

**RENOVATION WORK
AT
HLL CORPORATE HEAD OFFICE,
THIRUVANANTHAPURAM**

IFB No: HLL/CMO/HCD/CHO-RW/25-26, DT. 21.11.2025



HLL LIFECARE LIMITED

(A GOVT. OF INDIA ENTERPRISE)

HLL Bhavan, No26/4, Tambaram-Velachery Main Road,
Pallikaranai, Chennai 600 100, Tamilnadu pskerala@lifecarehll.com
Web:www.lifecarehll.com

NOVEMBER 2025

HLL Lifecare Limited

HLL Bhavan, No26/4, Tambaram-Velachery Main Road, Pallikaranai, Chennai 600
100, Tamilnadu

Mail: pskerala@lifecarehll.com

INVITATION FOR BIDS (IFB)

HLL Lifecare Limited (HLL), a Government of India Enterprise, invites sealed and super-scribed tenders from interested firms Tender for Renovation Work at HLL Corporate Head Office Thiruvananthapuram.

The tender document can be downloaded from the website, <http://www.lifecarehll.com>

The tender document will be available up to 15.00 Hrs. on 01.12.2025.

- | | | |
|----|---------------------------------------|---------------------------|
| a) | Issue of tender document | - 21.11.2025 at 17.30 hrs |
| b) | Last date and time of receipt of bids | - 01.12.2025 at 15.00 hrs |
| c) | Date and time of opening of bids | - 01.12.2025 at 15.30 hrs |

Associate Vice President (MD & Prj.)

**TENDER NOTICE FOR RENOVATION WORK AT HLL CORPORATE HEAD OFFICE,
THIRUVANANTHAPURAM**

Ref: HLL/CMO/HCD/CHO-RW/25-26, DT. 21.11.2025

1. HLL Lifecare Limited (HLL), a Government of India Enterprise is in the process of Renovation Work at HLL Corporate Head Office Thiruvananthapuram. For the said project, sealed and super scribed bids are invited on two bid basis from eligible, competent and experienced firms who are capable to do the following work meeting the requirements as per our tender.
2. The tender documents available on the web site www.lifecarehll.com and submit the tender before the due date.
3. HLL reserves the right to reject any or all tenders without assigning any reason thereof and also not bound to accept lowest tender. Tenders in whom any of the prescribed conditions are not fulfilled or found incomplete in any respect are liable to be rejected.
4. Canvassing whether directly or indirectly in connection with tender is strictly prohibited and the tender submitted by the contractors who resort canvassing will be liable to be rejected.
5. The technical bid submitted by the parties shall be opened on the next day of tender closed date. The price bids of technically qualified parties shall be opened at a later date and the technically qualified parties shall be informed well in advance about the opening of their price bid.

Associate Vice President (MD & Prj.).

RENOVATION WORK AT HLL CORPORATE HEAD OFFICE,
THIRUVANANTHAPURAM

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PART - I
INSTRUCTIONS TO BIDDERS

1. GENERAL

- (i) Name of the work is “Renovation Work at HLL Corporate Head Office Thiruvananthapuram”.
- (ii) Tenderers are advised to inspect and examine the site and its surrounding and satisfy themselves before submitting the tenders and obtain all necessary information which they feel is necessary to submit their tender.
- (iii) The bidders are advised to quote their rates for executing the work in the format enclosed as Part-VI.

2. SUBMISSION OF TENDER

Tenders shall be submitted in two parts in the following manners: -

- i) **“Part-I- Technical Bid”**

The envelope shall be marked Part-I- Technical Bid and shall contain the information/ documents as per clause No. 3 below.

- ii) **“Part-II- Price Bid”**

The envelop shall be marked Part-II- i.e. Price Bid will contain Estimated Quantities that are given in the Schedule of Quantities against for which the agency shall quote the rates in figures as well as in words in the format enclosed.

3. QUALIFYING CRITERIA

Tenderers having following valid documents will be technically qualified and considered for opening of their price bid. Technically qualified parties have no right to claim for award of the work. The HLL reserves the right to cancel or award the work to any party/tenderers.

SN	Eligibility Criteria	
1	Bidder should have a valid Certificate of the following:	
	a.	GST Registration certificate
	b.	IT PAN Card
	c.	EPF Registration Certificate (if the firm has exemption, declaration of the same shall be submitted in their letter head)
	d.	The bidder should have an office in Kerala and shall provide documentary evidence to support this claim. The bidder's registered office address in Kerala shall be valid at the time of bid submission. Proof of registration/address proof, such as GST registration certificate, PAN card, or other relevant documents, shall be submitted along with the bid documents.
	Note:	Copy of valid certificates for the above shall be submitted in proof of the same
2	The bidder should have successfully completed similar works during the last five years ending 31 st Oct 2025 should be either of the following:	

SN	Eligibility Criteria	
	One similar completed work costing not less than Rupees 10 Lakhs and similar work here encompasses civil and electrical work necessary for the construction/renovation of buildings. Copies of Work orders and satisfactory work completion reports issued by the Client/Authority concerned shall be submitted in proof of the same. The Duly filled and Signed copy of the PERFORMANCE DECLARATION FORM as per item No.1 Part IV is to be attached Note: - HLL reserves the right to contact the clients of the bidder and obtain feedbacks regarding the quality of work and service provided by the party. Any decision based on the same by HLL will be final and binding on the bidders.	
	a.	For Govt. /Departmental works, completion certificate issued by the Competent Authority (Exe. Engr, Supt. Engr., etc.) shall be submitted. Completion certificates for works issued by private parties shall be supported by TDS certificates.
4	Has the Contractor/Firm/Company ever been blacklisted by the Govt./or the registering authority. (Yes/ No). If NO, the duly signed declaration form as per item no-2 of part- IV is to be attached.	
	Note	The bidder will be disqualified if they have any record of poor performance such as abandoning the works, not properly completing the contract, inordinate delays in completion, litigation history or financial failures etc. including ongoing works.
5	The bidder should submit the duly notarized Power of Attorney, issued by the competent authority in favour of the signatory of the bid in the stamp paper of appropriate value as per the Stamp Act.	
6	The duly signed acceptance forms as per item no-3 of Part-IV to be attached	
7	Completion Period Declaration duly filled as per item no-4 of Part-IV to be attached	
8	Duly filled and signed copy of requisition for e-payment form along with clear and visible scan copy of cancelled cheque as per item no-5 Part-IV of this bid document in original.	
9	The duly signed No Deviation Certificate as per item no-6 of Part-IV to be attached	
10	The site visit certificate issued by HLL shall be submitted as per item no. 7 of part-IV failing which, the bid will be summarily rejected.	
11	Part V - List of approved make shall be duly signed with seal to be attached	

Pre-bid queries shall be communicated through pskerala@lifecarehll.com or through +91 7907961267

4. The price bids of the bidders who do not meet the qualifying requirements in the technical bid will not be opened.

5. VALIDITY OF OFFER

Tender submitted by tenderers shall remain valid for acceptance for a minimum period of 120 days from the date of opening of the tenders. The tenderers shall not be entitled during the said

period of 120 days, to revoke or cancel their Tender or to vary the Tender given or any term thereof, without the consent in writing of the Owner. In case of tenderers revoking or canceling their tenders or varying any terms in regard thereof without the consent of owner in writing, HLL shall forfeit Earnest money paid by them along with their tender without giving any notice.

6. ACCEPTANCE/ REJECTION OF TENDER

- a. HLL does not bind itself to accept the lowest tender.
- b. The HLL also reserves the right to accept or reject any or all tenders without assigning any reason whatsoever.
- c. HLL also reserves the absolute right to reject any or all the tenders at any time solely based on the past unsatisfactory performance by the bidder(s) the opinion/decision of HLL regarding the same shall be final and conclusive.

It will be obligatory on the part of the tenderer to sign the tender documents for all the components & parts. After the work is awarded he will have to enter into an agreement on Performa to be provided by the HLL for work awarded, on a non-judicial stamp paper of requisite value at his own cost within ten days from date of receipt of acceptance order or before the work is undertaken.

PART - II

SCOPE OF WORK:

The scope of work for the Renovation Work at HLL Corporate Head Office Thiruvananthapuram as follows as,

Scope of Civil Works:

Scope Summary: Demolition, internal civil finishes, joinery, glazing, partitions, false ceiling, flooring, painting, window treatments, minor MEP coordination, and provision/installation supervision of specified furniture and workstations as described below.

1. Demolition / Dismantling

- Dismantling and safe disposal of existing finishes as applicable in the renovation area:
 - Existing tile works.
 - Existing aluminium works (doors/frames/partitions).
 - Existing false ceiling works.
- Debris removal and site cleaning; disposal to authorised dumping site as per local regulations.

2. Civil & Masonry Works

- Provide and install 100 mm thick gypsum wall panels for window closing and other locations as per drawings.
- Repair and minor masonry/patch works required to receive new finishes (plastering/pointing as required).

3. Partitions & Glazing

- Supply & install 12 mm slim-profile partitions (aluminium/frame as per approved design) including necessary framing, seals and gaskets.
- Supply & install 12 mm toughened glass door shutters with approved hardware and fittings.
- Apply frosted film to specified glazed surfaces as per architect's layout.

4. Joinery / Carpentry Works

- Fabrication & fixing of joinery items in 18 mm marine plywood with laminate finish for:
 - Printer table
 - Storage cabin
 - Shelves
 - Bookshelves
- Provide necessary hardware, hinges, drawer sliders, and locksets.
- Ensure all plywood work uses marine grade ply (710 BWP or equivalent) and approved laminate brands/colour.

5. False Ceiling

- Supply & install 12.5 mm tapered edge moisture-resistant gypsum board for false ceiling areas, complete with suspension system, access panels, and edge trims as required.
- Provide POP/plaster finishing and joints treatment to receive paint.

6. Flooring & Skirting

- Provide & lay vitrified tiles (size and finish as per approved sample) including bedding and joints.
- Provide matching skirting for all tiled areas.
- Ensure level, alignment and proper sealing of joints.

7. Painting & Surface Finishes

- Prepare surfaces by scraping existing white/colour wash; repair cracks and imperfections.
- Apply Plaster of Paris putty for false ceiling areas and other required surfaces.
- Apply deluxe multi-surface paint for all internal walls (two coats finish over primer), with colours as approved.
- Touch-up and protective painting for exposed metal/frames where required.

8. Window Treatments

- Supply & install roller blinds for windows as per sizes and approved colours/texture. Include adequate fixtures and fitting.

9. Workstations & Furniture (Supply & Installation /Supervision)

- Supply, assemble and install:
 - **Workstations:** 8 nos. (Configuration as per drawing).
 - **High-back chair:** 1 no.
 - **Mid-back chairs:** 10 nos.
 - **L-shaped table:** 1 no.
 - **3-seater sofa:** 1 no.
- Note: If furniture is procured separately by client, civil contractor to coordinate delivery, positioning and any minor fixing required.

10. Fixtures, Finishes & Accessories

- Supply and fix required hardware, door handles, locks, ironmongery, sealants, edge banding for plywood, and approved fittings.
- Provide CP/SS fittings where specified.

11. Quality Standards & Materials

- All materials to be approved by Engineer-in-Charge prior to procurement.
- Use materials conforming to relevant IS standards and manufacturer datasheets (marine ply, vitrified tiles, gypsum board, adhesives, paints, hardware).

- Samples/mock-ups of joinery, tiles, paint shade and blinds to be submitted and approved before bulk work.

12. Testing, Commissioning & Handover

- Final inspection and walk-through with client/Engineer-in-Charge.
- Ensure all works are cleaned, defects rectified and site handed over in ready-to-use condition.
- Provide as-built drawings (if any layout changes), maintenance instructions for installed items and warranties/guarantees from suppliers (where applicable).

13. Safety, Site Management & Housekeeping

- Contractor to implement site safety plan, PPE for workers, and maintain housekeeping throughout the contract.
- Ensure no damage to adjacent occupied areas; protect finishes during work.

14. Deliverables

- Detailed Shop Drawings for joinery, partitions and false ceiling.
- Material submittals and samples for approval.
- Completed and commissioned civil works as per approved drawings.
- Handover documents, warranty certificates (where applicable), and as-built drawings.

Scope of Electrical Works

1. **Scope Summary:** Dismantling of existing fittings and sockets. Proposed additional point wiring and circuit wiring, Supply and installation of modular type switch and sockets, modular box and base plates, DB accessories, Energy efficient light fittings and wall fan, data sockets and cat 6 cable, cassette ac and split ac for the proposed rooms.

2. Dismantling

- Dismantling and handing over the electrical items without any damage
 - Existing LED light fixtures
 - Existing Split AC
 - Existing ceiling fans
 - Existing switch and sockets
 - Existing data sockets

3. Point wiring and circuit wiring

- Wiring for light point and wall fan point with 1.5 sq.mm FRLS PVC insulated copper wire
- Wiring for circuit/sub main wiring with 3 runs of 1.5/2.5 sq.mm FRLS PVC insulated copper wire

4. Modular type switch and socket

- Supplying and fixing following modular switch/socket, modular box and plate

5. DB Accessories

- Supplying and fixing of 6/16amps single pole mcb and 32 TP mcb in the existing DB

6. Light fitting and wall fan

- SITC of recess mounted downlight fixture, die cast aluminum with powder coated housing, frosted PMMA / PC diffuser 18W LED light fixture
- SITC of wall fan, white colour, 5 star rated as per BEE complete with blades

7. ELV System

- Supplying and drawing of UTP 4 pair CAT 6A LAN cables
- Supply, Laying, Testing & Commissioning of CAT6 A (RJ-45) I/O Ports

8. Hi- wall/cassette Ac

- Supply, Installation, Testing and Commissioning of 1.5TR BEE 3 STAR rated INVERTER-Type Air-Cooled Hi-Wall Split-Type Air Conditioners for Cabin
- Supply, Installation, Testing and Commissioning of 2.0TR 3 STAR BEE rated INVERTER type, 4-way cassette Air Conditioners for work station

PART - III
GENERAL CONDITIONS OF CONTRACT

The General Conditions of Contract are as under:

1.1 Delay and extension

If the work is delayed by force majeure or any other cause in the absolute discretion of Employer, which is beyond the Agency's control, the agency shall immediately upon the happening of such event contributing to delays give notice thereof in writing to HLL/Engineer-in-Charge but shall nevertheless use constantly their best endeavors to prevent or make good the delay and shall do all that may be reasonably required to the satisfaction of HLL to proceed with the work.

Request for extension of time shall be made by the Agency in writing within seven days of the happening of the event causing delay. The survey Agency shall also indicate with any such request, the period for which extension is required. In any such case HLL may give a fair and reasonable extension of time for completion of individual items or group of items of work for which separate period of completion is specified in the contract as a whole, but it shall be the sole discretion of the Employer to grant or refuse such extension.

The decision of HLL in regard to the extension will be communicated to the Agency in writing within a reasonable time but no compensation or any extra amount shall be paid for such extension granted by HLL.

1.2 Compensation payable for delay in completion and risk prejudice clause

The Agency shall be liable to pay compensation to HLL in case of delay in fulfilling obligation under this agreement for causes solely attributable to the Agency @ 1% (One percent) of contract amount per week of delay subject to maximum of 5%(five percent only) of the total contract price towards their contract.

1.3 Risk Prejudice Clause

In case progress of any part of Agency's work is found to be unsatisfactory by HLL at any time during the execution vis-à-vis the terms of contract, HLL shall give the Agency a fortnight's notice in writing asking for their plans for remedying the situation and to complete the job within the time decided by Engineer in Charge/HLL, subject however to the conditions that the entire work falling within their scope of work shall be completed within the stipulated time. On the failure to remedy the situation as per agreed time with HLL, HLL shall have the right to withhold that portion of the work and get the same done at the risk and cost of the Agency after giving one weeks' notice.

1.4 Arbitration

If at any time any doubt, question, dispute or difference whatsoever, shall arise between the Agency and HLL upon or relating to or in connection with this contract,

either of the parties may give the other notice in writing of the existence of such doubt, question, dispute or difference and the same shall be referred to the Engineer-In- Charge, HLL or his nominee as Sole Arbitrator. The decision of the sole arbitrator thereon shall be final, conclusive and binding upon the parties to dispute. The party invoking arbitration shall specify the dispute or disputes to be referred to the arbitration under the clause together with the amount or amounts claimed in respect of each of dispute.

1.5 Jurisdiction of Court

The courts at Thiruvananthapuram shall have jurisdiction to entertain and adjudicate any disputes.

1.6 Termination of Contract

HLL reserves the right to terminate, or postpone the work on account of fulfillment of contractual obligation(s) or any sufficient cause, HLL being sole judge of the same. The Agency shall be paid for the useful work done up to the date of termination. HLL shall determine the credit to be given to the agency for the value of the work executed by the Agency. The Agency shall give HLL all the data, compiled report, drawings etc. prepared by them till the date of termination before the final dues are paid to the Agency. Even after the termination of agreement, the Agency shall continue to cooperate with HLL to such a reasonable extent as may be necessary to clarify or explain any reports or recommendations in documents or detailing made by them.

1.7 Breach of Trust

Unless otherwise directed by HLL specifically, the Agency shall not contact directly or indirectly the client or any other authorities connected with the project. Non-compliance of this clause shall be treated as breach of trust resulting in the termination of contract between HLL and the Agency for which without any prior notice to him. In such event, no job will be entrusted to him in future by HLL.

1.8 Discussions with HLL and Approvals

The Agency shall make themselves available at reasonable notice to be present for discussions with HLL. The Agency shall also provide assistance, advice and information to HLL as may be required from time to time for discussions with HLL officials connected with the work other agencies or

The Agency shall get approved the work done by him at every stage throughout the period from HLL. However, such approval by HLL shall not be deemed to absolve the Agency of the total responsibility of the correctness and soundness of the work and other obligations under this contract.

1.9 Guarantee and liability of the Agency

The Agency shall be liable for all consequence of errors and omissions arising from

errors solely attributable to Agency or on the part of their employees to the extent and with the limitation specified by HLL.

1.10 Periodical Progress Report

The Agency shall prepare and submit periodical progress reports and status of works being performed by them. Such submissions of reports and review and approvals, if any, thereof by HLL shall not be deemed to absolve the responsibilities of the completion of the assignment.

1.11 Unit Rates

Contractor must ensure to quote rate of each item, if any cell is left blank and no rate is quoted by the bidder, rate of such item shall be treated as "**0 (ZERO)**". The Unit rates quoted shall remain firm throughout the validity of the contract. The rate shall include cost of materials, machineries, labour (including lodging and boarding charges), removal of bushes and vegetation as required to carry out and complete the scope of work without any hindrances, tools and equipment's, transport charges, taxes, royalties, octroi, GST etc. payable on all transactions for the due performance of work under this contract. The rates shall be given in the schedule, as specified **herein itself positively**. No additional cost or escalation shall be paid on whatever accounts it maybe.

Rate quoted shall be binding for any quantity of each of the items.

1.12 Variation in scope of work and schedule of quantity

The scope of work & schedule of quantities may vary to any extent. The rates quoted by the Agency shall remain firm for the complete job as directed by the Engineer in Charge.

1.13 Mobilization Advance

No Mobilization advance shall be paid.

1.14 Tax

Tax shall be deducted from Agency's bill as per rules.

1.15 Computerized output

The Agency shall prepare a CD of the complete work assigned to them including drawings, report work, data, and other documents & the same shall be submitted to HLL after completion of job. All drawings shall be on AUTOCAD and in A0 sizes only. All Reports/ investigation. Data in 03 (three) sets to be attached in copy including Drawings etc. complete. If any.

1.16 Submission of Tender:

Sealed Quotations (Hard Copy) with tender reference number addressed to **Associate Vice President (MD & Prj.)** are to be submitted **before 15.00 Hrs. by**

01.12.2025 at following address:

HLL Lifecare Limited,
HLL Bhavan, No26/4,
Tambaram-Velachery Main Road, Pallikaranai,
Chennai 600 100,
Tamilnadu

The date & time of opening of Bids is on **01.12.2025 at 15.30 Hrs.** The venue of opening of bids shall be Chennai Office, HLL at the above address.

All pages of the NIQ documents and supporting documents if any and quotation sheet to be signed & sealed by authorized representative of Agency. Multiple forms can be submitted for different projects.

1.17 Completion Time

Total time period for completion of job will be **20 days** from the date of the work order issued to party

1.18 Terms of Payment

- I. 95% of the payment shall be released on the submission of final Measurement Book (inspected and verified by Engineer In-charge), along with completion certificate from concerned authorities and original invoices.
- II. All statutory payments should be made by the contractor and the same shall be reimbursed on recipient of valid documents.

Retention: Retention money shall be deducted at 5% from each bills. Retention shall bear no interest and this amount will be released after passing the satisfactory completion of **defect liability period of 12 months.**

Tax Deduction: All statutory deductions like GST, Income Tax, Works Contract Tax, E.S.I., P.F. or any other government-imposed liabilities shall be borne by the Contractor (as applicable at the time of execution of job) and shall be deducted from each bill submitted by the Contractor

Part IV
FORMS AND DECLARATIONS

1. PERFORMANCE DECLARATION FORM

(To be submitted in official letterhead of the firm, including complete company name, physical address, telephone numbers, and other relevant contact details.)

Details of all works of similar class completed during the last five years ending last day of the
Month of Oct 2025

SN	Name of work with brief description	Work order number with date	Work order amount (Excl. GST)	Gross amount of work completed (Excl. GST)	Actual Date of completion
1					
2					
3					

Note: Copies of Work orders and Completion certificates issued by the Client/Authority concerned shall be submitted as proof of the same. Completion certificates for works issued by private parties shall be supported by TDS certificates.

Signature and seal of the bidder

2. SELF-DECLARATION NON-BLACK LISTED

(In company letterhead with sign & seal)

To,

Associate Vice President (MD & Prj.)

Hi-Care Division,

HLL Lifecare Limited (A Government of India Enterprise)

Corporate Head Office, Poojappura. P.O,

Thiruvananthapuram – 695012,

Kerala, India

Ph: 0471- 2354949, 2775651

Email: *pskerala@lifecarehll.com*

Dear Sir, this is to certify that our company_____ has not been Black Listed /debarred or found guilty of malpractice /misconduct either by State Government or Government of India in connection with manufacture and supply of any of the product(s) quoted during the last 5 years' period.

SIGNATURE OF THE BIDDER WITH SEAL

3. ACCEPTANCE FORM

(To be submitted in the letter pad of the firm indicating full name and address, telephone & E-mail etc.)

From

To

Associate Vice President (MD & Prj.)

