet point up to the fixture shall be carried out by means General arrangement of fixture layout is indicated in drawings. Cares nail be taken to see that all light fixtures are in a row in a room or particular area, are in absolute line and plump and are symmetrically disposed with respect to finished surfaces of walls columns beams etc. of flexible copper wire of 'section not less than1.5mm.

4. All fixture suspended by means of conduits shall be done with all and socket joints or as per approved design.

2.9 Telephone System:

1. Empty conducting shall be done, recessed or exposed to surface along with pull boxes, junction boxes and telephone outlet boxes, in areas and location' as indicated in the relevant drawing as per materials and methods as described

in regard to conducting under section "Wiring in Conduits" except the G.I. pull wires of guage not. Less than 20 SWG shall be kept pulled through conduits in all sections so that in future telephone wires can be pulled easily.

2. Location shown on the drawing are approximate and final location shall be decided in the field by the Engineer-in-charge

Earthing

I GENERAL:

All non-live metal parts of the electrical system and equipment shall be earthed with suitable size of earth conductors. 2 distinct earthing shall be provided for all 3-phase equipment.
Earthing shall be in confirming with IS 3043 and Lightning protection shall be with IS 2309. Earth resistance of individual earth station shall not exceed 5 Ohm and overall resistance shall be less than 1 Ohm at all times. Earth resistance shall be taken with earth meggers for all earth points. All earth points shall be located 2.0mtrs away from the building and there will be a minimum distance of 3.0 meters between 2 earth points. All earth stations shall be identified with number and using painted board.

II EARTH STATION:

Pipe Electrode Earthling: 50 mm dia. Class B GI Pipe 3.0 mtrs long tapered at bottom and 12mm dia holes at 75mm c/c on all sides for bottom 2.0mtrs with top watering arrangement shall form earth electrode. The electrode has to be buried vertical in ground.
In case of rocky strata, Bore earthling stations with 150mm bore and 100mm class B GI pipe shall be done. Depth of bore earthling shall be 6.0 mtr minimum. Soil resistivity test shall be done for deciding depth if necessary. Bentonite or earth powder slurry shall be put along with pipe in the bore.

III MAINTENANCE FREE EARTHING:

Generally pipe-in-pipe technology shall be used with inner pipe and outer pipe of different sizes and lengths as mentioned below. These pipe electrodes shall be hot dip galvanized to enhance life.
The annular space between these pipes & inner pipe shall be filled with adequate special crystalline compound material which shall resists the corrosion of inner pipe electrode. Area surrounding outer pipe shall be filled with back fill compound mixed with the soil. Depth & size of pit shall suit to the electrode length. Soil resistivity test shall be done if necessary for deciding depth.

IV MASONRY CHAMBER:

Brick masonry chamber of size 450 x 450 x 450mm minimum (internal clear Dimensions) with cast iron cover / rcc cover and frame with top finished at ground level shall be provided for watering and test link access.

V ARTIFICIAL TREATMENT:

In case of rocky soil, hard murum soil resistance is very high. For getting proper earthing alternate layers of charcoal and salt are to be provided, for entire height of earth electrode with 300mm over all cover. Black cotton soil can be used for refilling the earth points in rocky strata.

VI EARTHING CONDUCTORS:

Earthing conductor size shall depend on the loads and defined fault conditions.
The earthing conductors shall be connected with either riveted or bolted joints with at least 2 rivets/bolts. The joints shall be painted with bitumen paint.

Earthing strips for lightning protection shall be run on parapet walls of outer periphery of building and outer periphery of highest structure for horizontal runs and on unapproachable vertical walls up to disconnecting box fixed at 1.0 mtr height above ground level. Lightning conductor shall be connected to earth station directly and separate 25x6 mm strip from earth station is to be connected to grid earthing. The lightning conductor/s shall be fixed at appropriate highest location on the building / structure. Separate earth pit shall be provided for each lightning conductor.

