Central Public Works Department

NIT NO: 12/EE/Mumbai-V/CE/MUMBAI-II/2025-26

(CE NIT No.06/CE/Mumbai-II/2025-26)

PART C

Electrical & Mechanical

O/o CHIEF ENGINEER, MUMBAI-II

CENTRAL PUBLIC WORKS DEPARTMENT

AE (E) / EE (P)

GENERAL TERMS AND CONDITIONS

1. The work shall be generally carried out in accordance with tender specifications and the following specifications /rules with upto date amendments.

   i. CPWD specification mentioned in schedule F (clause-11)

   ii. Commercial and Additional conditions for this work.

   iii. NBC 2016 as amended upto date.

   iv. The Indian Electricity Act, 2003, as amended upto date.

   v. Indian Electricity Rules 1956 amended upto date.

   vi. Local Fire Regulations, National electrical code 2011 amended up to date and Relevant sections of relevant IS codes of latest edition and CPWD special publications available on CPWD website.
   (Note: The higher specifications/ stringent conditions of CPWD specifications or NBC-2016 shall be followed), relevant BIS standards as modified up to date.

2. Interpreting Specifications:

   In the case of discrepancy between the Schedule of Quantities, the Specifications and / or the Drawings, the following order of preference shall be observed:-

   i. Description of Schedule of Quantities.
   ii. Particular Technical Specification and Special Condition, if any in NIT.
   iii. Commercial and Additional conditions of this work.
   iv. Drawings.
   v. CPWD Specifications
   vi. Indian Standard Specifications of B.I.S. OR other international code in case IS code is not available.
   vii. As per direction of Engineer-in-charge.
   However, nothing extra shall be paid on account of these, as the same are to be read along with schedule of quantities for the work.

3. If there are varying or conflicting provisions made in any one document forming part of the contract, the Accepting Authority shall be the deciding authority with regard to the intention of the document and his decision shall be final and binding on the contractor. Any error in description, quantity or rate in Schedule of Quantities or any omission there from shall not vitiate the Contract or release the Contractor from the execution of the whole or any part of the works comprised therein according to drawings and specifications or from any of his obligations under the contract.

4. Commercial and Additional conditions of that particular work are to be read in conjunction with above and in case of variations, specifications given in these additional

conditions shall apply. However, nothing extra shall be paid on account of these additional specifications and conditions, as the same are to be read along with schedule of quantities for the work.

5. "The agency shall arrange training on all specialized services for NABARD and CPWD teams, along with providing manuals and SOPs, after completion of the work.".

6. The working hours for the execution of work shall be as under:
   i. 6 PM to 8 AM on week days i.e. from Monday to Saturday.
   ii. Normal working hours on Sunday.

   The bidder should take note of the above timings of execution of work before quoting his bid and should arrange the labour & other requirements accordingly & nothing shall be paid extra in this regard

COMMERCIAL AND ADDITIONAL CONDITIONS

1. This specification covers manufacture, testing as may be necessary before dispatch, delivery at site, all preparatory work, assembly and installation, commissioning putting into operation of equipment of all E&M components of the tender.

2. The Tenderer may, before submission of the tender, must study various CPWD specifications; get themselves acquainted with site and site conditions. The department shall not bear responsibility for the lack of knowledge and also the consequences thereof to the Contractor. The information and data shown in the drawings and mentioned in the tender document have been furnished in good faith and for general information and guidance only. The Engineer-in-Charge in no case shall be held responsible for the accuracy thereof and / or interpretations or conclusions drawn there from by the Contractor and all consequences shall be borne by the Contractor and no claim, whatsoever, shall be entertained from the Contractor, if the data or information furnished in tender document is different from data / drawing for actual construction issued after the award of work or in-correct otherwise. It is presumed that the Contractor has satisfied himself for all possible contingencies, situations, bottlenecks and acts of coordination, which may be required between different agencies.

3. Before commencing the work, the Contractor shall, without in any way limiting his obligations and liabilities, insure at his own cost and expense against any damage or loss or injury, which may be caused to any person or property. Nothing extra shall be payable on this account.

4. INSPECTION OF SITE

   The Contractors should in his own interest visit the site, inspect and examine the site and its surroundings, get familiarize with the site conditions before tendering and satisfy themselves with the nature of site, the means of access to the site, the constraints of space for stacking material / machinery, labour etc., constraints put by local regulations, if any, weather conditions at site, general ground / subsoil conditions etc. or any other circumstances which may affect or influence their tenders. The site is available for work. The contractor shall, immediately on issue of letter of acceptance of tender, make arrangements for starting the work.

5. COMMERCIALCONDITIONS

   Type of Contract: The work to be awarded by this tender shall be treated as indivisible works contract. Income tax, GST, labour cess & other statutory deductions etc. shall be made at source as per the prevalent laws. The deductions of Security Deposit, Income Tax, Labour Cess etc. shall be done as applicable on the gross payments and net payment shall be paid accordingly.

6. RATES

The rates quoted by the tenderer, shall for complete items of works, firm and inclusive of all taxes (including GST, labour cess etc.,) duties and levies, all charges for items contingent to the work such as for packing, forwarding, insurance, freight and delivery, installation, testing, commissioning etc. at site including temporary construction of storage, equipment's required for temporary power connections, risks, overhead charges, general liabilities/obligations and clearance from CEA, local power supply company, local bodies, Fire authorities. However, the statutory fees for the inspections/approvals/NOC from CEA, local power supply company MSEDCL, Fire authorities shall be reimbursed by the department.

The clause 12.5 of the contract stipulates as under which is brought into the knowledge of the contractor:

The cost of any operation necessarily in contemplation of tenderer while quoting tender or necessary or incidental to proper execution of an item of work included in the Schedule of Quantities or in the Schedule of Rates mentioned in Schedule F, whether or not specifically indicated in the description of the item and the relevant specifications, shall be deemed to be included in the rates quoted by the tenderer or the rate given in the said Schedule of Rates, as the case may be. Nothing extra shall be admissible for such operations. (As Per No. DG/CON/312 dt. 17-02-2021)

7. Unless otherwise provided in the Schedule of Quantities, the rates quoted by the Contractor shall be inclusive of carrying out the works at and / or up to all heights, lifts, leads and depths. The contractor shall make all arrangements for the same. Nothing extra shall be payable on this account.

The tenderers shall take into account the element of wastage(s) those are likely to be there in all elements of the work and quote his price, taking that into account. The tenderers shall study all the items from the point of view of wastage(s), which are likely to take place. Nothing extra shall be payable on this account.

8. Insurance and Storage:

All consignments are to be duly insured up to the destination from warehouse to warehouse at the cost of the supplier. The insurance covers shall be valid till the equipment are handed over duly installed, tested and commissioned.

9. The contractor shall ensure quality construction in a planned and time bound manner. Any sub-standard material or work beyond set out tolerance limits shall be summarily rejected by the Engineer-in-charge.

The work is to be carried out in workman like manner and generally in accordance with the plans. However, the contractor will be bound to carry out the work with minor deviation over the plan supplied if desired by the Engineer-in-Charge of the work.

All ancillary and incidental facilities required for execution of work like labour camp, stores fabrication yard, site offices for Contractor/CPWD staff, watch and ward, temporary ramp, temporary structure for plants and machineries, installation and consumption charges of temporary electricity, telephone, water etc. required for execution of the work, liaison and pursuing for obtaining various No Objection Certificates/clearances, completion certificates from local bodies etc., protection works, barricading, testing facilities / laboratory at site of work, facilities for all field tests and for taking samples etc. during execution or any other activity which is necessary (for execution of work and as directed by Engineer-in-Charge), shall be deemed to be included in rates quoted by the Contractor, for various items in the schedule of quantities. Nothing extra shall be payable on these accounts. All incidental charges of any kind including cartage, storage, wastage and safe custody of material etc. shall be the sole responsibility of the Contractor & shall be borne by him and no claim whatsoever shall be entertained on this account.

The contractor shall give due notices to Municipality/Corporation, Police and/or other authorities that may be required under the laws/rules under force and obtain all requisite permissions/licenses for temporary obstructions/enclosures and pay all charges which may be leviable on account of his execution of the work under the agreement. Nothing extra shall be payable on this account.

10. The Contractor shall prepare the programme chart for the execution of the work showing clearly all activities from the start of work to the completion, with details of requirements of materials, man power, equipment's and machinery deployment, required for the completion of the work within the stipulated period and submit the same to the Engineer-in-Charge, as prescribed, after award of work. The Contractor shall also submit monthly programme and progress reports and update/ re-schedule the same every month. These shall be submitted by the contractor in soft copy also besides forwarding hard copy of the same.

11. The contractor shall coordinate with local bodies/licensing authorities/supply company etc. for getting approvals/clearances and shall submit necessary documents required for the same. No extra payment shall be made for the same. However statutory charges for such approvals/clearances shall be reimbursed by the department.

12. COMPLETENESS OF TENDER

All sundry equipment, fittings, unit assemblies, accessories, hardware items, foundation bolts, termination lugs for electrical connections, and all other items which are useful and necessary for efficient assembly and installation of equipment and components of the work shall be deemed to have been included in the tender irrespective of the fact whether such items are specifically mentioned in the tender documents or not.

13. STORAGE AND CUSTODY OF MATERIALS

The agency has to make his own arrangements for storage of materials. The contractor shall be responsible for the safe custody of the electrical installation in the building, including fitting, fixtures and equipment's till the installations handed over to the client/department. No storage accommodation shall be provided by the department. He should make his own arrangement for proper watch and ward, safe custody of the site/property/material provided by him and materials issued by the department against pilferage and breakage during the period of execution and thereafter till the work is completed and physically handed over to the client/department at his risk and cost. No claim will be entertained on this account.

14. CARE OF THE BUILDING:

Care shall be taken by the contractor while handling and installing the various equipment's and components of the work to avoid damage to the building/existing equipment's. He shall be responsible for repairing all damages and restoring the same to their original finish at his cost. He shall also remove at his cost all unwanted and waste materials arising out of the installation from the site of work.

The contractor or his representative, labour should not remove / disturb/ dislocate the existing equipment's and its parts from its positions until and unless it is authorized by the Engineer-in-charge. Care shall be taken not to damage the Civil / Electrical installation by improper handling etc. The contractor shall be responsible for any damage on account of negligence of the contractor's staff, the same will have to be made good at contractor's own cost. He shall also remove at his cost all unwanted and waste materials arising out of the maintenance from the site of work. Nothing extra shall be paid on this account.

15. PROGRAMME CHART

The Contractor shall prepare and submit to the Engineer-in-charge, an programme chart. The program chart showing clearly all activities from the start of work to completion, with details of manpower, equipment and machinery required for the fulfillment of the program within the stipulated period or earlier and submit the same for approval to the Engineer-in-Charge.

16. APPROVAL OF MATERIALS, SHOP FLOOR DRAWINGS AND COMMENCEMENT OF WORK

The design layout plans / drawings / other documents pertaining to E & M services shall have to be submitted for approval and got checked within the time period as specified in the table of mile stone. Within 15 days of award of work the contractor shall visit the site and submit following documents for approval.

1. List of makes & Model numbers of all items and/or equipment's and accessories offered for all packages.

2. Catalogues of the equipment's to be supplied, detailed technical literature, specifications, pamphlets and performance data for appraisal and evaluation.

3. Shop floor drawings of each package separately for approval. It is the responsibility of the tenderer to get the makes, models and shop floor drawings approved by the department.

4. All general arrangement drawings.

5. Any other drawing/information not specifically mentioned above but deemed to be necessary for the job by the contractor.

All materials equivalent to the one specified should be got approved by the Engineer-in-charge before using the said materials in the work.
The Engineer-in-charge shall scrutinize the proposal and approve the makes and models which are acceptable as per the schedule, specifications, conditions of the agreement and inform the agency for procurement.

After approval of the equipment/materials by the department the agency shall procure the equipment/materials from the OEM/authorized distributor/dealer as the case may be.
Adequate care that only tested and genuine materials of proper quality are used in work shall be ensured by firm. The firm shall also ensure that:

i) Material will be ordered & delivered at site only with the prior approval of the department to ensure timely delivery.
ii) The firm will be required to procure material directly from the manufacturer/authorized dealers to ensure genuineness & quality and as per the approved makes only. Proof in this regard shall be submitted by the contractor if required by the department.

Year of manufacturing of all equipment's/fittings/cables shall be current.

The successful tenderer should also furnish well in advance three copies of detailed instructions and manuals of manufactures for all items and/or equipment's regarding installation, adjustments operation and maintenance including preventive maintenance and troubleshooting together with all the relevant data sheets, spare parts catalogue and workshop procedure for repairs, assembly and adjustment etc. all in triplicate.

17. SUPERVISION OF WORK:

The proposed work is a prestigious project and quality of work is of paramount importance. The Contractor shall depute Site Engineers & well experienced skilled workers as required and deploy modern T&P and other equipment to execute the work. He shall submit organization chart along with details of Engineers and supervisory staff. It shall be ensured that all decision-making powers shall be available to the representatives of the Contractor at site itself to avoid any likely delays on this account. The Contractor

shall also furnish list of persons for specialized works to be executed for various items of work. The Contractor shall identify and deploy key persons having qualifications and experience in the similar and other major works, as per the field of their expertise. If during the course of execution of work, the Engineer-in-Charge is of the opinion that the deployed staff is not sufficient or not well experienced; the Contractor shall deploy more staff or better-experienced staff at site to complete the work with quality and in stipulated time limit.

The contractor will ensure that all the skilled persons deployed for executing the electrical work possess wireman license issued by approved authorities, otherwise he will not be permitted to execute the work.

Consequences arising due to the default of the contractor to comply with this condition would be contractor's responsibility only.

17. The contractor or his authorized representative shall sign the site order book and comply with the remarks entered therein by the representative of the Department.

18. SPECIALISED AGENCIES: The main Contractor has to associate approved specialized agencies for the E&M components as listed in the tender documents and as per CPWD manual provisions, as amended upto date. The contractor shall ensure that the all the specialized agencies under him shall fulfill all the conditions of the NIT for the entire period of the contract.

19. PROTECTIVE / SAFETY MEASURES: Necessary protective and safety equipment's shall be provided to the Site Engineer, workers & Supervisory staff by the Contractor at all time in his own cost and used at site.

The contractor has to make his own arrangement for the safety of his workman. Department shall not be responsible in case of any accident taking place during the work.

The contractor shall take all safety precautions to avoid accidents by exhibiting necessary caution boards day and night, speed limit boards, red flags, red light and by providing necessary barriers and all other measures required from time to time. The contractor shall be responsible for all damages and accidents due to negligence on his part.

No hindrances shall be caused to traffic during the execution of the work. In case of any accident of labours/ contractual staff's the entire responsibility will rest on the part of the contractor and any compensation under such circumstances if becomes payable the same shall be entirely born by the contractor and department shall have not role on this account.

20. DISPLAY PERMISSIONS: The Contractor shall display all permissions, licenses, registration certificates, bar charts, other statements etc. under various labour laws and other regulations applicable to the works, at his site office.

21. Indemnity:

The successful tenderer shall at all times indemnify the department, consequent on this works contract. The successful tenderer shall be liable, in accordance with the Indian Law and Regulations for any accident occurring due to any cause and the department shall not be responsible for any accident or damage incurred or claims arising there from during the period of erection, construction and putting into operation the equipment's and ancillary equipment under the supervision of the successful tenderer in so far as the latter is responsible. The successful tenderer shall also provide all insurance including third party insurance as may be necessary to cover the risk. No extra payment would be made to the successful tenderer due to the above.

22. Compliance with Regulations and Indian standards.

All works shall be carried out in accordance with relevant regulation, both statutory and those specified by the Indian Standards related to the works covered by this specification. In particular, the equipment and installation will comply with the following:

Factories Act.

Indian Electricity Rules.

I.S. & B.S. Standards as applicable.

Workmen's Compensation Act.

Statutory norms prescribed by local bodies like CEA, Power Supply Company, fire authorities etc.

Safety Codes & Statutory Regulations

Nothing in this specification shall be construed to relieve the successful tenderer of his responsibility for the design, manufacture and installation of the equipment with all accessories in accordance with currently applicable statutory regulations and safety codes.

In respect of all labour employed directly or indirectly on the work for the performance of the contractor's part of work, the contractor at his own expense, will arrange for the safety provisions as per the statutory provisions, B.I.S recommendations, factory act, workman's compensation act, CPWD code and instructions issued from time to time. Failure to provide such safety requirements would make the tenderer liable for penalty for Rs. 500/- for each violation. In addition the Engineer-in-charge, shall be at liberty to make arrangements and provide facilities as aforesaid and recover the cost from the contractor.