Hi-care Division,
HLL Lifecare Limited (A Government of India Enterprise)
Corporate Head Office, Poojappura. P.O,
Thiruvananthapuram – 695012,
Kerala, India
Ph: 0471- 2354949, 2775651
E-mail: pskerala@lifecarehll.com

Name of Work:

Dear Sir,

I / We, hereby offer to design / fabricate / supply / install / testing / validate / commission as detailed in schedule hereto or such portion thereof as you may specify in the acceptance of Bid at the price given in the price bid and agree to hold this offer open for **120 days** from the date of bid opening prescribed by the Purchaser. I / We have understood the terms and conditions mentioned in the invitation for bid and Conditions of Contract furnished by you and have thoroughly examined the specifications quoted in the bid document hereto and are fully aware of the nature of the scope of work required and my/our offer is to comply strictly in accordance with the requirement and the terms and conditions mentioned above.

We are hereby attesting all the pages of the tender document & submitting the same in proof of our acceptance of the terms of the tender.

Yours faithfully,

SIGNATURE OF THE BIDDER WITH SEAL

4. COMPLETION PERIOD

(To be submitted in the letter pad of the firm indicating full name and address, telephone no. & E-mail etc.)

_____ (Name of the Work)
as per the Schedule shall be completed within a period of **20 days** from the date of PO/Site clearance irrespective of the no of sites awarded.

SIGNATURE OF THE BIDDER WITH SEAL

5. REQUISITION FORM FOR E-PAYMENT

Certified that I am having a Savings / Current Account in <Name of Bank> -----
----- at <Name of Branch>----- with <IFSC Code>

The Account Number is: _____

I wish to receive all payments in this account through NEFT and RTGS systems, as the case may be, for all payments relating to this work.

Name of Bidder

Place: _____

Date: _____

(Attach Scanned copy of Cancelled cheque of above bank)

6. NO DEVIATION CERTIFICATE

To

Associate Vice President (MD & Prj.)

Hi-care Division,

HLL Lifecare Limited (A Government of India Enterprise)

Corporate Head Office, Poojappura. P.O,

Thiruvananthapuram – 695012,

Kerala, India

Ph: 0471- 2354949, 2775651

E-mail: pskerala@lifecarehll.com

Subject: No Deviation Certificate for _____

(Name of the work)

Tender Ref No.

Dear Sir,

With reference to above this is to confirm that as per Tender conditions we have visited site before submission of our Offer and noted the job content and site condition etc. We also confirm that we have not changed/modified the above tender document and in case of observance of the same at any stage it shall be treated as null and void.

We hereby also confirm that we have not taken any deviation from Tender Clause together with other reference as enumerated in the above referred Notice Inviting Tender and we hereby convey our unconditional acceptance to all terms & conditions as stipulated in the Tender Document.

In the event of observance of any deviation in any part of our offer at a later date whether implicit or explicit, the deviations shall stand null and void.

Yours faithfully,

Date:

(Signature, name and designation
of the Authorized signatory)

Name and seal of Bidder

Note:

In case of Association, the Associate Bidder shall also submit the Form

7. FORMAT OF SITE VISIT CERTIFICATE

Date:

SITE VISIT CERTIFICATE

This is to certify that _____, having its office at _____ has conducted a site visit at the project location:

The visit was carried out on _____ in connection with the following e-tender:

- Name of Work:
- Tender ID:

This certificate is issued upon request of the bidder

Sajith R C
Manager (Civil)
Hi-Care Division (P&S)

PART - V

LIST OF APPROVED MAKES **(In company letter head)**

LIST OF APPROVED MAKES FOR CIVIL AND ELECTRICAL WORK

To be submitted in the letter pad of the firm indicating full name and address, telephone & fax numbers etc.)

TECHNICAL SPECIFICATIONS

1. All the measurements shall be as per the latest edition of B.I.S.
2. The Technical specifications, code of practice etc. shall be referred in accordance with CPWD Specifications and work shall be executed accordingly for all works.
3. Items which are not covered under CPWD Specification shall be carried out as per relevant Indian Standard Specifications of BIS/ NBC/ IRC/ BS/ ASTM/ DIN as directed by the Engineer-in-charge.
4. The detailed specifications for electrical works shall be in accordance with CPWD – General Specifications for Electrical Works Part I (Internal) 2013.

TECHNICAL SPECIFICATION & CONDITIONS – CIVIL WORKS

1. **EARTH WORK:** As per relevant CPWD specifications.
 - A. Irrespective of the stipulations in the relevant CPWD Specifications or elsewhere in the Contract, the excavated earth shall be disposed of by the contractor at his own cost to the place as directed by Engineer – in-charge and/or permitted by the local authority after obtaining written permission of the Engineer – in-charge and no payment will be made by the HLL for disposal of this excavated earth.
 - B. The Contractor shall, at his own expense and without extra charges, make provision for all shoring, pumping, dredging or bailing out water, encountered from any sources such as rain, floods, springs, subsoil water table being high or due to any other cause whatsoever.
 - C. Filling in plinth shall be consolidated with water and compacted with pneumatic rammers, to achieve 90% relative density on testing. One test is to be carried out for 1000 sq.ms. of compacted area.
2. **PLAIN CEMENT CONCRETE AND REINFORCED CEMENT CONCRETE WORK:**
 - A. **STONE AGGREGATE:**
 - i. Stone aggregate used in the work shall be of hard broken stone to be obtained from approved source and shall conform to relevant provision in the Latest CPWD Specifications for works.
 - B. **SAND**
 - i. Sand to be used for the work shall be of as specified in CPWD Specifications 2019. Sand shall be obtained from the source to be got approved by the Engineer in charge and washed if required, with appropriate equipment to bring down the chemical, inorganic and organic impurities within the permissible limits as per the direction of the Engineer in charge. The

same shall consist of hard siliceous materials. Note: Where only one variety of sand is available the sand will be sieved for use in finishing work as directed by the Engineer – in – charge in order to obtain smooth surface and nothing extra will be paid on this account.

- ii. Nothing extra shall be paid for screening or washing the sand as prescribed above.

C. CEMENT

- i. The contractor shall procure 43/ 53 grade ordinary Portland cement [grade as per design/ decision of Engineer-in-charge] conforming to IS 8112/Portland Pozzolana Cement conforming to IS:1489 (Part-I) as required in the work, from approved manufacturers of cement having a production capacity not less than one million tonnes per annum as approved by the Engineer –in –charge. The tenderers may also submit a list of names of cement manufacturers which they propose to use in the work. The tender accepting authority reserves right to accept or reject name(s) of cement manufacturer(s) which the tenderer proposes to use in the work. No change in the tendered rates will be accepted if the tender accepting authority does not accept the list of cement manufacturers, given by the tenderer, fully or partially. The supply of cement shall be taken in 50 kg bags bearing manufacturer's name and ISI marking. Samples of cement arranged by the contractor shall be taken by the Engineer-in-charge and got tested in accordance with provisions of relevant BIS codes. In case the test results indicate that the cement arranged by the contractor does not conform to the BIS codes, the same shall stand rejected, and it shall be removed from the site by the contractor at his own cost within a week's time of written order from the Engineer in-charge to do so. The cement shall be brought at site in bulk supply of approximately 50 tonnes or as decided by the Engineer-in-charge. The cement godown of the capacity to store a minimum of 2000 bags of cement shall be constructed by the contractor at site of work for which no extra payment shall be made.

D. CENTERING SHUTTERING AND SCAFFOLDING:

- i. All Scaffolding centering for RCC shall be with properly designed system and brought to site well in advance so that the progress of the work is not hampered for non-availability of the same.
- ii. All shuttering for RCC work except soffits of slab shall be in water proof shuttering Ply. Shuttering for slab and soffits shall be in water proof shuttering ply or in good quality mild steel plates free of dents, bends or warping and rusting as approved by the Engineer in charge.
- iii. Contractor should deploy complete one set of shuttering materials for minimum one complete floor and the shuttering material for beam bottom shall be minimum for two complete floors.

E. REINFORCEMENT:

- i. TMT reinforcement steel shall be used shall be as per design and conforming to IS: 1786 pertaining to Fe 500D OR Fe 550D grade of steel.
- ii. TMT steel bars manufactured by main producers, as per list of makes, shall be allowed in the work. Contractor shall produce manufacturer Test Report for each dia and each lot Tests. Nothing extra will be paid for “straightening of bars” received from market in coils

or with bends. All incidental charges of any kind whatsoever including cartage, storage, safe custody of materials, cutting and wastage etc. shall be borne by the contractor.

- iii. The actual average sectional weight for dia up to 10 mm shall be arrived at from one meter long samples (minimum 3 from each dia) taken from each lot of steel. The discretion of the Engineer – in – charge shall be final for the procedure to be followed for determining the average sectional weight of each lot. Quantity of each diameter of steel received at site of work each day will constitute the single lot for this purpose.
- iv. The weight of each lot of a particular diameter of 10mm and below shall be reckoned as the weight as per actual issue multiplied by a factor equal to the standard sectional weight of the particular diameter divided by the average sectional weight of the particular dia in a particular lot worked out as per above para. Adjustment for the steel shall be effected on the basis of the weight as modified above for quantity payable.
- v. Measurement of all diameters of steel be on linear basis and will be converted into weight on the basis of standard sectional weight coefficients given in relevant CPWD specifications mentioned in schedule ‘F’ of General Conditions of Contract.
- vi. Measurement of reinforcement shall be as per procedure described in the relevant CPWD specifications mentioned in schedule ‘F’ of General Conditions of Contract

F. CONCRETE MIX DESIGN

The mix design shall be for MODERATE exposure and GOOD degree of quality control, unless otherwise specified.

3. BRICK WORK

A. BRICK WORK

- a. Bricks used in the work shall be obtained from kilns to be got approved from the Engineer in charge and shall be best quality well burnt ground moulded bricks as available in the vicinity. They shall have a compressive strength of not less than 75 Kgs/sq.cm and an absorption percentage of not more than 15 (Fifteen) % of its dry weight when immersed in water for 24 hours. In all other respects they shall conform to the provision in Latest CPWD Specifications for works.
- b. Both the face of wall of thickness more than 23cm shall be kept in the proper plane. Walls of half brick thickness or less shall be measured separately and paid in sqm.
- c. Bricks wall beyond half brick thickness shall be measured in multiple of half brick (i.e. more than 115mm or equivalent) which shall be deemed to be inclusive of mortar joints. In all other respects they shall conform to the provision in relevant specifications of the work.
- d. For mortar, use of PP Cement shall be preferred.

B. Solid/Hollow Block Work

- a. Precast CC blocks shall be procured from approved manufactures or manufactured at site. Nothing extra shall be payable on account of adding any admixture for making pre- cast blocks or for steam curing.
- b. The Solid CC blocks shall have nominal size of 400mm x 200mm x 200mm for 200mm thick masonry wall & Hollow blocks of nominal size 400mm x 200mm x 100mm for 100mm thick masonry wall and shall confirm to IS 2185.

- e. The samples of CC blocks (each sample consisting of 6 specimens) shall be chosen randomly from the lot and tested for various parameters specified below. One samples shall be tested for every 100 cum or part thereof.
- f. Following parameters shall be tested.

Compressive strength.

Water absorption

Density

Dimensional Tolerances

The material shall meet following parameters :

Compressive strength shall be no less than 5.0 N/sq. mm.

Water absorption shall not be more than 5%.

Density shall be not less than 1500 kg/cum.

Dimensional tolerance in the size shall be not more than + 5mm for length and + 3mm for height and width.

- g. Top course of all plinth, parapets, steps and top of walls below floor and roofs shall be laid with solid blocks, properly radiated and keyed into position to form cut (meru) corner. Where blocks cannot be cut to meru corners, cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size) equal to thickness of the coarse shall be provided in lieu of cut blocks. No additional payment shall be made on this account.
- h. Nothing extra shall be payable on account of chasing the CC block masonry work for embedding pipes, electrical boards/ boxes etc. and also filling the chases with cement mortar 1:4 (1 Cement : 4 Coarse sand). The chasing shall however be carried out using machine cutters so as not to disturb the joints in the masonry and without any cracks being developed in the masonry.
- i. All other specifications for 100 mm thick and 200mm thick hollow/solid block work shall be as described for full brick and half brick masonry work respectively.
- j. For unsupported lengths of 100 mm thick walls exceeding 3.5 m, 100 x 200 mm wide R.C. mullions shall be provided at 3.5 m centre, tied to the lintels at door height. Similarly, continuous R.C. beam of size 100 x 150 mm shall be provided at door height for 100 mm thick wall. Such RC mullion/ bands shall be measured and paid separately.

4. CEMENT PLASTER: - The use of PP Cement shall be preferred.

The joints in the brick work, concrete blocks, shall be raked to a depth of 15 mm while the masonry is green. Concrete surfaces to receive plaster shall be suitably roughened. All walls shall be washed with water and kept damp for 10 hours before plastering. The plaster unless specified otherwise shall be average of 12 mm thick on walls. The finished texture shall be as approved by the HLL. The mix for plaster unless otherwise specified, shall be one-part cement and four parts sand, to walls. All plaster work shall be kept continuously wet for seven days.

5. STEEL GRILL WORK:

- a. All steel grills shall be according to the detailed drawings and obtained from approved suppliers. These shall conform to Latest CPWD Specifications for works.

b. In case of grills an approved quality priming coat of zinc chromate shall be applied over and above a shop coat of primer. Nothing extra shall be payable for providing shop coat primer, but the zinc chromate primer, if additionally required, will be paid for separately.

6 .PAINTING

a. MATERIAL

This paint shall be brought to the site of work by the contractor in its original containers in sealed condition. The material shall be brought in at a time in adequate quantities to suffice for the whole work or at least a fortnight's work. The materials shall be kept in the joint custody of the contractor and the Engineer-in- Charge. The empty containers shall not be removed from the site of work till the relevant item of work has been completed and permission obtained from the Engineer-in-Charge

b. SCAFFOLDING

Scaffolding as required for the proper execution of the work shall be erected. If work can be done safely with the ladder or jhoola these will be permitted in place of scaffolding.

c. PREPARATION OF SURFACE

The surface shall be thoroughly cleaned off all mortar dropping, dirt dust, algae, fungus or moth, grease and other foreign matter of brushing and washing, pitting in plaster shall make good, surface imperfections such as cracks, holes etc. should be repaired using white cement. The prepared surface shall have received the approval of the Engineer in charge after inspection before painting is commenced.

d. APPLICATION

Before pouring into smaller containers for use, the paint shall be stirred thoroughly in its container, when applying also the paint shall be continuously stirred in the smaller containers so that its consistency is kept uniform. The lids of paint drums shall be kept tightly closed when not in use as by exposure to atmosphere the paint may thicken and also be kept safe from dust. Paint shall be applied with a brush on the cleaned and smooth surface. Horizontal strokes shall be given, First and vertical strokes shall be applied immediately afterwards. This entire operation will constitute one coat. The surface shall be finished as uniformly as possible leaving no brush marks.

e. BRUSHES & CONTAINERS

After work, the brushes shall be completely cleaned of Paint and linseed oil by rinsing with turpentine. A brush in which Paint has dried up is ruined and shall on no account be used for painting work. The containers when not in use, shall be kept closed and free from air so that Paint does not thicken and also shall be kept safe from dust. When the Paint has been used, the containers shall be washed with turpentine and wiped dry with soft clean cloth, so that they are clean, and can be used again.

7 ALUMINIUM WORK \UPVC

- a. The scope of the work is the fabrication, supply and erection at site of all types of Aluminium/ UPVC glazed doors, windows and ventilators in accordance with the drawings and specifications.
- b. The supply and erection will include all parts such as but not restricted to frames, tracks, guides, mullions, styles, rails, couplers, transoms, rails, plates glazing bars, glass, hinges, arrangement, spring catches, cord and pulley arrangements, spring catches, cord and pulley arrangements door closers floor springs etc., required for the whole work whether the parts/ items

are individually and specifically referred to in the schedules/ specifications/drawings or not provided that the supply and installation of such parts can be inferred there from and are necessary to make the work complete, unless separate provision is made in the bills of quantities for supply to such parts/items.

c. The doors, windows, ventilators, will be fabricated to suit the finished clear openings in the building/structure which the tenderer will himself measure.

d. Materials:-

- i. The members will be made out of aluminum alloy corresponding to IS:733 and will consist of extruded sections and of other shapes, and to sized gauges as shown in the drawings/ described in accordance with the relevant IS codes. The members shall be chosen to provide strength/ stability and maximum resistance to wear and tear.
- ii. UPVC members shall be made of PVC material conforming to IS: 10151.
- iii. The Sections will be as per approved makes, extruded sections. As indicated in the drawings the tenderer should specifically mention which sections he is using.
- iv. The weight of sections and the corresponding catalogue numbers are mentioned.
- v. The weight of sections and the corresponding catalogue numbers are mentioned. The IS specifications are to be strictly adhered.
- vi. The extruder using recycled materials may be preferred.
- vii. The alloy of extruded aluminum should be BS or IS old HE9, Alcon 50 SWP. to this effect test certificate has to be provided for the extruder.

e. Finishing

- i. The extruded aluminum section has to be mechanically finished to remove all scratches; extrusion marks etc and subsequently thoroughly cleared in all alkali baths prior to anodizing.
- ii. The polyester powder coating, as required, as per item of work, shall be of desired shade with minimum average thickness to 50 microns or other shades as required and to this effect the tenderer must have to produce test certificate from authorized institutions Bureau of Indian Standard.
- iii. The polyester powder coated material should be properly wrapped in gummed tape before fabrication to avoid scratches during fabricated and erection shall be kept protected till handing over.

f. Fabrication:

- i. Before commencing the fabrication the contractor shall submit to the Engineer – in - charge for their approval detailed shop drawings, based on the Architectural drawings and corresponding specification showing junctions, fittings, accessories such as hinges flush bolts, locks, latches, latching arrangements, peg stays, rotor arms, anodize pivots gaskets rubber packing door felts, mastic, sealant etc., including fixing and sealing arrangements . Type and method of scaffolding he intends to use, Fabrication is to be taken up only after approval by the Engineer – in - charge and in accordance with the approved drawings. Sections for fabrication of door/ window/ventilators etc shall be as per architectural drawings or as approved by the Engineer – in - charge.

- ii. A sample of finished door / windows/ ventilator railing etc. shall be fabricated as per the shop drawings approved by the Engineer – in - charge for final approval before under taking mass production/ fabrication,
- iii. The doors, window, ventilators and partitions shall be as per thickness given in the approved shop drawings, Polyester Powder coating shall be as specified in the item specifications.
- iv. All materials shall conform to relevant IS. Codes and in the absence of IS code, they should correspond to the best engineering practice; decision of the Engineer – in
- Charge shall be final and binding on the contractor.
- v. Fabrication shall be done true to the drawing/ sample approved and in correspondence to the finished openings at the site. All joints shall be mitered at the corners, true right angles, and joints to be finished neatly to hairlines, with concealed fasteners, wherever possible joints shall be made in concealed locations.
- vii. Site installation shall be with concealed screws, self-tapping or other approved fasteners or may be by welding, due precautions shall be taken to avoid any distortion/ discoloration /damage to the finished items.
- viii. Wood work faces /parts coming in contact with masonry shall before shifting to the site be given a heavy coat of alkali resistance bitumen paint. Steel items coming in contact with other incompatible materials shall be given a thick coat of zinc chromate primer.

g. Glazing:

Glazing shall be done with flawless sheet glass of best approved quality without waviness, distortion, coloration / discoloration, of specified thickness in sizes as shown in the drawings, fixed as required with special glazing clips, putty, neoprene/PVC gaskets. All glass shall be cleaned thoroughly before they are fixed in position. Unless otherwise specified the minimum thickness shall be 5 mm thick.

8. FALSE CEILING

- a. False ceiling items in general are carried out as per the description of the item in the Bill of quantities and also as per the manufacturer's specifications / as directed by the Engineer – in – Charge. 10
- b. Location of particular type of false ceiling shall be as per relevant drawing, in its absence written approval of the Engineer – in - charge shall be obtained.
- c. The false ceiling tiles from manufacturers using recycled materials shall be preferred.

9. FLOORING:

- a. The flooring in the building shall be as per the approved floor finish drawings and laid in such a way that limits in floor levels would not exceed the limits provided in the latest CPWD specifications or manufactures specifications.
- b. Wherever Vitrified Tile flooring is done, it shall be with multy grade/range 1st Quality tiles.
- c. Slope in floors shall be provided as per architectural drawings, else the levels at any place when checked over a distance of one meters in any direction should not show variation in floor level more than 3 mm.

- d. Rate for the items of flooring is inclusive of provision of sunken flooring and finishing edges of the same in bath kitchen, toilets, cutting holes for traps/ pipes etc., and nothing extra shall be paid on this account unless otherwise specified.
- e. Protective layer to be provided of any type of flooring and nothing extra shall be paid on this account.10.

10. STAINLESS STEEL RAILINGS

- a. The scope of the work includes preparation of the shop drawings (based on the architectural drawings), fabrication, supply, installation and protection of the stainless steel railing till completion and handing over of the work.
- b. The stainless steel work shall be got executed through specialized fabricator having experience of similar works. The Contractor shall submit the credentials of the fabricator for the approval of the Engineer-in-Charge.
- c. The Contractor shall submit shop drawings, for approval of the Engineer-in-Charge, for fabricating stainless steel railing with detailing of M.S. stiffener frame work backing along with the fixing details of the M.S. frame work to the R.C.C columns. The details of the joints in the stainless steel railing including location, etc. shall also be shown in the shop drawings.
- d. The Contractor shall procure and submit to the Engineer-in-Charge, samples of various materials for the railing work, for approval. After approval of samples, the Contractor shall prepare a mock up for approval of Engineer-in-Charge/ HITES. The material shall be procured and the mass work taken up only after the approval of the mock up by the Engineer-in-Charge/ HITES. The mock-up shall be dismantled and removed by the contractor as per the directions of the Engineer-in-Charge. Nothing extra shall be payable on this account.
- e. The stainless steel shall be of grade 316 with brushed steel satin finish and procured from the approved manufacturer. It shall be without any dents, waviness, scratches, stains etc.
- f. The required joints in the railing provided as per the architectural drawings, shall be welded in a workmanlike manner including grinding, polishing, buffing etc. all complete and compacted. The temporary clamps provided and fixed to hold the stainless steel railing, in position shall be removed after the concrete has set properly. The junction of the flooring and the cladding shall be neatly filled with weather silicone sealant of approved colour and shade. Nothing extra shall be payable on this account.
- g. One test (three specimens) for each lot shall be conducted for the stainless steel pipe in the approved laboratory. Therefore, the material shall preferably be procured in one lot from one manufacturer.
- h. The finished surface shall be free of any defects like dents, waviness, scratches, stains etc. and shall have uniform brushed st
be rejected and redone by the Contractor at his own cost. The finished surface shall therefore be protected using protective tape which shall be removed at the time of completion of the work. The surface shall then be suitably cleaned using nonabrasive approved cleaner for the material. Nothing extra shall be payable on this account.
- i. The item includes the cost of all inputs of labour, materials (including stainless steel pipes, welding, brazing, concrete, protective film, weather silicone sealant etc including cost of providing and fixing

M.S. frames), T & P other incidental charges, wastages etc. The items also included providing and fixing stainless steel anchor fasteners for fixing railing.