VII Water Cooler

Providing & Erecting full SS Body (SS 304) Split type water cooler having storage capacity 160 to 175 Ltr.(Tank SS 304) & Cooling capacity 200 ltr. Per hour @ an ambient temp of 350 C. The outlet temp. of the water should drop by 150C within a hour, The water cooler should be comprising of hermetically sealed Reciprocating compressor with R134A, fan motor, Copper Condensing unit with company fabricated Outdoor Unit water tank surrounded by evaporating coil, thermostats, relay etc. complete with necessary copper tube & Insulation, M.S Chanel Stand with Painting for water tank & M.S. Powder Coated Stand for Outdoor unit with Installation. With DPELCB and 4 Way DB Box with accessory Three core Cord for connection.

VIII Split Air Condition

Providing and erecting approved make split air-conditioning unit consisting of copper condensing unit with fan motor, hermetically sealed rotary compressor with accessories etc. duly connected separately erected evaporating unit and blower motor with its accessories by means of extra supplied proper insulated copper tubing, drain PVC pipes suitable for (cost includes powder coated Stand, Eco Friendly green gas charging, 15A plug top & Remote Control) with necessary core cutting.

IX WATER HEATERS

Supplying and erecting approved make Instantaneous type water heater with 3ltr.capacity rust free container housed in ABS plastic body insulated with glass wool / puff insulation and 3 Kw heating elements, adjustable thermostat 300 C to 850 C with set to operate at 850 C (+ /-60 C) auto reset indication lamps, thermal cut-out, safety valve fusible plug etc.

Supplying and erecting horizontal / vertical mounting type storage water heater with copper container housed in M.S./S.S./ABS body insulated with glass wool/puff complete with heating elements, adjustable thermostats 300C to 850C, indicating lamp, safety valve, fusible plug, etc. complete erected with coach bolts, nuts. washers & cementation

1. LED Panel Light shall have the following specifications:

Sr. No.	Description	Bank's requirement
1	Dimensions	600 mm (L) X 600 mm (W)
2	Power Consumption includingg driver loss	36 W
3	No. of LED	Depending upon total powerconsumption and illuminance
4	Luminous Efficacy of thesystem	Above 90 lm/w
5	Color	Natural White/Cool White
6	Lamp Type	LED Ceiling light
7	Fixture Material	Powder coated CRCA sheet
8	Input Voltage Range &Frequency	150 – 290 VAC, 50 Hz
9	Power Factor	Greater than 0.9
10	Beam Angle	100 – 120 deg.
11	Mounting Type	Ceiling
12	CRI	Greater than 80
13	Rated lamp life	Min. 25,000 Hrs
14	Heat Dissipation	Suitable arrangement havinglow LED driving current
15	Illuminance	350- 400 Lux at 6 ft height
16	IP Rating	IP 20
17	Protection	Voltage surge protection andthermal cutoff protection
18	Warranty	Five years (whole)
19	Diffuser	Glare free full opal

- Product should be LM79 & LM 80 compliance
- Certificate on Letter head of LED chip Manufacturer for authentication of LED chips

2. LED Tube Fitting (Batten) fixing arrangement as required shall have the following specifications:

Sr. No.	Description	Bank's requirement
1	Dimensions	4 Feet
2	Power Consumptionincluding driver loss	22W to 24W
3	No. of LED	Depending upon total powerconsumption and illuminance
4	Luminous Efficacy ofthe system	Above 90 lm/w
5	Color	Natural White/Cool White
6	Lamp Type	LED light including patti
7	Fixture Material	Heat Sink Aluminum Extrusion,Diffuser – Polycarbonate
8	Input Voltage Range& Frequency	130 – 290 VAC, 50 Hz
9	Power Factor	Greater than 0.9
10	Beam Angle	100 – 120 deg.
11	Mounting Type	Ceiling
12	CRI	Greater than 80
13	Rated lamp life	Min. 30,000 to 40,000 Hrs
14	Heat Dissipation	Suitable arrangement havinglow LED driving current
15	Illuminance	60 to 80 lux at 10 ft height
16	IP Rating	IP 20
17	Protection	Voltage surge protection andthermal cutoff protection
18	Warranty	Five years (whole)
19	Diffuser	Glare free milky

- Product should be LM 79 & LM 80 compliance
- Certificate on Letter head of LED chip Manufacturer for authentication of LED chips

3. L.E.D down lights shall have the following specifications:

Sr. No.	Description	Requirement
1	Dimensions	Ø 6 Inch or 8 Inch
2	Power Consumption including driver loss	20W - 24 W
3	No. of LED	Depending upon total power consumption and illuminance
4	Luminous Efficacy of thesystem	Above 90 lm/w
5	Color	Cool White 6000 – 6500 K
6	Lamp Type	LED Ceiling light
7	Fixture Material	Aluminum die cast
8	Input Voltage Range &Frequency	130 – 290 VAC, 50 Hz
9	Power Factor	Greater than 0.9
10	Beam Angle	100 – 120 deg.
11	Mounting Type	Ceiling
12	CRI	Greater than 80
13	Rated lamp life	Min. 25,000 Hrs
14	Heat Dissipation	Suitable arrangementhaving LED driving current
15	Luminance	120 to 180 lux at 6 ftHeight
16	IP Rating	IP 20
17	Protection	Voltage surge protection and thermal cutoffprotection
18	Warranty	Five years (whole)

- Product should be LM 79 & LM 80 compliance
- Certificate on Letter head of LED chip Manufacturer for authentication of LED chips

4. LED (70 to 150 W) Flood light fitting / Street Light shall have the following specifications:

Sr. No.	Description	Requirement
1	Dimensions	-
2	Power Consumptionincluding driver loss	36 W to 48 W – street light 48 W to 60W – Flood Light
3	No. of LED	Depending upon total power consumption and illuminance
4	Luminous Efficacy ofthe system	Above 90 lm/w
5	Color	Cool white
6	Lamp Type	Flood Light / street Light
7	Fixture Material	Die Cast Aluminum Heat Sink Housing, Transparent toughenedglass of minimum 2 mm thickness
8	Input Voltage Range& Frequency	130 – 290 VAC, 50 Hz
9	Power Factor	Greater than 0.90
10	Beam Angle	90 -110 deg.
11	Mounting Type	Outdoor
12	CRI	Greater than 80
13	Rated lamp life	Min. 25,000 Hrs
14	Heat Dissipation	Suitable arrangement by havingdie cast aluminum housing.
15	Illuminance	150 lux at height of 10 mtr height
16	IP Rating	IP 65
17	Protection	Voltage surge protection thermal and cutoff protection
19	Warranty	Five years (whole)

- Product should be LM 79 & LM 80 compliance
- Certificate on Letter head of LED chip Manufacturer for authentication of LED chips.

5. LED (5 to 10) W Bulb shall have the following specifications:

Sr. No.	Description	Details
1	Dimensions	-
2	Power Consumptionincluding driver loss	5 W to10 W
3	No. of LED	Depending upon total power consumption and illuminance
4	Luminous Efficacy ofthe system	Above 65 lm / W
5	CCT	6000 – 6500 K
6	Lamp Type	Ceiling
7	Fixture Material	Aluminum Housing / T.C.P.
8	Input Voltage Range &Frequency	130 – 290 VAC, 50 Hz
9	Power Factor	Greater than 0.90
10	Beam Angle	120 deg.
11	Mounting Type	B-22
12	CRI	Greater than 80
13	Rated lamp life	Min. 25,000 Hrs
14	Heat Dissipation	Suitable arrangement havinglow LED driving current
15	Illuminance	10 lux at height of 6 ft height
16	IP Rating	IP 20
17	Protection	Voltage surge protection andthermal cutoff protection
18	Warranty	Five years (whole)

- ❖ Product should be LM 79 & LM 80 compliance
- ❖ Certificate on Letter head of LED chip Manufacturer for authentication of LED chips.

6. BOLLARD LIGHT (15) W shall have the following specifications:

Sr. No.	Description	Details
1	Dimensions	-
2	Power Consumptionincluding driver loss	15 W
3	No. of LED	Depending upon total power consumption and illuminance
4	Luminous Efficacy ofthe system	Above 65 lm / W
5	CCT	6000 – 6500 K
6	Lamp Type	LED
7	Fixture Material	polycarbonate clear/milky diffuser
8	Input Voltage Range &Frequency	130 – 290 VAC, 50 Hz
9	Power Factor	Greater than 0.90
10	Beam Angle	NA
11	Mounting Type	3mm thick aluminium finished powder coated pipe with base plate 160x160mm
12	CRI	Greater than 80
13	Rated lamp life	Min. 25,000 Hrs
14	Heat Dissipation	Suitable arrangement havinglow LED driving current
15	Illuminance	10 lux at height of 6 ft height
16	IP Rating	IP 65 – OUTDOOR
17	Protection	Voltage surge protection andthermal cutoff protection
18	Warranty	Five years (whole)

- Product should be LM 79 & LM 80 compliance
- Certificate on Letter head of LED chip Manufacturer for authentication of LED chips.

7. POST TOP LANTERN (32-40) W shall have the following specifications:

Sr. No.	Description	Details
1	Dimensions	-
2	Power Consumptionincluding driver loss	32 -40 W
3	No. of LED	Depending upon total power consumption and illuminance
4	Luminous Efficacy ofthe system	Above 65 lm / W
5	CCT	6000 – 6500 K
6	Lamp Type	LED
7	Fixture Material	polycarbonate clear/milky diffuser
8	Input Voltage Range &Frequency	130 – 290 VAC, 50 Hz
9	Power Factor	Greater than 0.90
10	Beam Angle	NA
11	Mounting Type	3mm thick aluminum finished powder coated pipe with base
12	CRI	Greater than 80
13	Rated lamp life	Min. 25,000 Hrs
14	Heat Dissipation	Suitable arrangement havinglow LED driving current
15	Illuminance	10 lux at height of 6 ft height
16	IP Rating	IP 65 – OUTDOOR
17	Protection	Voltage surge protection andthermal cutoff protection
18	Warranty	Five years (whole)

- Product should be LM 79 & LM 80 compliance
- Certificate on Letter head of LED chip Manufacturer for authentication of LED chips.

LIST OF MATERIALS OF APPROVED BRAND/ MANUFACTURER (ONLY FIRST QUALITY TO BE USED (ELECTRICAL WORKS)

MAKE LIST FOR ELECTRICAL WORKS		
SR.NO.	**ITEM**	**STANDARD MAKE**
01	LED LAMPS	PHILIPS / CROMPTON/BAJAJ/HAVELLS/WIPRO
02	WATER GIZER	CROMPTON/BAJAJ/HAVELLS/REKOLD
03	LT PANELS	CPRI / ERDA APPROVED PANEL BUILDER. 70KA SHORT CIRCUIT WITHSTANDS STRENGTH. ACCESSORIES AS PER MENTIONED IN MAKE LIST.SUBJECT TO CLIENT CONFIRMATION.
04	DISTRIBUTION BOARDS	LEGRAND / SCHNIEDER / HAGER / SIEMENS / ABB
05	LT CABLE	FINOLEX / POLYCAB / APAR / RR / HAVELLS
06	CABLE TRAY (ALL TYPE)	PROFAB / PRECISION / UNIVERSAL / JETCOTECH
07	LT SWITCH GEAR (ALL RANGE)	AS PER SPECIFIED PANEL DESCRIPTION IN BOQ. MODEL AS PER SPECIFIED IN BOQ ABB/ SIEMENS/ LEGRAND / SCHNIEDER / HAGER
08	LT MCCB	SIEMENS / SCHNEIDER / LEGRAND / ABB / HAGER
09	LT MCB, ELCB	LEGRAND / SIEMENS / SCHNEIDER / HAGER / ABB
10	LT CONTACTORS	SIEMENS / SCHNEIDER / ABB / LEGRAND
11	AUTO CHANGE OVER SWITCH	SCHNEIDER / ABB / SIEMENS / LEGRAND / HAGER
12	STARTER (STAR-DELTA /DOL)	SCHNEIDER / ABB / L&T / SIEMENS / LEGRAND
13	SUBMERCIBLE MOTOR / MONO BLOCK PUMP SET	CROMPTON / KBL / LUBI
14	METERS (DIGITAL)	SCHNEIDER /L&T / SECURE / ABB / CONSERVE
15	RELAYS- EARTH FAULT	SIEMENS / SCHNEIDER / L&T / LEGRAND / HAGER
16	INDICATING LAMP	SIEMENS / SCHNEIDER ELECTRIC / ABB / KAPPA / ESBEE
17	ELECTRIC TIMER	SIEMENS / LEGRAND / L&T / HAGER
18	ROTARY SWITCH	SIEMENS / SCHNEIDER / KEYCEE / SALZER
19	PUSH BUTTON AND PUSH BUTTON SET	SIEMENS / SCHNEIDER ELECTRIC / L & T/ BCH / ABB

20	SELECTOR SWITCH	KEYCEE / SALZER / SCHNEIDER / SIEMENS
21	ANNUNCIATOR	PROTON / EAPL
22	LUGS	DOWELL'S / 3D / JAINSON / COMET / HMI
23	BIMETALLIC LUGS	ISMAL / HMI / DOWELLS
24	CABLE GLAND	JAINSON / 3D / COMET / HMI / MCI
25	PVC CONDUITS AND ACCESSORIES	PRECISION / NIHIR / POLYCAB / ASTRAL
26	CASING CAPING	PRECISION / NIHIR / POLYCAB
27	MODULAR SWITCHES, SOCKETS & OTHER ACCESSORIES	LEGRAND / HAVELLS-CREBTI / HAGER / L&T-ORIS / ABB / SCHNEIDER
28	PVC TAPE	STEEL GRIP / ANCHOR
29	WIRES FOR INTERNAL WIRING	FINOLEX / POLYCAB /RR / LAPP
30	CO AXIAL TV CABLE	DELTON /NATIONAL /RR / FINOLEX / LAPP
31	CONNECTORS (COLOURS AS PER PHASE & NEUTRAL)	SALZER / ELEMEX / L&T / CONNECT WELL / PHOENIX
32	LED LIGHT FIXTURES	PHILIPS / CROMPTON/BAJAJ/HAVELLS/WIPRO
33	SPLIT AC	OGENERAL/MISTIBUSHI/BLUESTAR/DYKIN
34	CEILING FAN/ EXHAUSTFAN	CROMPTON / USHA / HAVELLS / ORIENT / BAJAJ AS PER MODEL SPECIFIED IN BOQ
35	SENSORS	MK / CRESTON / LUTRON / LEGRAND
36	CHEMICAL EARTHING (BORE TYPE)	ASHLOK / LPI / ABB / AXIS
37	CAT6 / RJ45 / CAT6 JACK PANEL	Systimax / Schneider –Digi link / Le grand / LAPP
38	UNDER FLOOR METAL TRUNKING / CABLE MANAGEMENT SYSTEM ONWALL	MK / LEGRAND / SCHNEIDER
39	UPS	EMERSON /NUMERIC/EATON/ABB
40	CCTV SYSTEM (CAMERA, VIDEO RECORDER)	HONEYWELL/ SONY/ SCHNEIDER (PELCO) / PANASONIC

Special Note: -

1	Client has all right to check the challans of supplier.
2	The MCB and MCB DBs must be of same make.

<table>
<tr><td>3</td><td>Contractor has to take Prior approval for all the make of material from Client/Consultant/PMC before execution.</td></tr>
<tr><td>4</td><td>The Client/Consultant/PMC reserves the right to select the manufacture or approved make from the above list.</td></tr>
<tr><td>5</td><td>Any make not mentioned in the above lists must be approved from Client/Consultant/PMC before execution.</td></tr>
<tr><td>6</td><td>All the material should be ISI and as per standards mentioned in specifications and BOQ.</td></tr>
<tr><td>7</td><td>In case of shortage of material or un-time delivery or change in model take prior approval from client/consultant</td></tr>
<tr><td>9</td><td>Sample and items to be approved before supplying at site.
<table>
<tr><td>Modular Switches</td><td>Fan</td></tr>
<tr><td>DB Box</td><td>Light and Fixture</td></tr>
<tr><td>MCB</td><td>Cable and Wire</td></tr>
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ADDL. CITY ENGINEER

Rajkot Municipal Corporation

Signature of Contractor with Seal