The contractor shall provide necessary barriers, warning signals and other safety measures while executing the work etc. or wherever necessary so as to avoid accident. He shall also indemnify CPWD against claims for compensation arising out of negligence in this

respect. Contractor shall be liable, in accordance with the Indian Law and Regulations for any accident occurring due to any cause. The department shall not be responsible for any accident occurred or damage incurred or claims arising there from during the execution of work. The contractor shall also provide all insurance including third party insurance as may be necessary to cover the risk. No extra payment would be made to the contractor due to the above provisions thereof.

23. After completion of the installation, the same shall be offered for inspection by the representatives of the Central Electricity Authority if required, local powers supply company and local fire authority. The contractor will extend all help including test facilities to the representatives of CEA/local power supply company/Local fire authority. The observations of CEA/local power supply company/Local fire authority will be attended to by the contractor. The installation will be commissioned only after getting clearance from CEA/local power supply company/Local fire authority. Contractor should get inspection done & obtain approval from Central electrical Authority, local power Supply Company and local fire authority.
The Department is free to get the Equipment & machinery inspected from any of the external inspection agency and contractor shall co-operate with external agency in getting the inspection done. All defects/observation made by the inspecting agency shall be complied by contractor without any extra cost.

24. The contractor shall render all help and assistance in documenting the total sequence of this project by way of photography, etc. nothing extra shall by payable to the contractor on this account. Cost of photographs, etc. shall be borne by the contractor.

25. TOOLS AND PLANTS:
No tools and plants, tackles including any special T&P either for unloading or for shifting the equipment's for erection purposes etc. shall be supplied by the Department and the Contractor shall have to make his own arrangements for all these facilities at his own cost. Contractor should provide modern T&P and other equipment's to execute the work. No claim of hindrance (or any other claim) shall be entertained on this account. Scaffoldings & any other T & P required for execution, testing and commissioning of work shall be arranged by the contractor and is included in the cost of work tendered by the contractor.

26. Extent of work:
The work shall comprise of entire labour including supervision and all materials necessary to make a complete installation and such tests and adjustments and commissioning as may be required by the department. The term complete installation shall not only mean major items of the plant and equipment's covered by specifications but all incidental sundry components necessary for complete execution and satisfactory performance of installation with all layout charts whether or not those have been mentioned in details in the tender document in connection with this contract as this is a turnkey job.

a. The cable, sand and all other items shall be brought to site only after taking correct measurements as per actual requirement of work. Excess quantities shall not be accepted and paid. i.e., Quantity of item brought to site and used in work as per actual requirement shall only be measured and paid irrespective of quantities of BOQ / work schedule. The item brought at site and paid, if not used in the project have to be taken back by the contractor and deductions in the payment shall be adjusted in subsequent bills. The decision of the Engineer-in-charge in this regard shall be final & binding on the contractor.

b. In addition to supply, installation, testing and commissioning, of all E&M equipment, following works shall be deemed to be included within the scope of work to be executed by the tenderer. Nothing extra shall be paid on this account.

i) Minor building works necessary for installation of equipment's, foundation, making of opening in walls or in floor and restoring to their original conditions, finish and necessary grouting etc. as required.

ii) All necessary supports for cable and MS Channel for erection.

iii) Testing of PTs/CTs for metering & protection purpose & relay calibration & setting.

iv) The contractor shall remove all the debris due to the works from the site as soon as the work is completed.

c. Getting inspection done & obtaining approval from Central Electrical Authority, local power Supply Company and local fire authority for energizing the installation as briefed above.

27. The Contractor shall maintain all the work in good condition till the completion of entire work. The Contractor shall be responsible for and shall make good, all damages and repairs, rendered necessary due to fire, rain, traffic, floods or any other causes. The Engineer-in-Charge shall not be responsible for any claims for injuries to person/workmen or for structural damage to property happening from any neglect, default, want of proper care or misconduct on the part of the Contractor or of any other of his representatives, in his employment during the execution of the work. The compensation, if any, shall be paid directly to the Department / authority / persons concerned, by the Contractor at his own cost.

Any Damage done to the building during the execution of electrical work shall be responsibility of the contractor and shall be made good immediately at his own cost to the entire satisfaction of the Engineer-in-Charge. The decision of the Engineer-in-charge shall be final and binding.

28. For completing the work in time, the Contractor might be required to work in two or more shifts (including night shifts). No claim whatsoever shall be entertained on this account, not with-standing the fact that the Contractor may have to pay extra amounts for any reason, to the labours and other staff engaged directly or indirectly on the work according

to the provisions of the labour and other statutory bodies regulations and the agreement entered upon by the Contractor with them.

29. **Electric Power Supply and Water Supply:** It is the responsibility of the contractor to arrange power supply of 415 Volt, 3 phase, 4 Wire, 50 Hz, AC supply and water supply for installation and testing purposes during the contract period. CPWD/NABARD will not provide electrical supply. Nothing extra shall be paid on this account.

30. No foreign exchange shall be made available by the department for importing (purchase) of equipment's, plants, machinery, materials of any kindor any other items required to be carried out during execution of the work. No delay and no claim of any kind shall be entertained from the Contractor on account of variation in the foreign exchange rate and/or any Custom duties / charges or any other levies.

31. DEFECT LIABILITY PERIOD

All the LED Bulbs / LED fitting shall be guaranteed for a period of 5 years after completion of work. An undertaking for LED fitting from OEM (as per Annexure attached) needs to be submitted by the firm. The amount of 5% of agreement item of LED luminaries / bulb shall be deducted from every running as well as final bills of contractor and retained as Performance Guarantee of LED luminaries for five year after completion of work. This will be refunded @ 1% after every year after successfully completion of guarantee period (5 year).

32. Guarantee:

All equipment's shall be guaranteed for a period of 12 months (except LED fittings which shall be guaranteed for minimum 5 years) from the date of completion of work against unsatisfactory performance and/or break down due to defective design, workmanship of material. The equipment's or components, or any part thereof, so found defective during guarantee period shall be forthwith repaired or replaced free of cost, to the satisfaction of the Engineer-in-Charge. In case it is felt by the department that undue delay is being caused by the contractor in doing this, the same will be got done by the department at the risk and cost of the contractor. The decision of the Engineer-in-Charge in this regard shall be final. The firm will be required to attend to the breakdowns calls as and when required and also ensure timely periodically checks for installations as per CPWD Specifications and standard trade practice.

The tenderer shall warranty among other things, the following:

a. Quality, Strength and performance of the materials used.
b. Safe mechanical and electrical stress on all parts under all specified conditions of operation.
c. Satisfactory operation during the maintenance period.

33. Security Deposit shall be refunded proportionately on account of LED fittings as per OM issued vide No. Directorate General/SE(E)(TAS)/Various/12 Nirman Bhawan, New Delhi dt. 03.09.2019.

34. Payment to labour:

Contractor shall pay payment to labours (workers) through account payer cheque/ECS. Contractor shall submit Proof of payment made to labours engaged for this work in two copies. Payment details shall include name of worker, bank account details, photocopy, amount due, amount paid and cheque number or ECS statement.

Contractor shall make payment to workers at the rates not less than the rates payable as per minimum labour rates published by labour department Central Govt/Govt. of Maharashtra (whichever are higher).

Contractor has to obtain labour license from the labour commissioner office as per prevailing Government rules and has to upload following labour details online on CPWD web site in WBPIMS using his pan numbers as log-in ID within 7days.

a. Address & contact details of the contractor
b. Number of labour employed for thework.
c. Copy of labour license.
d. Registration details with EPFO ESIC, BOCW Welfare Board.
e. ESI smart Card for labour.
f. Details and mode of payment made to the labour along with details of ESI and EPF contribution paid on the part of employed.

35. NO WAIVING OF LEGAL RIGHTS AND POWERS

The Engineer-in-Charge shall not be precluded or stopped from taking any measurements, and framing of estimates or detaining any certificates made either before or after the completion and acceptance of the work and payment, from showing the true amount and character of the works performed and materials furnished by the Contractor and from showing that any such measurements, estimates or certificates untrue or incorrectly made and that Engineer-in-charge shall not be precluded or stopped from recovering from the Contractor such damages as it may be sustained by reasons of his failure to comply with the terms and conditions of the contract.

36. QUALITY ASSURANCE:

To assure quality assurance / procedure for E & M services mentioned in O.M. No. 51(4)/CE(Elect.)/CSQ/2016/293(H), dtd.31.03.2016 issued by the Directorate, CPWD, New Delhi shall be applicable.

The Contractor shall make available, on request from the Department, for record, copies of challans, cash memos, receipts and other certificates, if any, vouchers towards the quantity and quality of various materials procured and the same shall be kept in record. These shall also provide information on the name of the manufacturer, manufacturer's

product identification, manufacturer's instructions, warning, date of manufacturing and test certificates from manufacturers for the product for each consignment delivered at site, shelf life, if any, for the department to ensure that the material have been procured from the approved source and of the approved quality, as directed by the Engineer-in-Charge. Day to day account of receipt of such material shall be maintained at site of work and shall be regulated by the department. Nothing extra shall be payable on this account.

37. Inspection before Dispatch: All routine tests shall be conducted before dispatch of equipment's. No equipment shall be dispatched out from the manufactures premises before such tests are conducted and test result recorded. These test certificates shall be given along the supply of equipment's. The Engineer-In-charge shall, if he so desires inspect and witness the pre-delivery tests. For this purpose, the agency shall give 15 days advance notice. Agency shall arrange for inspection of the department. Department shall bear expenses of its officials for inspection as far as traveling, boarding and / lodging is concerned. However, the inspection shall be done at the discretion of the department without any cost implication but ROUTINE TEST & TYPE TEST Certificates shall have to be submitted for equipment's. Prior to dispatch, all equipment's shall be adequately protected & insured for the whole period of transit, storage and erection against corrosion and incidental damages etc. from the effect of vermin, sunlight, rain, heat and humid climate.

If the department desires to send any samples of materials for testing in a accredited laboratory, the Contractor at his own expense shall supply all materials, labour for preparing and testing samples as required by the Engineer-in-Charge. The testing shall be carried out in the presence of the representative of the Engineer- in- Charge. Payment of all charges and cost of testing etc shall be as per the relevant clauses of the contract.

For items/equipment requiring initial inspection at manufacturer's works, the contractor will intimate the date of testing of equipment's at the manufacturer's works before dispatch. The department also reserves the right to inspect the fabrication job at factory and the successful tenderer has to make the arrangement for the same. The successful tenderer shall give sufficient advance notice regarding the dates proposed for such tests/inspection to the department's representative(s) to facilitate his presence during testing/fabrication. The Engineer-in-charge at his discretion may witness such testing/fabrication. The cost of the Engineer's visit to the factory will be borne by the Department. Also equipment may be inspected at the Manufacture's premises, before dispatch to the site by the contractor.

38. Quality of material and workmanship:
All parts of the equipment shall be of such design, size and material so as to function satisfactorily under all rated conditions of operation. All components of the equipment's

shall have adequate factor of safety. The work of fabrication and assembly shall conform to sound engineering practice and on the basis of "Fail Safe Design". The mechanical parts subject to wear and tear shall be easily replaceable type. The construction of the equipment's shall be such as to facilitate easy operation, inspection, maintenance and repairs. All connections and contacts shall be designed to minimize risk of accidental short circuits caused by animals, birds and vermin etc. All identical items and their component parts should be completely, interchangeable including spare parts.

The contractor shall be responsible for removal of all defects in the work during the guarantee/warranty period. However, if any failure is noticed during this period which is attributable to poor quality of material and bad workmanship, the contractor will be required to rectify the same at his own cost, failure of which the department will be at liberty to get the defects rectified at the risk & cost of the contractor. The contractor will also be required to carry out his own inspection/testing during the guarantee/warranty period and attend to any defect taking place during this period.

Inspection and testing at site:

After completion of the work in all respect the contractor shall offer the installation for testing and operation.

i) The installation shall be subject to necessary inspection during every stage of erection, by the Engineer-in-charge or his authorized representative. The contractor shall provide all facilities and assistance for the purpose.

ii) The completed installation shall be inspected and tested by the Engineer-in charge in the manner as will be laid down by him, in consultation the agency.

iii) All instruments and facilities necessary for the tests shall be provided by the agency.

The contractor will have to arrange for insulation and other tests as per rules in the presence of the representative of Engineer-in-Charge as and when required by him and submit the test report in triplicate before the work can considered as complete.

39. Quality Control and Testing of materials:

All the material to be used on works shall bear ISI certification mark unless otherwise the make is specified in the item or special conditions appended with this tender document. In case ISI mark material or the materials mentioned in the tender documents are not available, the decision in this regard shall be as per opinion of Engineer-in-charge, which shall be final and binding. The materials to be used shall conform to CPWD specifications applicable in this tender or IS Code. In such cases Engineer-in-charge shall satisfy himself about the quality or such material and give his approval in writing. Only articles classified as first quality by the manufacturers shall be used unless otherwise specified. All material not having ISI mark shall be tested as per relevant ISI specification. The Engineer in charge may relax the condition regarding testing if the quantity of the materials required for the work is small. In all cases of use of ISI marked materials proper proof of procurement of materials from authentic manufacturers shall be provided by the

contractor to the entire satisfaction of Engineer-in-charge. All materials equivalent to the one specified should be got approved by the Engineer-in-charge before using the said materials in the work.

40. Painting:

This shall include cost of painting of entire exposed iron work complete in the installation. The agency shall be required to do only touching to the damages caused to the painting during transportation, handling & installation at site, if there is no major damage to the painting. However, hangers, supports etc. of bus trunking & cable tray, stands etc. shall be painted with required shade including painting with two coats of anticorrosive primer paint at site.

41. Completeness of work:

The installations shall be completed in all respects and put in to operation even where certain details have not been mentioned / left out in the specifications.

ii) All E&M services such as Internal Electrical installations shall be declared as completed after completion of trial run of 15 days or completion of whole work whichever is later. DLP / Warranty period of all works / machine / equipment shall commence from date of completion of complete work (project).

iv) All electrical & mechanical fittings / fixture / appliances, to be provided for the work, where BEE certification is available should have 5-star rating (of BEE).

42. Completion Period

The completion period indicated in the tender documents is for the entire work of planning, designing, approval of drawings etc., arrangement of materials & equipment's, delivery at site including transportation, installation, testing, commissioning and handing over of the entire system to the satisfaction of the Engineer-in-charge.

43. Acceptable makes of various Equipment's:

The acceptable makes of various equipment's/ components/ accessories have been indicated in "Preferred Makes" appended with the tender documents. The tenderer shall work out the cost of the offer on this basis. Alternate makes are not acceptable.

1. To ensure genuineness of materials the contractor will procure materials from authorized dealers only.
2. Material shall be procured only after assessing exact quantity at site in Consultation with Engineer-in-charge.

44. Inspection and Testing

a. Copies of all documents of routine and type test certificates of the equipment, carried out at the Manufacture's premises shall be furnished to the Engineer-in-charge. The decision of the Engineer-in-charge in this regard shall be final & binding on the contractor.

b. After completion of the work in all respects the contractor shall offer the installation for testing and operation. The contractor should submit all the related documents of completed E&M equipment to the department for further handing over to client department.

45. Insurance and storage

All consignments are to be duly insured upto the destination from warehouse at the cost of the contractor. The insurance covers shall be valid till the equipment is handed over duly installed, tested and commissioned.

46. Verification of correctness of Equipment at destination

The contractor shall have to produce all the relevant records i.e. Invoices / Test certificates to certify that the genuine equipment's from the manufacturers has been supplied and erected to the satisfaction of the Engineer-in-charge.

47. Training

The scope of works includes the on job technical training for all services of two to four persons of client/Department at site as decided by Engineer-in-charge. Nothing extra shall be payable on this account.

48. Maintenance

Sufficient trained and experienced staff shall be made available to meet any exigency of work during the guarantee period of one year from the date of Completion of work.

49. **TERMS OF PAYMENTS:**

The following percentage of contract rates for the various items included in the contract shall be payable against the stage of work shown herein

Sl. No.	Stage of Work	% of value
I)	After initial inspection (wherever specified) & delivery at site in good condition on pro-rata basis	70%
II)	On completion of installation on pro-rata	15%
III)	On testing and commissioning	10%
IV	On handing over	5%

The payment to the contractor for supply of items will only be made against submission of test certificates and invoices. Engineer-in-charge has full power to verify the genuineness of the material

Conditions & Eligibility Criteria for Association of agencies by successful bidder

1. The bidder shall upload an undertaking along with the bid for Association of Specialized Agencies in a standard proforma provided in the bid document.

2. All components specified anywhere in the bid document for which the main contractor has to associate a suitable agency/ agency fulfilling prescribed eligibility criteria shall be termed as specialized components of work.