- j. The railing shall be fixed in position using stainless steel pipes, stainless steel posts of required diameters and thickness as shown on drawing and polished to satin finish including cutting, welding, grinding, bending to required profile and shape, hoisting, butting, polishing etc.
- k. The item includes the cost of all inputs of labour, materials, T&P, other incidental charges, wastage etc. The entire work shall be carried out to the satisfaction of Engineer-In-Charge.

11. GLASS:

- a. All glass and glazing material shall be verified and coordinate with the applicable Performance requirement.
- b. All glass shall be cut to require size and ready for glazing. All glass shall be accurate sizes with clear undamaged edges and surfaces which are not disfigured. Any panel which does not fit any section of the curtain wall and shop front will be rejected and a replacement made at the Contractor's expense.
- c. Glass shall conform to the quality, thickness and dimensional requirement specified in Bill of Quantities/ CPWD Specification.
- d. Heat strengthened glass shall not deviate in surface flatness by more than 0.23 mm with in 260mm of leading or trailing edge, or 0.076 mm in centre. Direction of ripple shall be consistent and is acceptable to Engineer-in-charge. Distortion of glass shall be controlled as much as possible during heat strengthening. Sag distortion shall be unidirectional and surface compression shall be in the range of 320-450 Kg/cm². All glass shall be delivered to site with the manufacturer's label of identification attached.
- e. The glass glazed panel/ structural glazing frames for the structural glazing system shall be designed to withstand lateral imposed loads and comply with requirement of local building codes.
- f. Glass shall be free from defect or impurities detrimental to its performance. Defects such as bubbles, waves, spots scratches, spalls, discoloration, visibly imperfect coating, chipping, and bubbles delaminating of opacifier film shall be limited in accordance with the Manufacturer's / trade guidelines. The glass is to be produced in such a way that the rollers will be parallel to what will be the horizontal position of the glass. Glass should be consistent in colour.
- g. Double glazed units shall be procured only from approved manufacturer. Quality control tests shall be performed for mixing, curing, adhesion and dew point. The unit shall be guaranteed against condensation and dirt between the panes, failure of seal and damage to internal coating.
- h. All glass breakage caused by the Contractor or his sub-contractor because of negligence or caused by the installation of faulty work by him shall be replaced by the Contractor at his own expense without delay to the project completion.

12. WATER PROOFING TREATMENT:

All the items for water proofing treatment with cement based water proofing treatment for roof slab and sunken portion in schedule of quantities shall be guaranteed for TEN YEARS the case of cement based treatment by the contractor as per Performa prescribed. The water proofing treatment work should be got done through specialized agency approved by EIC.

13. WATER PROOFING TREATMENT FOR ROOF /SUNKEN FLOORS OF W.C'S ETC.

- a. Water proofing treatment for roof/ sunken floor has to be carried out as per the respective Bill of Materials/ CPWD Specification.
- b. The finished surface after water proofing treatment shall have required slope.
- c. While treatment of sunken floors is done it shall be ensured that the 'S' or 'P' traps as the case may be have been fixed/ eased and rounded off properly the work shall be carried out as per relevant CPWD specifications.
- d. **GURANTEE:** The above water proofing, treatment shall be guaranteed for TEN YEARS against any leakage etc. the contractor shall have to execute a bond, 10 % of cost of items executed for water proofing shall be retained for 10 years as security (Refer GCC provisions).

14. ANTIBACTERIAL PAINT

- a. The Antibacterial Paint shall be able to provide anti-Microbial Protection:
- b. The scope of work includes providing & applying approved makes anti-Microbial Paint on wall surfaces as per manufacturer's specifications complete in all respect & as directed by Engineer-in-charge. Following are the desired characteristics of the paint:
 - i. **Protection:** The product hygiene coatings to start the biocidal action as soon as the microorganism land on the surface, and prevents the growth of mould, bacteria and yeasts for at least 5 years.
 - ii. **Lily Cycle Savings:** The unparalleled durability of hygiene coatings should help to extend the maintenance cycle and to minimize all related material, labour and shut down costs.
 - iii. **Chemical Persistence:** The hygiene coatings should be highly resistant to abrasives, detergents and weak acids and alkalis used in cleaning

15. CHLORINATED POLYVINYL CHLORIDE (CPVC) PIPES

CPVC pipes & fittings used in hot & cold potable water distribution system shall conform to requirement of IS 15778. The material from which the pipe is produced shall consist of chlorinated polyvinyl chlorides. The polymer from which the pipe compounds are to be manufactured shall have chlorine content not less than 66.5%. The internal and external surfaces of the pipe shall be smooth, clean and free from grooving and other defects. The pipes shall not have any detrimental effect on the composition of the water flowing through it.

LIST OF APPROVED MAKES (CIVIL WORKS)

SN	Material	Approved Make/Manufacturers
1	Plywood /Block board /Ply board	Duro/ Greenply/ Century/ Kitply/ National/ Archiply/ Merino/equivalent
2	Pre-laminated particle board / Veneered particle board	Novapan /Century /Green Ply /AK Plywood/ Merino/equivalent
3	PVC door/shutter	Rajshri/ Plasopan/ Synkapolywood/ Polyline Sintex/ Polyex/equivalent
4	Clear Glass / Clear Float Glass / Toughened Glass/ Mirror/ Structural Glazing	Modiguard/ Saint Gobian (SG)/ TATA Continental/ Asahi India Safety Glass Ltd/equivalent

SN	Material	Approved Make/Manufacturers
5	Glass Wool / Insulation Boards	Rockwool/ UP Twiga/ Liloyd Insulation/ equivalent
6	Aluminum building hardware	IPSA/ Everite/ EBCO/ ECIE/ Hardwyn Traders/equivalent
7	Aluminium Sections	Jindal/ Hindalco/ Indal/equivalent
8	UPVC Doors & Windows & Partitions	Fenesta/ Lingel/ CASSA/ Evolution/ Kommerling/ NCL Wintec/ Duroplast/AparnaVenster/equivalent
9	UPVC Toilet Doors	AMD Overseas/ Fenesta/ Lingel/ CASSA/ Evolution/ Kommerling/ NCL Wintec/ Duroplast/AparnaVenster/equivalent
10	Locks/Latches	Godrej/ Harrison/ Hettichplaza/ yale/ link/equivalent
11	Door Hardware	Dorma/ Kich/ Classic/ Haffle/ Ozone/ Geze/equivalent
12	Hydraulic Door Closer/Floor Spring	Godrej/ Hardwyn/ Dorma/ Everite/equivalent
13	Adhesive for tiles	Cico / Pidilite / ArdexEndura / Sikka / Fosroc / BASF/ MYK Laticrete
14	Adhesive for Wood Work	Fevicol/ Pidilite/ ArelditeCico/ Vamicol/ Dunlop/equivalent
15	Fastener	Fisher/ Hilti/ Canon/ Bosch/equivalent
16	Fire Sealant	Hilti/ Promat/ Birla/ 3M/equivalent
17	Silicon sealants /Weather Sealant / Structural Glazing Sealant/ Additives	Asian paints/ Foscroc/ Pidilite/ GE- Silicon/ Pidilite/ CICO/ Sikka/ MYK Arment
18	Cement	ACC/ Coromandel / Ultra tech/ JK Cement/ Ambuja/ India Cement/ Ramco/ Dalmia/ Malabar Cement/ Birla/ Chettinad/ Cement Corporation of India/ Bharati/equivalent
19	Concrete Additive	Sikka/ CICO/ Pidilite/ Fosroc/ Fairmate/ MC Bauchemie / BASF/ MYK Arment
20	Concrete Admixture	Fosroc/ Pidilite/ MYK Arment
21	AAC blocks	Xtralite from Ultratech/ Aerocon from HIL/ Siporex India Limited/equivalent
22	Damp proof material	Impermo/ Duraseal/ ACCO-proof/
23	Gypsum Board / Gypsum False Ceiling/ Gypsum Partitions	India Gypsum/ SaintGobain/ Lafarge/ Boral Gypsum/ Armstrong/equivalent
24	Calcium Silicate Boards & Tiles False Ceiling	India Gypsum/ Aerolite/ RAMCO (Hilux)/ Saint Gobain (Gyproc)/equivalent
25	Metal false Ceiling	Armstrong/ Hunter-Douglas/ USG/ Unimet/ equivalent

SN	Material	Approved Make/Manufacturers
26	Mineral fibre false Ceiling	Armstrong/ Decosonic/ USG/ AMF/ Saint Gobain (Gyproc)/equivalent
27	Ceramic Tiles	Kajaria/ Somany / H & R Johnson/ Orient - Bell NITCO/ RAK/equivalent
28	Vitrified Tiles (Double/ Fully Charged)/ Gem Free	Kajaria/ Somany / H & R Johnson/ Orient- Bell/ NITCO /RAK/equivalent
29	Epoxy Flooring	CIPY/ FOSROC/ ArdexEndura/ Dr. Beck/ Flamaflor/ BASF/ MYK Arment
30	PVC Flooring	LG Floors / Gerflor / Premier Vinyl flooring / Armstrong/equivalent
31	Cement Concrete Paver Tiles/ Drain cover/ Kerb Stone	K.K/ HPL/ TUFFTECH/ NITCO/ Modern/ Dalal Tiles/ CICO/ Bharat Concrete Products/ Ashokaa/ Uni Stone Products (India) Pvt. Ltd/ Hindustan Tiles/equivalent
32	Antistatic Floor Coating	INARCO/ PVC WONDER FLOOR/ ARMSTRON/ MYK Arment
33	Water proofing compound	Dr.Fix/ FOSROC/ SIKKA/ CICO/ Pidilite/ Impermo by Snowcem/ MYK Arment
34	Water proofing Materials (Bitumenistic)	BASF/ Fosroc/ Sikka/ CICO/ Pidilite/ STP/ ArdexEndura/ MYK Arment
35	White Cement	Birla White/ JK White/equivalent
36	Wall putty	JK Wall Putty/ Birla Putty / Nippon/equivalent
37	Synthetic Enamel Paint	Asian (Premium Apcolite Gloss)/ Berger (LuxolHigloss)/ Nerolax/ ICI (Dulux Gloss)/ Nerolac / Jotun/equivalent
38	Oil Bound Distemper	Nerolac/ Berger(BisonAcrylic)/ Asianpaints/
39	Dry Distemper	Berger(Castle)/equivalent
40	Emulsion Paint	Nerolac/ Berger/ Asian paints/ ICI/ Jotun/equivalent
41	Steel/ wood primer	Nerolac/ Berger/ Asian paints/ ICI / Jotun/equivalent
42	Texture Paint	Spectrum/ Unilite Heritage/ Asian/ Berger/ Jotun/ equivalent
43	Epoxy Paint	ICI Dulux/ Nerolac/ Cico/ Sikka/ BASF/ Berger/ Pidilite/ MYK Arment
44	OT: Anti -Fungal Paint	ArdexEndura/ Sikka by Liquid Plastic/ Viesmann/ SSK/ TRILUX/ MYK Arment
45	Water proofing cement paint	Snowcem/ Asian/equivalent
46	Pre –coated galvanized steel Profile sheet & accessories	TATA Bluescope/ DynaRoof/ ESSAR Steel/ JINDAL/ Llyod Insulations India Ltd / S.R Metals/equivalent

SN	Material	Approved Make/Manufacturers
47	Steel section windows, Pressed Steel door frame	San Harvic Steelman Industries/ AGEW/ BHAWANI-STEEL/equivalent
48	Structural Steel Sections/ Rolled Sections & Tubeless Sections	SAIL, TATA (TISCO), RINL, Jindal/ RANA/ Capital/ Kamdhanu/ Prithivi/ Prakashsurya/ Appolo&Hitech/equivalent
49	Reinforcement Steel	SAIL/ TATA(TISCO)/ RINL/ JSW/ JINDAL/equivalent
50	Pre-coated Galvanized Steel Sheet	Tata BlueScope / Llyod Insulations India Ltd / S.R.Metals/equivalent
51	Polycarbonate Sheets	Galina/ GE Plastic / Skyarch/ Polytechno/ Tuflite/equivalent
52	PUF/ Sandwich Panels	Llyod Insulations India Ltd / Jindal / T K E S P Ltd. Isocab Sandwich Panels/equivalent
53	Vitreous china sanitary ware	Jaquar/ Kohler/ Cera/Hindware/ Parryware / Kerovit/equivalent
54	Plastic WC cover	Hindustan Saitary ware, Commander, DIPLOMAT/equivalent
55	Stainless Steel sink	Hindware/ Neelkanth/ Nirali/ Jayna/ Anupam/equivalent
56	G.I pipes	Jindal Hissar/ TATA/ BST/equivalent
57	G.I fittings	Unik/ ZOLOTOM/ DRP-M/ Kent/ equivalent
58	C.PVC pipe	Astral/ Ashirwad/ SFMC/ Finolex/ Ashirwad/equivalent
59	Rainwater & PVC pipes & fittings	Prince/ Supreme/ Finolex/ SFMC/ Astral/equivalent
60	Gun metal valves	Leader/ Sant/ Zoloto/ Kriloskar/ Cera/ Jaquar/equivalent
61	CPVC pipes & fittings	Supreme/ Finolex/ SFMC/ Astral/ Prince/equivalent
62	C.I covers & Manhole covers	RIF/ NICO/ SKF/equivalent
63	SS Gratings/ Soap Dish/ Towel Rail and other SS fitting	Camry/ Glacier/ Gem/ Jaquar/ Grohe/equivalent
64	CP Brass Fittings	Jaquar/ Hindware/ Crome/ Cera/equivalent
65	Floor Drain Fixture & Channel Gratings	Chilly/ Neer/ ACO/equivalent
66	C.P .Grating for Floor Trap	Chilly/ CockroachTrap/ GMGR/equivalent
67	Cast Iron Pipes & Fittings Manhole covers and frames	Electro Steel Calcutta/ Kesoram Calcutta/ NECO/ R.I.F./ B.I.C./ Hepco/ SKF/ Kajeco/equivalent

SN	Material	Approved Make/Manufacturers
68	PVC Storage Tanks	Sintex/ Rotoplast/ Electroplast/ Fusion/ Polycon / Prince/equivalent
69	Anticorrosive Tape for Pipe Protection	PYPKOTE/equivalent
70	Pressure Gauge	HGuru/ Fiebig/ Dwyer/equivalent
71	PTMT Fittings	Prayag/ Jaquar/ Cera/ Prayag/ Polytuf/equivalent

Note:

1. The Engineer-in-charge is at liberty to select any of the brands indicated above. The contractor obtains prior approval from Engineer-in-charge before placing the order listed above.
2. Change of any make of material in case of its non-availability or any other such reason shall be at the discretion of the Engineer-in-charge. The Contractor shall not be allowed to change the makes without their prior permission.
3. Equivalent make of any item may be added with the approval of Engineer in charge, wherever makes have not been specified for certain items, the same shall be as per BIS and as per approval of Engineer.
4. In case of items for which approved make is not given above, the Contractor shall place the order with the prior approval of the Engineer-in-charge.
5. In case of Contradiction between the approved makes/brands specified above and mentioned in the Specifications /Bill of quantities. The decision of the Engineer-in-Charge shall be final and binding on the Contractor.
6. All materials should confirm to relevant standard and codes of BIS and shall have ISI mark.

TECHNICAL SPECIFICATION & CONDITIONS – ELECTRICAL & MECHANICAL SERVICES

1.1. SCOPE OF WORK

The bidder shall supply, install and commission along with requisite spare, maintenance tools and tackles the following equipment and system in the Project. The scope also covers the detailed engineering and calculations of the various equipment/system mentioned hereunder and the same shall be approved by the HLL/Engineer-in-charge prior to execution of the job.

- Light fixtures – internal
- Wiring devices – switches & sockets
- Earthing.
- Laying and termination of L.T. cables.
- Distribution Boards / Sub-Distribution Board.
- Providing power supply to equipment's
- Complete internal building wiring as per specification.
- Safety to personnel and equipment during both operation and maintenance.
- Ease of maintenance and convenience of operation.
- Electrical supply to equipment and machinery within the design operating limits.
- Adequate provision for future expansion and modification.
- Maximum interchange ability of equipment.
- Fail-safe feature.
- Suitability for applicable environmental factors.
- All the necessary Approvals & Liasoning for Load enhancement from present approved load to the required load shall be in the scope of the contractor.

A. ELECTRICAL ITEMS:

GENERAL:

The contractor shall consider the following details in their scope of works no additional cost shall be paid, wherever required:

- All Switch gears shall conform $I_{cs} = 100\% I_{cu}$ as per IEC 61439 part 1 & 2
- Proper bonding to earth.
- Supporting rigid steel framework.
- Painting/ lettering on Breakers and distribution boards, the location they serve, providing on each panel its Circuit diagram.
- Providing cable clamps/supports within distribution boards cable alley.
- All MCB's /MCCB shall be of minimum KA breaking capacity as per CPWD General Specification Part-IV
Substation
- All MCCB's shall be provided with operating mechanism for door interlock.

- All hinged door shall be earthed through 2.5sqmm tinned braided copper wire.
- Tinned copper earth bus shall be provided throughout the length of each board.
- Pad locking of Switch board doors.
- Medium voltage switch boards/distribution boards, the combination of both these and components shall conform to the equipment's of the latest revision including amendments of the following codes and standards.
- All MCB's used for protection of resistive and lightly inductive load shall be type "B" characteristic and inductive (motor) load shall be of type "C" characteristic and discharge lamps and UPS etc. shall be of type D characteristic.
- The drawings, specification and BOQ complement each other and which is shown or called for one shall be interpreted as being called for on both. Material, if any, which may not have been specified but fairly required to make a complete assembly of switch gear as shown on the drawing, specifications shall be construed as being required and no extra charges shall be payable on this account.

WIRING:

- Control and protective wiring shall be done with copper conductor PVC insulated 1100 volts grade multi-stranded flexible wire of 1.5/2.5/4 sq.mm cross section. The colour coding shall be as per latest edition of IS: 375.
- Each wire shall be identified by plastic ferrule. All wire termination shall be made with type connection. Wire shall not be taped or spliced between terminal points.
- Terminal blocks shall preferably be grouped according to circuit function and each terminal block group shall have at least 20% spare capacity.
- Not more than one wire shall be connected to any terminal block. All doorframe of L.T. switchboard shall be earthed with bare braided copper wire.

EARTHING:

All electrical equipment is to be earthed by connecting two earth tapes from the frame of the equipment to a main earthing. The earthing ring will be connected via several earth electrodes. The cable armour will be earthed through cable glands. Earthing shall be in conformity with provision of rules 32, 61, 62, 67&68 of Indian Electricity Rules 1956 and as per IS-3043-1989.

The following shall be earthed:

- All fixtures, sockets outlets, fans, switch boxes and junction boxes etc. shall be earthed with PVC insulated copper wire as specified in item of work. The earth wires ends shall be connected with solder less bottle type copper lugs.

- The resistance between earthing system and the general mass of earth shall not be greater than 1ohm.
- The earth loop resistance to any point in the electrical system shall not be in excess of 1 ohm in order to ensure satisfactory operation of protective devices.
- All earthing conductors shall be of high conductivity copper/ G.I. as per B.O.Q. and shall be protected against mechanical damage. The cross-sectional area of earth conductors shall not be smaller than half that of the largest current carrying conductor.

L.T. CABLES & WIRE:

a) Wires

The design manufacture, testing and supply of single core LEAD FREE FRLS PVC insulated 1.1 KV grade multi-stranded twisted wires under this specification shall comply with latest edition of following standards.

- IS:3961 Current rating for cables.
- IS:5831 PVC insulation and sheath of electric cables.
- IS:694 PVC insulated cables for working voltage up to and including 1100volts. IEC:754(i) FRLS PVC insulated cable.
- Copper multi-stranded twisted conductor FRLS PVC insulated wires shall be used in conduit as per item of work.
- The wires shall be colour coded R Y B, for phases, Black for neutral and Green for earth.
- Progressive automatic in line indelible, legible and sequential marking of the length of cable in meters at every one metre shall be provided on the outer sheath of wire.
- Progressive automatic in line indelible, legible and sequential marking of the length of cable in meters at every one metre shall be provided on the outer sheath of wire.
- The material & insulation of wires shall be ROHS compliant (Reduction of Hazardous Substance) and shall comply the following directives:
- EU Directive 2002/95/EC Issued Jan 2003
- EU Directive 94/62/EC and 2004/12/EC (amendment) EU Directive 91/338/EEC
- EU Directive 91/157/EEC & 98/101/EC (amendment)

Summary on related directives

Directive Ref.	Date	Objective	Remarks
2002/95/EC	27Jan03	Restriction of the use of certain hazardous substances in electrical and electronic equipment	6 banned materials included Pb (Lead), Hg (mercury), Cr6+ (Hexavalent Chromium), Cd (Cadmium) and Flame Retardants- Polybrominated Biphenyls – PBB

		(EEE) and to contribute to the protection of human health and the environmentally sound recovery and disposal of waste EEE.	1000ppm & Polybrominated Diphenyls Esters- PBDE 1000ppm. Max. conc. value - 0.1% by weight in homogeneous material for Pb, Hg, Cr6+, PBB/ PBDE Max. conc. value - 0.01% weight in homogenous material for Cd.
94/62/EC	20Dec94	Amending directive 94/62/EC, on Packaging	The targets defined are the following:
2004/12/EC (amendment)	2Nov04	and Packaging Waste is to prevent packaging waste by encouraging packaging re-use and recycling while at the same time avoid distortions in the internal market.	Recovery of minimum 60% by weight of the packaging waste Recycling of at least 55% and a maximum 80% by weight of the total of packaging materials, with a material-specific minimum recycling rate for plastic of 22.5% Max. sum of concentration levels of Pb,

b) Cables

The design, manufacture, testing and supply of the cable under this specification shall comply with latest edition of following standards:

- IS:8130 Conductors for insulated electric cables and flexible cords .IS:7098 XLPE insulation and sheath of electric cables.
- IS:3975 Mild steel wires, strips and tapes for armoring cables. IS:7098 Current rating of cables.
- IS:7098 XLPE insulated (heavy duty) electric cables for working voltage up to and including 1100volts.
- IS:424-1475(F-3) Power cable-flammability test.
- Specification for cross-linked polyethylene insulated XLPE sheathed cable for working voltage up to 1.1 KV.
- Specification for XLPE insulated (heavy duty) electric cables for working voltages up to and including 1100 volts.
- ASTM-D: 2863 Standard method for measuring the minimum oxygen concentration to support candle-like combustion of plastics (Oxygen Index).
- ASTM-D: 2843 Standard test method for measuring the density of smoke from the burning or decomposition.

c) Technical Requirements:

- The cables shall be suitable for laying in racks, ducts, trenches conduits and under-ground buried installation with uncontrolled back fill and chances of flooding by water.
- They shall be designed to withstand all mechanical, electrical and thermal stresses under steady state and transient operating condition.
- The aluminium /copper wires used for manufacturing the cables shall be true circular/sector in shape before stranding and shall be of uniformly good quality, free from defects. The conductor used in manufacture of the cable shall be of H2grade.
- The cable should withstand 25 KA for 0.5 sec with insulation armour insulated at one end. Bidder shall furnish calculation in support of capability to withstand the earth fault currents. The current carrying capacity of armour and screen (as applicable) shall not be less than the earth fault current values and duration.