3. For specialized components of work, the successful bidder should either meet the eligibility criteria himself or he will have to associate with an agency/agency meeting the eligibility criteria.

4. In case the successful bidder himself is eligible (as per eligibility criteria) for executing any specialized component and intends to execute the component himself, he has to submit all the documents as per eligibility criteria mentioned for associated agency of individual specialized component.

5. If he does not fulfill the eligibility criteria himself and intends to associate with an agency/ agency, he has to submit details of such agency(s) along with consent letter (both in prescribed proformas) to the Executive Engineer of respective component within 30 days from the date of issue of award letter or within 15 days before scheduled start of such component, whichever is earlier.

6. The successful bidder himself shall thoroughly check whether the agency with whom association is proposed meet the eligibility criteria before submitting his consent letter and proposal to the Executive Engineer.

7. In support of the eligibility conditions of the proposed Associate specialized agency, the main contractor will have to submit following documents of associate agency to respective Executive engineer for approval:

(a) Electrical License certificate.
(b) GST documents.
(c) Certificate from Associate agency that they are not debarred as on the day of association with the main contractor.
(d) Any other document asked by the Engineer in charge.

8. For similar work experience certificates, the main contractor shall have to submit self-attested copies of work experience/ completion certificates of the work. The certificates should contain details like 1. Name of work 2. Scope of Work 3. Agreement No. 4. Estimated Cost 5. Tendered Cost 6. Final Value of Work Done 7. Date of Start 8. Stipulated date of Completion 9. Actual date of completion 10. Nature of the Work etc. In case some of above said details are not mentioned in the Completion certificate, the firm shall attach proof in support of above details.

9. The firm should have successfully completed similar works during the last 7 (seven) years ending last day of month previous to the one in which tenders are invited for each sub heads.
   The value of executed works shall be brought to current costing level by enhancing the actual value of work at simple rate of 7% per annum; calculated from the date of completion to last date of submission of bid.

10. The department reserves the right to allow the main firm to submit additional Documents /additional names of the associates in case of the deficiencies in documents or in case of no associate getting qualified in respect of certain components. The same will have to be complied with by the main contractor within the time allowed. The decision of the department shall be firm & binding on the main contractor.

11. After approval of Associate Specialized agencies by Engineer-in-charge, the main contractor has to enter into MoU with agency(s) associated by him. Copy of such MoU shall be submitted to EE/ DDH in charge of each relevant component as well as to EE-in-charge of major component. In case of change of associate contractor, the main agency(s) has to enter into MoU/agreement with the new contractor associated by him. The MoU (as per prescribed proforma) shall be in shape of affidavit on stamp paper duly attested by Notary in original within 5 (Five) days after issue of approval letter (for Associate Specialized Agency). The MoU shall be signed by both the parties i.e., Main Contractor as 1st party and Associated Specialized Agency as 2nd party, independently for all specialized work(s).

12. All technical discussions during currency of contract shall be attended by the Associated Specialized Agencies and the Main Contractor. Commercial/Technical submissions for the specialized work(s) shall be signed and submitted by the Associate Specialized Agencies along with the Main Contractor.

13. The Associated Specialized Agencies and the Main Contractor shall attend the site during inspection of the work by the Engineer-in-Charge or higher authority.

14. The Associated Specialized Agencies or his representative is bound to sign the site order book as and when required by the Engineer-in-charge and will comply with the remarks therein.

15. The Main Contractor shall be entirely responsible and answerable for all the works done by his Associated Specialized Agency (agencies) regarding their quality, adherence to the laid down specification, terms and conditions, warranty/guarantee etc. as per the agreement and he shall be liable to bear any compensation that may be levied by the department under any of the clauses of the agreement.

16. The main contractor shall be responsible for coordinating the activities of all the works and will ensure progress of all works as per the laid down programmed. The main contractor shall also arrange for proper storage of the accessories at site and will be responsible for their watch and ward.

17. In case the main contractor intends to change any of the above agency/agencies during the operation of the contract, he shall obtain prior approval of Engineer-in-charge of relevant specialized component(s). The new agency shall execute the left-over work without any loss of time or variation in cost to the department in this regard.
18. The new agency/agencies shall also have to satisfy the laid down eligibility criteria. In case Engineer-in-charge is not satisfied with the performance of any agency, he can direct the contractor to change the agency executing such items of work and this shall be binding on the contractor.

19. If any equipment supplied for the work, during the currency of the earlier Associate/sub-contractor and paid partly by the department, becomes redundant /not in a position to be installed and commissioned and put to beneficial use due to change in agency for execution of specialized component, the main contractor shall be liable for replacement of the equipment(s) at no cost to Department. The main contractor will not relive from his responsibility to complete the work as per agreement and hand over to department.
20. The payment for the work carried out by the Associate Agency shall be paid to the Main Contractual Agency by the Department. The Main Contractual Agency shall be responsible for transferring the corresponding payment to the Associate Agency within fifteen (15) days from the date of receipt. In case the Main Contractual Agency fails or refuses to make the payment within the specified time, the Department reserves the right to directly release the payment to the Associate Agency for the work completed, subject to submission and verification of all required supporting documents by the Associate Agency.

21. The Agency shall be responsible for preparing and submitting a detailed inventory of all Internal Electrical Installations, including the Fire Alarm System, for each section of the work, aligned with the scheduled quantities as per the tender documents. This inventory must be submitted to the Engineer-in-Charge for verification and formal approval prior to the commencement of any related works. Execution of the work shall not proceed until written approval is granted. Any variations in the inventory during the course of the project must be promptly reported to the Engineer-in-Charge and shall require prior written approval.

The Minimum Eligibility Criteria For E&M Components and Specialized Works Wherever Applicable

Sr. No.	Component of E&M Works	Total Estimated Cost taken in BOQ in Rs.	Eligibility
1.	**Internal Electrical Installation, Fan, Fittings, MCB DBs, MCBs, Power Wiring, etc.**	**86,65,388.00**	If the main contractor does not have valid Electrical license for executing the work then, he shall associate with eligible class registered contractor, possessing valid Electrical License of appropriate Category issued by competent authority and fulfilling the following eligibility criteria having successfully completed during last seven years ending up to previous day of last date of submission of tender as given below with completion certificate issued by an officer not below the rank of Executive Engineer or equivalent duly attested. Three similar completed works each of value not less than **40%**of cost of this component. **or** Two similar completed works each of value not less than **60%** of cost of this component. **or** One similar completed work of value not less than**80%** of cost of this component. Similar work shall mean " **SITC of IEI & Fans, MCB, DB's, Power wiring etc."**
2.	**LAN Network Services**	**32,90,146.00**	The main contractor shall have to associate with agency fulfilling the following eligibility criteria (if he himself does not fulfill the eligibility criteria) having successfully completed during last seven years ending up to previous day of last date of submission of tender as given below with completion certificate issued by an officer not below the rank of Executive Engineer or equivalent duly attested. Three similar completed works each of value not less than **40%** of cost of this component.

			or Two similar completed works each of value not less than **60%** of cost of this component. **or** One similar completed work of value not less **80%** of cost of this component. Similar work shall mean "**SITC of LAN Network Services**"
3.	**IP Based EPBAX System and Accessories**	**23,35,376.00**	The main contractor shall have to associate with agency fulfilling the following eligibility criteria (if he himself does not fulfill the eligibility criteria) having successfully completed during last seven years ending up to previous day of last date of submission of tender as given below with completion certificate issued by an officer not below the rank of Executive Engineer or equivalent duly attested. Three similar completed works each of value not less than **40%** of cost of this component. **or** Two similar completed works each of value not less than **60%** of cost of this component.
			or One similar completed work of value not less **80%** of cost of this component. Similar work shall mean "**SITC of IP Based EPBAX System and Accessories**"
4.	**CCTV System**	**6,05,484.00**	The main contractor shall have to associate with agency fulfilling the following eligibility criteria (if he himself does not fulfill the eligibility criteria) having successfully completed during last seven years ending up to previous day of last date of submission of tender as given below with completion certificate issued by an officer not below the rank of Executive Engineer or equivalent duly attested. Three similar completed works each of value not less than **40%** of cost of this component. **or** Two similar completed works each of value not less than **60%** of cost of this component.

			or One similar completed work of value not less **80%** of cost of this component. Similar work shall mean "**SITC of CCTV System**"
5.	**Audio Video System**	**33,12,862.00**	The main contractor shall have to associate with agency fulfilling the following eligibility criteria (if he himself does not fulfill the eligibility criteria) having successfully completed during last seven years ending up to previous day of last date of submission of tender as given below with completion certificate issued by an officer not below the rank of Executive Engineer or equivalent duly attested. Three similar completed works each of value not less than **40%** of cost of this component. **or** Two similar completed works each of value not less than **60%** of cost of this component. **or** One similar completed work of value not less **80%** of cost of this component. Similar work shall mean "**SITC of Audio Video System**"
7.	**VRV Air Conditioning**	**94,06,467.00**	The main contractor shall have to associate with agency fulfilling the following eligibility criteria (if he himself does not fulfill the eligibility criteria) having successfully completed during last seven years ending up to previous day of last date of submission of tender as given below with completion certificate issued by an officer not below the rank of Executive Engineer or equivalent duly attested. Three similar completed works each of value not less than **40%** of cost of this component. **or** Two similar completed works each of value not less than **60%** of cost of this component. **or** One similar completed work of value not less **80%** of cost of this component.

			Similar work shall mean "**SITC of VRV Air Conditioning System**"
8.	**Intelligent Addressable Fire Alarm System**	**18,41,589.00**	The main contractor shall have to associate with agency fulfilling the following eligibility criteria (if he himself does not fulfill the eligibility criteria) having successfully completed during last seven years ending up to previous day of last date of submission of tender as given below with completion certificate issued by an officer not below the rank of Executive Engineer or equivalent duly attested. Three similar completed works each of value not less than **40%** of cost of this component. **or** Two similar completed works each of value not less than **60%** of cost of this component. **or** One similar completed work of value not less **80%** of cost of this component. Similar work shall mean "**SITC of Intelligent Addressable Fire Alarm System**"
9.	**Access Control System**	**10,31,256.00**	The main contractor shall have to associate with agency fulfilling the following eligibility criteria (if he himself does not fulfill the eligibility criteria) having successfully completed during last seven years ending up to previous day of last date of submission of tender as given below with completion certificate issued by an officer not below the rank of Executive Engineer or equivalent duly attested. Three similar completed works each of value not less than **40%** of cost of this component. **or** Two similar completed works each of value not less than **60%** of cost of this component. **or** One similar completed work of value not less **80%** of cost of this component. Similar work shall mean "**SITC of Access Control System**"

10.	**UPS System**	**20,37,676.00**	The main contractor shall have to associate with agency fulfilling the following eligibility criteria (if he himself does not fulfill the eligibility criteria) having successfully completed during last seven years ending up to previous day of last date of submission of tender as given below with completion certificate issued by an officer not below the rank of Executive Engineer or equivalent duly attested. Three similar completed works each of value not less than **40%** of cost of this component. **or** Two similar completed works each of value not less than **60%** of cost of this component. **or** One similar completed work of value not less **80%** of cost of this component. Similar work shall mean "**SITC of UPS System**"

Note: -The value of executed works shall be brought to current costing level by enhancing the actual value of work at simple rate of 7% per annum; calculated from the date of completion to last date of submission of tenders

Particular Technical Specifications & Conditions

SH–I INTERNAL E.I. WORKS

The Work shall be carried out strictly in accordance with the CPWD general specification for Electrical work (Part-I Internal 2023 and Part-II External 2023 as amended upto date). All installations shall comply with the requirement of Indian electricity rules, 1956 as amended up to date. In case of items not covered by the above specification, the work shall be carried out as per the instruction of the Engineer-in-charge.

1. The contractor must be able to work on concrete slabs/walls as and when required and in complete co-ordination with the civil works. Cutting of chases in the plastered wall shall in no case be allowed. The contractor shall fix conduits and boxes in the walls soon after the brick work is completed and finish the chase to rough surface with proper cement sand mixture. Only in exceptional cases e.g. where cutting of plastered surface cannot be avoided it will be contractor's responsibility to ensure that plastering is done to match the original finish at no extra cost.

2. Copper conductor insulated cables of size 1.5 sq.mm and above shall be stranded and terminals provided with crimped lugs.

3. All PVC conduits accessories shall be ISI marked and of the same make as conduits. The conduits shall be terminated in switch boxes/metallic junction boxes with suitable PVC glands.

4. The-conduit layout/wiring layout/location of point/location of earth sets etc. shall be submitted by the contractor and got approved from the Engineer-in-charge before commencement of work.

5. Approval of Engineer-in-charge shall be taken in advance for all materials to be used on this work by the contractor.
6. In places where electrical conduits are required to pass through wall/RCC/column/beam or crimped sections etc. the conduit shall be laid in consultation with the Engineer-in-charge.

7. All the conduits for telephone / Networking etc. have to be provided with 16SWG steel fish wire and also suitable deep junction boxes shall be provided at a distance of not more than 10 meters and no extra payment shall be made on this account.

8. All the control switches for point wiring and plug points shall be of Modular type switches, 6 pin 5/15 amps sockets shall also be of the same make and type to maintain uniformity and be got approved by the Engineer-in-charge prior to its installation.

9. All repairs and patch works shall be neatly carried out to match the original finish at their own cost and to the entire satisfaction of the Engineer-in-charge.

10. The debris due to electrical works shall be cleared and shall be kept clean by the contractor at all the times.

11. The contractor shall leave such recesses, holes, openings, etc., as may be required for the electric, air-conditioning and other related works. For this purpose, any required inserts, sleeves, brackets, conduits, base plates, clamps etc. shall be arranged by the contractor and fix the same at the time of casting of concrete, stonework & brickwork, if required, and nothing extra shall be payable on this account.

12. All the metal boxes housing control switches, regulators and plug sockets, etc. shall be suitably earthed and no extra amount is payable on this account.

13. Colour code for the wiring shall be followed strictly as per CPWD specifications.

14. Wherever connectors used should be got approved before use in work. In special cases like fans and certain type of fittings sufficient length of wires should be left so that the same are straight away connected to the fans and fittings without the use of connector in between.

15. The first point from the S.D.B. should be of 15 amp socket outlet, so that looping is not difficult, followed by a 5A/15A socket out let. Where a 5A socket outlet comes first due to non available reason, followed by a 15A socket outlet a shrouded type terminal block inside the metal box of 5A socket outlet should be fixed, so that the looping is done at the terminal block and further higher current will not flow through the terminal of 5A socket.

16. All MCCB's shall be with (Ics=100% Icu) rating. All the connections with MCCBs shall be done along with spreader links wherever required without any extra cost. MCCBs shall be provided with operating handle with door interlock assembly within tender cost. MCCB upto 250A capacity shall be with thermal magnetic release and above 250A shall be with microprocessor based release.

17. Lighting

The Bidder should provide evenly distributed as per NBC-2016 design. It is necessary to align the distribution of lights with floor and equipment layouts to avoid shadowy areas caused by tall equipment, cabinets or racks. These lighting fixtures should be of LED type.

18. Cable Termination

The termination and connection of cables shall be done strictly in accordance with manufacturer's instruction, drawings and/or as directed by the Engineer In charge or his representative.

The work shall include all clamping, fitting, fixing, cable jointing, crimping, shorting and grounding etc. as required for heat/cold shrinking technology for the complete job.

All equipment required for all such operations shall be of Successful Bidder's procurement under this specification. Furnishing of all consumable materials, such as soldering material, electrical tape, sealing material as well as cable jointing kits shall be included in the rates.

The equipment will be generally provided with blank bottom plates for cable/Metal conduit entry and cable end box for power cables.

The Successful Bidder shall perform all drilling, cutting on the blank plate and any minor modification work required to complete the job. If the cable end box or terminal enclosure provided on the equipment is found unsuitable and requires major modification, the same shall be carried out by the Successful Bidder at the discretion of Engineer-in-charge.

The Successful Bidder shall put ferrules on all cable cores in all junction boxes and at all terminations. The ferrules shall carry terminal numbers with cross reference as per drawings. All ferrules shall be colored, plastic and interlocked type. Spare cores shall be similarly ferruled, crimped with lug and taped on the ends.

The Successful Bidder shall also maintain and submit when requested, a record of cable insulation value when drawn from store, after laying, before and after termination/jointing.

Cable shall generally be installed in perforated type site fabricated/pre-fabricated trays except for some short run-in rigid/flexible conduit for protection or crossings. Cables laid on trays and risers shall be neatly dressed and clamped at suitable intervals for horizontal and vertical cable runs.

All power cables shall be clamped individually and control cables shall be clamped in groups of three or four cables. Prior to lying of cables inside both indoor and outdoor trenches, the Successful Bidder shall properly clean inside those trenches.

Also, the cable runs both before and after the fire seals shall be suitably sprayed with anti-fire propagation liquid at least for 1M length. After completion of installation and prior to connection, all power cables shall be subjected to a high potential test.

19. Cable Tag &Marker

Each cable and Metal conduit run shall be tagged with numbers that appear in the cable and Metal conduit schedules.

Cables and Metal conduits shall be tagged at their entrance, every 30m and exit from any equipment, junction box.

The tags shall be of Aluminum with the number punched on it and securely attached to the cable by not less than two turns of nylon 6 cable ties.

The location of cable joints, if any, shall be clearly indicated with cable marker with an additional inscription 'cable-joint'. The Successful Bidder shall furnish and install all tags and markers stated above.

20. Earthing

Earthing work shall be carried out in accordance with chapter 8 of General Specifications for Electrical Works Part-I Internal 2023& as per IS 3043 – 1987 amended upto date.

Earth pits are required to avoid the hazard of electric shock by keeping the exposed conductive surfaces of a device at earth potential. It is recommended that separate earth pits be constructed for separate type of devices i.e., electrical, cooling, IT, UPS, security etc.

All the non-current carrying grid parts of the electrical installation and mechanical equipment shall be earthed properly. The cables armor and sheath, electric panel boards, lighting fixtures, ceiling and exhaust fan and all other parts made of metal shall be bonded together and connected by means of specified earthing system.

An earth continuity conductor shall be installed with all the feeders and circuits and shall be connected from the earth bar of the panel boards to the Metal conduit system, earth stud of the switch box, lighting fixture, and earth pin of the socket outlets and to any metallic wall plates used. All the enclosures of motors shall be also connected to the earthing system

Earthing Copper strips / wires from equi-potential bar to power panels, DBs, mechanical system etc.

Bonding of noncurrent carrying parts, and metallic parts of the electrical installations as per Indian standard. IS: 3043 - 1966 Code of practice for Earthing.

Earthing /Grounding

The Bidder should ensure that proper earthing has been done inside the building for the entire power system and provisioning should be there to earth UPS systems, Power distribution units, and AC units etc. so as to avoid a ground differential.

All metallic objects on the premises that are likely to be energized by electric currents should be effectively grounded. The connection to the earth or the electrode system should have sufficient low resistance in the range of 0 to 1.0 ohm to ensure prompt operation of respective protective devices in event of a ground fault, to provide the required safety from an electric shock to personnel & protect the equipment from voltage gradients which are likely to damage the equipment.

There should be enough space between data and power cabling and there should not be any cross wiring of the two, in order to avoid any interference, or corruption of data.

21. LED Fittings

All the LED fittings along with driver shall be under the comprehensive warranty of 5 years from OEM from the date of completion of work or handing over of site. Contractor shall submit 5 years of undertaking regarding onsite warranty certificate on LED lighting products from the OEM Manufacturer.(As per annexure attached).

Following test certificates from NABL accredited Lab shall be necessary & submitted in support of genuineness of quality of fittings. The contractor shall get confirmed from OEM for this as the luminaire shall not be accepted without these certificates.

i) High voltage Di-electric test of 1.5 kv as per IS:10322
ii) LM 79 and LM 80 for lumens, CCT & CRI.
iii) Temperature cycling test, supply voltage switching test and accelerated operational life test.
iv) Photo biological and other safety tests.

The models of LED luminaries mentioned in the list of acceptable makes shall be accepted only if these are meeting the requirement of item of BOQ along with the test reports.

Security Deposit shall be refunded proportionately on account of LED fittings as per OM issued vide No. Directorate General/SE (E) (TAS)/Various/12 Nirman Bhawan, New Delhi dt. 03.09.2019.

22. Split type AC, cassette AC and outdoor units shall be guaranteed for a period of minimum 1 year, all the other equipment such as PCB, compressor etc. shall be warrantied as per OEM and necessary Warranty Certificate shall be submitted.

23. UPS shall be guaranteed for a period of minimum 1 year, and battery for minimum – 2-year warranty etc shall be warrantied as per OEM and necessary Warranty Certificate shall be submitted.

24. The Panel fabrication shall be from any of the panel builders approved having in house 7 tank process, powder coating facility, CNC Machine having CPRI approved for relevant bus bar rating OR from any of the panel builders approved as per IS 61439 & by any of the OEMs of MCCB. The panel drawings shall be got approved prior to fabrication.

25. Warranty certificates, wherever specified shall be from the Original Manufacturer / their authorized stockiest / service partner & shall be submitted along with the bill.

26. Inspection: The major equipment like panels shall be inspected at the factory by the Engineer-in-Charge or his authorized representative for which advance intimation shall have to be given by the contractor to the Engineer-in-Charge for arranging the inspection.

27. Documents to be furnished on completion of installation:

    Completion certificate and Completion Plan as per Clause 1.26 of General Specifications for Electrical Works Part-I, Internal-2023. Completion plan indicating the wiring layout of the installation, indicating the Various Cables, conduits and floor trunking laid for different services along with the location of the switchgear for all the floors of the building. The contractor shall submit the completion plan/ "AS BUILT" separately in five sets on colour print (laminated hard copies + soft copy) after the completion of work.

SH II: -<u>M.V Panel</u>

This section covers Supply/erection/testing and commissioning of the panels suitable for 415 Volt, 3 phase, 50Hz 4 wire system.

General Construction

The cubicle panel/switch board shall be floor mounted (on base frame) freestanding, totally enclosed and extensible type. The switch board shall be dust& vermin proof and shall be suitable for the climate conditions as specified. The design shall include all provisions for safety of operation and maintenance personnel. The general construction shall conform toIS8623:1993 for factory assembled switch board.

Cubical Type Panels

Cubical type panels shall be fabricated out of sheet steel not less than 2.0mm thick. Wherever necessary, such sheet steel members shall be stiffened by angle iron frame work. General construction shall employ the principle of compartmentalization and segregation for each circuit. Unless otherwise approved, incomer and bus section panels or sections shall be separate and independent and shall not be mixed with sections required for feeders.

Each section of the rear accessible type panel shall have hinged access doors at the rear. Over all height of the panel shall not exceed 2.4 meters.

Operating levers, handle etc. of highest unit shall not be higher than 1.7meters. Multi-tier mounting of feeder is permissible. The general arrangement for multi-tier construction shall be such that the horizontal tiers formed present a pleasing and aesthetic look. The general arrangement shall be approved before fabrication.

Cable compartments of adequate size shall be provided in the Panels/Distribution Boards for easy termination of cables. Cable entries for various feeders shall be either from top or bottom through cable alleys located in between two circuit sections, either in the rear or in the front of the panel. All outgoing and incoming feeder terminals shall be brought out to terminal blocks in the cable compartment. All cable terminations shall be through gland plates. There shall be separate gland plate for each cable entry so that there will not be dislocation of already wired circuits when new feeders are added. Cable entry plates shall therefore be sectionalized.

The construction shall include necessary cable supports for clamping the cable in the cable alley or rear cable chamber. Cubicle panels with more than 1000 Amps bus shall be made of tested structural modular sections.

Bus Bar and Connections

The bus bars shall be of copper of high conductivity electrolytic quality and of adequate section. Current density for copper shall not exceed 160amps/sq. cm. The bus bar system may comprise of a system of main horizontal bus bars and ancillary vertical bus bars run in bus bar alleys on either side of which the circuit could be arranged with front access cable entries. In the case of rear access, horizontal bus system shall run suitably either at the top or bottom. All connections to individual circuits from the bus bar shall preferably be solid connections; however flexible connections shall also be permitted as per recommendations of the Panel Manufacturer. All bus bars and connections shall be suitably sleeved/ insulated in approved manner.

Incomer/Termination

In comer termination shall be suitable for receiving bus trunking /underground cables. Cable terminations shall in variably be through terminal blocks (Polyamide or superior) or brought out solid terminal.

The outgoing terminals and neutral link shall be brought out to a cable alley suitably located and accessible from the panel front. The current transformers for instruments metering shall be mounted on the terminal blocks. No direct connection of incoming or outgoing cables to internal components of the Panels/Distribution board is permitted.

Instruments

All volt meters and ammeters shall be flush mounted of size minimum 96mm conforming to class 1.5 of IS 1248 for accuracy. All volt meters shall be protected with MCB.

Indicating Lamps

On all the incomers of M.V panels, ON/OFF indicating LED lamps shall be provided and shall be suitable for operation on AC supply. Phase indicating LED amps shall be associated with necessary ON/OFF toggle switch.

Small Wiring

All small wiring for Controls, Indication etc. shall be with suitable FRLS/HFFR (halogen free fire retardant) copper conductor cables. Wiring shall be suitably protected within switch board. Runs of wires shall be neatly bunched, suitably supported and clamped. Means shall be provided for easy identifications of the wires. Where wires are drawn through steel conduits, the works shall conform to CPWD General Specifications for Electrical Works (Part I- Internal), 2023 and IS 732 as the case may be. Identification ferrules shall be used at both ends of the wires. All control wiring meant for external connections are to be brought out of terminal board.

Earthing:

Should be as per CPWD Specifications.

Name plates & Labels:

Suitable white engraving on black name plate and indications labels of metallic plates- anodized aluminium for all switchboards and circuits shall be provided. These shall indicate the feeder number and feeder designation. A common label shall also be provided for the panel Single line circuit diagram showing the arrangements of circuit inside the Panels/DBs shall be pasted on inside of the panel door and covered with transparent laminated plastic sheet.

Sheet Steel Treatment and Painting:

Sheet steel used in the fabrication of switchboards shall undergo a rigorous cleaning and surface treatment, seven tank process comprising of alkaline greasing, descaling in dilute sulphuric acid and a recognized phosphating process after which a coat of primer paint comp actively with the final paint shall be applied over the treated surface. Final paint coat of oven baked powder coating of minimum 50-micron thickness, of sheet approved by Engineer-in-charge shall then be provided.

Interlocks

Suitable mechanical interlock castle key type shall be provided, if specified. For automatic operation, only electrical interlocks shall be provided. Interlocking scheme shall be designed for automatic operation.

OPERATIONAL REQUIREMENTS

The indoor type MV panel shall conform to the following: -

(a) The panel shall comprise of incomers, outgoing feeders and bus coupler as specified. The incomer shall be either a double break/contact repulsion MCCB or an Air Circuit Breaker. The bus coupler shall be either a circuit breaker or a double break / contact repulsion MCCB or switch dis-connector fuse unit as specified. The outgoing feeders shall be circuit breakers/MCCBs as specified.

(b) Bus bars for phase and neutral shall have a rating as specified in the format of Appendix II of General Specifications for Electrical Works-Substation Part-IV 2013.

(c) The entire switch panel shall be cubical type generally conforming to IS8623:1993 for factory assembled switch board.

(d) The incomer panel shall be suitable for receiving bus trunking or MV cable of size specified either from top or from bottom.

(e) All incoming MCCB shall have suitable adjustable tripping current and the time delay settings.

(f) The entire panel shall have a common earth bar of size as specified with two terminals for earth connections.

CODES AND STANDARDS FOR CONTROL PANEL	
Equipment shall conform to the latest applicable Standards as mentioned In case of conflict between the Standards and this specification, this specification shall govern	
IS:13947 (Part 2&5), 1993	Low voltage switchgear & control arc
IS:2147, 1966	Degree of protection
IS: 13947 (Part 4, Sec.I),1993 BS:60947-4-1, 1992: IEC:158	Contactor for voltage not exceeding 1000V AC
IS:375, 1993	Marking and arrangement of bus bars
IS:694, 1990 & IS:8130, 1984	PVC Insulated cables and aluminum conductor
IS:1248,1991	Direct citing electrical indicating instruments
IS:13703, 1991	Low voltage fuses
IS:13118 (All parts), 1991	Alternating current circuit breakers

The equipment shall be designed to confirm to the below requirements for LT Panels.

Sl.No	Name of equipment	IS Code
1.	Air circuit breakers/MCCB	IS: 60947 (Part-II) & IEC 60947(2)
2.	Fuse switch and switch fuse units	IS: 13947 (Part-3) & IEC 947(3)
3.	HRC fuse links	IS: 13703
4.	Current Transformers	IS: 2705
5.	Voltage Transformers	IS: 3156
6.	Indicating instruments	IS: 1248
7.	Integrating instrument	IS: 722
8.	Control switches and push buttons	IS: 6875
9.	Auxiliary contactors	IS: 13947 (Part4/Sec-I) & IEC 947(4/1)
10	Relays	IS: 3231

SH III: -<u>Intelligent Addressable Fire Alarm & PA System</u>

1. The work shall be carried out as per CPWD General Specifications for Electrical Works, Part-I: Internal, 2023 and Part-VI Fire Detection and Fire Alarm System- 2018.
2. Shop Drawings for Fire Alarm System and Coordinated Drawings including all other Specialized services in the NIT shall be prepared by the contractor and got approved by Engineer-in-Charge prior to execution of work.
3. Final inspection and testing will be done by the Engineer-in- charge or his representative as per details indicated in chapter – 16 of General Specifications for Electrical works & Part-VI (Detection and Fire Alarm System- 2018).
4. **GENERAL**

   The work shall consist of supplying, installation, testing & commissioning of an **automatic Fire** alarm system. The work shall also include planning, designing, preparing drawings and getting the drawings approved from the Engineer-in-Charge.
5. **References for installation.**
   - i) Indian Standard IS/NBC and Fire Bye Laws issued by local Fire Authorities
   - ii) British Standard Institute / European Standards All Applicable codes and standards including BS EN54
   - iii) NFPA-72NationalFireProtectionAssociation
   - iv) Allmajorcomponentsoffirealarmsystemshallbeproductofasinglemanufacturer as per the list of approved make and shall conform to the requirement of / UL / IS approved and designed according to DIN VDE-14675 and VDE- 0833 Fire Alarm Systems CODE OF PRACTICE FOR SYSTEM DESIGN, INSTALLATION AND SERVICING

6. FIRE ALARM CONTROL PANEL(FACP)

In the event of fire reported from activation of manual call points or sprinkler operation the sequence of alarm operation shall be as follows:

i) The evacuation of the building shall be staged in phases to allow orderly movement of people.

ii) If a Manual Break Glass Unit is activated or a sprinkler flow switch is operated, then the evacuation shall be transmitted immediately to the affected fire zone plus the adjacent zones.

iii) Activation of the fire alarm system shall send signal to all elevator machine rooms indicating fire status (to control lifts)

iv) The panel shall be modular Multifunctional computer controlled using 32-bit processor. De-centralized control and monitoring functions to be realized on the loop and spur. The panel shall be complete with, but not limited to, the following elements:

(a) Built-in full numeric key board with function keys.

(b) Key switch to prevent unauthorized operation of keypad.

(c) Integral sealed lead acid battery and charger, with 24 hours back up in the event of supply mains failure.

(d) Essential controls – Delay, panel reset, Audible alarm off, disconnect master box, additional messages, verify/cancel fault buzzer. Fire, Pre-Alarm, Trouble, Disconnection lamps. Each lamp shall also have appropriate indication (Releasing Systems activated, Master box, Delay, Verify, CPU failure, in operation normal condition & failure of power supply / battery) Simple menu driven function keys with password protection shall allow users to an extensive range of software-based features such as:

i) All control buttons and keyboard shall be enclosed behind a lockable cover, up to 127 device capacity per 3.5 km loop length and a TTY/RS485 communication option

ii) In addition to the above, all other necessary controls, elements and accessories shall be included to provide a complete and efficient panel conforming to the requirements of DIN EN 54/ UL/IS.

7. MANUAL CALL POINTS

Installation shall be got approved from Engineer-in-charge (Electrical). The manual initiation devices shall be electrically compatible with all of the aforementioned detector types and shall be complete with all electronic components and circuitry for an automatic safe addressable device. The manual call point shall have an inbuilt microprocessor to ensure a response time of less than 1 second. The MCP unit shall also handle all communication to the control panel. All electronic devices contained within the MCP shall be hermetically sealed so as to prevent damage from hostile environment

conditions: e.g dust with minimum rating of IP43. The MCP operating voltage shall be 8-42 volts DC, RED similar to RAL 3020. If the MCP are located in public areas a transparent cover shall be provided as a protection to prevent inadvertent activation. MCP shall be available in two designs Large & small for aesthetic purposes to architects. It should have an option of using either frangible glass allowing for complete removal upon operation or plastic pane resettable function. There shall be no text but SYMBOLS on the MCP burning house/press to break). The device can be tested functionally without the need to either remove the front cover and/or breaking the glass, with a special test key (supplied as standard). The key shall insert the underside of the MCP ensuring easy access of the key at all times. These devices will comply fully with UL

8. **LOOP DRIVEN ADDRESSABLE ALARM SOUNDER**

Alarm sounders shall be capable of providing a minimum sound level of 97dBA ± 2 dBA @ 1meter.The sounder shall be capable of providing 4 different sound signals, which are selected/ configured from 19 tone types stored in the device. Each sounder shall include its own microprocessor to handle loop communications and monitoring of the internal sound element during an alarm condition. This shall allow faulty devices to be automatically identified during the weekly test procedure. All associated electronic components shall be hermetically sealed to provide protection from hostile operating environments. It shall be possible to connect up to 32 Addressable Alarm sounders to each detection loop of the fire alarm control panel. These devices will comply fully with EN 54 part3.