Laying of Cables:

- The cable drum shall be placed on jacks before unwinding the cable. Great care shall be exercised in laying cables to avoid forming links. At all changes in directions in horizontal & vertical places, the cable shall be bent with a radius of bend not less than 8 times the diameter of cable.
- The cable of 1.1KV grade shall be laid not less than 750mm below ground level in 36
- a 375mm wide trench(throughout), where more than one cable is to be laid in the same trench, the width of the trench shall be increased such that the interaxial spacing between the cables except where otherwise specified shall at least be 150mm minimum or as per site requirements or as approved by the Engineer-in-charge. Where single core cables are used in multiphase systems, the cables shall be installed in trefoil where possible.

INTERNAL ELECTRICAL WORKS:

1) PVC Conduit:

All conduits shall be high impact rigid 2mm thickness PVC heavy duty type and shall comply with I.E.E. regulations for non-metallic conduit 2mm thick as per IS-40 9537/1983 (Part-III). All sections of conduit and relevant boxes shall be properly cleaned and glued by using epoxy resin glue and the proper connecting pieces. Inspection type conduit fittings such as inspection boxes, drawn boxes, fan boxes and outlet boxes shall be M.S. or otherwise mentioned. Conduit shall be terminated with adopter/PVC glands as required.

Accessories:

Conduit accessories such as normal bends, unions, circular junction boxes and pull boxes, locknuts etc. shall be heavy gauge type and approved make. Conduit accessories shall conform in all respects to IS: 3837-1966 with latest amendment. Wherever several conduits are running together,

adequately sized adoptable boxes common to all runs shall be used to avoid inserting inspection boxes in the individual run. Where it is necessary to segregate wiring metal filler shall be fixed with in the box.

Separate conduit shall be used for:

- 1) Normal light, fan call bell
- 2) 16 A power outlet
- 3) Emergency Light Point
- 4) Fire alarm System
- 5) Computer Outlets
- 6) P.A System
- 7) Telephone system
- 8) TV Network
- 9) Or any other services not mentioned here.

Wiring for short extensions to outlets in hung ceiling or to vibrating equipments, motors etc. shall be installed inflexible conduits. Flexible conduits shall be formed from a continuous length of spirally wound interlocked wire steel with a fused zinc coating on both sides. The conduit shall be provided with approved type adopter. A separate and accessible earth connection shall bond across the flexible conduit.

Conduit runs on surfaces shall be supported with metal 1.2mm thick saddles, which in turn are properly secured on to GI spacer to the wall or ceiling. Fixing screws shall be with round or cheese head and of rust proof materials. Exposed conduits shall be neatly run parallel or at right angles to the walls of the building and shall be painted in color matching the adjoining area. Unseemly conduit bends and offsets shall be avoided by using better appearance. Cross cover of conduits shall be minimum and entire conduit installation shall be clean and with good appearance. For surface work, the boxes shall be raised back pattern type, designed for use with distances addles to give clearance of 6mm between the back of conduit and the fixing surface.

Wiring:

All the wiring installation shall be as per IS: 732 with latest amendment. PVC insulated copper conductor cables as specified in bills of quantity shall be used for sub-circuit runs from the distribution boards to the points and shall be pulled into conduits. They shall be twisted copper conductors with the thermos-plastic insulations of 660/1100volts grade. Colour Code for wiring shall be followed.

Looping system of wiring shall be used, wires shall not be jointed. Where joints are unavoidable, they shall be made through approved mechanical connectors with prior permission of the HLL. No reduction of strands is permitted at terminations. No wire smaller than 1.5sq.mm shall be used and shall be as per B.O.Q. Wherever wiring is run through trunkings or raceways, the wires emerging

from individual distributions shall be bunched together with cable straps at required regular intervals. Identification ferrules indicating the circuit and DB number shall be used for submains sub-circuit wiring. The ferrules shall be provided at both end of each submain and sub-circuit.

Where single-phase circuits are supplied from a three phase and a neutral distribution board, no conduit shall contain the wiring fed from more than one phase. In any one room in the premises where all or part of the electrical load consists of lights, fans and/or other single phase current consuming devices, all shall be connected to the same phase of the supply. Circuits fed from distinct sources of supply or from different distribution boards or through switches or MCBs shall not be bunched in one conduit. In large areas and other situations where the load is divided between two or three phase, no two single-phase switches connected to different phase shall be mounted within one box.

Conduit size	20mm		25mm		32mm		40mm		50mm		60mm	
Wire size in sq.mm.	S	B	S	B	S	B	S	B	S	B	S	B
1.50	7	5	1 2	1 0	2 0	1 4	-	-	-	-	-	-
2.50	6	5	1 0	8	1 8	1 2	-	-	-	-	-	-
4	4	3	7	6	1 2	1 0	-	-	-	-	-	-
6	3	2	6	5	1 0	8	-	-	-	-	-	-
10	2	-	4	3	6	5	8	6	-	-	-	-
16	-	-	2	-	4	3	7	6	-	-	-	-
25	-	-	-	-	3	2	5	4	8	6	9	7

Notes:

The above table shows the maximum capacity of conduits for a simultaneous drawing in of cables. The columns heads 'S' apply to runs of conduits which have distance not exceeding 4.25 m between draw in boxes and which do not deflect from the straight by an angle of more than 15 degrees. The columns heads 'B' apply to runs of conduit which deflect from the straight by an angle of more than 15 degrees.

The Contractor shall be responsible for:

Detailed co-ordination with other services, shop drawings for various electrical layouts such as equipment layout, lighting layouts, cabling layouts, earthing and lightning protection layouts, including equipment installation and cable termination details etc. prior to start of work.

- Preparation of bill of materials for cabling, lighting, earthing and miscellaneous items etc.
- Cable schedule.
- Lighting/power panel schedule.
- Inter connection drawing.
- Protection co-ordination drawings/tables for complete power system.
- Shop inspection and testing procedures.
- Field testing and commissioning procedures.
- Preparation of as built drawings for all services.

B. ELV (EXTRA LOW VOLTAGE)

GENERAL:

All the material shall must confirm the good working condition as per the local weather/temperature and environmental condition. The work covered under this contract shall include furnishing of all labour, materials, equipments and services required for the Security systems in accordance with the drawings and specifications.

The specifications given here shall be used to identify the requirement for rich and a high standard integrated Fire Alarm system, CCTV System, Public Address System, Access Control System, Passive Security System and Structured Cabling & Active Devices. All systems shall provide satisfactory operations, in the range of 110% and 85% of rated voltage.

Technical specifications & schedule of quantities provided under different headings are as mentioned below:

- 1. STRUCTURED CABILING AND ACTIVE DEVICES**
- 2. PUBLIC ADDRESS SYSTEM**
- 3. CCTV SYSTEM**
- 4. ACCESS CONTROL**
- 5. FIRE DETECTION SYSTEM**

1. STRUCTURED CABILING AND ACTIVE DEVICES

Structured Cabling: The cabling design to the department LAN cabling shall be as per the TIA/EIA-T568-A standards/ TIA/EIA-T568-B standards.

Faceplate: Faceplate shall meet the following requirements:

- a) Shall have the ability to fit a dust cap or shutter to prevent dust and dirt getting into the outlet for single, dual, Quad or Hexa outlets.
- b) Shall have clear label for application identification
- c) Shall be able to have 1,2,3,4,6 or 12 outlets
- d) Shall have options for vertical style or horizontal style.

- e) The faceplate housing the UTP connector modules shall have no visible mounting screws.
- f) The faceplate housing the UTP connector modules shall have aperture plugs to cover any unused openings in the faceplate.
- g) The faceplate housing the UTP connector modules shall provide flexibility in configuring multimedia workstation outlets that respond to present or future network needs such as audio, video, coaxial and optical fiber application

Modular Jack connector: TIA / EIA-T568-A defines four basic modular jack styles. The 8-position and 6-position keyed modular jacks are commonly referred to as RJ45 (Registered Jack) connector and keyed RJ45. The 6-position modular jack is commonly referred to as RJ11. RJ45 is the standard connector for unshielded twisted pair cabling. RJ 45 is a plastic connector with eight pins. It allows insertion in only one way. The jack wiring specification is as per the Universal Service Ordering Codes (USOC).

Patch Cord: The Patch cord shall meet the following requirements:

- a) Shall consist of 8 Solid copper conductors terminated with RJ 45 plugs at both ends.
- b) Shall meet transmission performance and comply to EIA/TIA 568-B.2 and ISO/IEC 11801-CAT 6 minimum standard for patch cord testing (as per Annex 3)
- c) Factory terminated with options for 1.2 meter, up to 12.8 meters with a long flexible boot and in different colors. The boot material should be injected into the plug to retain the position of the conductors. The Boot should be at least 2" long with built-in bend radii maintaining technology. (d) Shall have Characteristics impedance of 100Ω +/- 5% @ 100 MHz. (e) The Patch cord shall

Patch Panel: Rack mounted patch panels shall be used for termination of copper cables or rack mount fiber termination unit shall be used for termination of optical fiber cable. 11.2.8.

Patch cords shall be provided for cross-connections to facilitate Moves, Adds and Changes (MACs). They shall be able to support up to Category 6 applications and shall be NEXT compliant. 11.2.8.2 The cross connect module shall be (a) (b) (c) Fire-retardant, molded plastic modules UL 94 V-0 rating, consisting of horizontal index strips for termination of Cat5 25 pair module to ensure ease of re-termination in case of wrong pair termination or NEXT compliant RJ 45 Modular jack panel. 10/25 pair disconnection module for incoming voice or 8/10/25 pair disconnection module for all data services.

The UTP copper cables: The UTP copper cables meet the following requirements: (a) Shall be CMR, LSZH, CMP, or MPR rated form. (b) Shall consist of 23-24 AWG, twisted pair copper conductor with UL approved insulator. (c) Fire retardant PVC Sheath shall have improved frictional properties, allowing it to be pulled through conduit without the use of lubricants. (d) The insulation should be made from Polyolefin for ruggedness (e) Available in the form of 25 pairs. - minimum Cat5 UTP cable. (f) The UTP multi pair cable shall meet the following electrical specifications: - i. EIA / TIA 568 A commercial wiring standard. ii. All applications as per annex 4 Mutual capacitance (at) 1Khz: 22 nF / 1000 feet. iv. Dc resistance

(Ohms/1000 feet: 28.6 v. Characteristics Impedance: 100 ohms +/- 15 % @ 100Mhz (except 4 Pr)

Optical fiber requirements: Cable must be Armored Single Mode (OM1), Multi-mode (OM1, OM2 or OM3) color coded fibers, jelly filled color coded loose tubes, around the dielectric central strength member, jelly filled, plastic tape, dielectric strength member and outer PE jacket for outdoor use and shall be tight buffered with color-coded PVC for identification for multi-core fiber optic cable (OM1, OM2, OM3 and OS1) for Indoor use

NETWORKING SWITCH: Key considerations for network are – gigabit connectivity to each user from the nearest distribution rack to various users/departments/devices in a topology consisting of core switches at central server room followed by the distribution and edge/access switches.

- a. The network shall have a mix of components for supporting PoE+ as well as non-PoE devices.
- b. A robust fiber optics based backbone is being provided. It shall be based on ring topology using single mode fiber optics cable. The vendor shall ensure that the networking switches shall be populated with the necessary transceivers for achieving this design objective.
- c. Several applications are proposed to run on this network – IP-based voice communications supporting voice-data-video, network based cameras and storage, integrated audio-video, video conferencing, interactive learning, integrated building management systems and important services integration such as fire detection.
- d. The integrators shall propose and supply enterprise class networking switches only

1. WALL /FLOOR MOUNTED NETWORK RACK :

- a) Construction shall be single section welded robust with ventilation holes on the sides and top & bottom covers with provision to mount 2 fans
- b) Top/ Bottom covers and side panels shall be of sheet steel, powder coated Vertical 19” metric panel mounts and door trims shall be of sheet steel and powder coated
- c) The top and bottom covers shall be provided with four cut outs on top and bottom cover for cable entry and round cuts shall be edge protected with rubber grommets
- d) Two pairs of 19” equipment mounting angles with mounting holes conforming to IEC 297-3
- e) Toughened glass front lockable door
- f) Wall mounted Networking rack shall be available in various heights
- g) Cooling shall be achieved with the help of two fans, 90 CFM capacity each, mounted on top
- h) Power shall be provided in form 19” rack mountable power strip which shall consist of minimum four 5/15A power sockets.
- i) Cantilever shelf – at least one front mounting 1U cantilever shelf shall be provided with depth of 250 mm or more

- j) 1U vertical cable managers on a/r (as required basis) for dressing of cables for 24 ports patch panel, 24 ports switch Hardware Pack / Rack mounting accessories and hardware – as required Horizontal managers on A/R basis for ensuring neat and aesthetically clean installation

2. PUBLIC ADDRESS SYSTEM

The Public Addressing system shall be as per the IEC 60268-7 (Audio equipment - Part 7: Public address systems), IS 10201 (Audio equipment - General requirements and methods of test), and specific guidelines regarding power supply, noise levels, intelligibility, and safety features depending on the project's requirements and location, with consideration for local regulations and building codes

The scope of work under this shall include designing supplying and installing of Public Address System. The work under this system shall consist of furnishing all materials, equipment's and appliances and labour necessary to install the said system, complete with Speakers, Amplifiers, Mike and Zone Selection Panel.

System Design

The Speakers shall be distributed in the entire floor and shall be configured into multiple zones. The announcement can be made zone wise or to all the speakers simultaneously in ALL CALL mode. Fire Alarm shall be announced immediately on receipt of Fire signal from the panel to all zones.

The PA System shall serve to,

- a) Play the music
- b) Making general announcement
- c) Make announcement in car park
- d) Transmit fire tone under fire condition

Amplifier

Amplifier shall be USB/BLUETOOTH player and AM/FM Tuner with World space receiver, with remote control and suitable to for 220-240V AC supply operations.

Speakers

Speakers shall be especially designed for broadcasting high quality, integrated emergency fire alarm signals and voice communications and approved by an appropriate authority for use in such situations.

Speakers shall be ceiling or Column mounted as shown in the schedule of work and shall be completed with mounting brackets accessories etc. Speakers shall be in wooden or metal enclosures.

P A System Wiring

High-quality twisted pair cable designed for connecting speakers and amplifiers in commercial I A/V systems. The speakers in each zone are connected in parallel and are connected to the respective output. The cables from each zone are separately routed and terminated in the Panel.

Testing and commissioning

Entire PA system shall be tested to establish the following.

- a) Functionality of the PA system
- b) Combined systems shall be tested for the overriding feature for prioritizing fire alarm and life safety requirements.
- c) Acceptable audibility of the public address in all spaces and record sound pressure levels of the Public address viz the ambient noise levels.

DOCUMENTATION:

The contractor, upon completion of the commissioning activity, shall hand over the system to the customer. At the time of hand over, the contractor shall provide the customer with the following documentation:

- a) Copy of detailed report
- b) Component and equipment list
- c) Product description sheets
- d) System design drawing(s)
- e) System schematic diagram(s)
- f) System operating manuals

3. CCTV SYSTEM

CCTV cameras and recorders must be registered and manufactured according to IS 13252 (Part 1):2010 under the BIS Compulsory Registration Scheme from the Bureau of Indian Standards (BIS)

The camera shall meet the following networking standards:

- IEEE 802.3af (Power over Ethernet)
- IPv64
- IPv67
- QoS – DiffServ (RFC 2475)

Work includes providing all material, equipment, accessories, hardware, software, licenses, services and tests necessary to complete and make ready for operation by the NETWORK/IP based CCTV System in accordance with the design & specifications given in Technical Specifications of the Security Surveillance System.

System should be programmed such that operator's intervention if required shall be minimal and the system should provide features like guard tours, preset positions and the preset positions will be linked to perimeter protection system/intrusion system in future. The NVR/DVR should allow for recording of events both continuous and motion triggered as per requirement and recordings should be able to create evidences and support post event analysis.

GENERAL REQUIREMENTS

- The camera shall be of manufacturer's official product line, designed for commercial/industrial 24/7/365 use.
- The camera shall be based upon standard components and proven technology using open and published protocols.

QUALITY ASSURANCE

- All camera installation, configuration, setup, program and related work shall be performed by electronic technicians thoroughly trained by the manufacturer in the installation and service of the equipment provided.
- All equipment provided shall be backed by a minimum of one-year manufacturer warranty.
- The specified unit shall be manufactured in accordance with ISO 9001 / EN 29001.

CCTV wiring standards

Using RG59 or RG6 cables for video transmission, ethernet cables for IP-based systems, and coaxial cables for analog video transmission. Optical fiber cables are also used for high-speed CCTV.

RG59 and RG6 cables

- RG59 is the industry standard for transmitting video signals.
- RG6 is a thicker gauge cable that can also be used for surveillance cameras.

- These cables are shielded from most video interference.

Ethernet cables

- Ethernet cables (Cat5e, Cat6) are used for IP-based systems.
- They connect IP cameras to the internet and power the cameras.

Coaxial cables

- Coaxial cables are used for analog video transmission.

Optical fiber cables

- These cables use pure glass to transmit data via light.
- They are the fastest option of all the cables mentioned.
- They are expensive, delicate, and require more technical know-how than other cables.

CCTV wiring

A standard practice is to use PVC conduit with a minimum diameter of 20mm ($\frac{3}{4}$ inch), depending on the number of cables being run, with larger diameters needed for multiple cables or long runs; always consult local building codes for specific requirements in your area.

- **Cable type:** The type of CCTV cable (e.g., coaxial, UTP, or fiber optic) will influence the conduit size needed.
- **Number of cables:** More cables require a larger conduit diameter.
- **Environmental factors:** Outdoor installations may require heavier duty conduit with additional protection against weather elements.
-

Common conduit sizes for CCTV:

- **Small installations:** 20mm ($\frac{3}{4}$ inch) conduit for a few cables.
- **Medium installations:** 25mm (1 inch) conduit for moderate cable runs.
- **Large installations:** 32mm (1 $\frac{1}{4}$ inch) conduit for multiple cable runs or long distances.

b) ACCESS CONTROL

Proposed system should consist of Biometric Finger/Face scan for staff access entry to have extreme security. Offered Reader should be high quality, technologically advanced and high pixel face detection camera. Single door Electromagnetic Locks Capacity of Holding Pressure 300 /600 Lbs should be installed at the entry door for staff entry. Entire system should have Access Server PC along with required Hardware & SQL Database Software.

A. Common Features:

1. Software to generate time and attendance report
2. Door Controls:

- a. Door open and close alarm activation
- b. Door lock capabilities with locks
- c. Door Switch
- d. Switch or keypad (internal)
- 3. Status control and anti-pass back
- 4. Flexible (minimum 32) sets of time zone to provide user to set up each time zone with different time districts
- 5. Self-hardware testing function when equipments are activated
- 6. Internal battery included during power shortage
- 7. Battery operation possible when AC power is interrupted
- 8. Data logging facility for minimum 5,000 Access transaction
- 9. Capable of communicating with multiple readers to provide online information
- 10. Add more readers without changing software
- 11. Communication, information Inquiry / Setting through RS-232/422/485 and Ethernet
- 12. Remote Web Management Interface or functionality to be accessed from any workstation.
- 13. Grant or deny access to single or group of employees to a single or all entrances.
- 14. Back-end Database (industry Standard)

CABLING FOR ACCESS CONTROL

0.5 Sq mm X 8 Core Shielded Flexible FRLS Cable

- Size : 1.5 Sq mm
- Core : 8 Core
- Conductor Type : Flexible Copper
- Insulation : PVC
- Sheathing : FRLS
- Shielding : Foil
- Voltage Grade : 300/500 V

The vendor will be responsible for all the related accessories, software, locks, cables, minor civil work (if required), documentations, configuration and commissioning of the devices at the existing network (Ethernet CAT-5). The cost of items should be inclusive of these services and items.

PANIC / EMERGENCY EXIT SWITCH:

Specification

- Weight : 0.18 kg
- Dimensions (HxWxD) : 93x89x59.5mm
- Operating Temperature : -10 °C to +55 °C
- IP Rating : IP24D

c) FIRE DETECTION SYSTEM

This section of the specification includes the furnishing, installation, connection and testing of the conventional and microprocessor controlled, intelligent reporting fire alarm equipment required to form a complete, operative, coordinated system. It shall include, but not be limited to, alarm initiating devices, alarm notification appliances, Fire Alarm Control Panel (FACP), auxiliary control devices, annunciators, and wiring as shown on the drawings and specified herein.

The fire alarm system shall comply with requirements of NFPA Standard 72/EN54 LPCB for Protected Premises Signaling Systems except as modified and supplemented by this specification. The system shall be electrically supervised and monitor the integrity of all conductors.

The system and its components shall be Underwriters Laboratories or Loss Prevention Certification Board Inc. listed under the appropriate UL/ EN54 testing standard as listed herein for fire alarm applications and the installation shall be in compliance with the UL/EN54 listing

EQUIPMENT AND MATERIAL

General:

All equipment and components shall be new, and the manufacturer's current model. The materials, appliances, equipment and devices shall be tested and listed by a nationally recognized approvals agency for use as part of a protective signaling system, meeting the National Fire Alarm Code.

All equipment and components shall be installed in strict compliance with manufacturers' recommendations. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc., before beginning system installation.

All equipment shall be attached to walls and ceiling/floor assemblies and shall be held firmly in place (e.g., detectors shall not be supported solely by suspended ceilings). Fasteners and supports shall be adequate to support the required load.

Where required, all wiring shall be installed in conduit or raceway. Conduit fill shall not exceed 40 percent of interior cross sectional area where three or more cables are contained within a single conduit.

Cable must be separated from any open conductors of power, or Class 1 circuits, and shall not be placed in any conduit, junction box or raceway containing these conductors, per NEC Article 760-29.

Wiring for 24 volt DC control, alarm notification, emergency communication and similar power-limited auxiliary functions may be run in the same conduit as initiating and signaling line circuits. All circuits shall be provided with transient suppression devices and the system shall be designed to permit simultaneous operation of all circuits without interference or loss of signals.

Conduit shall not enter the fire alarm control panel, or any other remotely mounted control panel equipment or back boxes, except where conduit entry is specified by the FACP manufacturer.

Conduit shall be 25mm minimum.

Wire:

All wires shall be of FRLS PVC insulated copper conductor as per BOQ

Intelligent thermal or Heat Detectors

Thermal detectors shall be intelligent addressable devices rated at 135 degrees Fahrenheit (58 degrees Celsius) and have a rate-of-rise element rated at 15 degrees F (9.4 degrees C) per minute. It shall connect via two wires to the fire alarm control panel signalling line circuit.