INSTALLATION

The entire fire alarm system shall be installed in accordance with DIN / BS EN54 Standards / IS and recommendations of local fire authority

TESTING

Fire alarm system shall be tested in accordance to Local Fire Authority regulations and put into operation by the manufacturer or his authorized representative in the presence of engineer. Fault and alarm conditions shall be simulated and all data and alarm indicators checked with full events recorded on system printer according to the testing procedure.

Installation shall be operated & maintained by the agency during warrantee period of 12 months after completion of wheelwork.

Fire Alarm System shall be integrated with firefighting system & mechanical ventilation system of the basements for the purpose of monitoring the system

9. Scheme – for fire alarm system

It is proposed to provide a UL list and marked fire alarm system in a suitable location in building as decided by the Engineer-in-Charge.

The fire alarm panel shall have the following – fire alarm main panel, integrated or separate digital voice evacuation system. Manual call points shall be provided near all staircase landings on each floor. Hooter with strobe, wall mounted speakers shall also be provided above the manual call points. Control modules, mounting GI boxes for all devices shall be provided within the tendered cost.

Multi criteria detectors shall be provided in each electrical shaft, electrical room and in lift machine shafts.

10. **List of Codes:**

The work shall be carried out in accordance with the following relevant & applicable codes amended up to date, and to the best available standards of engineering practice, design & workmanship.

a) Items of BOQ & Technical Specifications of the Agreement,
b) CPWD General Specifications for Electrical Works: Part I (Internal) 2023, Part II (External) 2023, Part-VI Fire Detection and Alarm System 2018).
c) Indian Standards Specifications by BIS, IS Code
d) National Building Code- 2016 & NFPA-72.
e) Indian Electricity Rules & Statutory Regulations.
f) TAC Regulations
g) Local Fire Authority Regulations.

11. **Execution:**

The contractor shall depute well experienced / skilled Engineer / Supervisor /Foreman & licensed wireman / electrician for execution of work. The Engineer- in-Charge reserves the right to reject/remove any person which is not suitable/ fit in his opinion.

The work shall be executed in well planned & engineered like manner. Poor/Bad workmanship shall not be accepted. The same shall be redone as per the directions of the Engineer-in-Charge, for which no extra payment shall be made. No tools and tackles either for unloading or for shifting the equipment's for erection purposes would be made available by the department. The successful tenderer shall make his own arrangement for all these facilities.

12. Completion & Guarantee:

The completion of the work shall be certified by the competent authority of the department, the defects if any shall have to be rectified to the entire satisfaction of the competent

authority. The contractor shall stand guarantee/warranty for a period of at least 12 months from the date of completion of work or after taking over the installations by the department whichever is later, against any manufacturing defect in material, unsatisfactory performance/ working of system/ installation and / or breakdown due to defective design, workmanship.

The material / equipment / installation so found defective shall be replaced / repaired free of cost to the satisfaction of the Engineer-in-Charge. The delay in rectification/ replacement shall not be accepted. The department reserves the right to get it done at the risk and cost of the contractor. The decision of the Engineer-in- Charge shall be final & binding to the contractor.

The contractor must carry out routine inspection/ testing as the manufacturer's recommendation or as per decision of the Engineer-in-Charge during the guarantee period and attend to the defects taking place during this period. Sufficient number of trained and experienced staff shall be made available to meet any exigency /emergency at site of work during the guarantee period.

SH-IV TECHNICAL SPECIFICATIONS - VRV / VRF System

1. General Description

a) The system selected is a modular system, with number of indoors connected to centrally located outdoor units. The outdoor units for all the system shall be air cooled type. Specialized agency shall submit the heat load calculation and equipment selection, heat load design as per ASHRAE condition.

b) Factory inspection of all the units shall be done by the department. The contractor will inform at least 10 days before inspection of work.

c) All the VRF air conditioners shall be fully factory assembled, wired, internally piped &tested. The outdoor unit shall be pre-charged with first charge of refrigerant. Additional charge shall be added as per refrigerant piping at site. All the units shall be suitable for operation with 415 V +/- 10%, 50 Hz +3%, 3 Phase supply for outdoor units & 220 V +/-10%, 50 Hz +/- 3%, 1 Phase supply for indoor units.

d) The equipment for variable refrigerant volume/flow (VRV/VRF) system shall be air-cooled consisting of Outdoor units and multiple Indoor units for cooling the space in summer.

e) The system shall consist of suitable Outdoor units, Indoor units as required, interconnecting refrigerant piping, drain piping with insulations, central controller unit, control cabling, and accessories as required.

f) It shall be possible to connect multiple Indoor units on a single refrigerant circuit. The Indoor units on any circuit may be of different type and should allow individual control. ODU power consumption & delivered TR @39 degree C Ambient and 24 degree C room temp - Zero derating upto 39 degree C at 100% load. All the compressors of outdoor units shall be suitable for variable loading. The VRF system shall provide stable, trouble free & safe operation, with flexibility of operating desired indoor units. The outdoor units must be capable of delivering exact capacity proportional to the number of indoor units switched on & the heat load in the air-conditioned area. The proportional operation shall be achieved by varying the refrigerant flow by the outdoor units. The operation of the VRF system shall be through independent wired/ wireless remote controllers, as specified.The scope of work also includes Pressure Testing of the entire system and holding the same for minimum 24 Hours. Flushing the system, Refrigerant Gas (R 410) Charging /Topping up in the system and final commissioning of the system all complete as required. Providing and Fixing of Fire Sealant to close the cut-outs of all Cables, refrigerant pipes and tray all complete as required and to the satisfaction of Engineer-in-charge. The system shall be designed to meet the following Internal Design Conditions for summer and monsoon 24 ± 1 Deg° C DBT & 55±5% RH for Office and staff areas. Monsoon outside condition is 35 Deg C DBT. Filtration: 20 Micron flat Pre filters. After the refrigeration system has been charged and has been in continuous operation for one week, the contractor shall replace the initial type "HH" filter drier with the final filter dryer.

2. Outdoor Unit

i. The outdoor unit should comprise of Inverter controlled Scroll /Twin rotary Compressor hermetically sealed.

ii. Each module of outdoor unit must have at least 50% of Variable/Invertors compressor which can work on Part load Suitable to operate at heat load proportional to indoor requirement.

iii. The ODU must have ISEER as per ECSBC -2024 norms.

iv. The outdoor units must be suitable for actual refrigerant piping length between outdoor unit& the farthest indoor units. Allowable level difference between outdoor unit & indoor units shall be as per manufacturer recommendations.

v. Allowable level difference between various indoor units connected to one out door unit shall be up to 10mtrs.

vi. The outdoor units shall be suitable to operate within an ambient temperature range of 5 Deg C to 50 Deg C in cooling mode.

vii. The entire operation of outdoor units shall be through independent remotes of indoor units. No separate Start/ Stop function shall be required.

viii. Starter for the Outdoor Unit compressor shall be —Direct On-Line type. Inverter compressor of the unit shall start first & at the minimum frequency, to reduce the in rush current during starting.

ix. Complete refrigerant circuit, oil balancing/ equalizing circuit shall be factory assembled & tested.

x. The Outdoor unit shall be a factory assembled unit housed in a sturdy weather proof casing,

xi. Constructed from rust-proofed mild steel panels complete with powder coated finish.

xii. Each module of Outdoor units shall consist of scroll /Twin rotary compressor(s), air-cooled condenser as Heat Exchanger, high efficiency propeller fans with low noise motor, internal Refrigerant piping, safety controls, Air Inlet grilles, fan protection grille etc. all enclosed in weather proof housing.

xiii. The Outdoor unit shall have multiple scroll/Twin rotary compressors and shall be able to operate even in case of breakdown of one of the compressors. (The smallest capacity unit may have only one compressor). Outdoor units shall be complete with following safety devices:

i) High pressure switch

ii) Fan drive overload protector

ii) Over current relay

iv) Overload Protector

v) Fusible Plug

xiv) The Outdoor unit shall be suitable for mix and match connection of various types and capacities of Indoor units as per demand.

xv) The noise level shall not be more than 62 dB(A) under normal operation, measured horizontally, 1 ma way and 1.5m above ground.

xvi) The Outdoor unit shall be modular in design and shall allow for side-by-side installation of multiple Outdoor units, to match the requirement.

xvii) All the units shall be provided with built-in microprocessor control panel, for automatic operation and capacity control.

xviii) The units shall be suitable for Refrigerant R-410A.

xix) Suitable single-phase preventer for protection from single phasing, phase reversal, phase unbalance condition with inbuilt timer suitable for operation on 415 Volts supply, i/c enclosure & connections etc are to be provided.

Compressor: The compressor in inverter-based scroll /twin rotary system shall be highly efficient. The system should response efficiently in accordance to the variation in cooling or heating load requirement. All outdoor units shall have multiple steps of capacity control to meet load fluctuation and indoor unit -individual control. All parts of compressor shall be sufficiently lubricated stock. Forced lubrication may also be employed. Oil heaters shall be provided in the compressor casing or as per manufacturer standards.

Condensing Unit: Condensing units of the system shall be provided incorporating following details:

The Condenser coil shall be Air-cooled type with copper tubes and aluminium fins. The condenser coils shall be of adequate size and shall have an integral sub cooler circuit for sub cooling of the liquid. Condenser coil shall have a refrigerant side working pressure of400 psig with anti-corrosive treatment. Condenser shall have multiple piping and cabling connection option. Pump down facility should be provided in the refrigerant system by providing good quality hand / shut off valves to avoid loss of refrigerant gas during maintenance. The condenser fans shall be propeller type, with aluminium blades, low speed, and low vibration levels and quite in operation with IP 55 Protection.

Oil Recovery System Unit: System shall be equipped with an oil recovery system to ensure stable operation with long refrigeration piping lengths. The system must be provided with oil balancing circuit to avoid poor lubrication.

Refrigerant Circuit: The refrigerant shall be R410a.The refrigerant circuit shall include liquid and gas shutoff valves and a solenoid valve at condenser end. The equipment must have in-built refrigerant stabilization control for proper refrigeration distribution. All necessary safety devices shall be provided to ensure the safe operation of the system.

Heat Exchanger: The heat exchanger shall be constructed with copper tubes mechanically bonded to aluminium fins to form a cross-fin coil. Heat exchanger coil shall have a refrigerant side working pressure of 400 psig. The aluminium fins shall be covered by anti-corrosion resin film. The unit shall be provided with necessary number of direct driven low noise level propeller type fans arranged for vertical discharge. Each fan shall have a safe guard.

Safety Devices: All necessary safety devices shall be provided to ensure safe operation of the system. Following safety devices shall be part of outdoor unit: - high pressure switch, fuse, fan drive overload protector, fusible plug, crankcase heater, over load relay, overload protection for inverter.

Anti-Corrosion Treatment:

i. The portions of machines like side panel, outer panel, bottom frame, which are exposed to corrosive atmosphere, should be alloyed hot-dip zinc coated steel plate, coated with corrosion protection powder polyester resin coating on both inner and outer surfaces in thickness of 64 microns or more or other equivalent industry standards.

ii. Finned coil protection net should have coating of resin /any other coating containing ultraviolet ray absorbent. Fan and its fan protective net should be with weather resistant polypropylene resin/ any other materials to ensure corrosion prevention.

iii. The copper pipe-aluminium fan shall be with special acrylic resin coated or any as per any other industry standards and internal supports, frame, control box shall also be hot-dip zinc coated steel plate and with rust preventive powder coating of64 microns or more on inner and outer surface.

iv. All screws, bolts used in outdoor unit shall be with SUS410, Zinc-Nickel alloy plating, zinc chrome acid film treatment and rust inhibitor coating.

Field installed Accessories:

The outdoor shall be factory assembled weather proof casing constructed from heavy gauge MS panels and coated with baked enamel finish.

3. Indoor Units (IDU)

i. The units include pre-filter, fan section and DX coil section. The housing of units shall be light weight powder coated galvanized steel. Units shall have external casing of ABS Plastic for supply & return air.

ii. The system shall permit connection of a variety of non-duct able or duct able Indoor units on to single refrigerant piping circuits, as per description given later.

iii. The capacity of the IDU shall vary as per the requirement of the given area.

iv. The Cassette type of IDU is to be connected as per SOQ given.

3.1 Common features of Indoor Units

iv. The coils shall be complete with well-designed tube circuiting and liquid distributor.

v. All types of units shall have a built-in electronic expansion valve and suitable control units.

vi. The control units shall control temperature, fan speed and features specific to each unit such as night mode, set back, etc.

vii. Suitable drain pan and drain arrangement shall be part of all IDUs.

viii. The control units shall permit control from a corded or a wireless remote controller.

ix. The unit casing shall be Galvanized Steel Plate or Aluminium Wired / CORDLESS Remote Controller: Wired/Cordless remote controller shall be supplied. The controller must have display screen, which displays complete operating status. The digital display must allow setting of temperature at 1 Deg C interval. Remote shall be able to individually program by timer the respective times for operation start and stop within a maximum of 72 hours. Remote must be equipped with thermostat sensor in the remote controller that will make possible more comfortable room temperature control The remote shall be able to monitor room temperature & preset temperature by microcomputer & can select cool/ heat operation mode automatically. The remote must constantly monitor malfunctions in the system &must be equipped with a "self-diagnosis function" that let know by a message immediately when a malfunction occurs. In case of corded remote it shall be possible to wire the remote up to 500 metres

CENTRALIZED TYPE REMOTE CONTROLLER:

The controller should be LCD remote controller to act as an advanced air-conditioning management system to give complete control of VRV / VRF air-conditioning Equipment, it should have ease of use for the user and must have a user-friendly panel and LCD display. It shall be able to control up to 64 zones or 64 groups (each group consists of Max. 16 units) or 128 nos. of indoor units with the following functions.

i. Starting/stopping of Air-conditioners as a zone or group or individual unit.

ii. Temperature settling for each indoor unit or zone.

iii. Switching between temperature controls modes, switching of fan speed and direction of airflow, enabling/disabling of individual remote controller operation.

iv. Monitoring of operation status such as operation mode & temperature setting of individual indoor units, maintenance information and troubleshooting information.

v. OPTIONAL-Display of air conditioner operation history.

vi. OPERATIONAL-Daily management automation through yearly schedule function with possibility of various schedules. The controller shall have wide screen user friendly LCD display and can be wired by a non-polar 2 wire transmission cable to a distance of 1 kilometre away from indoor unit.

4. Refrigerant Piping

i. All refrigerant pipes and fittings shall be type 'L' hard drawn copper tubes and wrought copper fitting suitable for connection with silver solder. The copper thickness of wall shall be as mentioned in BOQ and CPWD specifications.

ii. All joints in copper piping shall be swaged joints using low temperature brazing and/ or silver solder.

iii. Before jointing any copper pipe or fittings, its interior shall be thoroughly cleaned be passing a clean cloth via wire or cable through its entire length. The piping shall be continuously kept clean of dirt etc. while construction of the joints. Subsequently, it shall be thoroughly blown out using nitrogen.

iv. Refrigerant lines shall be sized to limit pressure drop between evaporator and condensing unit to less than 0.2 kg per Sq.cm.

v. After the refrigerant piping installation has been completed the refrigerant piping system shall be Pressure tested using, Freon mixed with nitrogen at a pressure of20 Kg per Sq.cm. (High side) and 10Kg per Sq. cm (Low side). Pressure shall be maintained on the system for 24 hours.

vi. The system shall then be evacuated to a minimum vacuum of 70 cm. of mercury and held for 24 hours, during which time; change in vacuum shall not exceed 12cm of mercury. The pressure testing shall be done in the presence of Engineer-in charge or his authorised representative

vii. After successful pressure testing, Full Charging of Refrigerant Gas (R 410), Topping up in the system, if required and final commissioning of the system all complete as required.

viii. All refrigerant piping for the VRV/VRF system shall be carried out using hard drawn seamless copper pipe using either soft, half hard or hard pipes as per CPWD Specifications.

x) The branching of refrigerant piping from the main line shall be carried out using manufacturer approved either specially designed, Tee connectors or 'Y' joints. This joint should ensure that each branch receives the required refrigerant flow.

xi) All pipe sizing shall be on the basis of sizing data of the concerned manufacturer and should ensure adequate oil return back up to the compressor.

5. Pipe Insulation

1) Refrigerant Pipe Insulation

a) The whole of the liquid and suction refrigerant lines including all fittings, valves and strainer bodies, etc. shall be insulated with 19mm thick Nitrile close cell rubber, so that condensation does not occur.

b) The joints shall be properly sealed with synthetic glue to ensure proper bonding of the ends.

2) Condensate Drain piping & its insulation

a) All pipes to be used for condensate drain shall be UPVC pipe conforming to IS & all joints should be Gluing or solvent cementing as per manufacturer recommendation. The pipe shall be laid in proper slope for efficient draining of the condensate water.

b) Drain pipe carrying condensate water shall be insulated with 9 mm nitrile rubber insulation having K valve 0.037 W/mk at a mean temperature of 200 C at min. density of 55 kg./m3. The joint shall be properly sealed with synthetic glue to ensure proper bonding of the ends.

c) All pipe supports shall be of pre-fabricated and pre-painted slotted angle supports properly installed with clamps.

7. BRAZED JOINTS:

A. When brazing, remove solenoid-valve coils and sight glasses; also remove valve stems, seats, and packing, and accessible internal parts of refrigerant specialties. Do not apply heat near expansion valve bulb. Joints shall be cool before reassembling valve.

B. Tubing shall be cut square, reamed, and burrs removed.

C. Both inside of fittings and outside of tubing shall be well cleaned with an abrasive cloth or stainless-steel wire brush before brazing. Steel wool is NOT permitted.

D. During brazing an inert gas (such as dry nitrogen, argon) shall be continuously passed through the system at a flow rate sufficient to maintain an oxygen-free environment to prevent the formation of copper oxide scale.

E. Care shall be taken to prevent annealing of fittings and tubing when making connections.

F. Copper to copper joints shall be brazed with a copper-phosphorous brazing alloy containing a minimum of 15% silver and conforming to AWS A5.8, BCuP5.

G. Copper to brass joints shall be brazed with a silver brazing alloy containing a minimum of 50% silver and conforms to AWS 5.8, BAg-7.

H. Copper to stainless steel joints shall be brazed with a silver brazing alloy containing a minimum of 50% silver and conforms to AWS 5.8, BAg-7.

I. All brazed joints shall be cleaned to remove residual flux.

8. **After award of work:** The successful tenderer would be required to submit the following for the VRF/VRV system:

a) Heat load calculation of the areas /rooms proposed with air conditioning for approval by the Engineer-in-Charge. Subsequently, after approval of the heat load calculations, submission of GAD drawing of entire VRF air conditioning system shall be submitted to the department for approval.

b) Details of foundations/stands for the equipment's and the weights of assembled equipment.

c) Refrigerant pipe design details with calculations.

d) Access panel requirements and flashing details.

e) Cable layout, control wiring, schematic drawing etc.

f) Any other drawings and details necessary for the job as called for and in general required for approval before commencement of installation.

g) At the time of submission of the TDS, the OEM shall furnish a quotation along with the detailed scope of work for comprehensive maintenance for a period of five (5) years after expiry of the DLP. The OEM shall be contractually bound to undertake and execute the said comprehensive maintenance at or below the quoted rates, and no claim for escalation or additional charges shall be entertained. Although the Comprehensive maintenance is not in the scope of this work.

9. Guarantee

i) The contractor shall guarantee the complete system to maintain the specified conditions under all conditions of ambience and internal loads subject to the condition that designed outside conditions &designed internal loads are not exceeded. Also, the inlet/ outlet temperatures shall be guaranteed.

ii) Any leakage of refrigerant and/or oil due to defective design, manufacture, workmanship or installation during the guarantee period shall be made good by the contractor free of charge.

SH IV –UPS SYSTEM

The work shall be carried out as per CPWD General Specifications for Part-I for Internal Elect. Work 2023 and Part-IV: Sub Station 2013. The UPS system shall comprise of the following: -

(a) Rectifier

(b) Inverter

(c) Static Switch

(d) Display Panel

(e) Control Logic

(f) Audible Alarm

(g) SMF Battery Bank & rack

1.2 SCOPE OF WORK

The scope of work involves complete design, system engineering, supply, installation; testing and commissioning of fully microprocessor-based UPS system.

(a) The supply and installation are to be as per schedule of quantity to meet the system design and performance requirements.

(b) To terminate the cables and make connectivity as per the system design and site requirement.

(c) Cabling shall be carried out as per the design of the firm executing the UPS system. In case the electrical contractor is executing the Cabling the firm entrusted with the UPS system shall co-ordinate with the electrical contractor for Cabling. Circuitry diagram and specifications shall be provided by the

successful tenderer. The tenderer is fully responsible for the quality of the UPS system. Interconnections and termination of cables for the UPS system shall be the responsibility of the tenderer.

(d) Testing and commissioning of the system

(e) Training and documentation

(f) Maintain the system during one year warranty period commencing from the date of commissioning of the building.

(g) Necessary Copper cabling between UPS and batteries / battery breaker etc., shall be a part of UPS tender.

(h) Necessary control cabling between different units of UPS shall be a part of UPS Job.

(i) UPS installation cost shall include necessary MS angle iron base frame of suitable height for bottom cable terminations. The angle iron frame shall be powder coated with shade same as UPS.

(j) Before procurement Vendor to submit dimensional GA drawing of UPS / Batteries and obtain approval of engineer-in-charge.

(k) UPS System shall be procured directly from the approved OEMs and proof of purchase submitted along with Warrantee certificate and test certificates from OEM. Testing and commissioning of the UPS system also shall be done in presence of the Engineer from UPS manufacturer and the system certified for satisfactory installation &Commissioning.

(l) UPS shall be Warranted for a period of 12 months and Batteries shall be Warranted for a period of 24 months from the date of completion of work.

(m) The constructional and functional characteristics of UPS must be in line with the state-of-the-art technology in this field.

(n) The supplying company must be able to provide proof that it is ISO 9001-2000 and ISO 14001 certified for design and manufacturing and for the provision of services.

(o) The UPS will be guaranteed for one year during which time the Supplier will provide technical assistance.

The offer must include:

(p) providing for 24-hour service with guaranteed minimum service call response time of 4 hours (references are required)

(q) the addresses of all Service Centres, divided according to geographical areas, and the number of engineers working for each centre Indication of main Tele-monitoring installations in operate

1.3 The following are to be submitted after award of work and before commencement of work for

approval for CPWD:

(a) Circuitry Diagram along with components

(b) One set of technical catalogues of all the equipment to be used in the system.

(c) Tenderer shall make good the system at his own cost in case the system performance is below the desired standard after completion of work. No price increase shall be entertained. Tenderer shall conduct the site survey before quoting if required.

(d) Clarifications regarding site issues necessary for quoting shall be sought before bidding.

(e) The successful tenderer shall submit two copies of operation manual of the system proposed which shall also include basic trouble shooting guidelines.

(f) At least Two officials of CPWD/NABARD shall be trained in operation and maintenance of the system.

SYSTEM DESIGN

The UPS system shall meet the following requirements:

(a) The system should be of fully microprocessor based and can capable to control through BMS via Modbus or J bus protocols.

(b) The system should be on line double conversion i.e. load independent from both main's voltage and frequency. Ensure Server-grade high quality of power.

(c) The system should have IGBT based PWM inverter resulting perfect sine wave voltage.

(d) The system should be wide input voltage tolerance (+10/-15%).

(e) The system should be wide input frequency tolerance (+ / - 3%).

(f) The system should be advance battery management system with programmable automatic battery testing, constantly monitors the health of the battery pack keeping the battery ready to work for emergency situations.

(g) The system should be high overload capacity of static bypass.

(h) The system should be built in maintenance bypass.

(i) Front access for easy replacement and maintenance.

(j) The system should have hardware for fault diagnostic unit, data logger and power monitoring system.

Maintenance Free Battery Requirements

Battery bank connected to each ONLINE UPS is designed to provide 30 minutes back-up at load. The ONLINE UPS module should be automatically disconnected when the battery reaches to the minimum discharge voltage level or when signaled by other control functions.

During normal operation batteries is continuously float charged & the charging current is electronically controlled for the limiting purpose.

PRODUCT

Fabrication Materials

All materials of the ONLINE UPS in new and of present state of the art, of current manufacturer, high grade and free from all defects and not have been in prior service except as required during factory testing.

Construction and Mounting

The ONLINE UPS unit comprised of input Isolator, Rectifier/Charger, Inverter, Static Transfer switch, Maintenance Bypass switch and static bypass input switch is housed in a free-standing steel enclosure with key lockable doors. Front/rear access is required for

expedient servicing, adjustments and installation. The enclosure will be built to comply with IP 20. The ONLINE UPS is constructed of replaceable sub-assemblies. Printed circuit assemblies are plug-in type.

Cooling

Cooling of the ONLINE UPS is by forced air ventilation. Low velocity fan is used to minimize audible noise output. Fan power is provided by the ONLINE UPS output. Temperature is monitored by thermal censors.

Cable Entry

Standard cable entry for the ONLINE UPS module is from the bottom/top as required through detachable gland plate.

Maintenance By pass

Isolator General

A manually operated maintenance bypass isolator is incorporated into the ONLINE UPS cabinet to directly connect the critical load to the input AC power source, bypassing the rectifier/charger, inverter, and static transfer switch.

Maintenance Capability

With the critical load powered from the maintenance bypass circuit, it is possible to check out the operation of the rectifier/charger, invert, battery, and static transfer switch.

Display and control

Monitoring &Controlling: The ONLINE UPS is provided with a microprocessor-based unit status display &controls section designed for convenient and reliable user operation. A system power flow diagram, a percentage load and battery time remaining display is provided as part of the monitoring and controls sections which depicts a single line diagram of the ONLINE UPS illuminated visual indicators is of the long-life LED type. All of the operator controls and monitors is located on the front of the ONLINE UPS Cabinet.

Metering: -

The following parameters are displayed:

- DC Voltage
- Battery voltage
- Battery charge &discharge current
- Bypass voltage and frequency
- Output AC voltage line-to-line and line to neutral and % load used of' nominal

- Output AC current for each phase and neutral
- Output frequency
- Active power (KW) Apparent Power (KVA)
- Temperature - Ambient, battery, inverter and transformer

Warning and Alarm Messages: -

- Normal Operation, Input breaker open
- Output breaker open
- Battery breaker open
- Bypass absent, Bypass over limits
- Bypass under limits, Bypass freq. over limit
- Bypass inhibits
- Load on bypass,
- Rectifier off or failed
- Inverter off or failed
- ONLINE UPS unsynchronized
- D.C Volts over voltage
- D.C under voltage and end of discharge pre-alarm
- DC Bus over volts Battery Low
- Emergency stop
- ONLINE UPS Overload Controls

Four pushbuttons are located on the operator control panel.

- Enter
- Escape
- UP
- Down

The push buttons permit the operator either to select options from a menu for display on the LCD winder or to change the value of some parameters. One push-button-alarm silence switch.

Power Status Diagram

A mimic panel is provided to depict a single line diagram of the ONLINE UPS. Indicating lights is integrated within the single line diagram to illustrate the status of the ONLINE UPS. The three LEDs indicate the following status.

- Bypass voltage OK
- Load on bypass
- Load on inverter

Power status diagram is an LED bar graph indicating % load with amber overload indication. Also, an LED bar graph indicating % battery time remaining is included.

Audible Noise: - Noise generated by the UPS system, under any condition of normal operation, shall not exceed an allowable sound pressure level according to EN27779(revised).

RELEVANT REFERENCE STANDARDS

The choice of materials and components, engineering developments and the construction of the equipment must comply with current directives and standards.

The UPS will have a CE mark as specified by Directives 73/23, 93/68, 89/336, 92/31 and 93/68.

The UPS will be designed and produced according to the following specifications:

- IEC/EN 62040-1-1 "General and safety requirements for UPS used in operator access areas."
- EN 62040-2 “Electromagnetic compatibility (EMC) requirements”
- IEC/EN 62040-3 “Performance requirements and test methods”

Sub Head V:CCTVSystem

1. The work shall be executed as per CPWD General Specifications for Electrical works amended upto date & as per relevant IS and as per directions of Engineer-in-charge.
2. The tenderer should in his own interest visit the site and familiarizes himself with the site conditions before tendering, so as to satisfy themselves with all site working conditions, cable routes etc.
3. No T&P shall be issued by the department and nothing extra shall be paid on account of this.
    a) All the CCTV Equipment’s like Dome/ Bullet Cameras, NVR, Display, Hard disk, Display, UPS, etc. should be of compatible approved make. The bid of the tenderer using different makes for different components will not be acceptable. The firm must submit a letter from equipment manufacturer that the model of CCTV equipment’s including accessories quoted by them is in continuous process of manufacturing and acceptance in this respect the decision of the Engineer-in-charge is final & binding on the contractor.
4. Item must be complete with all equipment’s and required accessories along with necessary power systems, video connector, plugs, sockets and hardware/software as required for complete installation of the system under this contract and present scope of work.
5. All software & hardware should be in upgrade version.
6. CCTV equipment’s and items should be with minimum one year warranty / as per OEM standards and **should be supplied with STQC certification.**
    a) Any damage done to the building/false ceiling/Exhibits is to be made good by the contractor with no extra cost by department.
7. For Sundry of material, the agency has to make his own arrangement. No separate storage accommodation shall be provided by the department. Watch and ward of the stores and their safe custody shall be the responsibility of the contractor till the final

taking over of the installation by the department.

8. The Firm shall ensure adequate and prompt after sales service in the form of maintenance, spares and personnel are available at site of work during the guarantee period to minimize the breakdown period. The firm shall also ensure that in the event of any breakdown of the system, same should be made operational within 24 hrs. A penalty as deemed reasonable by Engineer-in-charge shall be recovered from the firm (which will be minimum Rs 1000/- per day).

9. DOCUMENT TO BE FURNISHED ON COMPLETION OF INSTALLATION
Three sets of the following shall be furnished to the department by the contractor on completion of

a) Completion drawings
b) Manufacturer's technical catalogues of all equipment's and accessories.
c) Operation and maintenance manual of all major equipment's detailing all adjustment, operation and maintenance procedure. – 3 Sets

10. All the safety procedures outlined in the CHAPTER 10 (SAFETY PROCEDURE) of CPWD General Specifications for Electrical Works Part – I Internal 2023 shall be complied with.

2.0 Technical Specifications:

2.1 IP Dome Camera

Certifications compliance	ON VIF ProfileS/G/Tcompliant,UL/CSA62368-1,CE(EN50130-4),FCC Part 15, EN 55032, RoHS (EN63000) & NDAA Section 889 compliant.
Ingress protection	IP66
Impact protection	IK10
Night vision(IRversion only) Distance	50m
Operating temperature (continuous)	-40ºC to +60 ºC
Digital video resolution	Maximumdigitalvideoresolution2552x1944

2.2 IPPTZ Camera

Certifications compliance	ONVIF ProfileS/G/Tcompliant,UL/CSA62368-1,CE(EN50130-4),FCC Part 15, EN 55032, RoHS (EN63000) & NDAA Section 889 compliant.
Ingress protection	IP66/67
Impact protection	IK10
Night vision(IRversion only) Distance	150m
Pan range	360ºContinuous
Tilt range	-10ºto 90º
Digital video resolution	Maximum digital video resolution 2552x1944

2.3 CCTV Recorder(NVR)

Certifications compliance	CE,FCC, UL RoH & NDA Sectio 889 Compliant , S A n
Storage type	8Trays:3.5-inchSATAHDDs
Operating temperature	-10°C to+55 °C

2.4 CAT6/ 6aCabling

Copper CAT6/6a Cabling as per structured cabling standards including both end crimping with RJ45 Jack and required terminations

SH-VI EPABX SYSTEM

1. The EPABX system shall be Digital Microprocessor based stored program control with latest Software Version. It shall have facility to connect Telephone through suitable Interface common to all such devices.
2. The EPBAX system shall be capable of working in a suitably ventilated non-air- conditioner environment. The design shall be immune to noise from various sources like power supplier, lighting system etc.
3. The EPBAX system shall be ensure a very high degree of availability and maintainability through use of highly reliable components and appropriate structural & functional units.
4. Power fail cut through shall be provided in case of system failure.