The detector shall be capable to configure and to be addressed manually as well as from software or remote locations also.

Beam Smoke Detectors

Sensing Range: 5 to 50 meters □ Adjustment Angle: $\pm 10^\circ$ horizontal and vertical.

Typical sensitivity levels: Level 1 — 25%. Level 2 — 30%. Level 3 — 40%. Level 4 — 50%.]

Fault Condition (trouble): 96% or more obscuration blockage. In alignment mode. Improper initial alignment. Self-compensation limit reached.

Alignment Aid using optical gun sight or integral signal strength indication or Two-digit display.

Addressable manual call box

Addressable manual fire alarm boxes shall on command from the control panel, send data to the panel representing the state of the manual switch and the addressable communication module status. They shall use a key operated test-reset lock, and shall be designed so that after actual emergency operation, they cannot be restored to normal use except by the use of a key.

All operated stations shall have a positive, visual indication of operation and utilize a key type reset. All entrances and stair levels shall be equipped with a pull type manual call point to activate an alarm. Manual call points shall be located in a manner so as to give an easy access to occupants in emergency; these shall be at entry/exits and within 30 meters distance.

Sounder and strobe:

Shall follow NFPA 72 2013.

1. Electronic sounders shall operate on 24 VDC nominal.
2. Electronic sounders shall be field programmable without the use of special tools, at a sound level of at least 90 dBA measured at 3 meters from the device.

Addressable Control Module (Whether Applicable Separately)

Addressable control modules shall be provided to supervise and control the operation of one conventional NACs of compatible, 24 VDC powered polarized audio/visual notification appliances.

- a) Audio/visual power shall be provided by a separate supervised power circuit from the main fire alarm control panel or from a supervised remote power supply from the same OEM
- b) . The control module shall be suitable for pilot duty applications and rated for a minimum of 2.0 amps at 24 VDC.

Isolator Module (whether Applicable Separately)

Isolator modules shall be provided to automatically isolate wire-to-wire short circuits on an SLC Class A or branch. The isolator module shall limit the number of modules or detectors that may be rendered inoperative by a short circuit fault on the SLC loop segment or branch. Each loop shall have isolator module after every 20 detectors to protected zone of the building.

- a) If a wire-to-wire short occurs, the isolator module shall automatically open-circuit (disconnect) the SLC. When the short circuit condition is corrected, the isolator module shall automatically reconnect the isolated section.
- b) The isolator module shall not require address-setting, and its operations shall be totally automatic. It shall not be necessary to replace or reset an isolator module after its normal operation.
- c) The isolator module shall provide a single LED that shall flash to indicate that the isolator is operational and shall illuminate steadily to indicate that a short circuit condition has been detected and isolated.

TEST

- The service of a competent, factory-trained engineer or technician authorized by the manufacturer of the fire alarm equipment shall be provided to technically supervise and participate during all of the adjustments and tests for the system. All testing shall be in accordance with NFPA 72
- Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.
- Open initiating device circuits and verify that the trouble signal actuates.

- Open and short signalling line circuits and verify that the trouble signal actuates. Open and short notification appliance circuits and verify that trouble signal actuates. Ground all circuits and verify response of trouble signals.
- Check presence and audibility of tone at all alarm notification devices.
- Check installation, supervision, and operation of all intelligent smoke detectors using the walk test.
- Each of the alarm conditions that the system is required to detect should be introduced on the system. Verify the proper receipt and the proper processing of the signal at the FACP and the correct activation of the control points.
- When the system is equipped with optional features, the manufacturer's manual shall be consulted to determine the proper testing procedures. This is intended to address such items as verifying controls performed by individually addressed or grouped devices, sensitivity monitoring, verification functionality and similar

FINAL INSPECTION

At the final inspection, a factory-trained representative of the manufacturer of the major equipment shall demonstrate that the system functions properly in every respect

C. FIRE FIGHTING SYSTEM GENERAL

The scope of work includes the design, engineering, supply, installation, testing, and commissioning of a complete fire-fighting system for the buildings. The system specified in the BOQ must adhere to the tender specifications outlined below. All materials used will comply with the relevant IS specifications, where applicable, and are subject to the approval of the Engineer-in-Charge. The fire-fighting system will be designed and executed in strict accordance with the prevailing norms of NBC-2016, CPWD General Specifications for Electrical Works, Part-V, Wet Riser & Sprinkler System: 2020, and relevant Indian Standards such as IS:13039:2014 (External Hydrant Systems), IS:15105 (Fixed Automatic Sprinkler Fire Extinguishing System), as well as local bye-laws and requirements from the relevant fire inspection authorities. The work will cover the complete process from design and supply to installation, testing, commissioning, and obtaining necessary statutory approvals from fire inspection authorities, including securing the No Objection Certificate (NOC) for the occupation of the buildings.

1.1 WET RISER AND DOWNCOMER

The firefighting system's pipeline design must ensure that the pressure at both the hydraulically remote hydrant and the highest hydrant does not fall below 3.5 kgf/cm² and does not exceed 7 kgf/cm². The pipeline should be engineered to allow discharge at any given location. The design parameters include a maximum flow velocity of 2.5 m/s and a maximum friction loss of 5 meters per 100 meters of pipeline run. The number of risers should be determined based on the following criteria: no corner of the building should be more than 30 meters from the nearest riser, the horizontal distance between two risers should not exceed 50 meters, and one riser must be provided for every 1000 sqm of plinth area or part thereof. These specifications are essential for ensuring adequate water flow and pressure for firefighting operations across the building.

However, number of Risers may be suitably increased to meet given situation as per directions of Engineer-In-Charge. The quantity of Sprinkler & Hydrant, Wet Risers etc. and all other allied equipment shall be provided as per norms of NBC-2016 latest as amended.

All down comer pipes shall be inter connected at the terrace level. In case terraces are not interconnected, all building will be treated as individual buildings. Fire service inlet shall be provided with each Riser/down comer for facilitating pumping of water from fire service tenders.

1.2. INTERNAL HYDRANTS

Internal hydrants shall be installed on each floor at the same location and connected to risers. The firefighting hydrants will be placed in the lobby within the firefighting shaft. Hydrants near the fire exit staircase on each floor must be located within 5 meters from the exit door along the exit access. The number and placement of risers will be determined according to the norms specified in the preceding sections. Each building wing should preferably have independent hydrants.

The landing valve will feature an oblique pattern and will include a GI twist release chain and cap. The manufacturer's name, trademark, year of manufacture, size, and type must be clearly marked. Valves will be coated with a primer followed by two coats of red paint (Shade No. 536, as per IS-5), with paint conforming to IS 2932. The hand wheel will be painted black, and the valve will be BIS-approved. Blank caps will be made of gunmetal. A hydrostatic pressure test will be conducted at 21 kg/cm² for 2.5 minutes, and a flow test will be performed at 7 kg/cm² at 900 LPM. The water-tightness seat test will be conducted at 14 kg/cm². In case of any discrepancies between the manufacturer's standards and the specified values, the parameters must comply with the relevant IS codes.

The RRL hose pipe will be of the non-percolating type, ISI marked (IS:8423), with a 63 mm diameter and 15-meter length (2 Nos.), complete with instantaneous type gunmetal 63 mm dia ISI marked Male & Female couplings (IS:903), securely bound and riveted with copper rivets and 1.5 mm copper wire, and a bursting pressure not less than 22 kg/cm². The external hydrant post will include a standard short size 63 mm dia gunmetal branch pipe with a gunmetal nozzle of 20 mm nominal bore outlet, featuring an instantaneous type 63 mm dia coupling, in compliance with IS:903. The internal hydrant

will be equipped with a fireman's axe with a heavy rubber handle. A swing-type first aid hose reel in red color will be provided with a 30-meter-long, 20 mm dia heavy-duty rubber water hose, a 20 mm dia globe valve stopcock, terminating with a GM coupling and nozzle with a 5 mm outlet and shut-off valve, conforming to IS:8090-1976. It will come complete with a drum and wall-mounted brackets, bolts, and nuts conforming to IS:884-1969.

A mild steel door made of 16 gauge MS sheet, capable of accommodating the fire hose reel, landing valve, hose pipes, fittings, 1 CO2 fire extinguisher, and 1 dry powder fire extinguisher, along with accessories, shall be provided. The door will feature a 1250 mm high front glass with a lock and key arrangement and will be painted with one coat of primer and two coats of finished stove enamelled post office red color paint.

The internal hydrant will be clearly marked on the front with the inscription "FIRE HOSE CABINET" in letters of 75 mm height and 12 mm width, with a luminous sign. The location of these cabinets will be shown on the floor plan and displayed on the landing of the respective exit fire staircase. Internal hydrants must be easily accessible, with a minimum clearance of 1.5 meters in front for operation. They shall not be placed in a lockable room.

A masonry enclosure will be provided on three sides, with minimum dimensions of 1200 mm wide, 800 mm deep, and 2100 mm high. A 200 mm x 200 mm cutout will be provided in one corner of the slab for the wet riser/down comer pipe, and an additional cutout of the same size will be made for the sprinkler pipe and drain pipe.

1.3 BUILDING TO BE SPRINKLER PROTECTED

The sprinkler pipes shall be installed throughout the area to be protected. The structure shall be designed to support sprinkler pipes and the contained water. Inbuilt drainage with slope shall be provided throughout the area so that in the event of operation of sprinkler, water is drained out without spreading to other parts of the building. Storage racks/platforms shall be sufficiently raised above floor. It is essential to make provisions for avoiding water from Sprinkler/hydrant operation entering lifts and electrical rooms.

1.4 FIRE BRIGADE INLET CONNECTIONS/ DRAW OFF CONNECTION

One set of 2/4 ways collector head Fire Brigade connection shall be provided at underground tank, Ring Main, Sprinkler system and individual wet risers as specified conforming to IS 904.

The inlet to the wet riser sprinkler header shall be with 150 mm dia butterfly or sluice valve and non-return valve. The scope shall include necessary reducers, tees bends and special fittings as required.

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It should be provided with M.S. enclosure fabricated from 1.5 mm thick M.S. sheet, front glass locking arrangement supported on M.S. structural members, painting with two coats of postal red enamel.

Fire brigade inlet connection (fire department connection) consisting of 4 Nos. 63 mm dia instantaneous inlet arranged on a 50 mm dia header, 1 No. 150 mm diameter sluice valve, with in built Non-return valve and wall mounted box of M.S. construction made out of 16 gauge MS Sheet with glass door to house the above mentioned components.

Fire brigade draw out connection (fire department connection) with suction pipe MS class 'C' 100 mm dia. & 100 mm dia. foot valve & steel chain including wall mounted box M.S. construction made out of 16 gauge MS Sheet with glass door to house the above mentioned components.

Inlet breeching having C.I. body Two-way gun metal 63 mm dia instantaneous inlets conforming to IS 903 fitted with non-return valves, 25 mm dia gun metal drain cock, blank cap, brass chains and 150 mm dia flanges with all accessories suitable for local fire tender complete as required.

2. PORTABLE FIRE EXTINGUISHERS:

2.1) **ABC Powder stored pressure type Fire Extinguishers** of 4 kg capacity IS:15683 & CO2 gas based Fire Extinguisher of 4.5 Kg capacity with IS :15683, IS 2878 is proposed for all floors near internal hydrant locations.

2.2). **4.5 kg Carbon Dioxide Extinguisher**, IS marked shall be complete with high pressure discharge tube, horn, control valve & CCE approved cylinder. It shall be suitable for extinguishing Class B & C fires. It shall be provided with Wheel type /Squeeze grip type with discharge hose & horn. It shall be suitable for operation within the temperature range of -20°C to 55°C. The test pressure shall be 250 Bar. The minimum effective discharge shall be 95 percent.

2.3). The ISI marked extinguishers and their installations shall be in accordance with acceptable standards of NBC 2016. These units shall be mounted at a convenient height & locations to enable quick access at all times. All requirement of fire extinguishers shall be fulfilled as per as per NBC 2016, Part-4, Table -7, other statutory norms and directions of Engineer-In-Charge.

3. FIRE SIGNAGES:

Various types of signage will be provided throughout the building/complex in compliance with NBC-2016, Part-4. On each floor, near the lift landing, a diagram indicating stairways shall be displayed with the instruction: "IN CASE OF FIRE USE STAIRS UNLESS INSTRUCTED OTHERWISE." This signage will be positioned above the call button in the lift lobby. Additionally, floor signage

indicating the exit path will be placed on each floor within the staircase. The numerical text on these signs will be in bold type, with a minimum height of 75 mm. Directional signage indicating the fire escape route will be placed in each corridor on every floor. All fire-related signage will be LED-lit with UPS power backup or made using photo luminescent paint to ensure visibility in the event of a power failure. These signs will be printed on Photo luminescent U1000 aluminium sheets (1.0 mm $\pm 10\%$) or acrylic boards containing Lumigen II as the base chemical, covered with a UV-stabilized coating. The signs will be of the appropriate size and will be securely fixed to walls, doors, or ceilings using proper clamps, hangers, cleats, anchor fasteners, etc. Text will be either double-sided or single-sided, depending on the requirements. Samples of all fire signage must be submitted for prior approval by the Engineer-In-Charge.

The signage will be lightweight yet highly powerful, capable of penetrating even the finest grills and meshes. It will feature an easy snap safety seal that can be broken in seconds. Each fire extinguisher will be equipped with a pressure gauge, discharge mechanism with an easy snap lever lock, and an EPDM rubber hose. It will be capable of fighting Class A, B, and electrically started fires. The extinguisher will have ISO 9001 and CE certifications, and preferably UL listing and FM approval, conforming to ISI standards. It should come with a warranty of at least 5 years. The extinguisher will preferably have a minimum capacity of 4 kg, a discharge time of approximately 8 seconds, and a range of around 2 meters.

4. PIPE WORK

4.1 SCOPE

This chapter covers the requirements of pipe work in firefighting installations.

4.2 PLUMBING DESIGN

Pipe sizes shown in tender documents are purely for contractor's guidance. The contractor shall be responsible for selection of sizes as per detailed engineering to be done by him. Plumbing design to be done by the contractor shall incorporate the following: -

- (a) Sluice valves shall be provided at suction and delivery sides of pumps.
- (b) External hydrant
- (c) Fire service connection/inlet.
- (d) Test valve.
- (e) Drain connections.
 - i. For testing the system healthiness and automatic operation on daily basis, one test pipe with sluice valve shall be provided in common discharge header. For avoiding wastage of water, this pipe shall discharge water in the tank.
 - ii. Non-return valve shall be provided at the delivery of each pump and fire service inlet. This shall be of swing type.

- iii. Air release valves with ball valve shall be provided in the piping system for venting trapped air with a size of 25 mm for pipes up to 100 mm and 40 mm for larger pipes.
- iv. Plumbing drawings showing the sizes of pipe, valves, layout and other details shall be prepared and shall be got approved from the Engineer-in-Charge before the execution of the plumbing work.

4.3 PIPE MATERIALS

Pipes shall be of the following materials:

- a) Mild steel heavy class (C-class) conforming to IS:1239 for sizes up to 150 mm.
- b) Welded black steel pipe, Class 2, conforming to IS: 3589, for sizes greater than 150 mm. These pipes shall be factory rolled and fabricated from minimum 6mm thick M.S. Sheet for pipes upto 350 mm diameter and from minimum 7 mm thick M.S. sheet for pipes of 400 mm diameter and above. MS pipes may be allowed for extension of existing systems which are laid with CI pipes.
- c) Cast iron double flanged pipe, Class-A conforming to IS 1536 or IS: 1537 (to be provided only in underground application).

Note: For pipe work of Automatic Sprinkler System inside the building, Stainless Steel Pipes and fittings of grade AISI 304 as per JIS standard 3448 are also permitted particularly where replacement of pipes is not easy like areas above false ceiling etc., subject to the condition that these pipes with associated fittings are suitable to safely withstand the system test pressures.

- d) (i) GI Pipe Medium Class (B-class) conforming to IS:1239 (For Drain)
- (ii) Cadmium plated steel nuts/bolts/washers shall be used.
- (iii) Flex drop of stainless steel metallic pipe with mounting accessories, frame for installation on false ceiling.

4.4 PIPE JOINTS

- a) Electric welding joints shall be provided in the MS pipe work. Flanged joints shall be provided for connections to valves, pumps, air vessels etc. and also on straight lengths at suitable points to facilitate erection and subsequent maintenance.
- b) For connection of C.I. Pipe, fittings shall also be of C. I. heavy grade conforming to IS:1538. The flanges shall be smooth faced and neoprene gasket shall be provided between joints. All bolt holes in flanges shall be drilled. The drilling of each flange shall be in accordance with the relevant Indian Standards. Where un-avoidable and to connect underground pipe with risers, MS pipe may be used in the form of distant pieces. The joint between C.I. and MS pipe shall be flanged type. MS pipe laid at such locations shall be provided anti-corrosive treatment as per Para 7.5.

- c) Mild steel flanges shall be in accordance with Table - 17 of IS : 6392 i.e. "Plate Flanges for Welding" and flange thickness shall be as under. Gasket thickness shall not be less than 3 mm.

Pipe diameter	Flange Thickness
200 mm	24 mm
150 mm and 125 mm	22 mm
100 mm and 80 mm	20 mm
65 mm	18 mm
40 mm and below	16 mm

- d) Fittings installed underground shall be of cast iron 'heavy' grade conforming to IS 1538 whereas those installed above ground shall normally be of medium grade wrought steel or mild steel conforming to IS 1239 (Part 2) or malleable iron fittings conforming to IS 1879.
- e) All hardware items such as Nuts, Bolts, Washers shall be of appropriate size. Washers shall be used on both sides of the bolt.

4.5 ANTI-CORROSIVE PROTECTION ON UNDER GROUND MS PIPE

Corrosion protection tape shall be wrapped on MS pipes to be buried in ground. This corrosion protection tape shall comprise of coal tar/asphalt component supported on fabric of organic or inorganic fibre and minimum 4 mm thick and conform to requirement of IS:10221-Code of practice for coating and wrapping of underground mild steel pipe line. Before application of corrosion protection tape all foreign matter on pipe shall be removed with the help of wire brush and suitable primer shall be applied over the pipe thereafter. The primer shall be allowed to dry until the solvent evaporates and the surface becomes tacky. Both primer and tape shall be furnished by the same manufacturer. Corrosion protection tape shall then be wound around the pipe in spiral fashion and bounded completely to the pipe. There shall be no air pocket or bubble beneath the tape. The overlaps shall be 15 mm and 250 mm shall be left uncoated on either end of pipe to permit installation and welding. This area shall be coated insitu after the pipe line is installed. The tapes shall be wrapped in accordance with the manufacturer's recommendations. If application is done in cold weather, the surface of the pipe shall be pre- heated until it is warm to touch and traces of moisture are removed and then primer shall be applied and allowed to dry.

Holiday Testing for wrapping and coating is essential. Holiday testing may preferably be carried by flexible and detachable ring probe, which will enable the entire 360o of the surface of the pipe to be scanned.

At least 10 percent of all the welded joints shall be radio graphically tested and half of the joints radio graphed shall be the 'field joints'.

4.6 VALVES

Each pump shall be provided with a non-return valve and a sluice valve on the delivery side, the sluice valve being installed on the upstream side of the non- return valve. A pressure gauge shall also be provided between the pump and the non-return valve. The size of the non-return valve and cut off (sluice) valve shall not be less than the size of the initial delivery pipe and, in no case, less than the delivery outlet of the pump. No butterfly valves shall be installed inside the pump room.

- Sluice valve shall conform to IS: 780.
 - Butterfly valve, wherever used, shall conform to IS:13095.
 - All valves shall be suitable to with-stand the pressure in the system and rating shall be PN 1.6. All valves shall be right handed (i.e. handle or key shall be rotated clock wise to close the valve), the direction of opening and closing shall be marked and an open/shunt indicator fitted.
- a) The material of valves shall be as under:
Body - Cast iron
Disc - Cast Bronze or Stainless Steel
Seat - Either integral or Nitrile rubber
O-ring - Nitrite/ Silicon
- b) Non return valves shall be swing check type in horizontal run and lift check type in vertical run of pipes.
- c) Air release valves shall be of gunmetal body.

4.7 ISOLATION VALVES:

- (i) Isolation valves shall be provided in the network to enable isolation of any section of the network without affecting the flow in the rest. These valves are distributed according to the general layout of the installation. The isolation valves shall be normally located near the loop junctions. Additional valves shall be provided in the segments where the length of the segment exceeds 300 m.
- (ii) Cut-off valves shall conform to IS 780 (PN 1.6 rating)/IS 14846, Class 3.
- (iii) Butterfly valves can be accepted subject to the condition that the valves of diameter exceeding 150 mm shall necessary be of gear operated.
- (iv) All Cut-off valves shall be of the right-hand type and enclosed in properly constructed surface boxes, at least 1 m² in area so as to allow for broken joints being easily remade. The top of the surface box shall be 80 mm above ground level, except where it is located on a road. Valve wheels shall have an arrowhead engraved or cast thereon showing direction for turning open and close.

- (v) It is recommended that the position of the surface box be indicated by an iron plate painted fire red with distinct lettering. Such plates shall also show the open and close direction as cast or indicated on the valves and the serial number of the sluice valve.
- (vi) Locations where vehicles can pass shall be avoided for provision of valve below ground. (CPWD Specs Para 7.10 (xii))
- (vii) In case of installations in earthquake prone zones, flexible couplings shall be used for jointing purposes at required locations.

4.8 Valves in fixed firefighting installations shall have supervisory switch with its signaling to fire alarm panel or to have chain(s), pad lock(s), label and temper-proof security tag(s) with serial number to prevent tempering/unauthorized operation. These valves shall be kept in their intended 'open' position.

4.9 STRAINERS

Stainless steel strainers shall have minimum 1 mm thick screen with 3 mm perforations. Strainers shall be provided with flanges.

4.10 ORIFICE PLATE

Orifice plate shall be made of 6 mm thick stainless steel and shall have an identification tag projecting beyond any flange between which it is clamped. The orifice shall be plain central hole without burrs and diameter not less than one-half of the internal diameter of the pipe to which it is fitted.

4.11 INSTRUMENTS

- (i) Pressure gauge of appropriate range and 150 mm diameter size shall be provided.
- (ii) The pressure gauge shall be duly calibrated before installation and shall be complete with shut off valve.

4.12 AIR VESSEL

Air vessel shall be provided on top of each riser and shall be fabricated out of 8 mm thick M.S. Sheet. The ends shall be dished. This shall be of 250 mm diameter, 1.2 m high and installed vertically on suitable legs. The legs shall be provided with M.S. Plate of size 75 mm x 75 mm x 5 mm at the bottom so that the legs do not puncture the roof. The legs shall be grouted in CC foundation. Flange connection shall be provided for connection with wet riser pipe. Air release valve and pressure gauge with shut off valve shall be provided. The air vessel shall be tested at 25 kgf/cm² pressure before installation.