5. All cards of the same type & design shall be interchangeable without necessity special adjustments.

6. Cabinet design shall provide for adequate ventilation to dissipate heat due to energy loss.

7. The EPABX shall be suitable for operation on 230V , 50 Hz AC or 24 V DC power supply as per the requirement.

8. The EPABX System should be Digital PCM / TDM (non-blocking) technology.

9. The equipment and circuits for tone ringing shall from part of main PABX equipment.

10. Extension-to-Extension Dialing: Shall be possible to establish internal calls automatically by dialing any number without assistance of the attendance.

11. Direct Outward Dialing: It shall be possible to establish external calls automatically by dialing any number without assistance of the attendance (subject to class of service).

12. Privacy of Call: Shall be available on all calls whether established directly or by the attendant. A warning tone of a specified frequency shall be applied when trunk-offering facility is exercised by the attendant on an extension user.

13. Automatic Call Back facility shall exist for an extension user on encountering a busy signal on a called extension, to invoke the automatic call back feature by dialing a code before hanging up. When both the calling and called parties are free, the call should be automatically put through on no-answer the call may be disconnected after a specified period. (This facility should be available throughout the network if more than one EPABX are interconnected in a Private Network).

14. Call Forwarding: Extension with this class of service shall be able to transfer all incoming calls, temporarily to another pre-selected extension. Such requests shall be registered by dialing a code followed by the extension No. Facility shall also exist for cancellation of a request registered earlier. This facility should be available throughout the network if more than one EPABX are inter-connected in a Private Network.

15. Automatic Call Transfer: Shall be possible for an extension user to transfer incoming calls to another extension with or without help of the attendant

16. Executive Over-Ride: Facility offering priority to 5 min extensions to over-ride on going conversations.

SH VII: -ACCESS CONTROL SYSTEM

Scope of Work:

Providing Access Control system for the building including all equipment's not mentioned below but required for proper completion of the job is deemed to be included in this scope of work.

SUBMITTALS

1. Manufacturer's Product Data: Submit manufacturer's data sheets indicating systems and components proposed with proper details like physical, mechanical, electrical, hermal along with instruction/Installation manuals & Operational maintenance Manuals.

2. Shop Drawings: Submit complete shop drawings including connection diagrams for interfacing equipment, list of connected equipment, and locations for major equipment components.

3. Product /Material certifications from relevant authorities, manufacturers, testing labs etc as and where required as per the tender specifications.

4. List of recommended &mandatory spares and consumables.

1. DELIVERY, STORAGE, ANDHANDLING

Deliver materials in manufacturer's labelled packages. Store and handle in accordance with manufacturer's requirements, in a facility with environmental conditions within recommended limits.

2. Smartcard Reader

S.No.	Specification	
1	Read Range	4 -9cms
2	Data Read	CSN/Sector
3	Type	Smartcard (Mi fare Classic)
4	Transmit Frequency	13.56MHz
5	Card (Transponder)	Mifare®Series(ISO14443-A)
6	Card Read Time	0.1 sec
7	Output Interface	Wiegand Format(32 bits)
8	LED Indicator	BicolorLED
9	Power supply	12VDC@ 100mA
10	Dimensions	80WX83HX21D
11	Material	ABS Plastic
12	Color	Black
13	Cable Specs (Recommended)	5core,7/36shieldedcable
14	Cable Distance from Controller:	80m (Wiegand)
15	Cardshouldbereadin1 sec	
16	A Wiegand output that easily interfaces with most existing Wiegand protocol access control panels.	
17	Compact and Elegant. Easily installed on walls and doors.	

3. Electro Magnetic Lock

- 600lbs single door and 1200lbs double door magnetic lock.
- Single / Double EM locks should be designed to meet fire/life safety applications by providing an auxiliary locking mechanism that has no moving parts to bind or wear out for trouble free operation. This should ensure inhibited release at all times where they have become extremely prevalent in applications other than fire/life safety.
- Suitable for access controlled & secure areas within buildings with Single /double leaf doors.
- The Magnetic Lock should consist Magnet mounted frame onto door frame and a steel plate attached to the top of the door. They will be strongly bonded when magnet get energized and holding the steel plate. Instant release should be possible when power supply is cut-off, in an emergency situation.
- Holding Force–600lbs&1200lbs/magnet
- Operating Voltage–12V /24VSelectable
- Current Draw–300-500mA
- Operating Temperature:-10to55DegC

4. Exit Push Button

Exit Push Button with Includes break glass switch assembly use to egress swinging or sliding doors that are electrically or electronically locked. In perimeter protection systems that involve the central control of electric locking devices, an on- site emergency release may be required. The “break glass” concept may be preferred over the pull station, because it is less vulnerable to misuse or tamper actuation. Shall be Surface mount in a standard 3-gang enclosure. Shall be Compatible with all Fail Safe type electronic locking systems. Shall be Models with LED or audible alarm. Also Clearly marked signage indicating purpose of the release.

5. Door Contact

The Door Contact will be used for indicating the status of Door is properly closed. The Contact Shall be Surface mount, 5 screw terminals In ABS plastic housing. The door contact shall be EN50131-1 Security Grade 1, Environmental Class II. Housing.

i. Proposed system should consist of required number of cameras installed along the designated areas for the general surveillance. All the cameras should be connected to the central control room servers through LAN using CAT6 cables as per applicable distance limitations.

ii. Offered system should support Failover database functionality to avoid single point of failure. Offered system shall also support parallel recording of all the cameras or user defined critical cameras parallelly on to a separate storage location to avoid loss of old recording in any situation.

iii. The system shall carry a 5 years OEM support assurance. Necessary certificate from the OEM or OEM authorized shall be submitted along with submission of technical details for approval.

iv. The system shall have provision for addition/deletion of cameras.

v. The system must be ONVIF S compliant & should work with 3rd party ONVIF cameras.

vi. The Full HD Cameras and Network Video Recorder shall be UL Listed. For eliminating Compatibility related issues related to cameras and Network Video Recorder, the Prospective tenderer shall preferably supply the same makes of Cameras and NVR Only. However, the system shall be of open protocol and shall be compatible for other makes with suitable specifications.

There shall be no license charges and the system shall have support from the OEM for the full period of its Life. Necessary assurance / certificate from the OEM / OEM Authorized distributer shall be submitted along with the supply of items.

TECHNICAL SPECIFICATION OF VIDEO SYSTEM

Scope of work

The work shall comprise of entire labour including supervision and all material necessary to meet a complete installation and such tests and adjustment and commissioning, as may be required by the department. The term complete installation shall not only mean major items of the plant and equipments covered by the specification but all incidental sundry components necessary for complete execution and satisfactory performance of installation with all layout charts whether or not those have been mentioned in detail in the tender documents in connection with this contract. Further, it is clarified that nothing extra will be paid on account of following works which are required for completion of work.

(i) Drawing of Audio Video systems / cables in existing PVC/ MS conduits fixed behind the wall panelling and above the false ceiling.

(ii) All cable terminations e.g. VGA, HDMI, sound, etc. The rate quoted by the tenderer for equipment/ cable/accessories shall include this.

(iii) Making opening in false ceiling/ wall panelling/ furniture and repairing the same for fixing of speakers, LED Display, Projector & connected accessories, etc.

(iv) Making arrangement for watch & ward of Audio/Video installation till its handing over.

(v) Contractor has to provide technical assistance as and when required for approval.

(vi) Program chart showing all activities and its progress should be provided after award of work and updated on weekly basis.

(vii) The Audio system must be compatible and synchronized to the video wall system without fail.

Guarantee

i) The contactor shall guarantee the complete system to maintain the specified conditions under all conditions of ambient temperature.

ii) All equipment's shall be guaranteed for a period of 12 months or as per OEM recommendations from the date of acceptance and taking over of the installation by the department against unsatisfactory performance and/or breakdown due to defective design, material, manufacture, workmanship or installation. The performance guarantee shall be release after completion of 12 Months guarantee period. The equipment or component or any part thereof so found defective during the guarantee period shall be repaired or replaced free of cost to the satisfaction of the Engineer-in-Charge. In case it is felt by the department that undue delay is being caused by the contactor in doing this, the same will be got done by the department at the risk and cost of the contractor. The decision of Engineer-in-Charge in this regard shall be final.

3.0 The bill/ challan/ invoice/ testing report of Audio Video System and its associate's parts shall be furnished by contractor

4.0 The bidder should have to furnish Name; Address; e-mail; Mobile No. of OEM after completion of work.

C6:-LAN SYSTEM

COMMERCIALANDTECHNICALSPECIFICATIONSOFLANSYSTEM

1. The scope of work shall include planning, designing, supply, installation, testing and commissioning of complete of LAN and Wi-Fi system.
2. The outlets are as described in the BOQ. The scope of work also includes the provision of both Active & Passive Components.
3. The complete system has to be supplied, installed, tested and commissioned in complete manner to have a fully functional system, as required.
4. The entire office shall be Wi-fi enabled. Contractor shall submit wi-fi hot mapping.
5. The contractor shall ensure that the maximum length from the switch to the data point including the patch cords etc. does not exceeds 80m.There shall be20% redundancy on each switch.
6. Each floor rack shall be connected to the Server Room Main racks through Optical Fiber cable/CAT6 cable and links.
7. Complete LAN networking system with all necessary Cat 6 /6 A cabling in recess PVC conduit, power points, floor/Wall mounted racks with minimum L2/L3 networking switches, patch cords, Wi-fi modems covering all floors and all areas, Fiber cabling, all active & passive components etc. as required. Fiber optic cables shall be used for interconnections of Managed network switches.
8. Wi-Fi points shall be provided in corridor, common places. Wi-Fi point includes Cat 6 wiring with LAN outlet, 6 A power point and wi-fi router.
9. Each floor rack shall be connected to the Server Room Main racks through back bone Optical Fibre cable/CAT6 and links. Each rack shall have dual-linkage from the different server racks.

Proforma-B

PROPOSAL FOR ASSOCIATION OF AGENCIES

We hereby propose the following agencies as per details mentioned against each. Their consent letters are also attached as per Proforma.

Sl. No.	Name of Associated Agency	Category and class of registration in CPWD, if any	Enlistment copy/Registration No./ completion Certificates attached	Monetary Limit of Work/Value of Gross Work Done of Specialized component	Validity of registratio/ Enlistment , if any	Consent letter attached (Yes/No)
1						
2						
3						
4						
5						
6						
7						

Signature of Bidder(s) with stamp

Proforma-C

CONSENT LETTER FROM PROPOSED AGENCY FOR ASSOCIATION

(Separate for each component of work)

Name of work:- Renovation of NABARD premises at Sterling Center 1st and 7th floor, Worli, Mumbai.

I/we hereby give my consent to associate with M/s._____ for executing the component of work of …… (Mention specialized works(s)/category) for the above-mentioned work.

I / we will execute the work as per specifications and conditions for the agreement and as per direction of the Engineer-in-charge for the corresponding specialized component of work(s) till the completion of the work.

I / We will be responsible for necessary action to handover the installations and for rectification of defects and repair during the maintenance / warranty period.

Also I /we will employee full time technically qualified supervisor for the Specialized component for the work as required and list of same shall be made available to Engineer-in-Charge.

I /we will attend inspection of officers of the department as and when required.

Dated:

Signature of Main Contractor	**Signature of Associate Specialized Contractor**
	Registration detail Address:
Telephone: FAX: e-mail: 1. Witness with address (From main contractor side) 2. Witness with address (From Associate agency side)	Telephone: FAX: e-mail:

Proforma-D

MEMORANDUM OF UNDERSTANDING [M.O.U]

(Separate for each component of work)

1] M/s. [Name of the firm with full address]

(Henceforth called the main contractor)

And

2] M/s. [Name of the firm with full address]

(Henceforth called Associated Agency)

For the execution of Specialized component of work(s) of main work: Renovation of NABARD premises at Sterling Center 1st and 7th floor, Worli, Mumbai.

Name of sub-work: …… as per schedule, specifications, terms and conditions of the agreement.

We state that M.O.U between us will be treated as an agreement and has legality as per Indian Contract Act [amended upto date] and the department [CPWD] can enforce all the terms and conditions of the agreement for execution of the above work. Both of us shall be responsible for the execution of work as per the agreement to the extent this MOU allows. In case of any dispute, either of us will go for mediation by the Engineer –in-charge. Any of us may appeal against the mediation to the respective CE/SE. His decision shall be final and binding on both of us.

We have agreed as under:

1. The Associated agency will execute all the specified specialized work(s) in the wholesome manner as per terms and conditions of the agreement and as per the direction of the Engineer-in-charge.
2. That the Associated Specialized Agency has gone through the contract and has understood the scope of work required for the purpose of executing the specialized work(s).
3. The Associated Agency shall be liable for disciplinary action if he failed to discharge the action[s] and other legal action as per agreement.
4. All the machinery and equipment's, tools and tackles required for execution of the specified Specialized work(s), as per agreement, shall be the responsibility of the Associated Agency.

5. The site staff required for the specialized work(s), as per agreement, shall be the responsibility of the Associated agency as per terms and conditions of the agreement.

a) Site order book maintained for the said work shall be signed by the authorized representative of the main contractor as well as by the Associated Agency.

b) All the correspondence regarding execution of the specialized work(s) shall be done by the Department with the Associated Agency with a copy to the main contractor. In case of non-compliance of the provisions of agreement, the main contractor, as well as the Associated Agency shall be responsible. The action under clauses 2 and 3 shall be initiated and taken against the main contractor.

Signature of main contractor Signature of Associated Agency

Name :

Address :

Date:

Place:

Name :

Address :

Date:

Place:

COUNTERSIGNED

EXECUTIVE ENGINEER (E)

Proforma-1

Undertaking from LED fitting OEM

We hereby agree that:

All the LED fittings supplied by us are guaranteed for five years including drivers from the date of handing over.

In case of discontinuation of model and non-availability of spares, we will replace the fittings with equivalent/ high end model in case of manufacturing defect during the warranty period of 5 years.

For M/s. …….....,

…….....

(Authorized signatory of manufacturer of LED luminaire)

Counter Signature by.

Major contractor with stamp

Proforma- 2

MANUFACTURER UNDERTAKING/AUTHORIZATION CERTIFICATE

To,
The Executive Engineer (E),
Mumbai-IV, CPWD,
Mumbai-37.

Name of work: **Renovation of NABARD premises at Sterling Center 1st and 7th floor, Worli, Mumbai.**

NIT No. /CE/Mumbai-II/2025-26

Dear Sir,

We, ...(Name of OEM) having registered office at ……who are established and OEM of .....(Name of equipment) which are being offered for the above project having production facilities at…….(Place) do hereby authorize M/s. …… (Name of bidder) to submit a bid and subsequently negotiate and sign the Contract with you against above NIT including the above equipment, goods produced by us and hardware, software if any, provided by us. We hereby unconditionally support the bidder technically throughout the execution of contract, attend manufacturing defect and subsequent Comprehensive Maintenance Contract period of five years and we shall provide all the genuine spares required for healthy functioning of the equipment and other equipment supplied by us for a period of at least seven years including the software updates and upgrades if any, as per terms & conditions of the above NIT. We duly authorize the said Bidder to act on our behalf in fulfilling the obligations under the NIT.

Web also under take that in case of default in execution of this tender by the……..(Name of Bidder), the……. (Name of OEM) will take all necessary steps to provide service support for our equipment as per tender terms.

For and on behalf of the OEM

Signed:_____

Date:_____ In the capacity of_____(and this should be signed by a person having the power of attorney to legally bind the manufacturer).

Date:.....

Place:.....……..

(Designation).....…….....

(Company Seal).…….....….….….....

Note 1. The letter of Authorization Certificate should be on the letterhead of the OEM (Original Equipment Manufacturer) and should be signed by a person competent and having Power of Attorney to legally bind the Manufacturer.

Note 2. In case of VRV work, OEM will submit the cost of 5 years Comprehensive Maintenance after DLP alongwith detailed scope of work covered in Comprehensive Maintenance.

Counter Signature by.

Major contractor with stamp

ANNEXURE-III

Equipment's for Testing of Materials at Site Laboratory

Equipment's for conducting necessary tests shall be provided and installed at site in the well-furnished site laboratory by the agency at his own cost. The following list is only indicative and not exhaustive. The Bidder may be required to deploy more T & P as per requirement of work. Nothing extra shall be payable.

In case any equipment is not required in the work as per decision of Engineer in Charge, the same shall be considered as deleted from list.