4.13 INSTALLATION

- i. The installation work shall be carried out in accordance with the detailed drawings prepared by the contractor and approved by the Engineer-in-charge.
- ii. In pipe above ground level, expansion loops or joints shall be provided to take care of expansion or contraction of pipes due to temperature changes.
- iii. Tee-off connections shall be through equal or reducing tees, otherwise ferrules welded to the main pipe shall be used. Drilling and tapping of the walls of the main pipe shall not be resorted to.
- iv. Open ends of piping shall be blocked as soon as the pipe is installed to avoid entrance of foreign matter.
- v. Piping installation shall be supported on or suspended from structure adequately. The contractor shall provide, clamps, hangers etc. Proper lines and levels shall be maintained while installing exposed pipes. Pipe supports in pump house shall be floor mounted and of mild steel/ G. I. Spacing of pipe supports shall not be more than that specified below:

Nominal Pipe Size (mm)	Spacing (m)
20 and 25	2.00
32 to 125	2.50
150 and above	3.00

Extra supports shall be provided at the bends and at heavy fittings like valves to avoid undue stress on the pipes.

- vi. Anti-vibration pads, springs or liners of resilient and non-deteriorating material shall be provided at each support, so as to prevent transmission of vibration through the supports.
- vii. Pipe sleeves of diameter larger than the pipe by least 50 mm shall be provided wherever pipes pass through walls and the annular spaces shall be filled with felt and finished with retaining rings.
- viii. Vertical risers shall be parallel to walls and column lines and shall be straight and in plumb. Risers passing from floor to floor shall be supported at each floor by clamps.

5. AUTOMATIC SPRINKLER SYSTEM

This section covers the general requirement of selection, design, installation, testing, commissioning and maintenance of automatic sprinkler system for firefighting in buildings used for other than industrial, storage purpose, hotels and mercantile buildings.

References: For additional information regarding definitions, planning, design, hydraulic calculations, tables etc. following documents are to be referred to:

- i. IS: 15105: Design and Installation and Maintenance of Fixed Automatic Sprinkler Fire Extinguishing Systems- Code of Practice (First Revision).

- ii. IS: 9972: Specification for Automatic Sprinkler Heads for Fire Protection Service (First Revision).

5.1 INTRODUCTION

Firefighting systems for Wet Risers, Downcomers, and Wet Riser cum Downcomer are designed to be operated manually. Any delay in manual operation due to late detection or response could lead to the rapid spread of fire. In an automatic sprinkler system, sprinkler heads are installed throughout the protected areas at specified locations such as on roofs or ceilings, walls, between racks, and below obstructions. These sprinkler heads are connected to water supply lines that are permanently charged with water at a specified pressure. The sprinklers activate at a predetermined temperature, discharging water over the affected area to provide sufficient coverage for controlling or extinguishing the fire. Only those sprinklers near the fire, which reach the necessary heat level, will activate. The operation of the sprinkler system triggers the flow of water, which in turn initiates the fire alarm. Therefore, sprinklers serve two primary functions: detecting the fire and distributing water to control or extinguish it. Water distribution from the ceiling cools the hot gases forming under the ceiling of the enclosure, helping prevent the fire from spreading to adjacent areas and containing the damage within a limited area.

5.2 CLASSIFICATION OF OCCUPANCIES AND PROVISION OF AUTOMATIC SPRINKLER FIRE SYSTEM

Sprinklers are provided in industrial and non-industrial buildings. The design of sprinkler installation depends upon type of occupancy. For the purpose of designing and installation of automatic sprinkler system, buildings are categorized under the following classes in IS: 15105.

- (a) Light hazard class
- (b) Moderate/Ordinary hazard class
- (c) High hazard class
- (d) Storage hazards

For details of classifications, IS:15105 is to be referred. Light Hazard Occupancies shall be understood as those with low fire loads and with materials within having low rates of heat release. Light Hazard Occupancies are of non-industrial type subject to the condition that “No single compartment greater than 210 m² are allowable within light hazard occupancies and such compartments shall be fire separated by walls having 30 min rating and doors. Otherwise the sprinkler system shall be designed as per Ordinary Hazard Occupancy.”

Office buildings (excluding store rooms), education institutions, hospitals (excluding kitchens, stores, utilities), libraries, museums, nursing homes, prisons and residential apartments are classified under light hazard occupancies.

Airport terminal buildings, car parking areas within building or basement, departmental stores/retail shops are classified under ordinary hazard class.

In order to satisfy above conditions, all buildings classified under Light Hazard shall be designed under Ordinary Hazard class. Accordingly, these specifications cover Ordinary Hazard class only.

5.3 PLANNING

Automatic sprinklers shall be installed wherever required in terms of Table 7 of Part-4, Vol-1 of NBC 2016 (amended up to date).

Automatic Sprinklers shall also be installed in false ceiling voids exceeding 800 mm in height. Ramps at all levels shall also be protected with sprinklers. Pressure in the sprinkler installation piping shall not exceed 7 bar and pressure at the most remote sprinkler at any level shall not be less than 0.5 bar and also not more than 5 bar.

5.3.1. Extent of Sprinkler Protection: Sprinklers shall be provided, but for following exceptions:

- a) Areas, rooms or places where the water discharged from a sprinkler may pose a fire or explosion or toxic hazard. In such areas alternative arrangement shall be made.
- b) Stairs, spaces below stair headings (but not rooms above a stair) and lift wells. Any part of the building not provided with sprinkler protection shall be fire separated by walls. Fire doors not less than 1 hour in fire resistance shall be provided in the opening of such walls. Construction of Health Facilities under ECRP-II (PKG-I) Vol-5 Tech Specifications
- c) Wash rooms, toilets and WCs (but not cloak rooms) of area less than 5 m². If area of these rooms exceed 5 m², these shall be provided with sprinkler protection unless fire separated by walls and all openings in the walls are protected.
- d) Sprinklers shall not be required in electrical equipment rooms where all of the following conditions are met:
 - i. The room is dedicated to electrical equipment only.
 - ii. Only dry-type electrical equipment is used.
 - iii. Equipment is installed in a 120 minutes' fire-rated enclosure including protection for penetration in walls.
 - iv. Cable coating is done in trays or trenches to prevent flame spread.
 - v. Storage is not permitted in the room.

In addition, for firefighting provisions to be provided for Substation/Transformers, Electrical MV main distribution panel and lift panel Clause 3.4.6.3 and 3.4.6.4, Page-22-23 of NBC 2016, Vol-1, Part-4 may be referred to.

- e) Rooms like server room or electrical control room where alternate protection by other automatic extinguishing systems, (for example gas, powder and water spray).
- f) In areas having height 17 m or above such as in atria, sprinkler installations may be rendered ineffective and hence may be avoided.

5.3.2. The area to be protected by sprinkler is divided in to various zones. For detecting operation of sprinkler in a zone, flow switches are provided which are wired to an annunciation panel installed in the Fire Control Room. In the event of operation of sprinkler(s) in an affected area. The annunciation panel will give audio-visual alarm and indicate the affected zone. This arrangement will be independent of fire alarm system.

5.3.3. Design, Density and Assumed Maximum Area of Operation (AMAO): - This is different for different hazards classified in Para 13.4. For moderate hazard, water discharge shall be at least 5 litre/min/m² over an assumed area of operation covering 360 m².

5.3.4. Sprinkler Spacing, Arrangement, Distribution and Locations: - Sprinkler heads may be installed on ceiling and or side walls. For selection of number of sprinkler and their location in a given area, following factors shall be considered:

i. Maximum Area Coverage per Sprinkler

(a) Ceiling sprinkler: 12 m²

(b) Side Wall sprinkler:

- Combustible ceiling: 7.5 m²
- Non-Combustible ceiling: 9 m²

ii. Maximum Distance between Sprinklers

(a) Ceiling Sprinkler: 3.5 m

(b) Side wall sprinkler

- Combustible ceiling 2.7 m
- Non-combustible ceiling 3 m

iii. Minimum Distance between Sprinklers (for Ceiling as well as Sidewall sprinklers):1.8m

In case of intermediate ceiling suspended sprinklers, protecting commodities in racks, distance lower than 1.8 m may be considered if necessary. Construction of Health Facilities under ECRP-II (PKG-I) Vol-5 Tech Specifications

iv. Maximum distance of sprinklers from end walls (for ceiling & sidewall sprinklers) shall not exceed half of the allowable distance between sprinklers

Note: For ceiling sprinklers:

- (a) Where the external walls are combustible or built with metallic or otherwise or open sided; and in case of open joisted ceilings or where the roof has the rafters exposed, the distance between the boundary and the sprinklers shall not exceed 1.5 m.
- (b) Distance shall be measured perpendicular to the wall.
- vi. Sprinklers shall not be located at a distance less than 100 mm from the wall (for ceiling sprinklers). Sprinklers shall not be located at a distance less than 100 mm from the end wall (for sidewall sprinklers)
- vii. While designing sprinklers installation, the recommendation of sprinkler manufacturer shall be considered. Typical layout of side wall sprinklers shall be shown in shop drawings.

5.3.5. Spacing below Sprinkler Heads: Clear minimum space of 0.5 m shall be maintained below the deflector of sprinkler head.

6. TESTING

a. Initial Testing

- i. During laying of pipes, the same shall be subjected to 10 kgf/cm² hydraulic pressure for a period of 24 hours, in sections.
- ii. After completion of the work, all valves/ fittings shall be installed in position and entire system shall be tested for 24 hours at a pressure of 10 kgf/cm². The drop of pressure up to 0.5 kgf/cm² shall be accepted.

b. Final Testing

- i. After completion, all operation checks as per norms in relevant Para shall be carried out for automatic operation of the systems. For this purpose, landing valves may be opened at different locations. The exercise shall be repeated couple of times to ensure trouble free operation of the system.
- ii. **Flow Test:** The design flow of pumps shall be checked. The pump shall be operated after opening a number of landing valves at different locations. Design pressure is to be maintained in the pump house. Water discharge is to be measured by drop in level in UG tank for a certain period. All pumps shall be tested one by one. The flow rate shall be not less than as specified while maintaining the design pressure in pump house.

7. COMMISSIONING

Before commissioning, the entire firefighting system must be thoroughly flushed to remove any earth or foreign materials that may have entered during installation. This can be done by operating the pump and opening valves at various locations. Once the work is complete, the system shall be commissioned and made ready for use. The need for functioning firefighting installations is crucial, even during the occupancy phase of the building. If only part of the building is occupied, the completed firefighting system must be commissioned by isolating the system serving the under-construction areas. From the moment of commissioning, the firefighting system must be properly maintained and manned. Any defects identified during the warranty period must be promptly addressed by the contractor, ensuring the system is fully operational at all times.

8. TRAINING TO CLIENT'S PERSONNEL

The contractor shall conduct orientation and training sessions on the Fire Fighting System for the client's personnel assigned to this task. Training will cover all aspects of operation, maintenance, and troubleshooting, and will be provided on mutually agreed-upon dates as per the instructions of the Engineer-In-Charge.

D. HVAC SYSTEM

GENERAL:

The tender Bill of Quantities (BOQ) may include any combination of Split AC systems, VRV/VRF Systems including indoor units such as Hi-Wall, Cassette, Ductable units, Air Handling Units (AHUs) etc. The specific HVAC system(s) required for this project will be clearly delineated within the BOQ. Bidders shall base their tender submissions on the system(s) indicated therein. The Contractor is required to follow the detailed specifications outlined in the BOQ, which take precedence and shall be read in conjunction with these general tender specifications. It is the Contractor's responsibility to thoroughly review and understand both this tender specification document and the BOQ in its entirety to ensure accurate and compliant bid preparation and project execution. All systems must comply with relevant Indian standards (IS, BIS, and IEC) and be energy-efficient, reliable, and suitable for the local climate.

1. SPLIT AC SYSTEMS

All Hi-Wall Split AC units shall operate with R-410A refrigerant or an environmentally equivalent alternative. The minimum Indian Seasonal Energy Efficiency Ratio (ISEER) ratings for each unit must correspond to the 3-star or 5-star energy rating specified in the BOQ, in accordance with the most recent standards by the Bureau of Energy Efficiency (BEE). Hi-Wall indoor units shall be equipped with auto-swing functionality and operate with low noise levels. Outdoor units must be weatherproof, corrosion-resistant, and designed for low-noise operation. Cassette-type units shall feature 4-way airflow distribution and a compact design for easy maintenance. Ductable units shall be designed for concealed installation and seamless integration with the building's ductwork system.

The power supply requirements are 230V, 50Hz for smaller units and 415V, 50Hz three-phase for larger capacity units.

2. VRV/VRF SYSTEMS

VRV/VRF systems shall be modular and have a scalable capacity range, utilizing R-410A refrigerant. The system must meet the minimum ISEER rating as specified in the BOQ. It should incorporate heat pump functionality appropriate for varying climatic conditions, inverter-driven compressors, and individual zone control. Indoor units should be available in Hi-Wall, Cassette, Ductable, and Ceiling Concealed configurations. Outdoor units must be weatherproof, compact, and designed for low-noise operation. A centralized control system shall enable individual zone temperature adjustment. The system shall operate on a 415V, 50Hz, three-phase power supply.

3. AIR HANDLING UNIT (AHU)

All the AHUs supplied shall be factory-built. The AHU configuration, as detailed in the BOQ, shall be adaptable to either ceiling or floor mounting and shall be either a single-deck or double-deck type, contingent upon the specific requirements of the installation location. The AHUs shall be fully compatible with the intended system type, whether DX, VRF, or CHW. In addition to the specifications detailed herein, all other characteristics including tonnage, CFM, and external static pressure, must comply with the individual AHU requirements as defined in the BOQ. AHUs shall include the following components and features:

- The construction shall consist of double-skinned panels with a minimum thickness of 40 mm, with both inner and outer skins being 0.8 mm thick. The specific material—either pre-coated galvanized stainless steel (GSS) or aluminium sheet—will be as detailed in the Bill of Quantities (BOQ). The panels shall be filled with factory-injected polyurethane foam (PUF) insulation with a minimum density of 40 kg/m³. Thermal break aluminium extruded profiles shall be provided at all corners and joints to ensure thermal efficiency.
- The AHU shall be equipped with a two- or three-stage filtration system. The MERV rating for each stage, as well as any HEPA filter requirements, shall be as specified in the BOQ.
- Unless otherwise specified the cooling coil shall be a six-row DX cooling coil with aluminium fins and copper tubes for efficient heat transfer.
- A plug fan with a variable frequency drive (VFD) and a suitable IE3 class TEFC drive motor with IP55 protection, designed for 415V $\pm$ 10%, 50 Hz, three-phase AC supply shall be provided. The fan shall be Eurovent/AMCA certified.

- An 18-gauge stainless steel 304 drain pan with 19 mm NBR insulation and necessary drain connections shall be included.
- UV-C emitters with reflectors shall be mounted on the coil surface using removable extruded aluminum frames. The emitters shall be UL certified, capable of producing 254 nm wavelength radiation, and provide a minimum of 7.5 watts/sq. ft. of coil surface area for uniform distribution.
- Slip-in type tubular heaters with a step controller shall be provided inside the AHU. The heaters shall be arranged in two independently operating banks, one controlled by a humidistat and the other by a thermostat. Safety features such as a safety thermostat, air stat/airflow switch, and interlocking with the fan motor shall be included.
- The AHU shall include essential accessories and components, including a mixing box (if required) for blending fresh and return air, aluminium volume control dampers (VCDs) on air inlets and outlets to regulate airflow, and minimum two-bend GSS/PVC eliminators to prevent water carryover. Vibration isolation arrangements shall minimize noise and vibration. Safety and maintenance features include limit switches on access doors and an inspection lamp. AHU shall be equipped with an expansion valve, drier, complete with DX/VRF AHU kit, and a corded remote controller.
- The AHU shall be Eurovent/AHRI certified.
- The scope of supply shall include all necessary supporting GI hangers, MS angles, channels, nuts, bolts, washers, and other installation materials. All incoming power and control cabling, earthing, and interconnections between the AHU, strip heaters, and control panel shall also be included.
- The Contractor shall submit a comprehensive AHU datasheet for approval, detailing the proposed AHUs' specifications and demonstrating compliance with this tender document.

4. AHU CONTROL PANEL

The AHU control panel shall be a CPRI-approved (IEC 61439-1 and 2), factory-fabricated, wall-mounted unit designed to control the AHU and associated components. The panel shall include the following features:

- **Motor Control:** The panel shall incorporate a variable frequency drive (VFD) for fan motor control, along with a bypass DOL/star delta starter and a manual changeover switch for transitioning between VFD and DOL/star delta operations.

- **Control Elements:** The panel shall include contactors, overload relays (OLR), single-phase preventors (SPPR), control switches, and MCBs for AC units. It shall also feature a 24V AC power supply for fire interlock.
- **User Interface:** The panel shall have an auto/manual selection switch, ON/OFF push buttons, and indicator lamps for ON, OFF, and trip status.
- **Heater Control:** The panel shall include contactors and breakers for the heater banks, with necessary power and control wiring to maintain the desired temperature and relative humidity (RH%) as per the design conditions. The fan/blower motor shall be interlocked with the heaters to ensure that the heaters are powered only after the blower has reached full designed speed.
- **Safety and Monitoring:** The panel shall be equipped with a humidistat, thermostat, air stat/airflow switch, and safety thermostat for precise control and safety.
- **Wiring and Interconnections:** All necessary control and power cabling between the AHU and the panel shall be included in the scope of supply.
- **Data Sheets:** Contractor shall provide AHU panel drawings & data sheets for prior approval.

5. FANS

All ventilation fans, including inline and cabinet fans, must be AMCA certified for both air and sound performance. The material of construction and the static pressure rating shall conform to the specifications detailed in the BOQ. Installation shall be all-inclusive, incorporating an electronic speed regulator for single-phase fans. Three-phase fans shall utilize VFD-compatible motors and include a VFD starter panel. All related power and control wiring between the power supply and fan speed regulator/panel, a suitable enclosure, a plug top for connecting to the socket, mounting brackets, and all other necessary accessories must be incorporated in the installation.

6. THERMAL INSULATION

- The insulating material shall be a closed-cell elastomeric compound based on Nitrile Butadiene Rubber (NBR). The thermal conductivity of the elastomeric NBR insulation must not exceed 0.035 W/m·K when tested at a mean temperature of 20°C, following the procedures outlined in EN 12667. The insulation material shall have a density ranging from 40 to 60 Kg/m³.
- Prior to insulation, all duct surfaces must be thoroughly cleaned to remove contaminants, including grease, oil, and dirt. Accurate surface measurements should be taken to ensure

precise cutting of the closed-cell elastomeric rubber sheets, with sufficient allowance for proper fitting. The insulation material must be installed under compression, without stretching. Apply a thin, uniform layer of adhesive to both the back of the insulation sheet and the prepared metal surface. Allow the adhesive to become tack-dry before carefully positioning the insulation sheet and pressing firmly to achieve a secure bond. All longitudinal and transverse joints shall be sealed in accordance with the insulation manufacturer's recommendations, using only the adhesive specified by the manufacturer.

- For ductwork installations directly exposed to solar radiation, a UV-resistant and mechanically protective coating, as recommended by the insulation manufacturer, shall be applied after allowing the adhesive to cure for 36 hours.
- All refrigerant and condensate drain lines shall be insulated as detailed herein, maintaining a 25 mm air gap between adjacent insulated chilled water or refrigerant surfaces. Prior to applying insulation, all pipes shall be cleaned and brushed to remove any surface contaminants (dirt, dust, mortar, grease, oil, etc.). Only the insulation manufacturer's recommended adhesive should be used for all applications.

7. ACOUSTIC INSULATION

To mitigate noise transmission, specified areas shall incorporate acoustic insulation with the following attributes:

- The acoustic insulation shall be of engineered, open-cell Nitrile Rubber foam. The insulation must demonstrate specific sound absorption capabilities as measured by Random Incidence Sound Absorption Coefficients (RISACs) across a range of octave band frequencies. Testing must adhere to the methodology defined in ISO 354. The insulation material shall be manufactured without the use of fibers. The acoustic insulation must possess a minimum density of 140 Kg/m³. The insulation shall incorporate an integrated anti-microbial agent during the manufacturing process. This agent must provide sustained protection against fungal and bacterial growth. The acoustic insulation shall exhibit a thermal conductivity not exceeding 0.047 W/m·K when tested at a temperature of 20°C. The insulation shall conform to a Class 1 rating for surface spread of flame. Additionally, it must comply with UL 94 (HBF, HF1 & HF2) flammability standards.
- Duct Acoustic Lining: For ductwork designated on the project drawings and listed in the Schedule of Quantities, an internal acoustic lining with a thickness of 10mm shall be applied. Unless otherwise specified, the lining shall extend for a minimum distance of 6 meters along the duct length or 30% of the total duct length, whichever is greater.

8. DUCT WORK – GENERAL SPECIFICATION

- All ducts shall be fabricated from either Galvanized Sheet Steel (GSS) conforming to IS: 277 or aluminium sheets conforming to IS: 737. The steel sheets shall be hot-dip galvanized with a MAT finish and a coating of minimum 120 grams per square meter (GSM) of zinc. GI sheets shall be lead-free, eco-friendly, and RoHS compliant.
- The thickness of sheets for the fabrication of rectangular ductwork shall be as follows. The thickness required corresponding to the longest side of the rectangular section shall be applicable for all four sides of the ductwork:

Longest Side (mm)	Minimum Sheet Thickness (GSS)	Minimum Sheet Thickness (Aluminum)
750 mm and below	0.63 mm	0.8 mm
751 mm to 1500 mm	0.8 mm	1.0 mm
1501 mm to 2250 mm	1.0 mm	1.5 mm
2251 mm & above	1.25 mm	1.8 mm

- All sheet metal connections, partitions, and plenums required for the flow of air through the filters, fans, etc., shall be at least 1.25 mm thick galvanized steel sheets in the case of G.I. sheet ducting or 1.8 mm thick aluminum sheets in the case of aluminum sheet ducting and shall be stiffened with 25 mm x 25 mm x 3 mm angle iron braces.
- Aluminum ducting shall normally be used for clean room applications, hospital works, and wherever high cleanliness standards are functional requirements.

8.1 ASSOCIATED ITEMS

- Supply/return air outlets, F.A. (Fresh Air) grilles, and accessories shall be constructed from extruded aluminum sections.
- Flanges for matching duct sections, stiffening angles (braces), and supporting angles shall be of rolled steel sections and shall be of the following sizes:

Application	Duct Width	Angle Size
Flanges	Up to 1000 mm	35 mm x 35 mm x 3 mm
-do-	1001 mm to 2250 mm	40 mm x 40 mm x 3 mm
-do-	More than 2250 mm	50 mm x 50 mm x 3 mm
Bracings	Up to 1000 mm	25 mm x 25 mm x 3 mm
-do-	More than 1000 mm	40 mm x 40 mm x 3 mm
Support Angles	Up to 1000 mm	40 mm x 40 mm x 3 mm
-do-	1001 mm to 2250 mm	40 mm x 40 mm x 3 mm
-do-	More than 2250 mm	RS section size decided individually

- Hanger rods shall be of mild steel and of at least 10 mm dia for ducts up to 2250 mm size, and 12 mm dia for larger sizes. All nuts, bolts, and washers shall be zinc-plated steel. All rivets shall be galvanized or shall be made of magnesium-aluminum alloy. Self-tapping screws shall not be used.

8.1.2 DUCTWORK FABRICATION AND INSTALLATION STANDARDS

- Ducts shall be fabricated either on-site or factory-fabricated, adhering to IS: 655 "Specifications for Metal Air Ducts," unless otherwise specified. The interior surfaces of the ducting shall be smooth to ensure efficient airflow. Ducts up to 600 mm on the longest side shall be cross-broken between flanges by a single continuous break. Ducts 600 mm and above shall be cross-broken by single continuous breaks between flanges and bracings. Alternatively, beading at 300 mm centers shall be provided for stiffening. Long-radius elbows and gradual changes in shape shall be used to maintain uniform velocity, reduce turbulence, minimize resistance, and lower noise. The ratio of duct size to the radius of the elbow shall not be less than 1:1.5. Flanged joints shall be used at intervals not exceeding 2500 mm. Flanges shall be welded at corners first and then riveted to the duct.
- Stiffening angles shall be fixed to the sides of ducts by riveting at 1.25 meters from joints for ducts 600 mm to 1500 mm, and 0.6 meters from joints for ducts larger than 1500 mm. Diagonal angles may be used as bracings for ducts larger than 1500 mm. Plenums for filters shall include a suitable access door of size 450 mm x 450 mm. Factory-fabricated ducts shall be supplied in L-sections, with lengths not exceeding 1800 mm for ducts with the longest side of 600 mm and above, and 3000 mm for smaller ducts.

8.1.3 AIR OUTLETS AND INLETS (SUPPLY AND RETURN)

- All air outlets and intakes shall be made of extruded aluminum sections, presenting a neat appearance and rigid mechanical joints. Square and rectangular wall outlets shall have a flanged frame with returned or curved edges (5 to 7 mm) and a flexible gasket between the flange and the wall face. Supply air registers shall have adjustable front louvers for vertical deflection (up to 22.5 degrees) and back louvers for horizontal spread (at least 45 degrees). Return air grilles shall have only front louvers. The outer framework shall be made of at least 1.6 mm thick aluminum sheet, with aerofoil-designed louvers of 0.8 mm thickness.
- Square and rectangular ceiling outlets/intakes shall have a flange flush with the ceiling or be of anti-smudge type. The outer shell shall be made of at least 1.6 mm thick extruded aluminum, with a removable diffusing assembly. Linear diffusers shall have a flanged frame with returned edges (3.5 mm) and adjustable slots. The construction shall use at least 1.6 mm thick extruded aluminum sheet.
- Grilles and diffusers shall have grille bars set straight or deflected, assembled by mechanical interlocking to prevent distortion. Adjustable rear blades shall be provided for deflection.

Supply air outlets shall include volume control devices with mill-finish/block-shade blades pivoted on nylon brushes to avoid rusting and noise. Opposed blade dampers shall be used for circular outlets, while radial/shutter-type dampers shall be used for square and rectangular outlets. All products shall be supported by manufacturer performance curves.

8.1.4 FRESH AIR INTAKES

Fresh air intake grilles shall be made of extruded aluminum sections. A bird wire screen of 12 mm mesh in 1.6 mm steel wire shall be fixed to the rear face of the louver frame.

8.1.5 FIRE DAMPERS

- Fire dampers shall be installed in all supply and return air ducts, return air passages, and at floor crossings. Access doors shall be provided before each set of fire dampers. Fire dampers shall be multi-blade louver type, constructed with at least 1.6 mm thick galvanized sheet, and factory-fitted in a 400 mm long sleeve. They shall include a locking device, motorized actuator, and control panel.
- Unless otherwise specified, Fire dampers shall be motorized smoke and fire dampers, equipped with a UL-stamped fusible link to close in case of temperature rise or fire alarm activation. An electric limit switch shall cut off power to the AHU blower motor and strip heaters upon damper closure. Fire dampers shall be CBRI tested and certified for 90 minutes of fire resistance as per UL 555-1995.
- Fire dampers shall be compatible with the building's fire detection system and operate automatically via an electric motor upon receiving a signal from the fire alarm panel. Wiring from the fire alarm panel to the AHU electric panel shall be provided by the department, while wiring from the AHU panel to the fire damper shall be provided by the air conditioning contractor.

8.1.6 INSTALLATION OF METALLIC DUCT

- Fabrication and installation shall be performed in a workmanlike manner. Ductwork shall be rigid and straight, free from kinks. All exposed ducts within the conditioned space shall utilize slip joints. Flanged joints are prohibited in these areas. All joints must be airtight.
- Ducts shall be independently supported from the building structure with adequate support to maintain their true shape. Support spacing shall not exceed 2 meters. In situations where ducts cannot be suspended from the ceiling, wall brackets or alternative arrangements, as approved by the Engineer-in-Charge, shall be implemented. Neoprene or other vibration isolation packing, with a minimum thickness of 6 mm, shall be provided between the ducts and the

angle iron supports/brackets. Vertical ductwork shall be suitably supported at each floor level by steel structural members.

- Where metal ducts or sleeves terminate in woodwork, tight joints shall be achieved using closely fitting heavy flanged collars. Where ducts pass through brick or masonry openings, wooden framework shall be installed within the openings, and the crossing ducts shall be equipped with heavy flanged collars on either side of the wooden framework to ensure a leak-proof duct crossing. Duct connections to the air-handling unit shall be established by inserting a double canvas sleeve, 100 mm in length. The sleeve shall be securely bonded and bolted to both the duct and the unit casing.
- Dampers shall be installed in branch duct connections to facilitate proper volume control and balancing of air quantities within the system, regardless of whether they are indicated in the drawings. Suitable links, levers, and quadrants shall be provided for the proper operation, control, and setting of the dampers. Every damper shall feature an indicating device that clearly displays its position at all times.
- Where electrical heaters are mounted within the duct, they shall be of the low-temperature, totally enclosed type, fitted with radiation fins. A removable panel shall be provided in the duct to allow access to the heaters. Any openings in the duct for electrical wiring must be equipped with suitable bushes to prevent leakage. A 6 mm thick asbestos board lining shall be installed around the inside of the duct for a distance of 30 cm on either side of the electrical heaters. A manually reset thermostatic safety switch shall be positioned near the duct section housing the heaters. Furthermore, the heaters must be interlocked with the connected fan motor of the AHU.

8.1.7 AIR OUTLETS AND INLETS

- The locations of the air outlets and intakes are indicated in the tender drawings. The air conditioning contractor shall provide the necessary openings and wooden framework for fixing the grilles. The location of these outlets/inlets is subject to change, and the approval of the Engineer-in-Charge must be obtained before final fixing of the grilles/diffusers. When installing fresh air intakes, no fixing devices shall be visible from the face of the frame.
- Where louvers are to be fixed in masonry or concrete, they shall be secured using either expanding plugs or raw plugs. Where louvers are to be fixed in steel or wood, non-ferrous screws or bolts shall be used. Supply air outlets and return air intakes shall be anodized/powder-coated aluminum in a color that matches the surrounding wall/ceiling. Fresh air intakes shall be anodized/powder-coated aluminum, subject to the approval of the Engineer-in-Charge. The paint color shall be approved by the Engineer-in-Charge.

- The air-conditioning contractor shall repair any damage to the finish of the structure that occurs during the installation work before handing over the installation to the Department.

8.1.8 AIR BALANCING

Air systems shall be balanced to minimize throttling losses. The entire air distribution system shall be balanced with the help of an anemometer. Measured air quantities at the fan discharge and at the various outlets shall be within + 5 percent of the specified/quoted values. For fans greater than 0.75 KW (1.0 HP), fan adjustments must be made to meet design flow conditions. Branch duct adjustments shall be permanently marked after air balancing is completed to allow for restoration to their correct position if disturbed.

8.1.9 MEASUREMENT

- Duct measurements (for insulated ducts) shall be taken before the application of insulation. Ductwork shall be measured section-wise based on the external surface area, calculated by multiplying the axial length from flange face to flange face for each section by the corresponding duct perimeter at the center of that section length. Uniformly tapering straight sections shall be measured as described above. However, for special pieces like tees, bends, etc., surface area computations shall be performed according to the shape of such pieces.
- The quoted unit rate for external surfaces of ducts shall include all wastage allowances, flanges, gaskets for joints, vibration isolators, bracings, hangers and supports, inspection chambers/access panels, splitter dampers with quadrants and levers for position indication, turning vanes, straightening vanes, and all other accessories required to complete the duct installation per the specifications. These accessories shall not be measured separately.
- Grilles and diffusers (excluding linear diffusers) shall be measured by their cross-sectional areas, perpendicular to the airflow, excluding the flanges. Volume control dampers, where provided, shall not be accounted for separately.
- Linear diffusers shall be measured by linear measurements only, not by cross-sectional areas, and shall exclude flanges for mounting the linear diffusers. The supply air plenum for linear diffusers shall be measured as described above for ducting.
- Fire dampers shall be measured by their cross-sectional area perpendicular to the direction of airflow. Quoted rates shall include the necessary collars and flanges for mounting, inspection pieces with access doors, fusible links/solenoids with wiring, but excluding fire detectors, etc.

LIST OF APPROVED MAKES:

Sl.	Item	Makes
1	Steel conduit	BEC/AKG/PRECISION/ATUL
2	PVC Conduit & Accessories	AvonPlast, Atul, Polycab, Precision, Balco, Konseal, Anchor
3	PVC Insulated CU, Conductor FRLS Wires/Cables	RR-KABEL/National/Ralison/Finolex/Polycab/Havells.
4	Modular type Switches and Socket Outlet.	Clipsal/Legrand/Crabtree(Havells)/Wipro/MK
5	Step Type Electronic Regulators	Clipsal/Legrand/Anchor/WIPRO/Havells/Schneider
6	Single Phase Industrial Type Socket Outlet	Legrand/Siemens/ABB/Havells
7	LT Panel/M.V Cubicles Boards	L&T/Siemens/Schneider/Tricolite/Milestone/or CPRI Approved Panel Manufactures.
8	Air Circuit Breakers	L&T/Siemens/ABB/Schneider/GE
9	MCB's/Isolators/RCBO/RCCB	Legrand/C&S/L&T/ABB/Siemens/Schneider/Havells/HPL
10	MCCB	Siemens/ABB/Schneider/L&T/C&S/Legrand/HPL/Havells
11	Protection relays	L&T/ABB/Schneider/C&S/Siemens
12	Fuse Disconnecter Switch/SFU/Fuse	L&T/Siemens/ABB/C&S
13	Multifunction meter	Schneider/Siemens/L&T/ELMeasure
14	LT Cables (XLPE)	Polycab/RRKabel/KEI/Bonton/Havells/Finolex
15	Rising Mains/BUS Trunking	Tricolite/L&T /Zeta /C&S
16	Acoustic Enclosure	Jakson/ Sudhir power/SuperNova
17	Anti-Vibration Mountings	Dunlop/Resistoflex
18	Light Fittings	Philips/ Bajaj/Crompton/Havells/Wipro
19	Ceiling fans	Orient/Crompton/Khaitan/Polar/Usha/Havells
20	Motor	Siemens/ABB/Crompton/Kirloskar
21	Exhaust Fan	Havells/Crompton/Anchor by Panasonic/Almonard/Bajaj
22	Servo Stabilizer	Approved ISI Standards
23	Indicating Meters	HPL/L&T/Meco/Rishabh/Universal/ABB
24	kWH, kW Meters/TOD	HPL/L&T/Enercon/Meco/Rishabh/Universal/ABB
25	Capacitor	L&T/Conzerv/SHREEM
26	Earth leakage relay	L&T/ELMEASURE/ABB
27	Battery Chargers	Uptron/VolstatElectronics/StatconAE
28	Change over switch	L&T/C&S/Socomec/ABB
29	Diesel Generators	Cummins/Ashok Leyland/Kirloskar/TATA
30	AMF	Siemens/C&S/Schneider
31	Transformer	ABB/Intrans/Unipower/KEL

Sl.	Item	Makes
32	Cast resin current Transformers:	AE/L&T /Kappa/ Rishab
33	Cable Trays/ Raceways	OBO/Legrand/Anant Power
34	UPS	
a	Upto 3 KVA	Microtek/APtech/Luminous/V-guard
b	Above 3 KVA	Microtek/Luminous/Hykon/Eaton/Numeric
c	Battery (150 Ah/160Ah)	Relicell/Exide/Luminous/Amaron/Eveready
35	Lifts/ Dumb Waiters/Escalators	Otis /Kone/ Mitsubishi/ Scheindler/ Thyssenkrupp
	ELV(EXTRA LOW VOLTAGE)	
36	CCTV/ NVR/DVR	Hikvision/CP Plus/Dahuva/Honeywell.
37	CCTV Cable	Polycab/finolex/Hikvision/V-Guard
38	LED TV/SMART TV	Samsung/LG/Panasonic/Sony.
39	Routers	Alcatel/Cisco/TPLINK/NETGEAR/D-Link
40	Cat 6/6a Cable.	Finolex/D-Link/Polycab/V-guard
41	Socket, Keystone Module & Face Plate	Havells/Schnieder/ Honeywell/Indo Asian/Legrand
42	Speaker Wire	Finolex/MX/Polycab/V-guard.
43	Network rack	Legrand / D Link / Netrack / Wal Rack
44	Server PC	DELL / HP / Lenovo
45	Hard Disk	Seagate / Toshiba /WD
46	Network switch/POE switch & Wifi access points	Netgear/Cisco/Alcatel/ D-Link/TPLINK/Hikvision
47	Door Controller, Card Reader, Biometric Reader, Access Control Server Software, Smart card	Honeywell/Siemens /ESSL/ZKTeco/Biomax
48	PA System, Amplifier, PA Speaker, Voice Controller, Paging Station, Microphone	AHUJA/Bosch/ Honeywell/Yamaha
49	PVC Conduits & Raceways	Balco/TOMS/Finolex/Modi's/Precision
50	Video Conferencing System & Secondary Camera	Logitech/Jabra/Polycom/Sony
51	RG-6, RG-11Wire/ Coaxial Cables	Finolex/KEI/Polycab/Havells/DLINK
52	Digital/ANALOG PHONES/ Handsets/IP	Beetel /Panasonic /Alcatel
53	IPABX / EPABX System	CRYSTAL/Alcatel/ Matrix/ Panasonic/Coral

Sl.	Item	Makes
	FIRE ALARM AND DETECTION SYSTEM	
54	Smoke detector/Heat detector	Honeywell /Minimax/Ravel/ADT/Siemens/Agni
55	Fire Alarm control Panel	Honeywell /Minimax/Ravel/ADT/Siemens/Agni
56	Response indicator/Fault isolators/sounder/Manual Call Point/Phone control module	Honeywell /Minimax/Ravel/ADT/Siemens/Agni
57	Talk back unit	Honeywell /Minimax/Ravel/ADT/Siemens/Agni
58	Fire alarm cable	RR-Kabel/Finolex/V-guard/PolyCab/Valuecon
59	Fire Extinguisher	Minimax/New age/Vijay/Cease fire/Superax/Safex
	FIRE FIGHTING SYSTEM	
60	G.I./M.S. Heavy Class Pipe	Jindal-Hissar, Tata, Prakash
61	Gate, Butterfly, Air Release Valve	Leader, Zoloto, Castle, Sant, Crescent, Fouress, Audco, Viking
62	Forged Steel Fittings	True Forge, Sant, Zoloto
63	SS/Brass/Gunmetal Ball Valve (Fullway Check and Globe Valves)	Sant, Zoloto, Leader
64	C.I. Double Flanged Sluice Valve	Zoloto, AIP, Kirloskar
65	Fire Hose Pipes	Newage, Minimax, Safex, Ceasefire, Superex, Safeguard
66	Fire Hydrant Valves	Minimax, Safex, Ceasefire, Newage, Safe Guard, Kanex, , Superex, Agni, AAAG
67	Sprinkler Heads	Tyco, Viking, HD, Grinnel, Life Guard, Getech, Newage
68	Sluice and Non-return/Check Valve	I.V.C., Kilburn, Zoloto, Castle, Sant, KSB, Kirloskar, Leader, Crescent, AIP
69	First Aid Fire Hose Reels	Minimax, Safex, Ceasefire, Newage, Safe Guard, Kanex, Safe Fire, Superex.
70	Horizontal Centrifugal/Fire Pumps	Mather & Platt (WILO), GRUNDFOS, Kirloskar, Beacon
71	Diesel Engine	Cummins, Ashok Leyland, Caterpillar, Kirloskar
72	Electric Motors	GEC, Siemens, ABB, Crompton
73	G.I. Fittings	Unik, K.S., Zoloto
74	Yard Hydrant Stand Post	Eversafe, Safe fire, Minimax, Newage, Safe Guard
75	Pressure Gauge	H.GURU, Fiebig, HD, Manometer, GIC, Emerald, WIKA
76	Flow Switch	Potter, Safex, system sensor, Rapid flow, TRAC, Levcon, Switchgear, Honeywell, Siemens.
77	Pressure Switch	Indfoss, Switcher, Honeywell, Vexma Trafag, Danfoss, H-Guru,

Sl.	Item	Makes
		Switzer, Waaree
78	Fire Suppression System	KANEX, SVS Buildwel (p) ltd
79	Sprinkler Flexible Drops	VICTAULIC, SMITH COOPER, ANVIL, Tyco, HD, Agni
80	Branch Pipe	New Age, Steelage, Minimax, Superex, Safeguard
81	First Aid Hose Reel Drum	New Age, Minimax, Vijay
82	Alarm Valve & Hydraulic Alarm Motor	HD, Mather & Platt, Central Spray Safe, Grinnel
	HVAC	
83	Split AC Units (Hi Wall / Cassette Units / Ductable Split)	Hitachi, Daikin, Toshiba, Trane, O-General, Mitsubishi Electric, Voltas, Bluestar, Carrier
84	DX Condensing Unit	Hitachi, Daikin, Toshiba, Trane, O-General, Mitsubishi Electric, Voltas, Bluestar, Carrier
85	VRV/VRF	Hitachi, Daikin, Toshiba, Trane, O-General, Mitsubishi Electric, Voltas, Bluestar, Carrier
86	Air Handling Units	Flaktwood, Trane, Systemair, VTS, Edgetech, Zeco, Citizen, Euroclima
87	Circular Inline Fans / Cabinet Fans	Systemair, Greenheck, Kruger, Nicotra, Flakt, Comefri, Ostberg, Airmaster
88	Variable Frequency Drives	Siemens, Danfoss, ABB, Schneider, Yaskawa, Fuji Electric
89	Factory Fabricated Ducting	Zeco, Rollastar, Multiline, Sevenstar, Western Air
90	GI Sheets/Ducting	SAIL, Jindal, Tata
91	Aluminium Sheets/Ducting	SAIL, Jindal, Tata, Hindalco
92	Nitrile Rubber Insulation	Armacell, K Flex, ALP Aeroflex
93	Grilles / Diffusers / Louvers	Systemair, Greenheck, Ruskin, Titus, Dynacraft, Cosmos, Ravistar, Airmaster
94	Fire Dampers / Volume Control Dampers	Systemair, Greenheck, Ruskin, Titus, Dynacraft, Cosmos, Ravistar, Airmaster
95	Drain Pumps	Aspen
96	Electrical Panels	CPRI Approved Make List
97	Laminar Airflow Hood	Thermadyne, AAF, Camfil
98	MERV Filters	Spectrum, Camfil, Pyramid, EMW, AAF, Klenzaid, Thermadyne, Aerofil
99	HEPA Filters	Spectrum, Camfil, Pyramid, EMW, AAF, Klenzaid, Thermadyne, Aerofil
100	Magnehelic Gauges	Dawson, Omicron
101	Stabilizer	V-Guard/V-stab / Microtek
102	Thermostat / Humidistat	Honeywell, Johnson Control, Siemens, Danfoss, Schneider, Omicron, Belimo

Sl.	Item	Makes
103	Copper Piping	Mexflow, Mandev, Rajco, Totaline
104	Drain Piping	Supreme, Astral, Finolex, Prince
105	Communication Cable / Power Cable	Polycab, RR Kabel, KEI, Havells

Note:

1. Change of any make of material in case of its non-availability or any other such reason shall be at the discretion of the Engineer-in-charge. The Contractor shall not be allowed to change the makes without their prior permission.
2. Equivalent make of any item may be added with the approval of Engineer in charge, wherever makes have not been specified for certain items, the same shall be as per BIS and as per approval of Engineer.
3. In case of items for which approved make is not given above, the Contractor shall place the order with the prior approval of the Engineer-in-charge.
4. In case of Contradiction between the approved makes/brands specified above and mentioned in the Specifications /Bill of quantities. The decision of the Engineer-in-Charge shall be final and binding on the Contractor.
5. All materials should confirm to relevant standard and codes of BIS and shall have ISI mark.

SIGNATURE & SEAL OF THE BIDDER

PART - VI

PRICE BID FOR RENOVATION WORK AT HLL CORPORATE HEAD OFFICE, THIRUVANANTHAPURAM.