Sl. No	Equipment	Numbers (Minimum)
1	Megger (0-1000V)	2 Nos.
2	Earth Tester	2 Nos.
3	Lux meter	2 Nos.
4	Wire Gauge	2 Nos.
5	Micro meter	2 Nos.
6	Vernier Caliper	2 Nos.
7	Tong Tester	2 Nos.
8	Aluminum Ladder- Suitable for internal & external electrical	3 Nos.
9	Tacho Meter	1 No.
10	Hydro Meter	1 No.
11	Crimpling tool for all sizes	1 Set
12	Ammeter	2 Nos.
13	Voltmeter 0 – 500 volt	2 Nos.
14	Chain wrench 2", 4", 6"	2 Sets.
15	Pipe wrench up to 4 "	1 set
16	Spanners kit	1 set
17	Digital Micrometer least count 0.01mm	1 No.
18	Screw gauge (Digital)	1 No.
19	Dial Guage	1 No.
20	Bearing Puller	1 No.
21	Bench vice	1 No.
22	Multimeter	2 Nos.
23	Hand gloves	2 Nos.
24	First Aid Box with recommended medicines as per IS: 2217-1963 as amended.	1 No.
25	Thermometer	1 No.
26	Disinfection spray machine with disinfection liquid	1 No.

LIST OF PREFERRED MAKES

Note :

1. The contractor shall obtain prior approval from the Engineer-in-Charge before placing order for any specific material or engaging any of the specialized agencies. The contractor shall make a detailed submittal with catalogues and highlighted proposed specification as well as full details of the works executed by the specialized agencies, as specified.

2. Unless otherwise specified, the brand / make of the material as specified in the item nomenclature, in the particular specification and in the list of approved materials attached in the tender, shall be used in the work.

3. In case of non availability of the brand specified in the contract the contractor shall be allowed to use alternate equivalent brand of the material subject to submission of documentary evidence of non availability of the specified brand and prior approval of T.S. Authority. The necessary cost adjustments on account of above change shall be made for the material.

4. The Engineer-In-Charge shall verify that manufacturers must have valid IS Certification as on date for materials wherever applicable.

5. The Agency shall submit a minimum of two samples of different makes for each item, along with the relevant technical data sheets and drawings for approval.

LIST OF PREFERRED MAKES

Sr.No.	Description	Makes
	Internal Electrical Installations	
1	PVC insulated copper conductor FRLS/HFFR copper ISI Marked wire	Havells /KEl / Polycab/ Finolex
2	PVC Conduits(ISI Marked)& accessories	BEC/ AKG/ RMcon / NIC
3	UTP Cable	Legrand/Molex/ Schneider/Cisco
4	OFC Cable	Legrand/Molex/Schneider/Cisco
5	Call Bell / Buzzer	Anchor / Leader / Havells
6	Modular Plate / Switch box / Modular Switch / Power Socket / 2 Module Fan Regulator / Telephone Socket / USB Socket / USB Outlet / IO Socket (Cat 6A) / TV Outlet / Flip up box/Sliding Shutter Box	MK (Blenze Plus)/ Legrand (Myrius)/ Schneider(Clipsal X)
7	Telephone / Cat 6 Cable	Legrand / Schneider/ Molex/ Cisco
8	LED Fittings	Lighting Technologies/ Regent /Delta
9	Wall mounted fan	Havells / Crompton/ Atomberg / Usha /Orient/Bajaj
10	Inline/Propeller Fan	Kruger/Nicotra/Greenheck
11	MCB / Isolator / RCCB / ELCB / RCBO	Havells / Legrand / Siemens / L & T
12	Cable trays (Hot Dip Galvanised.)	RMCON / Legrand/ BEC/Valmont/ MK (Honeywell) / Steelways /
13	Brass Compression Gland/Lugs	Dowells/Jainsons/Comet/Braco
14	Ceiling rose (3 pin)	Anchor / Leader / Kinjal / GM
15	DB, MCCB's, Loose Wire Box & Accessories	Havells / L&T / Legrand /Siemens
16	Connector/Terminal block	Wago/Elemac/Phoenix/ Essen /Connectwel.
17	CAT6Cables &Wires.	Tyco / Commscope/ Molex/ Havells/ legrand
18	DLP Trunking	Legrand/OBO Betterman/Schneider/MK
19	Floor Trunking/Raceway (GI)/ Raceway (GI)Junction Boxes	Honeywell MK/OBO Better man/ Legrand

20	UPS	Vertiv (Emerson)/ APC (Schneider)/ Legrand- Numeric/ Mitsubishi / Fuji
21	UPS Batteries	Amaron/ amaraja/ Exide
22	Occupancy sensor Passive infrared PIR based occupancy sensor Ceiling mounted daylight sensor	Hager / Honeywel/ Schneider
23	Exit Signs	Bosch/L&T/Notifier/ Prolite/ Autoglow /Prolite
24	Fire Extinguisher(with ISI Marked)	Cease Fire/ Minimax/ Safe Guard/ Safex / Lifeguard / Omex
25	Electric Panel/ Enclosure (CPRI approved fabricator)	Adlec/ Tricolite/ ABAK Electrofab
26	Digital Meters/ Digital Energy Meters/ Multifunction Meters/Load Managers	L&T/ Elmeasure/ Neptune /AE /Siemens/ Schneider/ABB
27	Voltmeter, Ammeter	Schneider/ABB/AE / L&T
28	Cables 1.1 kV grade PVC insulated / XLPE copper/ aluminium conductor cables / wires (both Armoured and Unarmoured)	Finolex/ Havells / KEI / Polycab / Havells
29	FRLS Armoured Cable (Power, Control)	Finolex/ Havells / KEI / Polycab / Havells
30	FRLS Copper Wire (Class 2)	Finolex/ Havells / KEI / Polycab / Havells
31	Cable lugs/Thimbles/ Terminal Ends (heavy duty)	Finolex/ Havells / KEI / Polycab / Havells
32	Cable Glands	Finolex/ Havells / KEI / Polycab / Havells
33	CAT-6 Lan Cable	Havells / Legrand / CommScope/ Molex
34	DWC Pipe	Supreme / Gemini /Prince
35	Fastener	Canon / Fisher / Hilti

LAN & IP based EPABX System

1	EPABX System	Siemens/Cisco/Alcatel/ Matrix/ Tadiran
2	EPBAX IP based Server with Licenses / IP Phone/ PC based Operator Console	Siemens/Cisco/Alcatel/ Matrix/ Tadiran
3	Master console phone	Siemens/Cisco/Alcatel/ Matrix/ Tadiran
4	Telephone instrument	Siemens/Cisco/Alcatel/ Matrix/ Tadiran
5	CORE SWITCH L3/ DISTRIBUTION SWITCH/ ACCESS SWITCHES 48 / 24/ 8 PORT POE &NON POE	CISCO / JUNIPER/ Alcatel/ Extreme / Legrand

6	10 G SFP FIBER MODULE SINGLE MODE	CISCO / JUNIPER/HP/ NETGEAR/ Alcatel/ Extreme
7	Wi fi ACCESS POINT	CISCO / JUNIPER/ NETGEAR/Alcatel/Extreme
8	OPTICAL FIBER CABLE	Legrand/Molex/CommScope/Havells
9	Cat 6 Patch cord, Fibre Patch cord	Legrand/ Molex/ Cisco/ Schneider
10	Racks	Vallrack/ Netrack/ legrand

IP BASED CCTV

1	Bullet/Dome/PTZ camera	Bosch/Honeywell/Axis/Pelco
2	Recording server/NVR	Bosch/Honeywell/Axis/Pelco
3	Recording server software	Bosch/Honeywell/Axis/Pelco
4	Client work station	HP/DELL/Lenovo
5	Net/PoE-Switch and patch panel	Cisco/Netgear/Legrand/ Molex / Extreme /Alcatel
6	Data Network Cable and patch chord	Cisco/Netgear/Legrand/ Molex / Extreme / Schneider / Honeywell / Alcatel
7	U Rack	Valrack (Legrand) / Cisco/ Wipro/Schneider
8	Media Converter/SFP Uplink Module	Cisco/Zyxel/Juniper/Brocade
9	Fire Wall	Zyxel/Cisco/Fortdinet/Alcatel
10	Connector	Molex /Cisco/ Alcatel/ Legrand
11	Fiber terminal box	Molex /Cisco/ Alcatel/ Legrand
12	PVC Junction Boxes outdoor/indoor	Hensel/Gewiss/Tyco
13	LED Display / Monitor	Samsung/LG/ Sony
14	Hard Disc	Seagate/ HP/Toshiba /Dell
15	LIU	Alcatel/ Molex / Cisco/HP
16	OFC Cable	Finolex/Commscope/ Panduit/Siemen / Molex

AUDIO VIDEO SYSTEM

1	Display 55"/75”	Samsung/Sony/LG
2	Interactive Display 86”	Samsung/Sony/LG
3	HDMI cable	Legrand/Honeywell/Kramer
4	PTZ Camera	Bosch/Honeywell/Axis/Pelco
5	Hand held Micro Phone/ Wireless Lapel Microphone /Wireless Headworn/Antenna Splitter/Antenna /Tilt Mount /Gooseneck Micro Phone	Sennhiser/shure/Telvic /Bose
6	Audio Mixer	Yamaha / Sennhiser/shure/Telvic /Bose

7	Mixer Amplifier	Audac/ Yamaha/ Sennhiser/shure/Telvic /Bose
8	HDMI to USB Capture Device	Liberty/Extron/ Cypress
9	Microphone /Speaker cable	Legrand/ Polycab / Havells / KEI
10	RJ45 Connectors	Legrand / Schneider / L&T / Havells
11	Heavy duty Push Pull Brackets	Lumi/Logic/Legrand
12	SPEAKER /DSP/Amplifier	Yamaha / Sennhiser/shure/Telvic /Bose
13	AV Receiver	Marantz/Denon/Yamaha
14	Matrix Switches/ Transmitter/ Receiver	Cypress/Extron/Crestron
15	Podium / Floor Box	Revtech/Sinew/Maxhub

ONLINE UPS

1	60/80 KVA Online UPS	APC / VERTIV (EMERSON) / SCHNEIDER / NUMERIC
2	Battery	EXIDE/Amron/Luminious
3	Battery monitoring System	HBL/Eagle Eye / Btech/Canara
4	Cable & Accessories	Finolex/ KEI / Havells / Polycab

VRV/VRFSYSTEM

1	VRF / VRV Indoor and Outdoor Units	Toshiba/ OGeneral/ Mitsubishi / Carrier
2	MS/GI Piping	Jindal/Tata/Sail
3	2-Way Valves & Control System	Honeywell/Seimens/ Johnson Control
4	Modulating Actuators	Honeywell/Seimens/Belimo/Johnson Control/ System Air
5	Temp., RH Controllers &Sensors	Honeywell/ Seimens/ Johnson Control
6	Water Flow Switches	Honeywell/Indfoss/Danfoss
7	Pressure Gauges	Waree/Danfoss/H-Guru/Fiebig
8	Temperature Gauges	Waree/Danfoss/H-Guru/Fiebig
9	Automatic Air Vents	Danfoss/H-Guru/Fiebig
10	Factory Fabricated Ducting	Zeco/Rolastar/Ruskin-Titus/ Ductofab
11	GSS Sheets	Jindal/TATA/Sail
12	Inline Fans	Kruger / Nicotra / Greenheck

13	Motors	Siemens/ABB/Crompton Greaves/ Kirloskar
14	Starters	Siemens/ABB/L&T/Schneider
15	Diffusers, Grilles, Fresh Air Intake & Exhaust Louvers	System Air/Ruskin-Titus/AirMaster/AirFlow
16	SS-304 & GI Perforated Grills	Nicomac/Clestra/I-Clean/GMP
17	AL. Aerofoil Design Low Leakage Volume Control Dampers	Systemair/Ruskin-Titus/AirMaster/AirFlow
18	GI Volume Control Dampers	Systemair/Ruskin-Titus/AirMaster/AirFlow
19	Butter-Fly (Circular) Dampers	Systemair/Ruskin-Titus/AirMaster/Airflow
20	Fire Dampers & Control Panels	Systemair/Ruskin-Titus/AirMaster/Airflow
21	Fire Damper Actuators	Bellimo/ Siemens/ Honeywell/ Sauter/ Johnson/ Systemair
22	Nitrile Rubber Insulation – Piping	Armaflex/ RPG – Insulation / K-Flex/ Rubber Craft / Armacell
23	PUF Pipe Sections / Supports	Beardsell/Lloyds
24	Copper refrigerant piping	Hindustan/ Rajco/ Mexflow/ Mandev
25	Hi-wall Split AC	O General / Mitsubishi / Carrier
26	Adhesive for XLPE/ Nitrile Rubber	Pidilite / STP
27	VFDS	Danfoss/ABB/Siemens/Delta
28	PVC/ Steel Conduit and Accessories (ISI Marked)	BEC/AKG/ NIC / RM con /
29	PVC Insulated FRLS Copper Conductor Cables 1.1 KV Grade (ISI Marked)	Finolex/ Havells/ KEI / Polycab
30	Control Cables	Finolex/ Havells/ KEI / Polycab
31	PVC Pipe (For Drain) / Rigid PVC Pipe	Astrall/Finolex/Supreme

ADDRESSABLE FIREALARM

1	Microprocessor based analogue addressable intelligent fire alarm control panel (UL listed only)	Notifier/Bosch/System sensor by Honeywell/ Siemens
2	Analog Addressable type Active Repeater Fire Alarm panel with Backlit LCD Display (UL listed only)	Notifier/Bosch/System sensor by Honeywell/ Siemens
3	Fire alarm survival armored cable	Finolex/ Havells/ KEI / Polycab

4	Voice Evacuation System, Detectors, Main control panel, Repeater panel, MCP, (UL listed only)	Notifier/Bosch/System sensor by Honeywell/ Siemens
5	Analog Addressable Type Rate of Rise/ Fixed Heat Detector with Dual LED (UL listed only)	Notifier/Bosch/System sensor by Honeywell/ Siemens
6	Analog Addressable Type Multimedia Detector with Dual LED (UL listed only)	
7	Addressable type fault isolator (UL listed only)	
8	Response Indicators	
9	Intelligent Analog Addressable Type Control/Output Modules (UL listed only)	
10	Intelligent Analog Addressable Type Monitor Modules (UL listed only)	
11	Exit Point Directional Sounder with minimum4distinctSoundpatterns(UL listed only)	
12	Manual Call box (UL listed only)	
13	Addressable Type Loop Powered Hi tone hooter (UL listed only)	
14	Analog Addressable Thermal Detectors	Notifier/Bosch/System sensor by Honeywell/ Siemens
15	PA system	Notifier/Bosch/System sensor by Honeywell
16	Fire Survival Cable & Speaker Cable	Finolex/ Havells/ KEI / Polycab
17	Amplifiers	Notifier/Bosch/System sensor by Honeywell/ Siemens
18	Voice Command Key Pad	Notifier/Bosch/System sensor by Honeywell/ Siemens
19	Speaker & Accessories	Notifier/Bosch/System sensor by Honeywell/ Siemens
20	Smoke Detector/ Hooter/ MCP /RI	Notifier/Bosch/System sensor by Honeywell/ Siemens

KITCHEN EQUIPMENTS

1	Chimney (Electric) for Kitchen	Elica / Faber / Glen / Hindware / Prestige / Kaff/Bosch
2	Double Door Refrigerator	SAMSUNG / Whirlpool / LG
3	Microwave oven	IBF/ELETROLUX/LG/WHIRLPOOL
4	Gas Hob	HINDWARE/BOSCH/KAFF/KUTCHINA
5	Water Purifier	Eureka Forbes/Aquaguard / Pureit
6	Water dispenser standing	Voltas / Bluestar
7	Griller	Borosil/Havells/Usha/Hamilton

ACCESS CONTROL SYSTEM

1	IP Based Access control biometric cum access reader/ Control software / Video interface software	Bosch/ Honeywell/ HID/ Matrix/ CP Plus
2	IP Based Access controller	Bosch/ Honeywell/ HID/ Matrix/ CP Plus
3	Card Reader	Bosch/ Honeywell/ HID/ Matrix/ CP Plus
4	Hardware for client substation	Lenovo/ Dell/ HP
5	LED TV	Lenovo/ Dell/ HP /Sony
6	Electromagnetic Lock	Matrix / BEL / Belco / Securiton
7	Power supply for Lock	Trace/MRE / Generic
8	Emergency Door release/magnetic contact/push to exit switch	Matrix / BEL / Belco / Securiton
9	Flexible cable	Finolex/ Havells/ KEI / Polycab/L&T
10	Mounting/ Floor Rack	Netrack/Comrack/Valrack/legrand

Note: Makes suggested above are the Preferred Makes, before execution the agency shall submit TDS alongwith required Technical details for approval from Engineer-in-Charge. For fittings one sample of preferred make shall be submitted for approval.