RENOVATION WORK AT HLL CORPORATE HEAD OFFICE, THIRUVANANTHAPURAM					
SN	DESCRIPTION	QTY	UNIT	RATE	AMOUNT
CIVIL					
1	DISMANTLING AND DEMOLISHING WORKS				
1.01	Dismantling aluminium/ Gypsum partitions, doors, windows, fixed glazing and false ceiling including disposal of unserviceable material and stacking of serviceable material within 50 meters lead as directed by Engineer-in-charge	79.20	Sqm		
1.02	Dismantling tile work in floors and roofs laid in cement mortar including stacking material within 50 metres lead. For thickness of tiles 10 mm to 25 mm	40.80	Sqm		
1.03	Demolishing cement concrete manually / by mechanical means including disposal of material within 50 metres lead as per direction of Engineer - in-Charge. Nominal concrete 1:3:6 or richer mix (i/c equivalent design mix)	0.40	Cum		
1.04	PLYWOOD WORKS				
1.05	Providing and fixing panelling or Making Shelf, Racks, Tables, Partition etc : 18 mm thick Marine Ply wood with 1 mm thick laminate on the facing areas and 0.8mm balancing lamination on the inner side pasted and pressed with adhesive to give a uniform and smooth finish. (Area of opening more than 0.1sqm will be deducted during measurement and outer surface area will be measured for payment purpose) Shades, design, etc. as per the direction of site-in-charge.	20.90	Sqm		
1.06	Providing & Fixing decorative high pressure laminated sheet of plain / wood grain in gloss/ matt/suede finish with high density protective surface layer and reverse side of adhesive bonding quality conforming to IS: 2046 Types S, including cost of adhesive of approved quality. 1.0 mm thick	20.90	Sqm		
1.07	Providing and fixing special quality chromium plated brass cupboard locks with six levers of approved quality including necessary screws etc. complete. Size 50 mm	7.00	Each		
1.08	Providing and fixing magnetic catcher of approved quality in cupboard / ward robe shutters, including fixing with necessary screws etc. complete. Triple strip vertical type	14.00	Each		
1.09	Providing and fixing concealed hinge of approved quality for 19-20mm thick door with stainless steel screws complete :	14.00	Each		
1.1	Providing and fixing aluminium handles, ISI marked, anodised (anodic coating not less than grade AC 10 as per IS : 1868) transparent or dyed to required colour or shade, with necessary screws etc. complete. 125 mm	7.00	Each		
1.11	PARTITION WORKS				
1.12	Providing and fixing 12mm thick frameless toughened glass door shutter of approved brand and manufacture, including	5.70	Sqm		

RENOVATION WORK AT HLL CORPORATE HEAD OFFICE, THIRUVANANTHAPURAM					
SN	DESCRIPTION	QTY	UNIT	RATE	AMOUNT
	providing and fixing top & bottom pivot & double acting hydraulic floor spring type fixing arrangement and making necessary holes etc. for fixing required door fittings, all complete as per direction of Engineer in charge (Door handle, lock and stopper etc. to be paid separately				
1.13	Providing and fixing of glass door SS Patch Lock with out handle in toughened glass door including all necessary screws etc. complete.	3.00	Each		
1.14	Providing and fixing Steel S.S- 304 (D) Door Pull Both Side Handle of 12 inch, one Set (2 Handles) (best make of approved quality) for Glass, Wooden or similar doors including necessary cutting and making good etc. complete	3.00	Set		
1.15	Full height glazed partition-supply and fixing of 12mm Toughened Glass using System-45 Frames as per drawing. The Fixed glass to be fixed using BP45 Profiles at Top & Bottom, Side Profiles SP45 at sides. The profile size to be 45x25MM to be fixed on to the floor/wall/ ceiling as per the architect design. H Junction profile to be used at all Glass to Glass vertical joints, 90 Deg L Junction Profiles and T Junction profiles necessary as per design. In case of Glass overall panel MP45 & BP45 Overpanel Profile to be used. In case of Open glass edges EP45 End & Profile to be used.	48.10	Sqm		
1.16	Steel work in built up tubular (round, square or rectangular hollow tubes etc.) trusses etc., including cutting, hoisting, fixing position and applying a priming coat of approved steel primer, including welding and bolted with special shaped washers etc. complete. Hot finished welded type tubes.	35.60	Kg		
1.17	Providing and fixing frosted film in the fixed glass etc. Complete as per the direction of departmental officers	53.80	Sqm		
1.18	Providing and laying Gypsum panel partitions 100 mm thick with water proof Gypsum panels of size 666x500x100 mm, made of calcite phosphor Gypsum fixed with tongue and groove, jointed with bonding plaster as per manufacturers specifications in superstructure above plinth level up to floor V level. Gypsum blocks will have a minimum compressive strength of 9.3 kg/cm	1.40	Sqm		
1.19	CEILING WORKS				
1.2	Providing and fixing false ceiling at all height including providing and fixing of frame work made of special sections, power pressed from M.S. sheets and galvanized with zinc coating of 120 gms/ sqm (both side inclusive) as per IS : 277 and consisting of angle cleats of size 25 mm wide x 1.6 mm thick with flanges of 27 mm and 37 mm, at 1200 mm centre to centre, one flange fixed to the ceiling with dash fastener 12.5 mm dia x 50 mm long with 6 mm dia bolts, other flange of cleat fixed to the angle hangers of 25x10x0.50 mm of required length with nuts & bolts of required size and other end\ of angle hanger fixed with intermediate G.I. channels 45x15x0.9 mm running at the spacing of 1200 mm centre to	40.80	Sqm		

RENOVATION WORK AT HLL CORPORATE HEAD OFFICE, THIRUVANANTHAPURAM					
SN	DESCRIPTION	QTY	UNIT	RATE	AMOUNT
	centre, to which the ceiling section 0.5 mm thick bottom wedge of 80 mm with tapered flanges of 26 mm each having lips of 10.5 mm, at 450 mm centre to centre, shall be fixed in a direction perpendicular to G.I. intermediate channel with connecting clips made out of 2.64 mm dia x 230 mm long G.I. wire at every junction, including fixing perimeter channels 0.5 mm thick 27 mm high having flanges of 20 mm and 30 mm long, the perimeter of ceiling fixed to wall/partition with the help of rawl plugs at 450 mm centre, with 25 mm long dry wall screws @ 230 mm interval, including fixing of gypsum board to ceiling section and perimeter channel with the help of dry wall screws of size 3.5x25 mm at 230 mm c/c, including jointing and finishing to a flush finish of tapered and square edges of the board with recommended jointing compound, jointing tapes, finishing with jointing compound in 3 layers covering upto 150 mm on both sides of joint and two coats of primer suitable for board, all as per manufacturer's specification and also including the cost of making openings for light fittings, grills, diffusers, cutouts made with frame of perimeter channels suitably fixed, all complete as per drawings, specification and direction of the Engineer in Charge but excluding the cost of painting with:12.5 mm thick tapered edge gypsum moisture resistant board				
1.21	PAINTING WORK				
1.22	Removing white or colour wash by scrapping and sand papering and preparing the surface smooth including necessary repairs to scratches etc. complete	38.60	Sqm		
1.23	Providing and applying plaster of paris putty of 2 mm thickness over plastered surface to prepare the surface even and smooth complete.	42.20	Sqm		
1.24	Finishing with Deluxe Multi surface paint system for interiors and exteriors using Primer as per manufacturers specifications : Two or more coats applied on walls @ 1.25 ltr/10 sqmover and including one coat of Special primer applied @0.75 ltr /10 sqm	38.60	Sqm		
1.25	BLINDS				
1.26	Providing and fixing horizontal blinds of approved make and model, with 25 mm wide polyester slats, manufactured from 100% high-strength polyester material with suitable stiffness and flexibility, complete with powder-coated headrail and bottom rail, tilt mechanism, lift cords, brackets, end caps, and all necessary operating accessories. Slats shall have a polymer/enamel coated finish, UV-resistant, fade-proof, moisture resistant, and suitable for long-term indoor use. Installation shall be carried out complete with all fixtures, fittings, and labour as per the manufacturer's specifications and direction of the Engineer-in-Charge. Colour and shade shall be approved by the competent authority.	14.00	sqm		

RENOVATION WORK AT HLL CORPORATE HEAD OFFICE, THIRUVANANTHAPURAM					
SN	DESCRIPTION	QTY	UNIT	RATE	AMOUNT
1.27	TILE WORKS				
1.28	Providing and laying vitrified floor tiles in different sizes (thickness to be specified by the manufacturer) with water absorption less than 0.08% and conforming to IS : 15622, of approved make, in all colours and shades, laid on 20 mm thick cement mortar 1:4(1 cement : 4 coarse sand), including grouting the joints with white cement and matching pigments etc., complete.Size of Tile 600 x 600 mm	41.90	Sqm		
1.29	Providing and laying Vitrified tiles indifferent sizes (thickness to be specified by manufacturer), with water absorption less than 0.08 % and conforming to I.S. 15622, of approved make, in all colours & shade, in skirting, riser of steps, over 12 mm thick bed of cement mortar 1:3 (1 cement : 3 coarse sand), including grouting the joint with white cement & matching pigments etc. complete.Size of Tile 600x600 mm	1.80	Sqm		
1.3	WORK STATION				
1.31	Providing & Fixing of workstation table of size 1200x600x750mm, with frame made of 50x50 GP pipe with powder coating and pedestal box, top made of 16mm 710BWP marine plywood(15 years warranty)edge 25mm thick with colour laminate and ebco soft close fittings including glass partition with notice board and writing board as per approved shade and colour as per Architecture drawing and Engineer in Charge.	8.00	Each		
1.32	FURNITURE				
1.33	Providing & Fixing High back chair .The seat & back are made up of 12mm thick hotpressed plywood, upholstered with fabric & moulded with Polyurethane foam seat and back covers. The back foam should designed with contouredlumbar support for extra comfort .The seat has extra thick foam on front edge to give extra comfort.Mid back size 475 mm Width x 580 mm Height mm. And seat size 470 mm Width x 480 mm Thepolyurethane foam should bemoulded with density = 45 kg/m3 and hardness = 16 +/-2 kg on hampdem machine at 25% compression .Armrest are injection moulded from black copolymer polypropylene. The mechanism should befixed 360 degree revolving type,Upright position locking, tilt tension adjustment, seat back tilting ratio 1:3. The pneumatic height adjustment has an adjustment stroke of 12 cm. The pedestal should be injection moulded in black 33 % glass filled in nylon 66 with 5 nos twin wheel castors. The pedestal should be 66.3 cm pitch-center diameter.	1.00	Each		
1.34	Providing & Fixing mid back chair with ergonomic revolving chair with five-star nylon base, 50 mm dia. nylon twin-wheel castors, pneumatic gas-lift height adjustment, back-angle adjustment, 2 D adjustable armrests, PU-moulded foam seat, mesh backrest, and heavy-duty rubber-	10.00	Each		

RENOVATION WORK AT HLL CORPORATE HEAD OFFICE, THIRUVANANTHAPURAM					
SN	DESCRIPTION	QTY	UNIT	RATE	AMOUNT
	backed fabric upholstery in Black, complete as per standard specifications and as directed by the Engineer-in-Charge.				
1.35	Providing & Fixing of Executive L shaped table with one pedestol of size 1800x750x750mm, one drawer, made up of 16mm particle board with 710BWP marine plywood(15 years warranty), pedestol inside with off white laminated and exposed full colour laminate with table top edge 25mm thick with edge band, ebco soft close fittings including side table, sliding door type as per approved shade and colour as per Architecture drawing and Engineer in Charge.	1.00	Each		
1.36	Providing & Fixing Sofa-3 seater. Size: 1320 mm (W) x 835 mm (D) x 690 mm (H) Seat Height from ground 415 mm. Frame is made up of Tropical Solid Wood with syntheatic leather Upholstery,Seat Foam : Polyurethane Foam with recron layer.Foam Density : 18 kg/ cubic cm. Back Foam : Polyurethane Foam with silicon fill at arms. Foam Density : 22 kg/cubic cm S-Spring webbing.The Sofa is based on sheesham wood Legs walnut shade.	1.00	Each		
ELECTRICAL					
1.38	POINT WIRING				
1.39	Wiring for light point/ fan point/ exhaust fan point/ call bell point with 1.5 sq.mm FRLS PVC insulated copper conductor single core cable in surface / recessed medium class PVC conduit, with modular switch, modular plate, suitable GI box and earthing the point with 1.5 sq.mm FRLS PVC insulated copper conductor single core cable etc. as required. switch, modular plate, suitable GI box and earthing the point with 1.5 sq.mm FRLS PVC insulated copper conductor single core cable etc. as required.Group C	10	Point		
1.4	Wiring for group controlled (looped) light point/fan point/exhaust fan point/ call bell point (without independent switch etc.) with 1.5 sq. mm FRLS PVC insulated copper conductor single core cable in surface/ recessed PVC conduit, and earthing the point with 1.5 sq. mm FRLS PVC insulated copper conductor single core cable etc. as required.Group C	6	Point		
1.41	WIRING THROUGH PVC CONDUIT				
1.42	Wiring for circuit/submain wiring along with earth wire with the following sizes of FRLS PVC insulated copper conductor, single core cable in surface/recessed medium class PVC conduit as required.2X1.5 sq.mm + 1X1.5 sq.mm earth wire	75	Metre		
1.43	Wiring for circuit/submain wiring along with earth wire with the following sizes of FRLS PVC insulated copper conductor, single core cable in surface/recessed medium class PVC conduit as required2X2.5 sq.mm + 1 X2.5 sq mm earth wire	210	Metre		
1.44	Wiring for circuit/submain wiring along with earth wire with the following sizes of FRLS PVC insulated copper	45	Metre		

RENOVATION WORK AT HLL CORPORATE HEAD OFFICE, THIRUVANANTHAPURAM					
SN	DESCRIPTION	QTY	UNIT	RATE	AMOUNT
	conductor, single core cable in surface/recessed medium class PVC conduit as required 2X4 sq.mm + 1X4 sq.mm earth wire				
1.45	S/F PVC CONDUIT				
1.46	Supplying and fixing of following sizes of medium class PVC conduit along with accessories in surface/recess including cutting the wall and making good the same in case of recessed conduit as required.(ISI Make 20 mm	80	Metre		
1.47	Supplying and fixing of following sizes of medium class PVC conduit along with accessories in surface/recess including cutting the wall and making good the same in case of recessed conduit as required.(ISI Make 25 mm	60	Metre		
1.48	MODULAR TYPE BLANKING PLATE				
1.49	Supplying and fixing modular blanking plate on the existing modular plate & switch box excluding modular plate as required.	2	Each		
1.5	MODULAR TYPE SWITCH/SOCKET				
1.51	Supplying and fixing following modular switch/socket on the existing modular plate & switch box including connections but excluding modular plate etc as required. 5/6 Amps switch	36	Each		
1.52	Supplying and fixing following modular switch/socket on the existing modular plate & switch box including connections but excluding modular plate etc as required. 3 pin 5/6 Amp socket outlet	36	Each		
1.53	Supplying and fixing following modular switch/socket on the existing modular plate & switch box including connections but excluding modular plate etc as required. 15/16 Amps switch	2	Each		
1.54	Supplying and fixing following modular switch/socket on the existing modular plate & switch box including connections but excluding modular plate etc as required. 6pin 15/16 Amps (universal) socket outlet	2	Each		
1.55	Supply and Fixing the following modular switches & accessories in the existing front plates and giving necessary connections as required (RoHS compliant)25A SP switch with indicator	2	Each		
1.56	Supply and Fixing the following modular switches & accessories in the existing front plates and giving necessary connections as required (RoHS compliant)25A 3pin Shuttered socket	2	Each		
1.57	MODULAR BOXES AND PLATE				
1.58	Supplying and fixing following size/modules, GI box along with modular base & cover plate for modular switches in recess etc as required. 2 module	1	Each		
1.59	Supplying and fixing following size/modules, GI box along with modular base & cover plate for modular switches in recess etc as required. 3 module	1	Each		

RENOVATION WORK AT HLL CORPORATE HEAD OFFICE, THIRUVANANTHAPURAM					
SN	DESCRIPTION	QTY	UNIT	RATE	AMOUNT
1.6	Supplying and fixing following size/modules, GI box along with modular base & cover plate for modular switches in recess etc as required.6 module	1	Each		
1.61	Supply & Fixing the following types/ sizes of boxes suitable for modular accessories in surface/ recess including making good the damages, colour washing etc as required (RoHS compliant) 2 module moulded plastic box on surface	9	Each		
1.62	Supply & Fixing the following types/ sizes of boxes suitable for modular accessories in surface/ recess including making good the damages, colour washing etc as required (RoHS compliant) 3 module moulded plastic box on surface	18	Each		
1.63	Supply & Fixing the following types/ sizes of boxes suitable for modular accessories in surface/ recess including making good the damages, colour washing etc as required (RoHS compliant) 6 module moulded plastic box on surface	9	Each		
1.64	Supplying and fixing following modular base & cover on existing modular metal box etc for 2 module	9	Each		
1.65	Supplying and fixing following modular base & cover on existing modular metal box etc for 3 module	22	Each		
1.66	Supplying and fixing following modular base & cover on existing modular metal box etc for 6 module	11	Each		
1.67	DB AND ITS ACCESSORIES				
1.68	Supplying and fixing 5 amps to 32 amps rating, 240/415 volts, "C" curve, miniature circuit breaker suitable for inductive load of following poles in the existing MCB DB complete with connections, testing and commissioning etc. as required.Single pole	17	Each		
1.69	Supplying and fixing 5 amps to 32 amps rating, 240/415 volts, "C" curve, miniature circuit breaker suitable for inductive load of following poles in the existing MCB DB complete with connections, testing and commissioning etc. as required.Triple pole	1	Each		
1.7	Supplying and fixing single pole blanking plate in the existing MCB DB complete etc. as required.	4	Each		
1.71	Supply and fiing of 25 mm sized Medium Casing Caping white/Ivory colour with its all accessories	25	Meter		
1.72	Supplying and fixing 40A / 63A, TP MCB, 415 Volts, "C" curve, miniature circuit breaker in the existing MCB DB complete with connections, testing and commissioning etc as required.(VDB outgoings)	2	Each		
1.73	LIGHT FITTINGS & FANS				
1.74	SITC of recess mounted downlight fixture , die cast aluminium with powder coated housing, frosted PMMA / PC diffuser, 15-18W LED light fixture , p.f 0.9, THD < 20%, 2.5kV surge protection, CCT 6500K , Efficacy 75 Lm/W, CRI 80 etc with all required accessories.	14	Each		
1.75	SITC of wall fan, white colour, 5 star rated as per BEE complete with blades, casing, wall mounting accessories etc.	3	Each		

RENOVATION WORK AT HLL CORPORATE HEAD OFFICE, THIRUVANANTHAPURAM					
SN	DESCRIPTION	QTY	UNIT	RATE	AMOUNT
1.76	Dismantling of existing ceiling fan, light fittings using mechanical means or physical means without disturbing the overall structure of proposed area. All items dismantled and shall be made a checklist for returning back to concerned Authorities. All items shall be verified by Electrical Engineer (HLL) before handing over. If any working product is damaged during transit, the same shall be replaced without any additional claim.	1	Ls		
1.77	Dismantling of Switch boards with all accessories, and conveying the same to the section store without any damage as required.(upto 50m), all items dismantled and shall be made a checklist for returning back to concerned Authorities.	4	Nos		
1.78	ELV SYSTEMS				
1.79	Supplying and drawing of UTP 4 pair CAT 6A LAN Cable in the existing surface/ recessed Steel/ PVC conduit as required.	230	Metre		
1.8	Supply, Laying, Testing & Commissioning of CAT6 A (RJ-45) I/O Ports	4	Each		
1.81	Dismantling of existing CAT 6A Lan Cable and IO port RJ 45 socket	1	Ls		
1.82	HIWALL/CASSETTE SPLIT AC				
1.83	Supply, Installation, Testing and Commissioning of 1.5TR BEE 3 STAR rated INVERTER-Type Air-Cooled Hi-Wall Split-Type Air Conditioners , complete with Indoor Unit (IDU), Outdoor Unit (ODU), surface/concealed copper refrigerant piping with insulation (closed-cell elastomeric nitrile rubber tubular pipe section) up to 3 meters (IDU to ODU), copper power cable up to 3.5 meters (IDU to ODU), including drain pipe, R-32/R-410A/R-407C green refrigerant, wireless remote control, suitable for working between 180–260V with low & high voltage cutoff and 50 Hz, single-phase AC supply, capable of performing cooling, dehumidification, and air circulation of the following capacity with scroll/rotary compressor—the system shall be able to deliver 100% of the rated capacity up to 42°C. The unit must be able to operate up to 50°C (outdoor ambient temperature). WARRANTY: The system must include a MINIMUM 5-year Original Equipment Manufacturer (OEM) warranty for PCB, 10-year warranty on compressor, and 1-year warranty for the total machine. Warranty Certificate to be submitted for approval. Approved Make : Hitachi, Daikin, Toshiba, Trane, O-General, Mitsubishi Electric, Voltas, Bluestar, Carrier	1	each		
1.84	Supply, Installation, Testing, and Commissioning of minimum 2.0TR 3 STAR BEE rated INVERTER type, 4-way cassette split AC units, suitable for single or three phase AC supply. Each unit shall consist of an outdoor unit with a hermetically sealed, suction-cooled, energy-efficient scroll	1	each		

RENOVATION WORK AT HLL CORPORATE HEAD OFFICE, THIRUVANANTHAPURAM					
SN	DESCRIPTION	QTY	UNIT	RATE	AMOUNT
	or rotary compressor operating on R-32/ R-410A/ R-407C refrigerant, and a ceiling-mounted, 4-way cassette type indoor unit with a powder-coated, pretreated sheet metal cabinet. The indoor unit shall include an inbuilt drain pump, statically and dynamically balanced blower for silent operation, and synthetic washable media filters arranged for convenient cleaning. Installation shall include power and control cabling in PVC conduits, good quality copper refrigerant tubing with elastomeric nitrile rubber insulation, and an insulated drain line terminated at an agreed drain point. Each unit shall be supplied with a full-function wireless remote control for temperature, mode, and fan speed settings, and a thermostat. The outdoor unit shall be equipped with overload protection, an air-cooled copper condenser coil of sufficient depth and face area, a propeller type fan with a suitable motor, service valves, and a refrigerant filter, all housed in a powder-coated cabinet. WARRANTY: The system must include a MINIMUM 01-year Original Equipment Manufacturer (OEM) warranty for the total machine and a 03-year warranty on compressor. Warranty Certificate to be submitted for approval. Approved Make : Hitachi, Daikin, Toshiba, Trane, O-General, Mitsubishi Electric, Voltas, Bluestar, Carrier				
1.85	Supply and installation of automatic voltage STABILIZERS suitable for 1.0TR/1.5TR split AC units, complete with all necessary wiring, connectors, and wall mounting hardware. The stabilizer shall feature intelligent microprocessor-based control with SMT/PTH IC technology, $\pm 1\%$ output voltage accuracy, and startup time delay protection. It shall operate within 170V-270V AC input range (50Hz) with auto-reset low/high voltage cut-off, manual-reset thermal overload protection, short-circuit and surge protection	1	nos		
1.86	Supply and installation of heavy-duty mild steel (M.S) OUTDOOR STAND for split AC units, comprising of powder-coated mounting brackets with anti-corrosion treatment including all necessary galvanized mounting bolts, nuts, washers, and anchor fasteners. Installation shall be as per manufacturer guidelines and Engineer-in-Charge's directions, ensuring level alignment with wall/floor mounting options	2	nos		
1.87	Supply and installation of insulated PVC condensate DRAIN PIPING for split AC units including wall chasing, solvent-welded joints, and complete with clamps at regular intervals. Installation shall be with adequate slope towards drainage point. Work includes all necessary bends, couplings, P-traps and termination into designated drainage system.	20	metre		

RENOVATION WORK AT HLL CORPORATE HEAD OFFICE, THIRUVANANTHAPURAM					
SN	DESCRIPTION	QTY	UNIT	RATE	AMOUNT
1.88	Supply and installation of ADDITIONAL REFRIGERANT PIPING KIT for split AC units , comprising of Seamless copper tubing with wall thickness as per AC manufacturer's specifications, flame retardant elastomeric nitrile rubber insulation of minimum 13mm thickness all including necessary power and control cabling.	20	metre		
Total					

PART – VII

Proposed Drawings:

