

Regional Office-Kozhikode,
KSHB Building, 1ST Floor, Vikas Nagar Chakkorathukulam, East Hill Road
Kozhikode - 673006

Ref: RO:KOZ:SSD:CORRIGENDUM /01/2026-27

Date: 22.05.2026

CORRIGENDUM -01

TENDER FOR CONSTRUCTION OF NEW G+3 FLOOR COMMERCIAL BUILDING ALONG WITH INTERIOR FURNISHING WORK AND DEMOLITION OF EXISTING STRUCTURE AT CHEROOTY ROAD, KOZHIKODE, KERALA.

Union Bank of India has invited a tender dated **06.05.2026** for the construction of a new **G+3 floor commercial building**, including interior furnishing works and demolition of the existing structure at **Cherooty Road, Kozhikode, Kerala**.

The Notice Inviting Tender (NIT) was published in leading newspapers, on the Bank’s website, and on the Government portal, with the initial last date for submission of bids as **27.05.2026**.

Subsequent to the **pre-bid meeting held on 18.05.2026**, and based on the clarifications sought by prospective bidders, this **Corrigendum** is being issued.

The last date for submission of tenders has been extended to 03.06.2026 up to 3:00 PM.

Prospective bidders are advised to refer to this Corrigendum for detailed clarifications. **Details of the clarifications/compliance to queries raised by the intending bidders during the pre-bid meeting are provided below:**

Ser	Query	Clarification	Reference
1	Excavation and Disposal of Soil: A bidder has raised a query regarding the disposal of excavated soil and the process for obtaining permissions from Government Authorities.	It is hereby clarified that the responsibility for obtaining all necessary permissions, approvals, and clearances from the relevant Government Authorities for the disposal of excavated soil shall lie entirely with the Contractor. Further, disposal of surplus soil/earth, slurry, unserviceable materials, debris including RCC from demolished structures, and any other waste materials generated from the project site shall also be entirely the responsibility of the Contractor	The detailed scope of work and execution procedure are outlined in <i>Section 1 - Excavation, Earthwork, and Anti-Termite Treatment</i> of the Technical Bid document.
2	Sheet Piling:	Bidders are required to execute the sheet piling works	

	A bidder has raised a query regarding the requirement for sheet piling works.	in accordance with the specifications, scope, and requirements outlined in the Tender Document.	
3	<p>Price Fixation and Variation:</p> <p>A bidder has raised a query regarding the possibility of basic price fixation and price variation considering the current geo-political conditions and fluctuating market prices.</p>	As per the Bank's Procurement Policy and as advised by the consultant architect, provision for basic price fixation or price variation is not permissible. Bidders are required to quote firm prices, and no escalation or adjustment on account of market fluctuations or geo-political conditions shall be entertained.	
4	<p>Statutory Requirement for Electrical Connection (KSEB Approval)</p> <p>A bidder has raised a query regarding the requirement to deploy one ITI-qualified personnel and one Diploma-qualified personnel for obtaining approval from KSEB for commissioning and securing the electrical connection, citing applicable statutory guidelines. The bidder has further indicated that such manpower may be required for the ongoing operation of the facility and has sought clarification on whether the Bank will provide such personnel after handover of the project.</p>	The contractor shall deploy the required qualified personnel for commissioning and securing the electrical connection. Deployment of such personnel after handover is not within the scope of this project. However, all maintenance and repair activities during the Defect Liability Period (DLP) shall remain the sole responsibility of the contractor awarded the contract.	
5	<p>Unitised Substation - 200 kVA (11000 / 433V, 3 Phase):</p> <p>A bidder has raised a query stating that the Load Break Switch (LBS) specified in the scope of work is not in line with current Government guidelines and has suggested providing a Vacuum Circuit Breaker (VCB) instead.</p>	<p>Specifications of Unitised Substation - 200 kVA (11000 / 433V, 3 Phase) is revised.</p> <p>Bidders are advised to quote the rates as per the revised specifications, placed at page 03 of this Corrigendum</p>	Page No. 391-392 of Original bid Document.
6	<p>UPS Configuration</p> <p>A bidder has pointed out that the specified configuration of 3 kVA, <i>three-phase input and single-phase output online parallel redundant UPS with 30 minutes battery backup</i> is not feasible, as <i>three-phase input UPS</i> is not available.</p>	<p>Specifications of UPS (3 kVA and 10 kVA) is revised. Bidders are advised to quote the rates as per the revised specifications, placed at page 04 & 05 of this Corrigendum</p>	Page No. 402-403 of Original bid Document.

Revised Specifications of 200 KVA USS

SL. NO.	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
1.6	200 KVA USS				
1.6.1	<p>Supply , Installation, Testing and Commissioning of Unitised substation - 200 kVA capacity 11000 / 433V, 3 Phase, AN cooled Vector DYn11 cast resin outdoor transformer (USS) with off circuit tappings of +/- 5% in steps of 2.5%, changeable by tap links provided with LV terminals suitable for 2 runs of armoured PVC cable & HV terminals connected to 11 kV, 26.3 kA, 630 Amps. VCB (Vaccum Circuit Breaker) with Isolation Duty including Shunt Trip with 3 O/C + SC + 1 E/F Releases and 8 Way Annunciator with alarm with incoming suitable for XLPE cable with HRC fuses, 3 Nos. suitably rated HT CTs having class 0.2S sensitivy, 1 No. 11kV/110V PT(Class 0.2), superior quality TTB and provision for fixing HT TOD NET metering with all standard accessories and output connected to 11 kV Seal Off Bushings to the transformer including all control wiring etc. All the work shall be done as per IS/EI/EB standards [statutory charges shall be borne by the clients on production of valid proof]</p> <p>All civil works including construction of foundation ,fencing, jelly filling etc. shall be in the scope of contractor. 200kVA cast resin dry-type transformer's specifications include: 200kVA capacity, air-cooled (OA/AF) cooling, copper windings insulated with materials like Nomex, Class F or H insulation, and standard high-voltage (e.g., 11kV, 12kV, 33kV) and low-voltage (e.g., 433V, 400V) ratings, often with an "SCB" (Solid Cast Resin) series designation. Key features include fire retardancy, self-extinguishing properties, strong overload capacity, environmental friendliness (no oil), compact size, and suitability for indoor use in humid or polluted environments.</p>	Set	1		

(Refer Page No. 391-392 of Original bid Document)

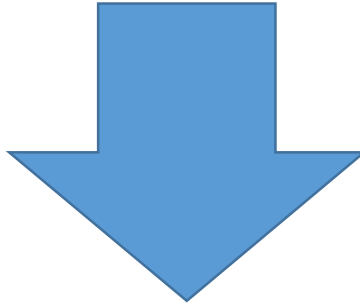
Revised Specifications of UPS (10 kVA & 3 kVA)

SL. NO.	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
5	UPS				
5.1	<p>10 kVA 3Ø Online UPS with 240 Minutes Backup and IGBT-PWM (Insulated Gate Bipolar Transistor - Pulse Width Modulation)</p> <p>The work includes the supply, installation, testing, and commissioning of a 10 kVA online UPS system with three-phase input and Single-phase output for reliable and continuous power supply.</p> <p>The UPS shall operate on 380/400/415 VAC, 3-phase input, with voltage tolerance of $\pm 20\%$ and frequency of 50 Hz. It shall maintain an input power factor of ≥ 0.99 and input current distortion within 5%. The output shall be regulated within $\pm 1\%$, delivering a pure sine wave with stable frequency under all operating conditions. The UPS efficiency shall be minimum 95% in online mode.</p> <p>The system shall be provided with a battery bank to support 240 minutes (4 hours) backup at 70-80% load. The battery system shall be based on 240V DC, comprising 20 numbers of 12V batteries of minimum 180 Ah capacity. Batteries shall be of SMF VRLA or approved equivalent type, complete with racks, cabling, interconnections, and necessary protection devices.</p> <p>The UPS shall include protection features such as overload, short circuit, battery protection, and thermal protection, along with static and maintenance bypass arrangements. It shall be equipped with an LCD display and communication ports for monitoring system parameters.</p> <p>The contractor shall carry out complete installation including cabling, earthing, testing, and commissioning. Site acceptance tests shall include load testing and battery backup verification.</p> <p>The system shall be supplied with a minimum 3-year warranty for UPS and 2-year warranty for batteries. Approved makes shall include APC (Schneider Electric), Vertiv, Eaton, Riello, or Numeric for UPS, and Exide, Amara Raja, or Panasonic for batteries.</p>				
5.2	<p>3 kVA 1Ø Online UPS with 240 Minutes Backup and IGBT-PWM (Insulated Gate Bipolar Transistor - Pulse Width Modulation)</p> <p>The work includes the supply, installation, testing, and commissioning of a 3 kVA online UPS system with single-phase input and single-</p>				

	<p>phase output to ensure uninterrupted and clean power supply.</p> <p>The UPS shall operate on 230V AC single-phase input with a voltage tolerance of $\pm 20\%$ and frequency of 50 Hz. It shall maintain an input power factor of ≥ 0.98 and input current distortion within acceptable limits. The output shall be regulated within $\pm 1\%$, delivering a pure sine wave with stable frequency under all operating conditions. The UPS efficiency shall be at least 90-93% in online mode.</p> <p>The system shall be provided with a battery bank designed for 240 minutes (4 hours) backup at approximately 70-80% load. The battery system shall typically operate on 72V or 96V DC, depending on the UPS design. The battery bank shall consist of 6 to 8 numbers of 12V batteries of minimum 150-200 Ah capacity, suitably selected to meet the backup requirement. Batteries shall be of SMF VRLA or approved equivalent type, complete with racks, interconnecting cables, and protection devices.</p> <p>The UPS shall include necessary protections such as overload, short circuit, battery deep discharge, and thermal protection, along with static bypass. It shall be equipped with an LCD display for system parameters and communication interfaces for monitoring.</p> <p>The contractor shall carry out complete installation including cabling, earthing, testing, and commissioning. Site tests shall include load testing and battery backup verification.</p> <p>The system shall be supplied with a minimum 3-year warranty for UPS and 2-year warranty for batteries. Approved makes shall include APC (Schneider Electric), Vertiv, Eaton, Riello, or Numeric for UPS, and Exide, Amara Raja, or Panasonic for batteries.</p>			
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(Refer Page No. 402-403 of Original bid Document)

**Find below the original
TENDER document
published on 06.05.2026**



**Regional Office-Kozhikode,
KSHB Building, 1ST Floor, Vikas Nagar Chakkorathukulam, East Hill Road
Kozhikode - 673006**

**TENDER FOR
Construction of New G+3 Floor Commercial building along with Interior Furnishing
work and Demolition of Existing Structure at Cherooty Road, Kozhikode, Kerala.**

PART-1

PRE-QUALIFICATION CUM TECHNICAL BID

Date of issue of Tender : 06-05-2026 to 27-05-2026 During office hours.
Last date for submission of tender : 27-05-2026 up to 3.00 pm.
Opening of Bid : 27-05-2026 at 3.30 pm.
Pre bid Meeting : 18-05-2026 at 11.00 am.

Owner:	Consultant:
Regional Office , Kozhikode KSHB BUILDING, 1ST Floor, Vikas Nagar Chakkorathukulam, East Hill Road Kozhikode - 006 Tel: 0495 2772325, 8848039042, 8547634848 Email: rh.kozhikode@unionbankofindia.bank.in, smpdrokoz@unionbankofindia.bank.in	M/S P.C. Rasheed and Associates Engineers and Architects 64/1355, Rarichan Road, Nadakkavu Eranhipalam P O, Calicut-673006- Kerala Tel: 9895444441,9497444441 Email: pcrasheedclt@gmail.com, pcrasheedandassociates@gmail.com 9895444441,9497444441

Regional Office -Kozhikode
KSHB Building , 1ST Floor, Vikas Nagar Chakkorathukulam, East Hill Road
Kozhikode - 673006

Construction of New G+3 Floor Commercial building along with Interior Furnishing work and Demolition of Existing Structure at Cherooty Road, Kozhikode, Kerala

Union Bank of India-Regional Office -Kozhikode invites Tenders in two-bid system i.e. Technical Bid and Commercial/Price Bid from eligible established contractors having Registered office in Kerala(Preferably Office / Branch Office in Kozhikode District) and executed at least one project/ work of similar nature in Kerala for Central Government/ State Government/ Public Sector undertakings for Construction of New G+3 Floor Commercial building along with Interior Furnishing work and Demolition of Existing Structure at Cherooty Road, Kozhikode, Kerala. The estimated cost of work is Rs.796.61 Lakhs +18% GST and the Completion period is 18 months. Tender forms (Prequalification Bid, Price Bid & detailed drawings) can be collected against payment of Rs.1000/- (Non-refundable) by way of pay order drawn from Scheduled Bank in favor of “Union Bank of India” payable at Kozhikode during working hours from 06.05.2026 to 27.05.2026 Up to 3:00 pm. The tenders are also available on Bank’s website www.unionbankofindia.bank.in. & Government portal www.eprocure.gov.in.Tenderer downloading documents from website, must submit pay order for document cost (Rs.1000/-) while submitting the tender in a separate envelope super scribing “tender cost” else tender will not be considered for opening. The last date of submission of tender is 27.05.2026 up to 3.00 PM.

Applicants registered as MSE / NSIC / Udyog Aadhar/SSI Scheme are exempted from depositing cost of BID document/ EMD provided they attach self attested copy of the relevant certificate.

Contractors submitting *MSE / NSIC / Udyog Aadhar/SSI* Scheme certificate under any other categories of work and seeking exemption from EMD will not be entertained and may lead to disqualification from further process.

The Bank reserves the right to reject any or all applications without assigning any reasons whatsoever. Please refer banks website and Govt. portal regarding any corrigendum for the subject tender till finalization.

REGIONAL HEAD
KOZHIKODE

DISCLAIMER

The information is provided to prospective tenderer having Registered Office in Kerala, who intend to participate in bidding process for Development of Property at Cherootty Road Kozhikode Kerala, for Union Bank of India for which this tender has been issued, as per the terms and conditions set out in this tender and any other terms and conditions related to such information.

This tender is neither an agreement nor an offer and the purpose of this Tender/ Request for Proposal (RFP) is to provide the Bidder(s) with information to assist the formulation of their proposals. The RFP does not claim to contain all the information each Bidder may require. While Bank has taken due care in the preparation of the information contained herein, it does not claim that the information is exhaustive. Respondents to this tender are required to make their own inquiries/analysis and should check the accuracy, reliability and completeness of the information in this RFP and where necessary obtain independent advices/clarifications. They should not rely solely on the information contained in the blank tender documents/forms. Bank may in its absolute discretion, but without being under any obligation to do so, update, amend or supplement the information in this RFP. The Bank is not responsible if no due diligence is performed by the Respondents.

The Bank, its employees and advisors make no representation or warranty and shall have no liability to any person, including any applicant or Bidder under any law, statute, rule or regulations or tort, principles of restitution or unjust enrichment or otherwise for any loss, damages, cost or expenses which may arise from or be incurred or suffered on account of anything contained in this tender or otherwise, including the accuracy, adequacy, correctness, completeness or reliability of the tender and any assessment, assumption, statement or information contained therein or deemed to form part of this tender or arising in any way for participation in this Bid stage.

Union Bank of India reserves the right to alter, amend, update or supplement the information reflected in this document or to change the process or procedure to be applied. It also reserves the right to decline bids without assigning any reason thereof.

The Bidder shall bear all its costs associated with or relating to the preparation and submission of its Bid including but not limited to preparation, copying, postage, delivery, fees, expenses associated with any demonstrations or presentations which may be required by Bank or any other costs incurred in connection with or relating to its Bid. All such costs and expenses will remain with the Bidder and Bank shall not be liable in any manner whatsoever for the same or for any other costs or other expenses incurred by a Bidder in preparation or submission of the Bid, regardless of the conduct or outcome of the Bidding process.

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NOTICE INVITING TENDER

**TENDER FOR CONSTRUCTION OF NEW G+3 FLOOR COMMERCIAL BUILDING AT
CHEROOTY ROAD, KOZHIKODE, KERALA**

Sealed, Item Rate, tenders are invited in the prescribed format from contractors having Registered office in Kerala (Preferably Office / Branch Office in Kozhikode District) and executed at least one project/ work of similar nature in Kerala for Central Government/ State Government/ Public Sector undertakings for Construction of New G+3 Floor Commercial building along with Interior Furnishing work and Demolition of Existing Structure at Cherooty Road, Kozhikode, Kerala as per following details:

NAME OF THE WORK: Construction of New G+3 Floor Commercial building along with Interior Furnishing work and Demolition of Existing Structure at Cherooty Road, Kozhikode, Kerala

Estimated Cost of the Work	Rs.796.61 Lakhs +18% GST(or as applicable)
Earnest Money Deposit	Rs.15,93,000/- (Rupees Fifteen Lacs Ninety Three Thousand only) in favor of Union Bank of India, drawn from Scheduled Bank, payable at Kozhikode (Kerala)
Period of Completion	18 months
Validity of Tender	120 days
Date of Issue of Tender	From 06.05.2026 to 27.05.2026 during office hours
Date and Time of the Pre-Bid Meeting;	11.00 am. on 18.05.2026 a Kozhikode Regional Office, Union Bank of India
Last Date for Submission of Queries by bidders;	Up to 3.00 PM on 27.05.2026
Last date of submission of Tender	Up to 3.00 PM on 27.05.2026
Date & Time of opening the Technical bid	3:30 PM on 27.05.2026 At Union Bank of India, Regional Office, KSHB Building, 1 ST Floor, Vikas Nagar Chakkorathukulam, East Hill Road Kozhikode - 673006)

The tender document (Prequalification Bid, Price Bid & detailed drawings) can be obtained from, Union Bank of India, Regional Office, Kozhikode on payment of Rs.1000/- (non-refundable) in favour of Union Bank of India, Regional Office-Kozhikode, drawn from Scheduled Bank payable at Kozhikode, Kerala and should be stamped and sealed submitted in original, in the same office.

1. The Item Rates under the contract include for full, final & entire completion of all works in all respects described in the tender document& as shown in drawings forming part of the contract. Contractor must quote Item Rates on estimated cost. Tenders will be opened in the presence of contracting agencies or their authorized representatives.
2. The tenders shall be submitted in two envelopes. The **Envelope No. 1** shall be marked as Technical Bid, shall contain Technical Bid of the tender, EMD in the form of

Demand Draft/ Pay Order drawn from Scheduled Bank, Prequalification application and any other matter.

3. The **Envelope No. 2** shall be marked as Price Bid.
4. All the above 2 envelopes to be put in 3rd **envelope** super scribing the subject tender before submitting.
5. Envelope No. 1. Will be opened on the due date of opening. Envelope No. 2 of the contractors will be opened at later date (to be intimated subsequently) and of those whose prequalification application meets with eligibility criteria of the advertisement and the requirement of EMD and the terms/ conditions submitted, acceptance of technical bid, etc.
6. Tenders are to be submitted in one sealed Envelope Cover Enclosing therein the Envelope No. 1 and Envelope No.2 Duly super scribed “TENDER FOR CONSTRUCTION OF NEW G+3 FLOOR COMMERCIAL BUILDING AT CHEROOTY ROAD, KOZHIKODE, KERALA”
7. The tenderer must use only the tender forms issued for the purpose to fill in the rates. Intimation of tender quoted by letter, telegram/ telex will not be acceptable. The tender must be dropped in a tender box. Delivery of the tender through courier/ post shall be avoided and any disputes arising thereof shall not be entertained.
8. Tenderers are advised not to make any alteration/modification in the tender documents, Item of work or in any respect whatsoever. Violation of this requirement will make the Tender Liable for rejection.
9. In case of postal delivery, the tenderer has to ensure that tender is reached before the due date and time and dropped in the tender box. The bank will not be responsible for damage in the transit and delay of receipt of tender, if any or sent by a special messenger. Tender received late shall be rejected.
10. Every page of the tender documents should be signed by the person or persons submitting the tender in token of his/their having acquainted himself/themselves with the General and Special Conditions of Contract, Specifications etc., as laid down. Any tender with any of the documents not so signed will be subjected to rejection.
11. No consideration will be given to a tender received after the time stipulated above and no extension will be allowed for submission of the tender.
12. Union Bank of India shall not be bound to accept the lowest tender and reserves the right to accept or reject any or all the tenders without assigning any reason whatsoever.
13. This notice inviting tenders, the conditions of tender and the duly completed form of tender etc. will form part of the Agreement to be executed by the successful tenderer with the bank.
14. Tender submitted without EMD will be treated as incomplete and the same will be rejected out rightly. The EMD shall be strictly in the form of Pay Order/ Demand Draft drawn from Scheduled Bank. No Cheques will be accepted on account of EMD. Tenders submitted with the cheque as EMD will be treated as incomplete and will be rejected.

**REGIONAL HEAD
KOZHIKODE**

“INTEGRITY PACT” (IP)

Vendors/bidders/sellers, only those who commit themselves to Integrity Pact (IP) with the Bank, would be considered competent to participate in the bidding process. In other words, entering into this pact would be the preliminary qualification. In case of bids for value of Rs.1.50 Crs. not accompanied with signed IP by the bidders along with the technical bid, the offers shall be summarily rejected.

IP shall cover all phases of contract i.e. from the stage of Notice Inviting Tenders (NIT)/ Request for Proposals (RFP) till the conclusion of the contract i.e. final payment or the duration of warrantee/guarantee. Format of IP is attached in **Annexure “A”** for strict compliance.

The following Independent External Monitors (IEMs) have been appointed by the Bank, who will review independently and objectively, whether and to what extent parties have complied with their obligation under the pact.

1. Shri. Jagdish Prasad Meena, IAS (Retd.)
Email- meenajp@gmail.com
2. Shri. Arvinda Kumar, IPS (Retd.)
Email: arvindak@gmail.com

It may kindly be noted that all clarification/query/status with respect to tender may be forwarded to the following officer and not to IEMs except query related to Integrity Pact:

Mr.Nikhil P
Senior Manager(Operations)
Ph. No.:**9037489211**
E-mail: smpdrokoz@unionbankofindia.bank.in

REGIONAL HEAD

BIO - DATA OF CONTRACTING AGENCY

1. Name of the firm :
 Address :
 Telephone No. :
 Office :
 Residence :
 Mobile :
 Fax :
 E-Mail :

- 2.a) Whether proprietary/partnership/ Pvt. Ltd. / Public Ltd. (certificate of registration / partnership deed to be enclosed as Annexure-I) :
 b) Name of the Proprietor, Partners, Directors :
 I)
 II)
 c) Year of establishment :

3. Registration with Tax Authorities :
 i) Income-tax (PAN) No. :
 ii) GST No. :
 iii) EPF Regn. No. :
 iv) ESI Regn. No. :

 (Copies of certificates of registration with relevant authorities to be enclosed as Annexure-II-A, II-B, II-C, & II-D)

4. Names of the Bankers with address & telephone numbers:
 I)
 II)

5. Enclose solvency certificate of the Amount 30% of estimated cost : Enclosed / not enclosed

Note: The solvency certificate should be addressed to Union Bank of India and not older than six months from the date of advertisement.

6. Furnish copies of audited balance-Sheet and Profit & Loss A/C. for the last 3 years i.e. Assessment years-2022-2023, 2023-2024, 2024-2025 as Annexure-IV-A, IV-B & IV-C. : Enclosed / not enclosed

7. Registration with Govt. / Public Sector / Banks (certificates of Registration to be enclosed as Annexure-V.

Name of the Organization	Year since empanelled

8. Give details if at present involved in litigation in similar type of contracts:

Sr. No.	Name of Project	Name of Employer	Nature of work	Work order dated	Date of completion of work	Value Rs.

9. Details of civil suit, if any, that arose during execution of contract in the past 10 years.

10. Specify maximum value of single value project executed during the last three years. :

11. Name& relation, if any, with the staff member of Union Bank of India. :

12. Details of work executed during the last 3 years:

Type of work	Work executed for (name of the Institution / Body)	Nature of work (in brief)	Location	Value Rs.	Duration of work with date		If work left incomplete or terminated (give reasons)
					Commence	completion	

Note: Copies of work orders along with Xerox copies of relevant TDS certificate, satisfactory completion certificate obtained from the client shall be enclosed as Annexure VI. Please note without the copies of certificates, your application is liable to be rejected.

13. Details of work on hand (photo copies of performance certificate, work orders issued by valued clients, preferably Banks, Govt., and Semi-Govt. Bodies should be enclosed as Annexure VII).

Type of work	Work executed for (name of the Institution / Body)	Nature of work (in brief)	Location	Value Rs.	Duration of work, stipulated time	Present stage of work

14. Details of Pre-Qualifying work (Filling of columns is mandatory and to be supported by copies of work order and completion letters as per the criteria. On Non filling of columns or not enclosing credentials, the application form submitted will be rejected without assigning any reason thereof.)

Name of the work	Name of the client	Work order reference / date	Completion letter reference/ date	Value of work completed

15. LIST OF NAME/S OF PROPRIETOR / PARTNERS & EMPLOYEES

Name	Qualifications	Experience	Particulars of work done	Employed in your firm since	Value of work done

16. Turnover in last 5 years:

Sr. No.	Year	Turnover (Rs.in lacs)	Income-tax paid	VAT paid	Service Tax paid
1	2020-21				
2	2021-22				
3	2022-23				
4	2023-24				
5	2024-25				

Copies of income-tax returns / assessment orders for each year to be enclosed as Annexure VIII-A,B,C,D& E

17. List of equipment's / machinery owned:

Sr. No.	Name of equipment	Year of manufacture	Nos. available

18. PRE-QUALIFICATION CRITERIA:

Signing of the Integrity Pact (IP) is the foremost criteria for Pre-qualification as per Annexure A. IP should be signed by the authorized signatory of the vendor/firm and to be submitted along with technical bid.

It is mandatory that all the agencies shall have registration for PAN /VAT / TIN / GST.

(Estimated Cost: Rs.796.61Lakhs)

Sr. No.	Criteria	Weightages	Self rating marks
1	Should have executed similar works for Central Govt, State Govt or Public Sector Undertakings during last 7 years. One similar work of 80% of estimated cost i.e. Rs. 637.00 Lakhs OR Two similar works of 50% of estimated cost i.e Rs.398.30 lakhs OR Three similar works of 40% of estimated cost i.e Rs.318.60 lakhs	50	
2	Average turnover for the last three years shall be 30% of estimated cost i.e. Rs.239.00 lakhs and above.	20	
3	Should have made profit at least in two years during last three years.	10	
4	Registered Office/Branch office in the state of Kerala	10	
5	Branch office in Kozhikode district	10	
6	Should have submitted solvency certificate of 30% of estimated cost i.e. Rs.239.00 lakhs (not older than 6 months).	Mandatory	
	TOTAL	100	

NOTE: The value of work executed will be enhanced by 5% per year to ascertain current value of the work done. Criteria mentioned above are just minimum requirement. The Bank at its discretion may upgrade the criteria. No complaint on this account will be entertained. Contractors scoring 80 marks & above will only be considered for pre-qualification. Contractors themselves have to fill in self-rating marks column in the above table.

Similar work means Construction of RCC Institutional/commercial building (Central Government/State Government/PSU) along with related service of Civil, Plumbing, Sanitary, Electrical, Fire Alarm System, Access Control works, firefighting system etc.

19. LIST OF ENCLOSURES:

Annexure No.	Particulars	Tick If Enclosed
I	Certificate of registration of Company/ partnership deed.	
IIA, IIB, IIC, IID	Certificates of registration with Income Tax, GST, EPF, ESI authorities.	
III	Solvency Certificate.	
IVA, IVB, IVC	Audited Balance Sheet & Profit & Loss A/c. Statement for 2022-2023, 2023-2024 & 2024-2025	
V	Certificates of Registration with Govt./ Public Sector/ Banks.	
VI	Copies of work orders along with xerox copies of relevant TDS certificate, satisfactory completion certificate mentioning value of work.	
VII	Copies of performance certificate, work orders issued by valued clients, preferably Banks, Govt., Semi-Govt. Bodies. At least One qualifying work mentioned by the Contractor in Bid is to be from Govt./Public Sector/Banks.	
VIIIA, VIIIB, VIIIC, VIIID, VIIIE	Copies of income-tax returns/ assessment orders for each year from 2021 to 2025	

Note: In absence of any of the above enclosures, your application is likely to be rejected.

DETAILS OF PREQUALIFYING WORKS - I

(Filling all details are mandatory without which application will be summarily rejected)

1.	Name of firm & address for whom the work is executed	
2.	Details of work done by the firm	1. CIVIL WORK = Rs. 2. ELECTRICALS = Rs.
3.	Photographs of work completed (please enclose copy)	
4.	Value of contract executed	
5.	Brief description of the work	
6.	Period during which the contract is executed	
7.	Work order reference (please enclose copy of the work order)	
8.	Completion certificate reference (please enclose copy of the completion of work)	
9.	Delay in execution of work	
10.	Whether time schedule is adhered to	
11.	Any other information which you consider will help us in taking our decision.	

PLACE:

SIGNATURE WITH OFFICE SEAL

DATE:

DETAILS OF PREQUALIFYING WORKS - II

(Filling all details are mandatory without which application will be summarily rejected)

1.	Name of firm & address for whom the work is executed	
2.	Details of work done by the firm	1. CIVIL WORK = Rs. 2. ELECTRICALS = Rs.
3.	Photographs of work completed (please enclose copy)	
4.	Value of contract executed	
5.	Brief description of the work	
6.	Period during which the contract is executed	
7.	Work order reference (please enclose copy of the work order)	
8.	Completion certificate reference (please enclose copy of the completion of work)	
9.	Delay in execution of work	
10.	Whether time schedule is adhered to	
11.	Any other information which you consider will help us in taking our decision.	

PLACE:

SIGNATURE WITH OFFICE SEAL

DATE:

DETAILS OF PREQUALIFYING WORKS - III

(Filling all details are mandatory without which application will be summarily rejected)

1.	Name of firm & address for whom the work is executed	
2.	Details of work done by the firm	1. CIVIL WORK = Rs. 2. ELECTRICALS = Rs.
3.	Photographs of work completed (please enclose copy)	
4.	Value of contract executed	
5.	Brief description of the work	
6.	Period during which the contract is executed	
7.	Work order reference (please enclose copy of the work order)	
8.	Completion certificate reference (please enclose copy of the completion of work)	
9.	Delay in execution of work	
10.	Whether time schedule is adhered to	
11.	Any other information which you consider will help us in taking our decision.	

PLACE:

SIGNATURE WITH OFFICE SEAL

DATE:

FORMAT OF CONFIDENTIAL REPORT

(To be submitted by the Client of applicant on their letterhead in sealed envelope to the Bank - Mandatory requirement)

To:

Union Bank of India,
 Regional Office,
 Kozhikode
 Tel: 0495 2772325
 Email:rh.kozhikode@unionbankofindia.bank.in
smpdrokoz@unionbankofindia.bank.in

Sir,

Confidential Report on M/s. _____

This is to certify that M/s. _____, having Office at _____ have completed the work of _____ Confidential Report for our project executed is as under:

1.	Details of Project Executed ByThe Firm	
2.	Area of Construction	
3.	Date of Commencement of Project	
4.	Date Of Completion Of Project	
5.	Total Value Of Project Executed	
6.	Quality Of Service Rendered	
7.	Competence To Handle Works	
8.	Integrity And Reliability OfThe Firm	
9.	Dealing In Execution Of Work	
10.	Whether Time Schedule Is Adhered To	
11.	Whether Any Penalty Imposed ForThe Delay	
12.	General Attitude OfThe Firm	
13.	Any Other Information Which You Consider Will Help Us In Taking Our Decision	

SIGNATURE: _____

NAME: _____

DESIGNATION: _____

PLACE: _____

DATE: _____

OFFICE SEAL

DECLARATION BY BIDDER

I / We have read the instructions appended to the proforma and I / We understand that if any false information is detected at a later date, any future contract made between ourselves and Union Bank of India, on the basis of the information given by me / us can be treated as invalid by the Bank and I / We will be solely responsible for the consequences.

I / We acknowledge that:

I / We agree that the decision of Union Bank of India in selection of contractors will be final and binding to me / us.

I / We agree that I / we have no objection if enquiries are made about the work listed by me / us in the accompanying sheets.

I / We agree that I / We have not applied in the name of sister concern for the subject empanelment process.

All the information furnished by me hereunder is correct to the best of my knowledge and belief.

Place :

Signature

Date :

Name & Designation

Seal of Organization

INSTRUCTION WITH REGARD TO SUBMISSION OF TENDER

1. Rates should be quoted both in figures and words in columns specified. All erasures and alterations made while initials of the tenderer must attest filling the tender. Overwriting of figures is not permitted. Failure to comply with either of these conditions will render the tender invalid and it will be the option of Union Bank of India to accept or reject the tender. No request of any change in rate or conditions after opening of the tender will be entertained.

1. In the case of figures, the word Rs. should be written before the figures of rupees and the word P' written after the decimal figures e.g. Rs. 3.25 P. In the case of words, the word Rupee should similarly precede and the words "Paisa only" should be written at the end, closely following each the Item Rate. The word "only" should not be written in the next line unless the rate quoted is in whole Rupees closely followed by the word "only": The amount should invariably be up to two decimal places.

2. The different Schedules should be filled as follows:

- (a) The "Rate" Column wherever applicable to be legibly filled in ink in both figures and words.
- (b) The "Amount" Column also to be legibly filled in ink in both figures and words.
- (c) All corrections to be initialed.
- (d) No over writing is allowed.
- (e) The figure of percentage of rate shall be legibly filled in ink in both figure and words.

3. Errors in the bill of quantities shall be dealt with in the following manner.

- (a) In the event of any discrepancy between the rates quoted in words and the rates in figures the former shall prevail.
- (b) In the event of an error occurring in the amount column of the bills of quantities as a result of the wrong extension of the unit rate and the quantity, the unit rate shall be regarded, as firm and extension shall be amended on the basis of the rates.
- (c) All the errors in totaling in the amount column and in carrying forward the totals shall be corrected.

4. The tender shall be signed and dated at all places provided therein. Also all pages, drawings and corrections/alterations shall be initiated. The tender submitted on behalf of a firm shall be signed by all the partners of the firm or by a partner who has the necessary authority on behalf of the firm to enter into the proposed contract. Otherwise, the tender may be rejected by Union Bank of India.

5. The time allowed for completion of works is 18 months from the date of commencement of the work is reckoned from the 10th day from the date of Letter of Intent. Time shall be considered the essence of contract.

6. It shall be the responsibility of the contractor to arrange for water and electricity required for completing construction. If water is available with the bank, the same will be

supplied to the contractor by recovering 1% of the value of work done. However, contractor will have to make arrangement of pipeline for distributing water. The Contractor shall make its own arrangements for electricity supply and shall pay the applicable tariff directly to the Electricity Board. In case electricity is supplied by the Bank, the Contractor shall install a separate energy meter at its own cost and pay electricity charges strictly as per actual consumption. Any change or conversion of tariff required for commercial construction purposes shall be carried out by the Contractor at his own cost and responsibility.

7. Every tender shall be accompanied by earnest money of Rs.15,93,000/- (Rupees Fifteen Lakhs Ninety Three Thousand Only) by way of Demand Draft/Pay Order only favoring UNION BANK OF INDIA, drawn from Scheduled Bank, payable at Kozhikode. Tender submitted without earnest money shall be summarily rejected. The contractor whose tender is accepted will have to deposit as initial security deposit a further sum to make up 2% of the value of the accepted tender including the earnest money. The initial security deposit will have to be made within 14 days from the date of acceptance of tender, failing which the Bank at his discretion may revoke the letter of acceptance and forfeit the earnest money deposit furnished along with the tender.

8. EMD Exemption: Vendors who are registered with the National Small Industries Corporation (NSIC), or classified as Micro or Small Enterprises (MSEs) as per the MSE Procurement Policy issued by the Ministry of Micro, Small and Medium Enterprises (MSME), or registered with the Central Purchase Organisation or the concerned Ministry or Department, shall be exempted from payment of EMD, subject to submission of valid supporting certificates/documents. Only vendors providing current and valid registration/eligibility certificates will be considered for exemption.

9. The Earnest Money will be retained in the case of the successful tenderer as part of the security for due fulfillment of the Contract. No. interest shall be paid on this deposit. Failure to enter into the Contract agreement within the stipulated time of 20 days from the date of acceptance of work order shall entail the forfeiture of the Earnest money Deposit. The Earnest money of unsuccessful tenderers will be released after issue of work order, without any interest.

10. A Solvency Certificate for 30% of estimated cost i.e. Rs.239.00 lakhs issued by a nationalized or scheduled commercial bank shall be submitted by the bidder, and the certificate shall have been issued within the last 6 months from the date of publication of the tender document. (i.e. from 06.11.2025 to 27.05.2026). Only certificates clearly indicating the date of issue and current financial standing of the bidder will be considered.

11. The tenderer shall submit his tender after carefully examining the whole of the tender document and the terms and conditions of contract, the drawings and specifications, the schedule of quantities etc., and also after examining the site and conditions prevailing in and around site.

12. The Bank does not bind himself to accept the lowest or any tender and reserve to them the right of accepting the whole or any part of the tender and tenderer is bound to perform the same at the rates quoted. The Bank will not be bound to accept the lowest tender and reserves the right to accept or reject any or all the tenders without assigning any reasons whatsoever. The work may also be divided among the contracting agencies depending on the exigencies of the bank.

13. Bank shall not be responsible for any expenses incurred by bidders in connection with the preparation and delivery of their bids, including expenses incurred during bidding.
14. Bids from consortium shall not be accepted. Telex / Telegraphic / Fax / Email bids shall not be accepted. Late/ Delay / post tenders shall be rejected and representative of such bidder shall not be allowed to attend the bid opening.
15. The Bank is not concerned with any rise or fall in the prices of materials and labour. The rates quoted shall include all costs, allowances, taxes including sales tax on works contract or any other charges including any enhanced labour rates etc. which may become effective for any reason including those due to acts of Government/ Statutory Bodies enacted from time to time by the State and or the Central Government. Under no circumstances, shall the Bank be held responsible for compensation or loss to the contractor due to any increase in the cost of labour or materials etc.
16. Contractor to coordinate and assist the Architect/Interior Designer in obtaining all statutory approvals and any other State and Central rules in force. Any expenses incurred in obtaining such approvals are deemed included in the rates quoted by the Contractors.
17. Tenders shall remain valid for a period of 120 days from the date of opening of the tender which period may be extended by mutual agreement and the tenderer shall not cancel or withdraw the tender during the initial validity period of 120 days.
18. The successful tenderer shall be bound to implement the Contract and mobilize and sign specified agreements within 10 days from the date of acceptance of work order.
19. Tenderers must include in their rates, all taxes excluding GST and any other tax & duty or other levy by the central and state government applicable on the date of submitting tender. Deductions in respect of sales tax or turnover levied as per government notification and/or guidelines shall be made from the Contractor's interim and final bills, and deposited with the relevant authority by the Bank, on his behalf. Any shortfall in deposit thereof shall be made up by the contractor, before submitting his final bill. Due to change in taxes structure by orders from Central Govt./ State Govt. after opening of tenders shall be reimbursed to the contractor as per actual and upon verifying the proof of having made the payment.
20. This contract shall be an Item Rate contract. The Contractor shall be paid for actual quantity of work done, as measured at site including any deviation plus or minus. The rate of any non-schedule items of work shall be decided as mentioned in the conditions of contract.
21. The tender drawings exhibited/enclosed are preliminary drawings intended for the guidance of the Contractor only. They may be subject to revision and alteration without vitiating any of the terms of the contract and the Contractor shall be bound to execute the works as shown on the final drawings without claiming any extra payment.
22. No correspondence will be entertained in respect of this tender other than any clarifications strictly pertaining to this tender.
23. The tender price quoted by a tenderer shall be kept strictly confidential and shall not be divulged to any other party even approximately before the time limit for delivery of tender. The only exception be for obtaining an insurance quotation, you may give your insurance company or agent any essential information they ask for, so long as it is done in

strict confidence. No information about other's tender price should be obtained and no arrangement with anyone else should be made whether or not he submits the tender.

24. For electrical, sanitary, water supply and drainage works, tenderers must possess respective valid licenses from the competent authority of the area where the site is located.

25. Contractor should sign at the end of every page prior to submitting the tender.

26. Conditional tenders will be summarily rejected.

27. Completion period of the project will be 18 months.

28. The contractor shall be responsible for obtaining all the necessary statutory permissions for the same.

29. The Contractor to depute a full time Supervisor, who shall be a degree civil engineer with minimum 10 years' experience in managing similar Construction projects. The contractor should submit the necessary credentials of such engineer to UBI for scrutiny & approval. Such engineer shall be deputed on the site full time for the full duration of the project & shall report daily to the project consultant architect appointed by UBI.

30. If it is found that the work on site is being carried out in absence of such an engineer, the contractor shall be fined Rs 5,000/- per day for such non-compliance. If such non-compliance is observed more than 10 times, UBI reserves the authority to ask the contractor to cease work on the site & terminate the contract without any explanation whatsoever & the termination process as per the tender document shall follow.

31. **COMMERCIAL EVALUATION:** Only the technically qualified bidders who are successful will be asked to participate in commercial bid/price Bid opening. Site visit report by Project Architect/Bank officials, confidential report, feedback from the client of bidder on previous work record will be taken into consideration while evaluation of Bids /price Bid opening. The indicative commercial bids of all the bidders' found ineligible as per the requirements of this RFP will be unopened or returned to them unopened against acknowledgement.

32. After opening of Commercial Bid, the lowest amount quoted by the bidder will be termed as L1 Bidder. The evaluation of the Commercial Bids will also be done by the Project Architect and tender evaluation committee of bank. If L1 vendor refuses due to any reason, the Bank may contact L-2 or L-3 vendor and @ L-1 agreed rate may be accepted (Due to time constraint).

33. If any cartel formation is found during any stages of the tender process, the bank has every right to cancel all the offers of shortlisted vendors and will be debarred / expelled from applying from the tenders for Union Bank for 2 to 3 years. The Bank's decision is final and binding.

Regional Head,
Union Bank of India,
Regional Office,
Kozhikode

TENDER FORM

To,

Union Bank of India,
Regional Office,
KSHB Building, 1ST Floor, Vikas Nagar
Chakkorathukulam, East Hill Road
Kozhikode - 673006
Tel: 0495 2772325

TENDER FOR CONSTRUCTION OF NEW G+3 FLOOR COMMERCIAL BUILDING AT CHEROOTY ROAD, KOZHIKODE, KERALA

Sir,

1. We have read and examined the following documents as received by us:
 - a) Notice Inviting Tender
 - b) Instructions to Tenderers
 - c) Conditions of Contract.
 - d) Supplementary Conditions.
 - e) Specifications
 - f) Drawings
 - g) Schedule of Quantities.
 - h) Addition condition of contract
2. We are well aware and familiar with CPWD, Delhi Schedule of Rates-2018 and their specifications, CPWD Specification, BIS publication and National Building code which shall apply to this contract to supplement any missing details in this contract in order of preference.
3. Further to the above, we have visited and examined the site of the proposed works and have acquired the requisite information relating thereto as affecting the tender invited by Bank.
4. We agree that any other terms or conditions of contract or any general reservation which may be printed on any correspondence emanating from us in connection with this tender or with any contract resulting from this tender shall not be applicable to this tender or to the contract.
5. We have obeyed the rules about confidentiality of tenders and will continue to do so as long as they apply.
6. We are enclosing along with our tender an earnest money of Rs. _____ (Rupees _____ only) favoring Union Bank of India, payable at ----- (Pay Order No.----- dated ----- drawn on -----). We hereby agree that this sum shall be forfeited by Union Bank of India in the event of our tender being accepted and if we fail to execute the contract when called upon to do so.

7. Subject to and in accordance with paragraphs 2 to 6 above and the terms and conditions contained or referred to in the documents listed in paragraph 1, we agree and offer to execute all the Works referred to in the said documents upon the terms and conditions contained or referred to therein and to carry out such deviations as may be ordered to be valued as per the conditions of contract.

8. We undertake to complete and deliver the whole of the works within a period i.e.18 months as specified in the contract and further confirm that the time allowed for completion is adequate. Time allowed for completion of entire job or part job assigned shall be reckoned from the tenth day of the date of acceptance of work order. We shall be under the obligation to pay the sum as stated in the contract for every day that the works shall remain incomplete, damages as compensation subject to the conditions of contract relating to extension of time.

9. We hereby agree that unless & until a formal agreement is prepared & executed in accordance with the Articles of agreement, this tender together with your acceptance thereof, shall constitute a binding contract between us.

10. We agree to pay initial security deposit of 2% (including Earnest Money) of the contract amount by way of DD/PO drawn from Scheduled bank in favor of UNION BANK OFINDIA, payable at Kozhikode. This amount shall be released after virtual completion of work. We further agree for a deduction of 8% from the running bill as retention money till accumulating total security deposit.

11. Validity of the tender is 120 days from the date of opening of tender or it may be beyond 120 days if mutually accepted.

12. The bank is at liberty to accept or reject any tender, without assigning any reasons whatsoever.

13. The work may be split up in the first instance as per exigencies of the bank. But it may be split up in more parts or parts combined if so desired by the Bank without assigning any reasons whatsoever. We will not have any claim either for loss of profit or revision in rates.

14. Adherence to the pert chart will be ensured by us as the project is to be executed in a very strict time frame.

15. We are aware that the quantities of work indicated in the bill of quantities are approximate, may vary to any extent, even it may be omitted, we will not have any claim of any kind against the bank.

Signed in the capacity of duly authorized
to sign tenders for and on behalf of

Address

.....

.....

.....

Telephone No.....

Telex No.

Fax No.

Date:

GENERAL INSTRUCTIONS TO CONTRACTORS

1. Canvassing in connection with tenders is strictly prohibited and the tenders submitted by the contractors who resort to canvassing will be liable to rejection.
2. The Tender Form must be filled in English and all entries must be made by the hand and written in ink, If any of the documents is missing, or unsigned, the Tender may be considered invalid by the Bank in its discretion.
3. 50% of retention money and initial security deposit will be returned against submission of Bank Guarantee valid for a period of 12 months of Defect Liability Period and after
 - I) Issue of virtual completion certificate by the Consultant of the work.
 - II) Contractor's removal of his material, equipment, labor force, temporary sheds/ stores, etc. from the site (excepting for small presence required, if any, for defect liability period and approval by the bank)
4. Balance 50% of retention money and security deposit shall be released to the contractor fourteen days after the end of completion of defect liability period provided he has satisfactorily carried out all the works and attended to all the defects in accordance with the conditions of contract including site clearance.
5. The contractor shall not assign the contract. He shall not sub-let any portion of the contract except with the written consent of the Bank. In case of breach of these conditions, the Bank may serve a notice in writing on the contractor rescinding the contract whereupon the Security Deposit shall stand forfeited to the Bank, without prejudice to his other remedies against the contractor. Central Govt./ State Govt. organization will not be allowed to sublet the work on back to back basis.
6. The contractor shall carry out of all the work strictly in accordance with Drawings, details and instructions of the Architect, Consultant and the Bank. If in the opinion of the Architect, consultant or the Employer, changes have to be made in the design and with the prior approval in writing of the Employer, they desire the contractor to carry out the same, the contractor shall carry out the same without any extra charge. The Bank's decision in such cases shall be final and shall not be open to arbitration.
7. A Schedule of probable quantities in respect of each work and specifications accompany these special conditions. The Schedule of probable quantities is liable to alteration by omission, deductions or additions at the discretion of the Architect/ Bank. No claim will be entertained from the contractor on account of loss of profit over revising the tender rates.
8. The Tenderer must obtain for himself on his own responsibility and at his own expenses all the information which may be necessary for the purpose of filling of Tender and for entering into a contract and must examine the drawings and must inspect the site of the work and acquaint himself with all local conditions, means of access to the work, nature of the work and all matters pertaining thereto. No compensation will be paid on account of not getting proper information.

9. The rates quoted in the Tender shall be inclusive of all charges for clearing of site before commencement as well as after completion, water, electrical consumption, meters, double-scaffolding, centering, boxing, staging, planking, timbering and pumping out water, including bailing, fencing, planking, hoarding, plant and equipment, storage sheds, watching and lighting by night as well as day, including Sundays and Holidays, temporary plumbing and electric supply, protection of the public and safety of adjacent roads, streets, cellars, vaults, open pavements, walls, houses, buildings and all other erections, matters or things and the contractor shall take down and remove any or all such centering, scaffolding, staging, planking, timbering, strutting, shoring, etc. as occasion shall require or when ordered so to do, and fully reinstate and make good all matters and things disturbed during the execution of the work and to the satisfaction of the Bank / Consultant.

10. Time allowed for carrying out the work as mentioned in the Memorandum shall be strictly observed by the contractor and its shall be reckoned from the 10 days after acceptance of order to commence the work or the date of handing over the site to the contractor whichever is later. The work shall throughout the stipulated period of the contract be proceeded with all due diligence and if the contractor fails to complete the work within the specified period, i.e. 18 months, he shall be liable to pay compensation as defined in the conditions of contract.

11. The contractor shall not be entitled to any compensation for any loss suffered by him on account of delays in commencing or executing the work, whatever the case of delays may be, including delays arising out of modifications to the work entrusted to him or in any sub-contract connected therewith or delays in awarding contracts for other trades if the project or in commencement or completion of such works or in procuring government controlled or other building materials or in obtaining water and power connections for construction purposes or for the other reasons whatsoever and the Employer shall not be liable for any claim in respect thereof. The Employer does not accept liability for any sum besides the Tender amount, subject to such variations as are provided for herein.

12. The successful Tenderer is bound to carry out any items of work necessary for the completion of the job even though such items are not included in the quantities and rates. Schedule of instructions in respect of such additional items and their quantities will be issued in writing by the Architect / consultant with the prior consent in writing of the Bank.

13. The successful Tenderer must co-operate with the other contractors appointed by the Employer so that the work shall proceed smoothly with the least possible delay and to the satisfaction of the Architects/ Consultant.

14. The contractor must bear in mind that all the work shall be carried out strictly in accordance with the specifications made by the Architect/ Consultant and also in compliance of the requirements of the Authorities concerned and no deviation on any account will be permitted.

(a) The rates quoted in the Schedule rates also include the expenditure for providing all the water required for the work and the contractor shall make his own arrangements for the supply of good quality water including obtaining Municipal connection for his labor as well as for construction purpose and all charges shall be borne by him. If Municipal water connection is not available and should it become necessary for the contractor to drill a bore well for obtaining water for construction

purposes or to bring water from outside by Tankers, the Bank shall not be liable to pay any charges in connection therewith.

(b) The rates quoted in the Tender shall also include Electric consumption charges for Power. If no power is available at site, the contractor shall have to make his own arrangement to obtain electric power connection and maintain at his own cost an efficient service of electric light and power and shall pay for the electricity consumed.

(c) For water and power, the contractor to whom the work is allotted shall maintain the same in good working conditions.

(d) Contractor for other trades appointed by the Bank shall also be allowed to use water and power available by fixing reasonable charges mutually agreed.

(e) Any dispute regarding payment for water and power charges by the other contractor and or by subsidiary agencies appointed by the Bank to the contractor, who has obtained the temporary connections and allowed sub-connections, will be settled by the Bank / Consultant and the decision taken by the Bank / Consultant shall be final and shall be that of the contractor.

(f) The Bank as well as the Consultant shall give all possible assistance to the Contractor to obtain the requisite permission from the various authorities, but the responsibility for obtaining the same shall be that of the contractor.

(g) If no such facility is available at the site of work and if available found inadequate, it shall be the responsibility of the contractor to make his own arrangement for obtaining water and power at his cost.

2. The contractor will have to obtain completion / clearance certificate in respect of services such as water supply, sewerage, etc. The contractor will also obtain permanent water connection for the entire project. The Bank will pay necessary fee to be made to Govt. authorities.

15. The Contractor shall strictly comply with provision of safety code annexed hereto.

16. The contractor shall indemnify Union Bank of India, against any claim or legal action arising out of the said Act due to the failure of non-compliance of the provisions of the said Act and the penalty or any other amount levied by the authorities, shall be recoverable from the payments due to the contractors.

17. The Contractor shall comply with the provision of the Apprentices Act-1961, and the Rules and Orders issued there under from time to time. Failure to do so will be in a breach of the contract and the Architect/ consultant and the Bank may in their discretion cancel the contract. The contractor shall also be liable for any pecuniary or other liabilities arising on account of any violation by him of the provisions of the Act.

18. The Security Deposit of the successful Tender will be forfeited if he fails to comply with any of the conditions of the contract.

19. The contractor shall be responsible for the observance of all Central Rules and Regulation framed by the Central Government under the Contract Labor (Regulation and Abolition) Act-1970. The Bank shall be entitled to deduct all damages, which it might suffer

on account of non-observance of these rules by the Contractor, from the amount payable to the Contractor.

20. Contractors are not allowed to remove materials brought at Site against which advances have been paid.

21. The Contractor is to provide at all times during the progress of the works and the maintenance period / defect liability period proper means of access, with ladders, gangways, etc., and the necessary attendance to move and adopt as directed for the inspection or measurement of the works by the Consultant or their representatives.

22. Materials shall be of approved quality and the best of their kind available and shall generally conform to I.S. Specifications. The Contractor shall order all the materials required for the execution of work as early as necessary and ensure that such materials are on site well ahead or requirement for use in the work. The work involved calls for approved standard of workmanship combined with speed and to the entire satisfaction of the Architect/ consultant. All the material shall be approved by the Consultant / Bank before use. Contractor to arrange samples well in time.

23. The Contractors shall after completion of the work clear the Site of all debris and left-over materials at his own expenses to the entire satisfaction of the Bank / Consultant and Municipal or other public authorities.

24. The contractor herewith agrees that in respect of inspection of works by the Chief Technical Examiner of the works, a wing of Central Vigilance Commission and the bills of the contractor including all supporting vouchers, abstract etc. to be made after payment of the bills and if as a result of such audit and technical examination any sum is found to have been over paid in respect of any work done by the contractor under the contract of any work claimed by him to have been done by him under the contract and found not to have been executed or any work is found not to have been executed in accordance with the contract, the contractor shall be liable to refund the amount of over payment made already and it shall be lawful for the bank to recover the same from him in any manner the bank deems fit either from any payments due and/ or becoming due to the contractor or from the security deposit or retention money or through any further bills and/ or final bill or in any other manner whatsoever not excluding through recourse to legal action. The certification of bills/ measurements by consultant/ Architect and Engineer will be scrutinized by the Bank's Central Office/ Audit/ Vigilance and any deficiency will be corrected accordingly. Contractor cannot insist for payment just because it is signed by consultant/ architect/ engineer. The contractor herewith agrees to co-operate with the Bank/ Consultant while such examinations of works and redo the things without any extra cost to the Bank. It is essential and agreed condition of the contract that any such action taken by the bank shall deemed to be the fully legal and valid and binding on the contractor.

25. Contractors are requested to note that no extra item or deviated item of work to be executed without taking prior permission, the Bank shall not be held responsible for the payment of such works executed. Contractors will have to submit all the particulars including purchase bills/price list for the materials along with the rate analysis for verification of Item Rates.

26. If it is observed the existing compound wall, gates railings are damaged then the contractors will have to make good the same at their own cost.

27. If contractors fail to pay the taxes/royalties to the Authorities concerned, the bank reserve their rights to recover the said amount from the amount payable to the contractor and pay the same to the Authorities concerned.
28. Work is to be executed & measurements are to be paid as per the detail specification & description of item given in the Standard Specification Book except for the items which are specifically mentioned in the tender for which the details of item and mode of measurements to be followed as indicated separately in the conditions of contractors.
29. If there are any contracting clauses mentioned in the tender, the interpretation of the same will be done by the Architect / consultant. However, the decision of the Bank will be final and binding.
30. After awarding the work, contractor shall get registered with the office of the Labor commissioner and inform Bank accordingly. Contractors shall follow all rules and regulations stipulated by the Labor Commissioner strictly.
31. Contractors shall quote consistent rates for the items of similar nature or analogous in specifications for the sections in schedule of quantities. If it is observed that the rates quoted for similar nature of items or analogous in specification under different sections, are inconsistent, then the Bank reserves his right to consider the lowest of rates for all such items and work out the final amount for payment, unless the competent authority finds that there is justifications for such inconsistent rates.
32. The contractor shall give a list of his relatives working with the bank along with their designations and addresses.
33. No employee of the bank is allowed to work as a contractor for a period of two years of his retirement from bank service, without the previous permission of the bank. The contract is liable to be cancelled if either the contractor or any of his employees is found at any time to be such a person who had not obtained the permission of the bank as aforesaid before submission of the tender or engagement in the contractor's service.

GENERAL CONDITIONS AND TERMS OF CONTRACT

1. DEFINITION OF TERMS/ INTERPRETATION:

In construction these conditions, the specification schedule of quantities and contract agreement, the following words shall have the meanings herein assigned to them except where the subject or context otherwise requires.

(a) “Employer/ Owner/ Bank” shall mean” Union Bank of India, Government of India undertaking” having Central Office at 239, Vidhan Bhawan Marg, Nariman Point, Mumbai - 400 0021 and Regional Office KSHB BUILDING, 1ST Floor, Vikas Nagar Chakkorathukulam, East Hill Road Kozhikode - 006and any of its employee representatives authorized on their behalf.

(b) “Architect/ Consultant” - shall mean M/s. P C Rasheed and Associates Engineers and architects having their office at Rarichan Road, Nadakkavu Eranhipalam PO Kozhikode Kerala or in the event of his or their ceasing to be Architect/ Consultant for the purpose of this contract such other person as the Bank shall nominate for the purpose.

(c) “Contractors” (in case of partnership) shall mean.....andtrading as partners in the name and style ofand shall include partners for the time being of the said firm and the legal representatives of a deceased partner.

“Contractors” (in case of individuals) shall mean.....andtrading in the name and style ofand shall include his / their heirs, legal representative assigns or successors.

“Contractors” (in case of company) shall mean.....a company incorporated under19.....and having its registered office atand shall include its successors and assigns.

(d) “Site” shall mean “Work Place” located at _____ include any building and erections thereon and any other land (inclusively), as aforesaid, allotted by the Bank for the contractor’s use.

(e) Site Engineer / Engineer: The Engineer appointed by the Bank / Architect / Consultant for the management of the project.

(f) “The works” shall mean the work or works to be executed or done under this contract.

(g) “This Contract” shall mean Articles of Agreement, the special conditions, the general conditions of contract, the appendix, the schedule of quantities and specifications, attached hereto and duly signed.

(h) “Notice in writing” or written notice shall mean a notice in written, typed or printed characters sent (unless delivered personally or otherwise proved to have been received), by registered post to the last known private or business address or registered office of the addressee and shall be deemed to have been received when in the ordinary course of post, it would have been delivered.

(i) “Act of Insolvency” shall mean any Act of Insolvency as defined by the Presidency Towns Insolvency Act, or the Provincial Insolvency Act or any amending such original.

(j) “The Schedule of Quantities” shall mean the schedule of quantities as specified and forming part of this contract.

(k) “Priced Scheduled of Quantities” shall mean the schedule of quantities duly priced with the accepted quoted rates of the contractor.

(l) “Net Prices” If in arriving at the contract amount, the contractor shall have added to or deducted from the total of the items in the Tender any sum either as a percentage or otherwise, then the net price of any item in the Tender shall be the sum arrived at by adding to or deducting from the actual figure appearing in the Tender as the price of that item a similar percentage or proportion of the sum so added or deducted of the sum so added or deducted by the contractor the amount of any Prime Cost items and provisional sums of money shall be deducted from the total amount of the Tender. The expression “net rates” or “net prices” when used with reference to the contract or accounts shall be held to mean rates or prices so arrived at.

2. SCOPE OF WORK:

The bank is owning a plot admeasuring 17.10 Cents (6.92 ares) at Cherooty Road, Kozhikode comprising in of Town Village Kozhikode Taluk Kozhikode District. The Bank intends to demolishing existing building and develop the property to accommodate Kozhikode Regional Office, Main Branch, MLP, RLP, Conference room, E-Lobby, ATM, Security room, etc. Land at Cherooty Road Kozhikode needs to be developed for the said construction. The buildings shall be RCC structures, maximum Basement + Ground floor + 3 floors to accommodate Union Bank Regional Office, e-Lobby, MLP, RLP etc.. The participating bidders should be well experienced in construction of Institutional/ Commercial buildings with Basement+G+3 Configurations for Central Government/State Government/PSU organizations.

The work consists of construction of Civil/ interior furnishing, Plumbing & Sanitary/ Electrical Installations and all other related works in accordance with drawings, schedule of quantities. The civil, sanitary, plumbing, electrical Installation, external sewerage/ drainage, water supply works and construction of internal road and pathways etc., are within the scope of this tender. It includes furnishing all materials, labor, tools and equipment and management necessary for and incidental to the construction and completion of the work. All work, during its progress and upon completion shall conform to the lines, elevations and grades as shown on the drawings furnished by the employer/ architects. Should any detail essential for efficient completion of the work be omitted from the drawings and specifications it shall be the responsibility of the contractor to inform the Bank/ Consultant and to furnish and install such detail with Bank/ Consultant’s concurrence, so that upon completion of the proposed work the same will be acceptable and ready for use.

3. CONTRACTOR’S RESPONSIBILITY

The Contractor shall carry out and complete the said work in every respect in accordance with this contract and with the directions of and to the satisfaction of Consultant/Bank. The Consultant may in his absolute discretion and in consultation with the Bank (with prior approval from the Bank) and from time to time issue drawings and/or written instruction, details directions and explanations which are hereafter collectively referred to as “Consultant /Bank’s Instruction”.

In regard to:-

- (a) The variations or modifications of the design, quality or quantity of works or the additions or omission or substitution of any work.
- (b) Any discrepancy in the drawings or between the schedule of quantities and/or drawings and or drawings and or specification.
- (c) The removal from the site of any defective materials brought thereon by the contractor and the substitution of any other materials thereof.
- (d) The removal and/or re-execution of any works executed by the contractor.
- (e) The dismissal from the works of any person employed thereupon.
- (f) The opening up for inspections of any work covered up.
- (g) The amending and making good of any defects under clauses 18 hereof and those arising during the maintenance/ defect liability period.

The contractor shall forthwith comply with and duly execute any work comprised in such Consultant/Bank instructions, provided always that the verbal instructions, directions, and explanations given to the contractor or his representative upon the works by the Consultant/Bank shall, if involving a variation, be confirmed in writing by the contractor within seven days, and if not dissented from in writing within a further seven days by the Consultant, such shall be deemed to be Consultant /Bank instructions within the scope of the Contract.

4. **VISIT TO SITE**

The contractor shall visit the site and make himself thoroughly acquainted with the local site condition, nature and requirements of the works, facilities of transport condition, effective labor and materials, access and storage for materials and removal of rubbish. The tenderer shall provide in their tender for cost of carriage, freight and other charges as also for any special difficulties and including police restriction for transport, etc. for proper execution of work as indicated in the drawings. The successful tenderer will not be entitled to any claim of compensation for difficulties faced or losses incurred on account of any site condition which existed before the commencement of the work or which in the opinion of the Bank or Consultant might be deemed to have reasonably been inferred to be so existing before commencement of work.

5. **AGREEMENT**

The successful contractor is required to sign agreement as may be drawn up to suit local conditions and shall pay for all stamps and legal expenses, incidental thereto.

6. **PERMITS AND LICENSES**

Permits and licenses for release of materials which are under Government control will be arranged by the contractor. The Bank will render necessary assistance, sign any forms or applications that may be necessary.

The contractor shall at his own cost arrange for storage shed adequate for taking delivery and storing of the quantity of controlled materials released by the authorities or supplied by the Bank. The costs of storing, transporting, etc. of all materials including those under Government control are to be included by the tenderer in his quoted rates.

The Bank/ Consultant shall be indemnified against all Government or legal actions for theft or misuse of any controlled materials in the custody of the contractor.

7. GOVERNMENT AND LOCAL RULES

The contractor shall conform to the provisions of all local Bye-laws and Acts relating to the work and to the Regulations etc. of the Government and Local Authorities and of any company with whose system the structure is proposed to be connected. The contractor shall give all notices required by said Act, Rules, Regulations and Bye-laws, etc. and pay all fees payable to such authority / authorities for execution of the work involved. The cost, if any, shall be deemed to have been included in his quoted rates, taking into account all liabilities for license, fees for footpath encroachment and restorations etc. and shall indemnify the Bank against such liabilities and shall defend all actions arising from such claims or liabilities.

8. QUANTITY OF WORK TO BE EXECUTED

The quantities shown in the schedule of quantities are intended to cover the entire new structure indicated in the drawings but the Bank reserves the right to execute only a part or the whole or any excess thereof without assigning any reason therefore. The quantity may vary to any extent and even the same will be omitted. No separate payment / compensation / revision in the rates will be entertained.

9. VARIATIONS TO BE APPROVED BY THE BANK / CONSULTANT

Notwithstanding anything herein contained, the Consultant or his representative shall not, without prior concurrence in writing of the Bank, issue any instructions, verbal or in writing, the Consultant can get the work done up to an amount of Rs.25,000.00 (Rupees Twenty five thousand only) and all instruction issued to the contractor should forthwith be brought to the notice of the Bank. The contractor shall submit through the Consultant, a statement of variations giving rise quantity and rates duly supported by analysis of rates, vouchers, etc. The rates on scrutiny and final acceptance by the Bank shall form a supplementary tender. The Bank shall not be liable for payment of such variations until these statements are sanctioned by the bank.

10. DRAWINGS AND SCHEDULE OF QUANTITIES AND AGREEMENT.

The contractor on the signing hereof shall be furnished by the Consultant free of cost one copy of each of the said drawings and of the specifications and one copy of all further Drawings issued during the progress of the works. Any further copies of such drawings required by the contractor shall be paid by him. The contractor shall keep

one copy of all drawings on the works and the Consultant / Bank or their representatives shall at all reasonable times have access to the same.

11. CONTRACTOR TO PROVIDE EVERYTHING NECESSARY:

(a) The contractor shall provide everything necessary for the proper execution of the works according to the intent and meaning of the Drawings, Schedule of quantities and Specification taken together whether the same may or may not be particularly shown or described therein provided that the same can be reasonably be inferred there from, and if the contractor finds any discrepancies therein, he shall immediately and in writings, refer the same to the Bank / Consultant whose decision shall be final and binding. The contractor shall provide himself for ground and fresh water for carrying out of the works at his own cost. The Bank shall on account be responsible for the expenses incurred by the contractor for hired ground or fresh water obtained from elsewhere.

(b) The rates quoted against individual items will be inclusive of everything necessary to complete the said items work within the contemplation of the contract, and beyond the unit price no extra payment will be allowed for incidental or contingent work, labor and /or materials inclusive of all taxes and duties whatsoever except for specific items, if any, stipulated in the tender documents.

(c) The contractor shall supply, fix and maintain at his own cost, for the execution of any work, all tools, tackles, machineries and equipments and all the necessary centering, scaffolding, staging, planking, timbering, strutting, shoring, pumping, fencing, boarding, watching and lighting by night as well as by day required not only for the proper execution and protection of the said work but also for the protection of the public and safety of any adjacent roads, streets, walls, houses, buildings, all other erections, matters and things and the contractor shall take down and remove any or all such centering, scaffolding, plumbing, timbering, strutting, shoring etc., as occasion shall be required or when ordered so to do, and shall fully reinstate and make good all matters and things disturbed during the execution or when ordered so to do, and shall fully reinstate and make good all matters and things disturbed during the execution of works to the satisfaction of the Bank / Consultant.

(d) The Contractor shall also provide such temporary road on the site as may be necessary for the proper performance of the contract and for his own convenience but not otherwise. Upon completion, such roads shall be broken up and leveled where so required by the drawings unless the Bank shall otherwise direct.

(e) The contractor shall at all times give access to workers employed by the Bank or any men employed on the buildings and to provide such parties with proper sufficient and if required, special scaffolding, hoists and ladders and provide them with water and lighting and leave or make any holes, grooves etc., in any work, where directed by the Bank as any be required to enable such workman to lay or fix pipes, electrical wiring, special fittings etc. The quoted rates of the tenderers shall accordingly include all these above-mentioned contingent works.

12. AUTHORITIES NOTICES AND PATENTS

(a) The contractor shall confirm to the provisions of any Act of the legislature relating to the works, and to regulations and bye-laws of any authority, and or any water electric supply and other companies and /or authorities with and whose the systems the structures is proposed to be connected, and shall, before making any variations from the drawing or specifications that may be associated to so confirming, give to the Architect written notice, specifying the variations proposed to be made and the reason for making it and apply for instructions thereon. In case the contractor shall not within ten days receive such instructions he shall proceed with the work confirming to the provisions, regulations, or byelaws in questions, and variations so necessitated shall be dealt with under clause 29 hereof.

(b) The contractor shall bring to the attention of the Consultant / bank all notices required by the said Acts, regulations or bye-law to be given to any authority and pay to such authority, or to any public office, all fees that may be properly chargeable in respect of the said work, and lodge the receipt with the Consultant / Bank.

(c) The contractor shall indemnify the Bank against all claims in respect of patent rights, royalties, damages to buildings, roads or members of public in course of execution of work and shall defend all actions arising from such claims and shall keep the Bank saved harmless and indemnified in all respects from such actions, costs and expenses.

13. CLEARING SITE AND SETTING OUT WORKS

The site shall be cleared of all obstructions, loose stone, and material rubbish of all kind. All holes or hollows either originally existing or produced by removal of loose stone or material shall be carefully filled up with earth, well rammed and leveled off as directed at his own cost. The contractor shall set out the works and shall be responsible for the true and perfect setting out of the work and for the correctness of the positions, dimensions, levels and the alignment of all the parts thereof. If at any time any error in this respect shall appear during the progress of any part of work or within the period of one year from the completion of the works, the contractor shall at his own expenses rectify such error to the satisfaction of the Consultant / Bank.

14. DATUM

The average ground level will be considered as the crown of the nearest road, which should be taken as “Datum” which is however, subject to final confirmation by the Bank / Consultant. All levels shown in the drawings are to be strictly adhered to.

15. BENCHES

The contractor is to construct and maintain proper benches of all the main walls, in order that the lines and levels may be accurately checked at all times.

These benches will consist of Salwood post of adequate length and minimum diameter 75mm to be driven in the ground at suitable distance as directed encased with brickwork. The wire nails will be driven on the top of Salwood post on the center lines of columns, walls, inside and outside faces of foundation trenches, in order that lines may be stretched between the benches and accurate intersection of

excavation. Centre line of walls, columns, etc. may be clearly indicated and checked at any time if it is so required.

16. CONTRACTOR IMMEDIATELY TO REMOVE ALL OFFENSIVE MATTERS

All soil, filth or other matters of any offensive nature taken out of any trench, sewer, drain, cesspool or other place shall not be deposited on the surface but shall be at once carted away by the contractor to place provided by him.

The contractor shall keep the foundations and works free from water and shall provide and maintain at his own expenses electrically or other power driven pumps and other plant to the satisfaction of the Bank for the purpose, until the building is handed over to the Bank. The contractor shall arrange for the disposal of the water so accumulated to the satisfaction of the Bank and local authority and no claims will be entertained afterwards if he does not include in his rates for the purpose.

17. MATERIALS, WORKMANSHIP, SAMPLES, TESTING OF MATERIALS:

All the works specified and provided for in the specifications or which may be required to be done in order to perform and complete any part thereof shall be executed in the best and most workman like manner with materials of the best and approved quality of the respective kinds in accordance with the particulars contained in and implied by the specifications and represented by the drawings or according to such other additional particulars and instructions as may from time to time be given by the Bank / Consultant during the execution of the work, and to his entire satisfaction.

The contractor shall have to carry out test on materials and workmanship in approved materials testing laboratories or as prescribed by the Bank / Consultant at own cost to prove the materials quality and test sample, confirm to the relevant I.S. Standard or as specified in the specifications. The necessary charges for preparation of mould (in case of concrete cube) transporting testing etc. shall have to borne by the contractors. No extra payment on this account should in any case be entertained.

All the materials (except where otherwise described) store and equipment required for the full performance of the work under the contract must be provided through normal channels and must include charges for import duties, sales tax, octroi and other charges and must be the best of their kind available and the contractors/must be entirely responsible for the proper and efficient carrying out the work. The work must be done in the best workman like manner. Samples of all materials to be used must be submitted to the Bank / Consultant when so directed by the Engineer/ Consultant and written approval from Bank / Consultant must be obtained prior to placement of order.

The Contractor shall set up a field laboratory with necessary equipment for day to day testing of material like sand, brick, aggregate etc.

18. INCLEMENT WEATHER

During the inclement weather the contractor shall suspend concreting and plastering for such time as the Bank / consultant may direct and shall protect from injury all work when in course of execution. Any damage (during construction) to any part of

the work for reasons due to rain, storm, or neglect of contractor shall be rectified by the contractor in an approved manner at no extra cost.

Should the work be suspended by reason of rain, strike, lockouts or any other cause, the contractor shall take all precautions necessary for the protection of work and at his own expenses shall make good any damage arising from any of these causes. The contractor shall cover up and protect from damage, from any cause, all new work and supply all temporary doors, protection to window, and any other requisite protection for the execution of the work whether by himself or special tradesmen or sub-contractor and any damage caused must be made good by the contractor at his own expenses.

19. MATERIALS AND WORKMANSHIP TO CONFORM TO DESCRIPTIONS:

All materials and workmanship shall so far as procurable be of the respective kinds described in the schedule of quantities and / or specifications and in accordance with the Consultant's instructions, and the contractor shall upon the request of the Consultant furnish him with all invoices, accounts, receipts and other vouchers to prove that the materials comply therewith. The contractor shall at his own cost arrange for and / or carry out any test of any materials which the architects may require from Government approved laboratories.

20. CONTRACTOR'S SUPERINTENDENCE & REPRESENTATIVE ON THE WORKS.

The contractor shall give all the necessary personal superintendence during the execution of the works, and as long thereafter as the Bank / Consultant may consider necessary until the expiration of the defects liability period stated in the Appendix hereto. The contractor shall also during the whole time the works are in progress employ;

a) An experienced qualified Civil Engineers (1 Nos., graduate engineer having experience of 7 years or more in field + 1 diploma holder having experience of 10 years) as required who shall be in constantly attendance at work while the men are at work. Any directions, explanations, instructions, or notices given by the Bank / Consultant to such representative shall be held to be given to the contractor.

For non-compliance an amount of Rs.20, 000/- pm / per Engineer shall be deducted from the contractor for the period required engineers are not provided. However, deduction of payment shall not exonerate contractor for his responsibility for executing quality work.

21. DEPLOYMENT OF LABORS

No laborer below the age of eighteen years shall be employed on the work. Any laborer supplied by the contractor to be engaged on the work on day-work basis either wholly or partly under the direct order or control of the Bank or his representative shall be deemed to be a person employed by the contractor.

22. FACILITIES TO BE PROVIDED TO WORKERS

The contractor shall comply at his own cost with the order of requirement of any Health Officer of the State or any local authority or of the Bank regarding the maintenance of proper environmental sanitation of the area where the contractor's

laborers are housed or accommodated, for the prevention of small pox, cholera, plague, typhoid, malaria and other contagious diseases. The contractor shall provide, maintain and keep in good sanitary condition adequate sanitary accommodation and provide facilities for pure drinking water at all times for the use of men engaged on the works and shall remove and clear away the same on completion of the works. Adequate precautions shall be taken by the contractor to prevent nuisance of any kind on the works or the lands adjoining the same.

The contractor shall arrange to provide first-aid treatment to the laborers engaged on the works. He shall within 24 hours of the occurrence of any accident at or about the site or in connection with execution of the works, report such accident to the Bank and also the competent authority where such report is required by law.

23. DISMISSAL OF WORKMEN

The contractor shall at the request of the Bank / Consultant immediately dismiss from the works, any person employed thereon by him who may in the opinion of the Bank / Consultant incompetent or misconduct himself and such person shall not be engaged again. Such discharges shall not be the basis of any claim for compensation or damages against the Bank or any of their officer or employee.

24. ACCESS TO WORK

The Bank / Consultant and their responsible representative shall at all reasonable times have free access to the works and/ or to the workshops, factories or other places where materials are being prepared or constructed for the work and also to any place where the materials are lying or from where they are being obtained the contractor shall give every facility to the Bank, the Consultant and their representative necessary for inspection and examination and test of the materials and the workmanship. No persons not authorized by the Bank or the Consultant except the representatives of Public Authorities shall be allowed on the works at any time.

25. ASSIGNMENT / SUB-LETTING

The whole of the works included in the contract shall be executed by the contractor and the contractor shall not directly or indirectly transfer, assign, or under-let the contract or any part share there of or any interest therein without the prior written consent of the Bank and no undertaking shall relieve the contractor of the full and entire responsibility of the contract or from active superintendence of works during their progress. Central Govt. / State Govt. companies shall not be allowed to sublet the work on back to back basis / labor basis without approval from the Bank. In case, in case contractor sub-let the work, the bank will be entitled to deduct 10% of cost of work executed besides initiating other measures provided in the contract.

26. VARIATIONS

No alterations, omissions or variations shall vitiate this contract, but in case the Architect thinks proper at any time during, the progress of the works to make any alterations in, or additions to or omissions from, the work or any alteration in the kind or quality of materials to be use therein and shall give notice thereof in writing under his hand to the contractor, the contractor shall alter, add to, or omit from, as

the case may be, in accordance with such notice, but the contractor shall not do any work extra to or make any alterations or additions to or omissions from the works or any deviations from any of the provisions of the contract, stipulation specifications or contract drawings without the previous consent in writing of the consultant /Architect/ bank and the values of such extras, alternations, additions or omissions shall in all cases be determine by the Consultant with the prior approval in writing of the Bank in accordance with the provision of the Clause hereof, and the same shall be added to, or deducted from the contract amount, as the case may be accordingly.

27. SCHEDULE OF QUANTITIES

The Schedule of quantities, unless otherwise stated shall be deemed to have been prepared in accordance with the standard method of quantity measurement.

Any error in description or in quantity or in omission of items from the Schedule of quantities shall not vitiate this contract but shall rectified and the value thereof shall be added to or deducted, from the contract amount (as the case may be), provided that no rectification of errors, if any, shall be allowed in the contractor's Schedule of rates.

The contractor shall be deemed to have satisfied himself before tendering as to the correctness and sufficiency of this tender for the works and the prices stated in the Schedule or quantities and or the schedule of rates and prices which rates and prices shall cover all his obligations under the contract and all matters and things necessary for the proper completion of works.

The quantities of work may vary to any extent or may be omitted, the contractor cannot claim loss of profit / overhead on this account.

28. MEASUREMENT OF WORKS

(a) The Consultant may from time to time intimate to the contractor and the Bank that he requires works to be measured, and the contractor shall forth with attend or send a qualified agent to assist the Consultant in taking such measurements and calculations and to furnish all the particulars or to give all assistance required by any of them.

(b) The contractor shall provide everything necessary for the proper execution of the works according to the intent and meaning of the Drawings, Schedule of quantities and Specification taken together whether the same may or may not be particularly shown or described therein provided that the same can be reasonably be inferred there from, and if the contractor finds any discrepancies therein, he shall immediately and in writings, refer the same to the Bank / Consultant whose decision shall be final and binding. The contractor shall provide himself for ground and fresh water for carrying out of the works at his own cost. The Bank shall on account be responsible for the expenses incurred by the contractor for hired ground or fresh water obtained from elsewhere.

(c) The Engineer will take measurement of the work jointly with the contractor and enter the same in measurement books. Based on these measurements the contractor will raise the bill as per the prescribed format. Consultant to verify the bill/measurement and issue certificate stating that the work completed is as per the

specifications and the measurement claimed for the works are actually executed at site. This certificate shall be issued within 14 days after bill submission by the Contractor. The bank will release bill amount within 21 days. If for some reason checking of the bill/ measurement is not completed, 75% of the bill amount atleast shall be released within 10 days and the balance within 30 days.

(d) Should the contractor not attend or neglect or omit to send such agent then the measurement taken by the Architect or a person approved by him shall be final and binding on the contractors.

(e) The contractor or his also supply without charge the requisite number of persons with means and materials necessary for the purpose of measurements or examinations at any time and from time to time of the work or counting weighting of the materials, etc.

(f) All authorized extra works, omissions and all variations made without the Consultant's knowledge, if subsequently sanctioned by him in writing (with the prior approval in writing of the Bank) shall be included in such measurement.

(g) Measurements shall be recorded as per IS 1200 mode measurement and in metric system. Measurement shall be recorded in 100 pages bounded measurement book to be supplied by Union Bank of India. Such measurement shall be recorded by the Engineer or Bank's officer and not by contractor. M.B. shall be kept in the custody of the consultant / Bank.

29. PROCEDURE FOR MEASUREMENT AND BILLING OF WORK IN PROGRESS:

(a) Advance against materials brought at Site:

Contractor may be allowed Secured advance on security for materials brought to site for execution on contracted item of work to the extent of 75% of the value of the materials provided that the materials of the imperishable nature is safeguarded against losses due to the contractor postponing execution of the work or to the storage or misuse the materials and against the expenses entitled for their proper watch and safe custody. Recoveries of advances so made would be from running bills. The secured advance may be given against the following materials brought to the site and stored properly.

1. Cement
2. Steel
3. Wood
4. Flooring/ Wall tiles
5. Aluminum steel/ wooden window and door frame
6. Plumbing/ Sanitary/ Pipes and fittings.
7. Electrical items (one time only)
8. Any other item of non-perishable nature and as decided by the Bank

The Contractors will have to submit the bills for the materials purchased, in triplicate, to verify the cost of the materials purchased and brought at Site.

No advances against perishable materials purchased and brought at Site will be made.

The Contractors will have to keep the materials at Site under their safe custody and at their risk and cost.

The Bank is not responsible for damages and losses of such materials brought at site.

The contractor to submit undertaking marking lien on the material brought at site against which bank has granted advance payment.

(b) Running Account Payments to be regarded as Advances:

All running account payments shall be regarded as payments by way of advance against the final payment only and not as payments for work actually done and completed and accepted and shall not preclude the requiring of bad, unsound and imperfect or unskilled work to be removed and taken away and reconstructed or re-erected or be considered as an admission of the due performance of the contract, or any part thereof, in this respect, or the accruing of any claim, nor shall it conclude, determine or effect in any way the powers of the bank/ consultant under these conditions or any of them as to the powers of the bank/ consultant under these conditions or any of them as to the final settlement and adjustment of the accounts or otherwise, or in any other way vary/affect the contract. The final bill shall be submitted by the contractor within two months of the date fixed for completion of the work, otherwise the Consultant/ Engineer-in-charge's certificate of the measurement and of the total amount payable for the work accordingly shall be final and binding on all parties. Interim Bill value to be minimum of Rs.50 Lakhs

30. COMPLETION CERTIFICATE

(i) APPLICATION FOR COMPLETION CERTIFICATE

The Consultant/Engineer-In-Charge shall normally issue to the contractor the completion certificate within one month after receiving, an application thereof from the contractor and after verifying from the completion documents and satisfying himself that the work has been completed in accordance with and as set out in the construction and erection drawing and contract documents.

The contractor, after obtaining the completion certificate, is eligible to present the final bill for the work executed by him under the terms of contract.

(II) COMPLETION CERTIFICATE

Within one month of the completion of the work in all respects, the Contractor shall be furnished with a certificate by the Consultant/ Engineer-In-Charge of such completion but no certificate shall be given nor shall the work be deemed to have been completed until all scaffolding, surplus materials and rubbish is cleared of the site completely. The work will not be considered as complete and taken over by the Bank, until all the temporary works, labor and staff colonies etc., constructed, are removed and the works site cleared to the satisfaction of the Consultant/ Engineer.

If the Contractor shall fail to comply with the requirements of this clause on or before the date fixed for the completion of the work, the Consultant/ Engineer-In-Charge may at the expenses of the contractor remove such scaffolding, surplus materials and rubbish and dispose off the same as he thinks fit and clean up the site and the contractor shall forthwith pay the employer for all expenses so incurred and shall

have no claim in respect of any such scaffolding or surplus materials as aforesaid except of any sum actually realized by the sale thereof.

31. ENGINEER

The Site Engineer or any representative of the Architect / Consultant, or the Bank shall have power to give notice to the contractor or to his representative, of non-approval of any work or materials and such work shall be suspended or the use of such materials shall be discontinued until the decision of the Architect is obtained. The work will be from time to time be examined by the Architect / the Bank's Engineer or the Architect's representative, but such examination shall not in any way exonerate the contractor from the obligations to remedy any defects which may be found to exist at any stage of the works or after the same is complete. Subject to the limitations of this clause, the contractor shall take instructions only from the Architect / Bank.

32. DUTIES OF ENGINEER

(a) To make a thorough study of contract documents, Architectural/Structural drawings and other details so as to bring out ambiguities/discrepancies between them and to obtain clarification from the Competent Authority well in time to avoid delays.

(b) To render a certificate to the Competent Authority to the effect that he has studied the contract documents, drawings and specifications.

(c) To approve the centerline layout of building pegged out on site by the contractor and the benches for ground floor and other levels.

(d) To take charge of objects of value and antiquity found on site or in excavations, immediately, after their discovery, to hold them in safe custody and to hand them over to the Competent Authority of the Bank for further action.

(e) To approve the foundation strata when the appropriate depth of excavation is reached in consultation with the architects.

(f) To ensure that the quality of materials and workmanship as laid down in the contract is maintained and the accuracy of dimension shown on drawings is attained in the construction.

(g) To watch the validity of the building permission issued by the Local Authority and to ensure that the revalidation, if necessary, is obtained well in time.

(h) To arrange periodical reconciliation of cement and steel account and ensure that proper recoveries are effected from contractor's running account bills.

(i) To maintain the undernoted records at the site of work, in addition to normal routine requirements of an office:

- (i) Daily Progress Record
- (ii) Work Site Order Book.
- (iii) Instruction by Bank's Officers.
- (iv) Cement Statement (Receipt/Consumption/Balance).

- (v) Steel Register/any other costly Material Register.
 - (vi) Contract Pour Reports including Slump Test Record.
 - (vii) Concrete Cube Test Register.
 - (viii) Test Registers of other materials/fittings, fixtures, equipments as stipulated in the tender.
 - (ix) Register of Drawings and Working Details.
 - (x) Log Book of Defects.
 - (xi) The Site Engineer should maintain in a Hindrance Register giving details of commencement and removal of each hindrance.
 - (xii) Dismantled Materials Account Register.
 - (xiii) Supply and consumption register of scarce/costly materials like bitumen, lead, laminates, special paints etc.
 - (xiv) Record of cement used/received: Day to day record of cement used/received shall be entered in the register and signed by the Site Engineer of the Bank as well as contractor's representative at site.
 - (xv) Record of reinforcement bars received at site: Necessary entry for reinforcement bars of each category shall be made in the register for steel and signed by the site engineer of Bank and the contractor daily.
- (j) To study the quality of approved coarse and fine aggregate and get the design of the concrete mix in accordance with modern practice. The Site Engineer shall ensure that the mix design for RCC work shall be carried out by the Architect/Structural Consultant, if applicable.
- (k) To record measurements of completed work jointly with the Contractor and to process them in running account bills.
- (l) To receive running account bills from the contractor and to forward them after checking, to the Competent Authority with his comments and recommendations and accompanied by all supporting documents.
- (m) To submit to the Competent Authority the Progress Report fortnightly.
- (n) To watch that the concerned contract does not lapse for want of extension of time. Therefore, to keep it alive and in operation from point of consideration that "Time is the essence of contract".
- (o) To ensure that progress on every contract is in accordance with the appropriate stage of its Time and Progress Chart.
- (p) To prevent contractor from proceeding with any work on which the contractor has got intentions of raising claims of extra/deviated items, until the Competent Authority approves the work to continue.
- (q) To receive the Final Bill from the contractor, to check it, and forward it with his comments and recommendations to the Competent Authority with all the supporting documents duly attached.

(r) To submit the final summary of costs for the project to the Competent Authority.

(s) To submit the Competent Authority authentic information on and the under noted records pertaining to the completed work in order to enable the Competent Authority to finalize them in the due course:

(i) Record i.e. as completed drawings.

(ii) Record of Standard Measurements for periodical services.

(iii) Inventory of fittings and fixtures.

(t) To hand over to the Competent Authority a “first draft” of “A Note of Comprehensive Information to the User” containing detailed instructions on how to use and maintain the completed building to the best advantage of the Bank.

33. PRICES FOR EXTRAS ETC. ASCERTAINMENT OF NON-TENDER ITEMS

The contractor may, when authorized, and shall, when directed in written by the Architect / Consultant with the approval of the Bank, add to, omit from, or vary the works shown upon the drawings, or described in the specification or included in the schedule of quantities, but contractor shall make no addition, omission or variation without such authorization or direction. A verbal authority or direction by the Architect / Consultant shall, if confirmed by them in written seven days, be deemed to have been given in writing.

Any such extra is herein referred to as authorized extra and shall be made in accordance with the following provisions.

(a) (i) The net rates or prices in the original tender shall determine the valuations of the extra tender shall determine the valuation of the extra work where such extra work is of similar character and executed under similar conditions as the work priced therein.

(ii) Rates for all items, wherever possible, should be derived out of the rates given in the priced schedule of quantities.

(b) The net prices of the original tender shall determine the value of the items omitted, provided if omissions vary the conditions under which any remaining items of works are carried out, the prices for the same shall be valued under sub-clause C hereof.

(c) Where the extra works are not of similar character and /or executed under similar conditions as aforesaid or where the omissions vary the conditions under which any remaining items of works are carried out or if the amount of the whole of the contract works or to any part thereof shall be such that in the opinion of the Architect the net rate or price contained in the priced schedule of quantities or tender or for any item of the works involves loss or expense beyond that reasonably contemplated by the contractor or is by reason unreasonable or inapplicable, the Architect shall fix such other rate or price as in the circumstances he shall feel reasonable and proper, with the prior approval in writing of the employer.

(d) Where extra work cannot be properly measured or valued the contractor shall be allowed days work prices as the priced schedule of quantities or, if not so stated, then in accordance with the local day work rates and wages for the district; provided that in either case vouchers specifying the daily time (and if required by the Architect, the workman's name) and materials employed to be delivered for verification to the Architect, or his representative at to the Architect or his representative at or before the end of the week following that in which the work has been executed.

Actual cost of materials Rs.
Add for Labor charges Rs.
Add for Taxes, Transportation, If any. Rs.
Add for Wastage of Materials (Upper Limit 5% wherever applicable).....	Rs.
Add for water and electricity Charges if any required, upper limit 2% of basic cost of materials.Rs.
Add for 15% towards contractor's overheads and profit.Rs.
Final rate arrived.Rs.

34. UNFIXED MATERIALS WHEN TAKEN INTO ACCOUNT TO BE THE PROPERTY OF THE BANK

Where in any certificate (of which the contractor has received payment), the Architect has included the value of any unfixed materials intended for and /or placed on adjacent to the works, such materials shall become the property of the Bank and they shall not be removed except for use upon the works, without the written authority of the Architect/Bank. The contractor shall be liable for any loss of or damages to such materials.

35. REMOVAL OF IMPROPER WORKS

The Architect/Bank shall, during the progress of the works, have power to order in writing from time to time the removal from the work within such reasonable time or times as may be specified in order, of any materials which in the opinion of the Architect/Bank are not in accordance with the specifications or the instructions, the substitution of proper materials, the removal and proper re-execution of any work executed with materials or workmanship not in accordance with the drawings and specification instruction and the contractor shall forthwith carry out such order at his own cost. In case of default on the part of the contractor to carry such order, the Bank shall have the power to employ and pay other persons to carry out the same and all expenses consequent thereon, or incidental thereto, shall be deducted by the Bank from any money due or that may become due, to the contractor.

No certificate, which may have been issued by the Architect, shall relieve the contractor from his liability in respect of unsound work of bad materials.

36. DEFECTS AFTER COMPLETION

The contractor shall make good at his own cost and to the satisfactions of the Bank all defects, shrinkage, settlements or other faults, which may appear within 12

months after completion of the work. In default the Bank may employ and pay other persons to amend and make good such damages, losses and expenses consequent thereon or incidental there to shall be made good and borne by the contractor and such damages, loss and expenses shall be recoverable from him by the Bank or may be deducted by the Bank, in lieu of such amending and making good by the contractor, deduct from any amount due to the contractor, a sum equivalent to the cost of amending such work and in the event of the amount retained being insufficient, recover that from the contractor from the amount retained as retention money together with any expenses the Bank may have incurred in connection therewith.

37. CONCEALED WORK:

The contractor shall give due notice to the Bank / architects whenever any work is to be buried in the earth, concrete or in the bodies of walls or otherwise becoming inaccessible later on, in order that the work may be inspected and correct dimensions taken before such burial, in default whereof the same shall, at the opinion of the Bank / architect be either opened up for measurement at the contractor's expense or no payment may be made for such materials. Should any dispute or differences arise after the execution of any work as to measurements etc., or other matters which cannot be conveniently tested or checked, the notes of the employer / architects shall be accepted as correct and binding on the contractor.

38. CERTIFICATE OF VIRTUAL COMPLETION & DEFECTS LIABILITY PERIOD

The work shall not be considered as completed until the architect has certified in writing that they have been virtually completed. The defects Liability Period shall commence from the date indicated in the virtual completion certificate issued by the Architect.

39. NOMINATED SUB-CONTRACTORS

All specialist, Merchants, Tradesmen and others executing any work of supplying and fixing any goods for which prime cost prices or provisional sums are included in the Schedule of Quantities and/or Specifications who may be nominated or selected by the Architect/ Bank are hereby declared to be Sub-Contractors employed by the Contractors and are herein referred to as nominated Sub-Contractors.

No nominated Sub-Contractor shall be employed on or in connection with the works against whom the Contractor shall make reasonable objection or (save where the Architect and Contractor shall otherwise agree) who will not enter into a Contract providing:-

(a) That the nominated Sub-Contractor shall indemnify the Contractor against the same obligations in respect of the Sub-Contract as the Contractor is under in respect of this contract.

(b) That the nominated Sub-Contractor shall indemnify the Contractor against claims in respect of any negligence by the Sub-Contractor, his servants or agents or any misuse by him or them of any scaffolding or other plant, the property of the Contractor or under any workmen's Compensation Act in force.

(c) Payment shall be made to the nominated Sub-Contractor within fourteen days of his receipt of the Architect's Certificates provided that before any certificate is issued, the contractor shall upon request furnish to the architect proof that all nominated Sub-Contractor's accounts included in the previous Certificate have been duly discharged; in default whereof the Employer may pay the same upon a Certificate or the Architect and deduct the amount thereof from any sums due to the Contractor. The exercise of this power shall not create privacy of Contract as between Employer and Sub-Contractor.

40. OTHER PERSONS ENGAGED BY THE BANK

The Bank reserves the right to execute any part of the work included in this contract by other agency or persons and contractor shall allow all reasonable facilities and use of his scaffolding for the execution of such work. The main contractor shall extend all co-operations in this regard.

41. INSURANCE

(a) IN RESPECT OF DAMAGE TO PERSONS AND PROPERTY

(i) The contractor shall be responsible for all injury to the work or to persons, animals or things, and for all damages to the structural and / or decorative part of the property which may arise from the operation or neglect of himself or of any nominated sub-contractor or any of his / sub-contractor's employee, whether such damage/ injury arises from carelessness, accident or any other cause whatsoever in any way connected in the carrying out of this contract. This clause shall be held to include inter alias, any damage to buildings, whether immediately adjacent or otherwise, and any damage to the roads, streets, foot-paths, bridge or ways as well as damage caused to the building and work forming the subject of this contract by rain, wind or other inclement of the weather. The contractor shall indemnify the Bank and hold it harmless in respect of all and any expense arising from such injury or damage to persons or property as aforesaid and also in respect of any claim made in respect of injury and damage under any Act of any Legislature or otherwise and also in respect of any award of compensation or damage consequent upon such claims.

(ii) The contractor shall reinstate all damage of every sort mentioned in this clause, so as to deliver up the whole of the contract works complete and perfect in every respect and so as to make good or otherwise satisfy all claims for damage to the property or third parties.

(iii) The contractor shall indemnify the Bank against all claims which may be made against the Bank by any member of the Public or third party in respect of anything which may arise in respect of the works or in consequence thereof and shall at his own expense arrange to effect and maintain, until the virtual completion of the contract, with an approved office, a Policy of Insurance in the name of the Bank and the contractor against such risks and deposit such policies with the Bank from time to time during the currency of this contract. The contractor will also similarly indemnify the Bank of all claims which may be made upon the Bank whether under the Workmen's

Compensation Act or any other statute in force during the currency of this contract or at common law in respect of any employee of the contractor or any sub-contractor and shall at his own expense effect and maintain, until the virtual completion of the contract, with an approved office, a Policy of Insurance in the joint name of the Bank and the Contractor against such risks and deposit such policy or policies with the Bank from time to time during the currency of the contract.

(iv) The contractor shall be responsible for any liability which may be excluded from the Insurance Policies above referred to and also for all other damages to any person animal or property arising out of incidental or defective carry in out of this contract. He shall also indemnify the Bank in respect of any cost, charges or expenses arising out of claims or proceeding and also in respect of any award of composition and damages arising there from.

(v) The Bank shall be entitled to deduct the amount of any damage, compensation, cost, charges and expenses arising from or accruing from, or in respect of, any such claims or damage from any or all sums due or to become due to the contractor without prejudice to the Bank's other rights in respect thereof.

(b) FIRE INSURANCE

(i) The Contractor shall, within fourteen days from the date of commencement of works, insure the works at his cost and keep them insured until the virtual completion of the contract, against loss or damage by fire and/ or earthquake, flood with an office to be approved by the Architect in the joint name of the Bank and the Contractor (the name of the former being placed first in the policy), for the contract amount only. The Contractor shall deposit the policy and receipts for the premium with the owner within 21days from the date of issue of work order, unless otherwise instructed by commencement of the works, unless otherwise instructed by the Architect. In default of the Contractor insuring as provided above, the Bank or the Architect on his behalf, may so insure the works and may deduct the premium paid from any money due or which may become due to the Contractor without prejudice to the other rights of the Bank in respect of such default. In case it becomes necessary to suspend the works, the Contractor shall as soon as the claim under the policy is settled, or work reinstated by the Insurance office should they elect to do so, proceed with all due diligence with the completion of the works in the same manner as though the incident had not occurred and in all respects under the same conditions of the Contract. The contractor in case of rebuilding or reinstatement after fire, shall be entitled to such extension of time for completion as the Bank/ Architect deemed fit.

(ii) The amount so due as aforesaid shall be the total value of the works duly executed and of the contract materials and goods delivered upon the site for use in works up to and including a date not more than seven days prior to the date of the said Certificate less the amount to be retained by the Employer (as hereinafter provided) and less any installments previously paid

under this clause. Provided that such Certificate shall only include the value of the said materials and goods as and from time to time as they are reasonably, properly and not prematurely brought upon the site and then only if properly stored and/or protected against weather.

- (c) The Contractors will have to take out following Insurance Policies:
- (i) Contractors All Risks Insurance Policy to cover-
 - (ii) Earthquake- Fire & Shock
 - (iii) Landslide/Rockslide/Subsidence.
 - (iv) Flood/Inundations.
 - (v) Storm/Tempest/Hurricanes/Typhoon /Cyclone Collapse.
 - (vi) Theft/Burglary.
 - (vii) Damage to material brought at Site and to be subsequently used in the work.
 - (viii) Third party Insurance Policy
 - ✓ For accidental loss or damage caused to the property of other persons.
 - ✓ For fatal or non-fatal injury to any person other than insured own employees or work men of employees of the owner of the works any other construction work thereon, or member of the Insured's family or of any of the aforesaid; directly consequent upon of solely due to the construction of any property described in the Schedule.
 - (ix) Workmen's Compensation Insurance.

42. ACCOUNTS RECEIPTS & VOUCHERS:

The contractor shall, upon the request of the employer furnish them with all the invoices, accounts, receipts and other vouchers that they may require in connection with the works under this contract. If the contractor shall use materials less than what he is required under the contract, the value of the difference in the quantity of the material he was required to use and that he actually used shall be deducted from his dues. The decision of the Bank shall be final and binding on the contractor as to the amount of materials the contractor is required to use for any work under this contract.

43. LIQUIDATED DAMAGES / DAMAGES FOR NON-COMPLETION

If the Contractor fails to complete the works by the date stated in the Appendix or within any extended time and the Architect certifies in writing that in his opinion, the same ought reasonably to have been completed, the Contractor shall pay the Bank liquidated damages @ 0.5% of the contract amount per week of delay subject to maximum deduction of 7.5% of the contract amount.

44. TOOLS, STORAGE OF MATERIALS, PROTECTIVE WORKS AND SITE OFFICE REQUIREMENTS

(a) The contractor shall provide, fix up and maintain in an approved position proper office accommodation for the contractor's representative and staff which offices shall be open at all reasonable hours to receive instruction notices or communications and clear away on completion of the works and make good all work disturbed.

(b) All drawings maintained on the site are to be carefully mounted on Boards of appropriate size and covered with a coat of approved varnish. They are to be protected from ravages of termites, ants and other insects.

(c) The contractor shall provide at his own cost all artificial light required for the work and to enable other contractors and sub-contractors to complete the work within the specified time.

(d) The contractor shall provide a suitable temporary hut for the watchmen and clear away the same when no longer required and to provide all necessary attendance, lights, etc. required.

(e) The contractor shall arrange for temporary latrines for the use of workers and field staff and keep the same in a clean and sanitary condition to the satisfaction of the Public Health Authorities and shall cause such latrines and soil to be cleared away whenever necessary and shall make good all the works disturbed by these conveniences,.

(f) Every precaution shall be taken by the contractor to prevent the breeding of mosquitoes on the works during the construction and all receptacles, cisterns, water tans, etc., used for the storage of water must be suitably protected against breeding of mosquitoes. The contractor shall indemnify the Employer against any breach of rules in respect of anti-malarial measures.

(g) The contractor shall not fix or place any placards or advertisement of any description or permit the same to be fixed or placed in or upon any boarding, gantry, building structure other than those approved by the Bank.

45. **PROTECTIVE MEASURES**

(a) The contractor from the time of being placed in possession of the site must make suitable arrangements for watching, lighting and protecting the work, the site and surrounding property by day, by night, on Sundays and other holidays.

(b) Contractor shall indemnify the Bank against any possible damage to the building, roads or members of the public in course of execution of the work.

(c) The contractor shall provide necessary temporary enclosures, gates, entrances, etc. for the protection of the work and materials and for altering and adoption the same as may be required and removing on completion of the works and making good all works disturbed.

(d) **Storage of materials:** The contractor shall provide and maintain proper sheds for the proper storage and adequate protection of the materials etc. and other work that may be executed on the site including the tools and materials of sub-contractors and remove same on completion.

(e) Cement godown shall be constructed for storing about six weeks' requirement of cement and stored as per norms with a stack of 10 bags each and 2 feet opening all around with 2 feet passage of each stack. Structure shall be water-proof from all the sides and top. Cement should be stored one feet above the ground level and have pucca raised floor.

(f) So also reinforcement bars are to be stored above the ground level to prevent the same from getting rusted.

(g) Tools: Theodolite levels, prismatic compass, chain, steel and metallic taps and all other surveying instruments found necessary on the works shall be provided by the contractor for the due performance of this contract as instructed by the site engineer.

(h) All measuring tapes shall be of steel and suitable scaffolding and ladders that may be required for safely taking measurement shall be supplied by the contractor.

(i) The mistries and the supervisors on the works shall carry with them always a one meter or two meter steel tape, a measuring tape of 30 meters, a spirit level, a plum bob and a square and shall check the work to see that the work is being done according to the drawing and specifications. The Site Engineer will use any or all measuring instruments or tools belonging to the contractors as he chooses for checking the works executed or being executed on the contract.

(j) The contractor should cover in his rates for making provisions for all reasonable facilities for the use of his scaffolding, tools and plant etc. by sub-contractors for their work.

46. **DATE OF COMMENCEMENT & COMPLETION**

The Contractor shall be allowed admittance to the Site on the "Date of Commencement" stated in the Appendix hereto, or such later date as may be specified by the Architect/ Consultant and he shall there upon and forthwith begin the works and shall regularly proceed with and complete the same (except the painting or other decorative works the Architect/ Consultant may desire to delay) on or before the "Date of Completion" stated in the Appendix subject nevertheless to the provision for extension of time hereinafter contained.

47. **TIME OF COMPLETION, EXTENSION OF TIME & PROGRESS CHART**

(a) Time of completion: The entire work is to be completed in all respects within the stipulated period i.e. 18 months. The work shall deemed to be commenced within 10 days from the date of acceptance of work order or date of handing over of site, whichever is later. Time is the essence of the contract and shall be strictly observed by the contractor. The work shall not be considered as complete until the Bank / Architects have certified in writing that this has been completed and the Defects Liability Period shall commence from the date of such certificate.

(b) Extension of time: If in the opinion of the Architect / Consultant the work has been delayed

(i) By force majeure; or

(ii) By reason of any exceptionally inclement weather or

- (iii) By reason of proceedings taken or threatened by or dispute with adjoining or neighbouring owners or public authorities arising otherwise than through the Contractors own default or
- (iv) By the works or delay or the other Contractors or tradesmen engaged or nominated by the Bank or the Architect and not referred to in the Schedule of Quantities and/or specification or
- (v) By reasons of the Architect's instructions as per clause 2 hereof or
- (vi) By reason of any combination of workmen or strike or lock-out affecting any of the building trades or
- (vii) In consequence of the Contractor not having received in due time necessary instructions from the Architect for which he shall specifically applied in writing or
- (viii) From other cause which the Bank may consider as beyond the control of the Contractor or
- (ix) In the event, the value of work exceed the value of the Priced Schedule of Quantities owing to variation, the architect may with the previous approval in writing of the Bank make a fair and reasonable extension of time for the completion of the Contract works.

In case of such strike or lockout, the Contractor shall as soon as give written notice thereof to the Architect / Consultant, but the Contractor nevertheless constantly use his endeavor to prevent delay and shall do all that may be reasonably required to the satisfaction of the Architect/Bank to proceed with the work and on his doing so that it will be ground of consideration by the Bank for an extension of time as above provided. The decision of the Bank as to the period to be allowed for an extension of time for completion hereunder (which decision shall be final and binding on the contractor) shall be promulgated at the conclusion of such strike or lock-out and the Bank shall then, in the event of an extension being granted, determine and declare the final completion date. The provision in clause with respect to payment of liquidated damages shall, in such case, be read and construed as if the extended date fixed by the Bank were substituted for and the damage shall be deducted accordingly.

(c) **PROGRESS OF WORK:** During the period of construction the contractor shall maintain proportionate progress on the basis of a Program Chart submitted by the contractor immediately before commencement of work and agreed to by the Bank / Architects. Contractor should also include planning for procurement of scare material well in advance and reflect the same in the Program Chart so that there is no delay in completion of the project.

48. FAILURE BY CONTRACTOR TO COMPLY WITH ARCHITECT / CONSULANT'S INSTRUCTION

If the Contractor after receipt of written notice form the Architect / Consultant requiring compliance within ten days fails to comply with such further drawings and/or Architect's instructions, the Bank may employ and pay other persons to execute any such work whatsoever the may be necessary to give effect thereto, and

all costs incurred in connection therewith shall be recoverable from the Contractor by the Bank on the Certificate of the Architect / Consultant as a debt or may be deducted by him from any moneys due to the Contractor.

49. IDLE LABOR:

Whatever the reasons may be no claim for idle labor, additional establishment cost of hire and labor charges of tools and plants would be entertained under any circumstances.

50. SUSPENSION:

If the contractor except on account of any legal restraint upon the Bank preventing the continuance of the work or in the opinion of the employer shall neglect or fail to proceed with due diligence in the performance of his part of the contract or if he shall more than once make default, the Bank shall have the power to give notice in writing to the contractor requiring the work to be proceeded within a reasonable manner and with reasonable dispatch, such notice purport to be a notice under this clause.

After such notice shall have been given the contractor shall not be at liberty to remove from the site of the works or from any ground contiguous thereto any plant or materials to subsist from the date of such notice being given until the notice shall have been complied with. If the contractor fails to start the work within seven days after such notice has been given to proceed with the works as therein prescribed, the employer may proceed as provided in clause Termination of Contract by employer.

51. TERMINATION OF CONTRACT BY THE BANK

If the Contractor being a individual or a Firm, commits any “act of insolvency” or shall be adjudged an Insolvent or being an Incorporate company, shall have an order for supervision of the court and the official Assignee or the Liquidator in such acts of insolvency and winding up, as the case may be, shall be unable within seven days after notice to him requiring him to do so, to show the reasonable satisfaction of the Architect that he is able to carry out and fulfill the Contract and to give security therefore, if so required by the Architect / Consultant.

OR if the Contractor (whether an individual, Firm or Incorporated Company) shall suffer execution or other process of court attaching property to be issued to the Contractor.

OR shall suffer any payment under this Contract to be attached by or on behalf of any of the creditors of the Contractors.

OR shall assign or sublet this Contract without the consent in writing of the Bank first obtained.

OR shall charge or encumber this Contract or any payment due or which may become due to the Contractor hereunder.

OR if the architect / consultant shall certify in writing to the Bank that the contractor:

- (i) Has abandoned the Contract, or
- (ii) Has failed to commence the works, or has without any lawful excuse under these conditions suspended the progress of the works for fourteen days after receiving from the Architect notice to proceed, or
- (iii) Has failed to proceed with the works with such due diligence and failed to make such due progress as would enable the works to be completed within the time agreed upon, or
- (iv) Has failed to remove materials from the Site or to pull down and replace work within seven days after receiving from the architect written notice that the said materials or work were condemned and rejected by the Architect under these conditions or,
- (v) Has neglected or failed persistently to observe and perform all or any of the acts, matters or things by this Contract to be observed and performed by the contractor to observe or perform the same.

Then and in any of the said cases the Bank may, notwithstanding any previous waiver, after giving seven days notice in writing to the Contractor, determine the Contract but without thereby affecting the powers of the Architect/Bank or obligations and liabilities of the Contractor, the whole of which shall continue in force as fully as if the contract has not been so determined, and as if the work subsequently executed had been executed by or on behalf of the Contractor, And further, the Bank by his agent or servants may enter upon and take possession of the work and all plant, tools, scaffoldings, shed, machinery, steam and other power utensils and materials lying upon the premises or on the adjoining land or roads and use the same as his own property or may employ the same by means of his own servants and workmen in carrying on and completing the works or by the employing any other contractor or person or persons to complete the works and the contractor shall not in any way interrupt or do any act, matter or thing to prevent or hinder such other contractor or other person or persons employed for completing or finishing or using the materials and plant for the work. When the work shall be completed or as soon as thereafter as convenient the Architect shall give a notice to the Contractor to remove his surplus materials and plant, and should the Contractor fail to do so within the period of fourteen days after receipt thereof by him, the Bank may sell the same by public auction, and give credit to the Contractor for the net amount realized. The architect shall thereafter ascertain and certify in writing under his hand what (if anything) shall be due or payable to, or by the employer, for the value of the said plant and materials so taken possession of by the Bank and the expense or loss which the bank shall have been put to in procuring the works to be completed and the amount, if any, owing to the Contractor and the amount, which shall thereupon be paid by the Bank to the Contractor or by the Contractor to the Bank, as the case may be and the certificate of the architect shall be final and conclusive between the parties.

52. CERTIFICATES & PAYMENTS:

- (a) The Contractor shall be paid by the Bank from time to time by instalments under Interim certificates to be issued the Architect / Consultant to the Contractor

on account of the works executed when in the opinion of the Architect, work to the approximate value named in the appendix as value of work for Interim Certificates (or less at the reasonable discretion of the Architect / Consultant has been executed in Accordance with this contract, subject, however, to a retention of the percentage of such value named in the appendix hereto as “retention percentage from Interim Certificate”, until the total amount retained shall reach the named in the Appendix as “Total Retention Money”, after which time the instalments shall be upto the full value of the work subsequently so executed and fixed in the building. The Architect / Consultant may in his discretion include the Interim Certificate, such amount, as he may consider proper on accounts of material delivered upon the site by the contractor for use in the works. And when the works have been virtually completed and the Architect / Consultant shall have certified in writing that they have been completed, the contractor shall be paid by the Bank in accordance with the certificate to be issued by the Architect / Consultant the sum of money named in the Appendix “Instalment after virtual completion” being a part of the said Total Retention Money. And the contractor shall be entitled to the payment of the Final Balance in accordance with the Final Certificate to be issued in writing by the Architect at the expiration of the period referred to as “The Defects Liability Period” in the appendix hereto from the date of virtual completion, or as soon after the expiration of such period as the works shall be finally completed and all defects made good according to the true intent and meaning and hereof whichever shall last happen, provided always that the issue of the Architect / Consultant of any certificate during the progress of the works or at or after the completion shall not relieve the contractor from his liability under clause 3 and 39 nor relieve the Contractor from his liability in case of fraud, dishonesty or fraudulent concealment relating to the works or materials or to any matter dealt with in the certificate, and in case of all the defects and insufficiencies in the works or materials which is a reasonable examination would not have disclosed. No certificate of the Architect shall of itself be conclusive evidence that any works or materials to which it relates are in accordance with the contract, neither will the contractors have a claim for any amounts which the Architect / Consultant might have certified in any interim bill and paid by the Bank and which might subsequently be discovered as not payable and in this respect the Bank’s decision shall be final and binding.

(b) The Architect / Consultant shall have power to withhold any Certificate if the works or any parts thereof are not being carried out to his satisfaction.

(c) The Architect / Consultant may by any certificate make any correction in any previous certificate, which shall have been issued by him.

(d) No certificate of payment shall be issued by architect if the contractor fails to ensure the works and keep them insured till the issue of Virtual completion certificate.

(e) All the interim payments shall be regarded as payments by way of advance against the final payment only and not as payments for work actually done and completed and shall not preclude the requiring of bad, unsound and imperfect or unskilled work to be removed and taken away and reconstructed or re-erected or be considered as an admission of the due performance of the contract, or any part

thereof in any respect or the accruing of any claim nor shall it conclude determine or affect in any way the power of the Bank under these conditions or any of terms as to the final settlement and adjustment of the accounts or otherwise or in any other way vary or affect the contract.

53. EXCEPTED MATTERS/ MATTERS TO BE FINALLY DECIDED BY THE BANK:

The decisions, opinion, direction, certificate with respect to all or any of the matters under this tender shall be final and conclusive and binding on the contractor and shall be without appeal. Any other decision, opinion, direction, certificate or valuation of the architect or any refusal of the architect to give any of the same, shall be subject to the right of arbitration and review. The Architect/ Consultant to give recommendations/ opinion in respect of interpreting the various clauses. However, the decision from the competent authority of the bank shall be final and binding.

54. SETTLEMENT OF DISPUTES BY ARBITRATION

(a) Wherever, in any of the documents forming part of the Contract, the Bank has been vested with the final powers, his decision, opinion, certificate or any other discretion shall be final conclusive and binding on the contractor and shall be without appeal. All other matters shall be subject to the right of arbitration.

(b) All disputes or differences of any kind whatsoever save and except matters referred to in clause 1) arising out of or in connection with the Contract, whether during the progress of Work or after Completion and shall after written notice by either party to the contract to the other of them and to the Bank hereinafter mentioned be referred for adjudication to two Arbitrator, one each to be nominated by the Contractor and the Bank, who shall thereafter appoint an Umpire. The provisions of Indian Arbitration and Conciliation Act 1996 shall apply for the purposes.

(c) The Work under the Contract shall, however, continue during the arbitration proceedings and no payment due or payable to the Contractor shall be withheld on account of such proceedings.

(d) The Arbitrator shall be deemed to have entered on the reference on the date he issued notice to both the parties fixing the date of the first hearing.

(e) The Arbitrator may from time to time, with the consent of the parties, enlarge the time for making and publishing the award.

(f) The Arbitrator shall give a separate award in respect of each dispute or difference referred to him. The Arbitrator shall decide each dispute in accordance with the terms of the contract and give a reasoned award. The venue of arbitration shall be such place as may be fixed by the Arbitrator in his sole discretion.

(g) The fees, if any, of the Arbitrator shall, if required to be paid before the award is made and published, be paid half and half by each of the parties. The cost of the reference and of the award including the fees, if any, of the Arbitrator who may direct to and by whom and in what manner, such costs or any part thereof shall be paid and may fix or settle and amount of costs to be so paid.

- (h) The award of the Arbitrator shall be final and binding on both the parties.
- (i) Subject to aforesaid the provisions of the Arbitration & Conciliation Act 1996 or any statutory modification or re-enactment thereof and the rules made, and for the time being in force, shall apply to the arbitration proceeding under this clause.
- (j) The Bank and the Contractor hereby also agree that arbitration under clause shall be a condition precedent to any right to action under the contract with regard to the matters hereby expressly agreed to be so referred to arbitration.
- (k) The Bank and the contractor hereby also agree that arbitration under clause shall be a condition precedent to any right to action under the contract with regard to the matters hereby expressly agreed to be so referred to arbitration.
- (l) Jurisdiction: All matters arising out of or in any way connected with this contract shall be deemed to have arisen in Kozhikode (Kerala) and only the courts in Kozhikode (Kerala) shall have jurisdiction to determine the same.

55. RIGHT OF TECHNICAL SCRUTINY OF FINAL BILL

- (a) The Bank shall have right to cause a technical examination of the works and the final bill of the works and the final bill of the contractor including all supporting vouchers, abstracts, etc., to be made at the time of payment of the final bill. If as a result of this examination or otherwise any sum is found to have been overpaid or over certified, it shall be lawful for the Bank to recover the sum. The Bank reserves the right to alter/ reduce amount certified by Consultant/ Engineer, if noticed that certification is not proper.
- (b) The subject work will be scrutinized by the Chief Technical Examiner's Office, a technical wing of Central Vigilance Commission and other Vigilance and Audit Authorities of the Bank. Decision of this Authority shall be binding on the contractor. Any discrepancy noted defected shall be rectified by the contractor free of cost or appropriate amount will be recovered from the contractor's payment.

56. BANK ENTITLED TO RECOVER COMPENSATION PAID TO WORKMEN:

The Bank is obliged, by the virtue of the provisions of the workmen's compensation Act, 1923, or any statutory modification or re-enactment thereof to pay compensation to a workman employed by the contractor in execution of the works, the Bank shall be entitled to recover from the contractor the amount of compensation so paid, and without prejudice to the rights of the bank under said Act. The Bank shall be at liberty to recover such amount or any part thereof by deducting it from the security deposit or from any sum due to the contractor under this contract or otherwise. The bank shall not be bound to contest any claim made against it under the said Act, except on written request of the contractor and upon his giving to the bank full security to the satisfaction of the Bank for all costs for which the Bank might become liable in consequence of contesting such claim.

57. ABANDONMENT OF WORKS:

If at any time after the acceptance of the Tender, the Employer shall for any reasons whatsoever not require the whole or any part of the works to be carried out, the Architect/ Bank shall give notice in writing to the contractor who shall have no claim

to any payment of compensation or otherwise whatsoever on account of any profit or advantage which be might have derived from the execution of the whole works but which did not derived in consequence of the foreclosure of the whole or part of the work.

58. RETURN OF SURPLUS MATERIALS:

Notwithstanding anything to the contrary contained in any or all the clauses of this contract, where any material for the execution of the contract is procured with the assistance of the Bank by purchase made under orders or permits or licenses issued by the Government, the contractor shall hold the said materials economically and solely for the purpose of the contract and not dispose of them without the prior written permission of the bank, if required by the Bank, at the price to be determined by the Architect having due regard to the condition of the materials, the price to be determined not to exceed the purchase price thereof inclusive of Sales Tax, Octroi Duty and other such levies paid by the contractor in respect thereof. In event of the breach of the aforesaid condition, the contractor shall, in addition to being liable to action for contravention of the terms of license or permit and /or criminal breach of trust, be liable to Bank for all such moneys, advantage or profits resulting or which in the usual course would have resulted to him by reason of such breach.

59. RIGHT OF BANK TO TERMINATE CONTRACT IN THE EVENT OF DEATH OF CONTRACTOR IF INDIVIDUAL.

Without prejudice to any of the rights or remedies under this contract, if the contractor, being an individual dies, the Bank shall have the option of terminating the contract without incurring any liability for such termination.

60. MATERIALS HAVING BASIC PRICE

For materials for which a basic price has been stipulated in the tender, the variation in the actual cost of purchase from the basic price will be considered for adjustment (payment / recovery) in the tender cost due to incorporation of required quantity of such material in the works over different periods of time as per construction schedule. Rates should be however fair and competitive and verified by market enquiry by the Bank / Consultant and the quantity purchased in every period should be reasonable and advantageous, if any due to bulk purchase may be also taken into account.

(a)	Reinforcement Steel (TOR)	As mentioned in the Bill of Quantity
(b)	Reinforcement Steel (MS)	As mentioned in the Bill of Quantity
(c)	Cement	As mentioned in the Bill of Quantity
(d)	Granite slab	As mentioned in the Bill of Quantity
(e)	Granite Tile	As mentioned in the Bill of Quantity
(f)	Marble	As mentioned in the Bill of Quantity
(g)	Ceramic tiles	As mentioned in the Bill of Quantity
(h)	Interlocking / paver blocks	As mentioned in the Bill of Quantity

(i) Vitrified tiles As mentioned in the Bill of Quantity

The amount of difference in actual price and basic cost will be paid by the bank if the increase is on higher side or the amount will be recovered if there is decrease in the prices. The clause will be operated irrespective of any ceiling in terms of time frame as stipulated for price variation adjustment wherein the contractor is supposed to complete specific value of work during first six months within which they are not entitled for PVA relief.

61. OFFICE ACCOMMODATION FOR SITE ENGINEER.

The contractor shall provide, erect, and maintain at his cost a separate simple watertight office accommodation for the Site engineer/ PMC. This accommodation shall be well lighted and ventilated and provided with windows, door with lock. The site engineer's / PMC office shall be minimum of 150 Sq.Ft. and the contractor shall provide a desk, chairs, drawers, for keeping drawing, a cupboard having proper lock and a tack board for displaying drawings. The accommodation shall be demolished when directed. The contractor has to provide one peon for the said office who shall keep the office neat and tidy. The contractor shall also make arrangement for toilet facilities and drinking water. The office shall be provided with fan / air-cooler / air-condition as required.

62. SECURITY ARRANGEMENT AT SITE

Upon taking possession of the site, the contractor shall make arrangement of security by posting required number of security guards and flood light arrangement.

INDEMNITY BOND

On the acceptance of his tender, the contractor will be required to execute an Indemnity Bond with-in 10 days of issue of work order in favor of the bank against third party claims, civil or criminal complaints, site mishaps and other accidents or disputes, against any damages, loss or expenses due to or resulting from any negligence or breach of duty on the part of the contractor, his subcontractors or his employees and agents etc., as per the appropriate Indemnity Bond attached at Annexure “B”.

It will also be covered by labor laws of the Govt. of India.

Any other conditions suggested by the Bank may be added subsequently.

The EMD/SD may be forfeited:

If the Bidder withdraws his Bid during the period of Bid validity specified in this RFP.

or

If the Bidder makes any statement or submit information which turns out to be false / incorrect at any time prior/post of issuing Purchase order.

or

If the Bidder fails to furnish security Deposits or is there any benefit of doubt of formation of cartel by bidders.

or

If the bidder backs out or do not accept the work order after being declared L-1 bidder.

or

In case of a successful Bidder, if the Bidder fails to sign/execute the contract in accordance with this RFP.

or

If a bidder refuses to accept the corrections of errors calculated in accordance with the provisions of the bidding documents, its bid shall be rejected and its EMD shall be forfeited.

APPENDIX / MEMORANDUM TO CONDITIONS OF CONTRACT

Estimated cost	Rs.796.61Lakhs +18%GST(as applicable)
EMD	Rs.15,93,000/- (Rupees Fifteen Lakhs Ninety Three Thousand only) in favor of Union Bank of India, drawn from Scheduled Bank, payable at Kozhikode (Kerala)
Document (Prequalification Bid, Price Bid & detailed drawings)	The tender document (Prequalification Bid, Price Bid & detailed drawings) can be obtained from, Union Bank of India, Regional Office, Kozhikode on payment of Rs.1000/- (non-refundable) in favour of Union Bank of India, Regional Office-Kozhikode, drawn from Scheduled Bank payable at Kozhikode, Kerala and should be stamped and sealed submitted in original, in the same office
Initial security deposit	The amount of ISD shall be 2% of the accepted value of the tender including EMD.
Date of commencement	10 th day from the date of acceptance of work order OR date of site possession, whichever is later.
Time for completion of work	As per time schedule given in tender document i.e. 18 months.
Retention money to be deducted from the bills.	8% of the certified gross value of each running bill, till accumulating total security deposit including ISD.
Total Security Deposit	10% of Contract amount/ value of final bill whichever is maximum.
Defect Liability Period	Twelve months from the virtual completion. However, if all the works or more than one works awarded to one contractor the defects liability period will be reckoned from the date of virtual completion of last work.
Period of Final Measurement	2 months.
Liquidated damages	Shall be 0.5% of contact amount per week of delay subject to ceiling of 7.5% of the accepted contract amount.
Value of works for Interim Certificates	Value not less than Rs.45.00 lakhs (Rs. Forty-Five Lakhs only) or as decided by the Bank.
Payment after virtual completion	50% of total security deposit will be returned after (i) issue of virtual completion certificate by the project architect. (ii) Contractor's removal of his material, equipments, cleaning of site and against Bank Guarantee. Balance 50% of retention money shall be released 15 days after satisfactory completion of defect liability period.
Period for honoring interim certificate.	75% of the bill amount shall be honored within 10 days after getting certificate from project architect and submitting to the bank. Balance 25% bill amount payable within 30 days after checking by the Bank.
Recovery towards taxes.	As per rules applicable from time to time.

SAFETY CODE

1. Scaffolds

1.1. Suitable scaffolds shall be provided for workmen for all works that cannot safely be done from the ground, or from solid construction except in the case of short duration work which can be done safely from ladders. When a ladder is used, it shall be of rigid construction made either of good quality wood or steel. The steps shall have a minimum width of 450 mm and a maximum rise of 300 mm. Suitable hand holds of good quality wood or steel shall be provided and the ladder shall be given an inclination not steeper than $\frac{1}{4}$ to 1 ($\frac{1}{4}$ horizontal and 1 vertical).

1.2. Scaffolding or staging more than 4 m. above the ground floor, swung or suspended from an overhead support or erected with stationary support shall have a guard rail properly bolted, braced or otherwise secured, at least 1m. above the floor or platform of such scaffolding or staging and extending along the entire length of the outside and ends thereof with only such openings as may be necessary for the delivery of materials. Such scaffolding or staging shall be so fastened as to prevent it from swaying from the building or structure.

1.3. Working platforms, gangways and stairways shall be so constructed that they do not sag unduly or unequally and if the height of the platform, gangway or stairway is more than 4 m. above ground level or floor level, they shall be closely boarded and shall have adequate width and be suitably fenced as described in (ii) above.

1.4. Every opening in the floor of a building or in a working platform shall be provided with suitable means to prevent the fall of persons or materials by providing suitable fencing or railing whose minimum height shall be 1 m.

1.5. Wherever there are open excavations in ground, they shall be fenced off by suitable railing and danger signals installed at night so as to prevent persons slipping into the excavations.

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

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

2. Other Safety Measure

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

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

3. Excavation & Trenching

3.1. All trenches, 1.25 m. or more in depth shall at all times be supplied with at least one ladder for each 30 m. in length or fraction thereof. The ladder shall be extended from bottoms of the trench to at least 1 m. above the surface of the ground. Sides of trenches which are 1.5 m. or more in depth shall be stepped back to give suitable slopes or securely held by timber bracing so as to avoid the danger of sides of collapsing. The excavated materials shall not be placed within 1.5 m. of the edges of the trench or half of the depth of the trench whichever is more. Cutting shall be done from top to bottom. Under no circumstances undermining or undercutting shall be done.

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

4. Demolition

4.1. Before any demolition work is commenced and also during the process of the work:

4.2. All roads and open areas adjacent to the work site shall either be closed or suitably protected.

4.3. No electric cable or apparatus which is liable to be a source of danger over a cable or apparatus used by the operator shall remain electrically charged.

4.4. All practical steps shall be taken to prevent danger to persons employed from the risk of fire or explosion or flooding. No floor, roof or other part of the building shall be so overloaded with debris or materials as to render it unsafe.

5. Personal Safety Equipment

5.1. All necessary personal safety equipment as considered adequate by the Engineer should be kept available for the use of the person employed on the site and maintained in a condition suitable for immediate use, the contractor should take adequate steps to ensure proper use of equipment by those concerned.

5.2. Workers employed on mixing asphaltic materials, cement and lime mortars shall be provided with protective footwear and protective goggles.

5.3. Those engaged in whitewashing and mixing or stacking of cement bags or any material which is injurious to the eyes shall be provided with protective goggles.

5.4. Those engaged in welding work shall be provided with welder's protective eyesight lids.

5.5. Stone breaks shall be provided with protective goggles and protective clothing and seated at sufficiently safe intervals.

5.6. When workers are employed in sewers and manholes, which are in use, the contractor shall ensure that the manhole covers are opened and are ventilated at

least for an hour before the workers are allowed to get into manholes and the manholes so opened shall be cordoned off with suitable railing and provided with warning signals or boards to prevent accident to the public.

5.7. The contractor shall not employ men below the age of 18 years and women on the work of painting with products containing lead or any toxic material in any form. Wherever men above the age 18 are employed on the work of such painting the following precautions should be taken:

5.8. No paint containing lead or lead products shall be used except in the form paste or readymade paint. Paints like vinyl and epoxies having toxic fumes should be applied after following all precautions laid down by manufactures.

5.9. Suitable face masks should be supplied for use by the workers when paint is applied in the form of spray or a surface having lead paint dry rubbed and scrapped.

5.10. Overalls shall be supplied by the contractor to the workmen and adequate facilities shall be provided to enable the working painters to wash during the cessation of work.

5.11. When the work done near any public place where there is risk of drawings all necessary equipments should be provided and kept ready for use and all necessary steps taken for prompt rescue of any person in danger and adequate provision should be made for prompt first aid treatment of all injuries likely to be sustained during the course of the work.

6. Hoisting Machines

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

6.2. These shall be of good mechanical constructions sound material and adequate strength and free from patent defect and shall be kept in good repair and in good working order.

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

6.4. Every crane driver or hoisting appliance operator shall be properly qualified and no person under the age of 21 years shall be in charge of any hoisting including any scaffolding winch or give signals to operator.

6.5. In case of every hoisting machine and of every chain ring hook, shackle shovel and pulley block used in hoisting or as means of suspension the safe working load shall be ascertained by adequate means. Every hoisting machine and all gear referred to above shall be plainly marked with the safe working load. In case of a hoisting machine having a variable safe working load, each safe working load and the conditions under which it is applicable shall be clearly indicated. No part of any machine or any gear referred to above in this paragraph shall be loaded beyond the safe working load except for the purpose of testing.

6.6. In case of departmental machines, the safe working load shall be notified by the Engineer. As regards contractor's machines, the contractor shall notify the safe

working load of the machine to the Engineer whenever he brings any machinery to site of work and get verified by the Engineer concerned.

6.7. Motors, gearing, transmission, electrical wiring and other dangerous parts of hoisting appliances should be provided with efficient safeguards. Hoisting appliances should be provided with such means as will reduce to the minimum of the risk of any part of a suspended load becoming accidentally displaced. When workers are employed on electrical installations which are already energized, insulating mats, wearing apparel, such as gloves, sleeves and boots as may be necessary, should be provided. The workers should not wear any rings, watches and carry keys or other materials which are good conductors of electricity.

6.8. All scaffolds, ladders and other safety devices mentioned or described herein shall be maintained in safe condition and no scaffold, ladder or equipment shall be altered or removed while it is in use.

6.9. Adequate washing facilities should be provided at or near places of work.

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

6.11. To ensure effective enforcement of the rules and regulations relating to safety precautions the arrangements made by the contractor shall be open to inspection by the Labor Officer, Engineer of the Department or their representatives.

6.12. Notwithstanding the above clause from (i) to (xviii), there is nothing in these to exempt the contractor from the operation of any other Act or Rule in force in India.

ADDITIONAL CONDITIONS

1. **Tenderer to inspect Site:** The tenderer shall visit and examine the construction site and satisfy himself as to the nature of the existing roads or other means of communications, the character of the soil and the excavation, the extent of magnitude of the work and facilities for obtaining material and shall obtain generally his own information on all matters affecting the execution of the work. No extra changes made in consequence of any misunderstanding or incorrect information on any of these points or on grounds of insufficient description will be allowed. All expenses incurred by the contractor in connection with obtaining information for submitting this tender including his visits to the site or efforts in compiling the tender shall be borne by the Tenderer and no claim for reimbursement thereof shall be entertained.
2. **Access to Site:** The tenderer is to include in his rates for forming access to the Site with all temporary roads gangways required for the works.
3. **Setting out:** The tenderer shall set out the building in accordance with the plans. All grid/centre lines shall be pegged out to satisfaction of the Architects. The tenderer shall be responsible for the correctness of the lining out and any inaccuracies are to be rectified at his own expenses. He will be responsible for taking ground levels of the Site before setting out and recording them without any extra charge.
4. The tenderer shall construct and maintain proper benches at the intersection of all main walls, columns, etc., in order that the lines and levels may be accurately checked at all times.
5. **Treasure Trove:** Should any treasure, fossils, minerals, or works of art of antiquarial interest be found during excavation or while carrying out the works, the tenderer shall give immediate notice to the Architects of any such discovery and shall make over such finds to the Employer.
6. **Attendance upon all Trades :** The general tenderer shall be required to attend on all the Tradesman or Sub-contractor/ contractors appointed by the bank for Water-Supply & Sanitary, Electrical installation, Air-conditioning, Security Equipment, Hardware, Telephone and other special contactors. The rates quoted shall be inclusive of attendance and also allow the contractors and retain until such times the relevant Sub-contract works are completed.
7. **Gate-Keeper and Watchmen:** The tenderer from the times of being placed in possession of the Site must make arrangements for watching, lighting and protecting the work, all materials, workmen and the public by day and night on all days including Sundays and holidays at his own cost.
8. **Sheds for materials :** The contractor shall provide all necessary sheds of adequate dimensions for storage and protection of materials like cement, lime, timber, and such other materials including tools and equipments which are likely to deteriorate by the action of sun, wind, rain or other natural causes due to exposure in the open.
 - (a) Cement godown shall be constructed for storing about six weeks' requirement of cement and stored as per norms with a stack of 10 bags each and 2 feet opening all around with 2 feet passage of each stack. Structure shall be waterproof from all

the sides and top. Cement should be stored one feet above the ground level and have pucca raised floor.

(b) Reinforcement bars are to be stored above the ground level to prevent the same from getting rusted.

(c) All such sheds shall be cleared away and the whole area left in good order on completion of the contract to the satisfaction of the Architects.

(d) All materials which are stored on the site such as bricks, aggregate, etc. shall be stacked in such a manner as to facilitate rapid and easy checking of quantum of such materials.

9. **Cost of transporting:** The tenderer shall allow in his cost for all transporting, unloading stacking and storing or supplies of goods and materials for this work on the site and in the places approved from time to time by the Architects. The tenderer shall allow in his price for transport of all materials controlled or otherwise to the site.

10. **W.C and Sanitary accommodation and office Assessors and accommodation:**

(a) The tenderer shall provide at his own cost and expense adequate closet and sanitary accommodation complying in every respect to the rules and regulations in force of the local authorities and other public bodies, for his workmen of nominated sub-contractors and other contractors working in the building, the assistant engineer and other employer's agent connected with this building project and maintain the same in good working order.

(b) The tenderer shall also provide at his own expense adequate office and shall maintain the same in a satisfactory condition and shall provide light, fan and attendant, etc... for the same and shall remove them after completion of works. He shall arrange to supply at his own expense, office furniture with drawing assessors for the official use of the assistance engineer and at all times maintain in good working order a dumpy level and a Theodolite at Site, to enable the Site Engineer to check the lines and levels of work.

11. **Materials, Workmanship & Samples:** Materials shall be of approved quality and the best of their kind available and shall generally conform to I.S. Specifications, The Contractor shall order all the materials required for the execution of work as early as necessary and ensure that such materials are on site well ahead of requirement for use in the work. The work-involved calls for high standard of workmanship combined with speed and to the entire satisfaction of the Architects.

12. **Rates for Non-Tender Items:** Rates of items not included in Schedule of Quantities shall be settled by the Architects as mentioned in the variation clause of the Contract Conditions.

13. **Rate to include:** The rates quoted shall be for all heights and depths and for finished work.

(a) The contractor shall ascertain from other contractors as directed by the Architects all particulars relating to their work with regard to the order of its execution and the position in which cases, holes and similar items will be required,

before the work is taken in hand as no claims for extras will be allowed for cutting away work already executed in consequence of any neglect by the contractors to ascertain these particulars beforehand.

(b) Before ordering materials, the contractors shall get the samples approved from the Architects well in time.

14. **Testing of work and material:** The contractors will have to carry out testing of the material at regular interval to proof quality, soundness and efficiency of the material. Expenditure required for testing and transportations shall be borne by the tenderer. All the test should be as under:

LIST OF MANDATORY TESTS

MATERIALS	TEST	TEST ROCEDURE	MINMUM QUANTITY	FREQUENCY
1	2	3	4	5
Lime	Chemical and Physical Properties of lime	IS-6932	15 Mt.	10 mt or part thereof
Sand	a) Silt Content	Field	40 Cu.M.	40 Cu.M. or part thereof
	b) Bulking	Field	40 Cu.M.	50 Cu.M. or part thereof
	c) Particle size distribution	Field	80 Cu.M.	Every Cu.M. required in R.C.C. Work
Stone Aggregate	Particle size distribution		135 Cu.M.	Every 135 Cu.M. or part thereof for R.C.C. work. For rest of work as desired.
Cement	- Setting time - Strength - Soundness	IS-269 and other applicable I.S.		Every batch of Consignment and as directed wherever there is a change of source.

Cement Concrete or R.C.C.	1. Slump			Once a day or as desired.
	2. Cube strength		20 Cu.M. in slab beams & connected columns 5 Cu.m. in column.	Every 20 Cu.M. of a days concrete. Every 5 Cum. In column concrete.
Bricks	1. Water absorption & Efflorescence		Designation-35	One test for each source of manufacture.

	2. Compressive strength		Designation-35	1,00,000 or part thereof. Two test for 1 st lot of 1,00,000 & One test later for every 2,00,000 & part thereof.
Timber	Moisture		1 Cu.M.	Every three Cu.M. & part thereof.
Aluminum doors or Windows fitting	Thickness of anodic coating	IS-5523	Rs.5000.00	Rs. 10000 or part thereof.
Mortice Locks	Testing of springs		50 os.	100 or part thereof.
Steel	a)TensilesStrength	IS-1529	20 ton	Every 20 Tonne or part thereof.
	b) Bend strength		-----do-----	-----do-----
Marble/Mosaic/ Terrazo Tiles	1) Transverse strength	IS-1237	10000 tiles	10000 tiles or part thereof
	2) Water absorption	-----do-----	-----do-----	-----do-----
	3) Abrasion test	-----do-----	-----do-----	-----do-----
White glazed tiles	1) Water absorption	IS_777	10000 tiles	10000 tiles or part thereof
	2) Craxing		-----do-----	-----do-----
	3) Impact		-----do-----	-----do-----
Flush door	1) End Immersion		IS-2202	Destructive tests no.
	2) Knife			No. of shutters
	3) Adhesion		22-65	1
			66-100	2
			101-180	2
			181-300	3
		301-500	4	
		501-above	5	

- (a) Cost of testing and transport will be borne by contractors.
- (b) Any other materials will be tested by contractors at his own cost as per the instruction of Architect and Bank from time to time.
- (c) Frequency stated above is minimum and the Contractor may have to test materials with any frequency or as instructed by Bank/Architects without any cost.
- (d) If after any such test the work or portion of works is found in the opinion of the Architect to be defective or unsound, the contractor shall pull down and re-do the same at his own cost. Defective materials shall immediately be removed from the site.

15. **Mechanical Plant:** The contractor will be required to provide and maintain in working order the following power-driven equipments during the constructions work: -

- (a) Concrete Mixers of more than 200 Liters capacity (7 C.ft.).
- (b) Devices to lift up materials to the highest level of the building of the capacity in R.C.C. beams, columns and partition wall and surface type vibrators shall be maintained on the site of work.
- (c) Pumps for bailing out water.
- (d) Any other machinery ordered by the Architects.

16. **Foremen and Tradesmen:**

- (a) All tradesmen shall be experienced men properly equipped with suitable tools for carrying out the work of carpentry and joinery and other specialist trades in a first class manner and where the Architects deemed necessary, the contractor shall provide any such tools, special or ordinary which are considered necessary for carrying out the work in a proper manner.
- (b) All such tradesmen shall work under an experienced and properly trained foremen, who shall be capable of reading and understanding all drawings, pertaining to this work and the contractor shall also comply with other conditions set out in Clause 9 of the conditions of the contract.

17. **Work Program / weekly progress report:**

The contractor shall prepare and submit to architects for approval, a bar chart showing the program of construction of various items, fitted within the period stipulated for completion, within 15 days of the communication of the acceptance of the tender. The contractor shall also furnish necessary particulars to the site engineer for compiling weekly progress reports in the form furnished by the architects.

18. **Photographs:**

The contractor shall at his own expense supply to the architects with triplicate copies of large photographs not less than 25cm x 20cm (10"x8") of the works taken from two approved portions of each building, at intervals of not more than three months during the progress of the work, or at every important stage of construction.

19. **Preparation of building for occupation and use on completion:**

- (a) The whole of the work shall be thoroughly inspected by the contractor and all deficiencies and defects put right. On completion of such inspection, the contractor shall inform the architects in writing that he has finished the work and it is ready for the architect's inspection.
- (b) On completion, the contractor shall clean all windows and doors and all glass panes, including cleaning of all floors, staircases and every part of the building including oiling of all hardware. He will leave the entire building neat and clean and ready for immediate occupation and to the satisfaction of the architects.

20. **Clearing of Site:**

(a) The contractor shall after completion of the work clear the site of all the debris and left over materials at his own expense to the entire satisfaction of the Architects and Municipal or other public authorities.

(b) The whole of the work shall be thoroughly inspected by the contractor and all deficiencies and defects put right. On completion of such inspection, the contractor shall inform the Architects in writing that he has finished the work and it is ready for the Architects inspection.

21. Notice Board:

The contractor shall provide a notice board on proper supports 2 m. x 1.5m (6' x 4'-6") in a position approved by the Architects. He shall allow for painting and lettering stating name of work, name of Architects, Structural consultants, general contractor and Sub-contractor. All letters except that of the name of the work shall be in letters not exceeding 5 cm. in height and all to the approval of the Architects.

22. Vouchers:

The contractor shall furnish the Architects with vouchers on request, to prove that the materials are as specified and to indicate the rates at which the materials are purchased in orders to work out the rate analysis of the non-tender items which he may be called upon to carry thereafter.

23. Consultant's decisions are final & binding on the contractor:

For all matters not specifically provided for herein the provisions of General and Special Tender Documents shall apply and the rights and liabilities of the parties shall be decided accordingly. The decision of the Consultant in this regard shall be final and binding, provided that decision is based on contract clauses executed.

24. Settlement of dispute:

Wherever, in any of the document forming part of the contract, the Consultant has been vested with powers and his decisions, opinion, certificate or any other discretion shall be final, conclusive and binding on the contractor and shall be without appeal. All other matters shall be subject to the right of arbitration.

25. Type of Contract:

The Contractor shall be paid for the actual quantity of Work done, as measured at Site, at the percentage quoted by him in the Contract Bills.

26. Schedule of Quantities:

The schedule of Quantities given in the Contract Bill are provisional and are meant to indicate the intent of the Work and to provide a uniform basis for tendering. The Bank reserves the right to increase or decrease any of the quantities or to totally omit any item of Work and the Contractor shall not claim any extras or damages on these grounds.

27. Contract Sum (Consideration):

The rates and percentages quoted by the Contractor in the priced bill of quantities (Contract Bills) shall be treated as firm and the contract sum shall be deemed to have been calculated with reference to the cost of execution of Works as set out in price bid of Contract Documents and shall not be adjusted or altered for any reason.

28. Idle Labor/ Machinery:

Whatever the reason may be, no claim for idle labor, additional establishment cost of hire and labor charges of tools & plants would be entertained under any circumstances, even if the work is delayed / abandoned for any reason.

29. Provisional Completion of works:

The Works shall be deemed to have been provisionally accepted after fulfillment of all the following by the Contractor:

- (a) Obtaining approvals from local Authorities as required for occupation and use of the Works and handing over such certificates to the Engineer as follows :-
 - (i) Sewer drainage approval up to drainage completion including required submission drawings, certificates and required follow up with Authorities/Authority - Concern Department of statutory authority.
 - (ii) Storm water drainage approval up to storm water drain completion including required submission drawings, certificate and required follow up with Authorities/Authority - Concern Department of statutory authority.
 - (iii) All required approval/permission for temporary structures, temporary water connection and temporary electrical connection for construction purpose from the authorities/authority - Concerned Government Authority.
- (b) Submitting As-Built drawings (Contractor shall mark all the services on drawings issued by the Engineer), Catalogues, Brochures, Data Sheets, manuals as directed by the Engineer.
- (c) Obtaining certificate of Completion from the Consultant.
- (d) Handing over of the Works to the Bank as directed by the Consultant.

30. Non-compliance of instructions:

- (a) If within seven days after receipt of a written notice from the Consultant, requiring compliance with an instruction the Contractor does not comply therewith, then the Bank may employ and pay other persons to execute any Work whatsoever which may be necessary to give effect to such instructions and all cost incurred with such employment shall be recoverable from the Contractor by the Bank as a debt or may be deducted by him from any monies due or to become due to the Contractor under this Contract.
- (b) Upon receipt of what purports to be instruction issued to him by the Consultant the Contractor may request the Consultant to specify in writing the provision of these conditions which empowers the issue of the said instruction? The Consultant shall forthwith comply with any such request, and if the Contractor shall thereafter comply with the said instruction, then the issue of the same shall be deemed for all purposes of this Contract to have been empowered by the provision of these Conditions specified by the Consultant in answer to the Contractor's request.

31. Certification of Bills in absence of 'Claimant's Engineer:

If the Contractor fails to attend or neglects or omits to send his agent at the time of taking measurement or for examining the records or drawings then the measurements so taken by the Consultant, the records and drawings as prepared by the Engineer shall be taken to be correct, final and conclusive.

32. Interim payment as adhoc against final bill:

All the interim payments shall be regarded as payments by way of advance against the final payment only and not as payments for Work actually done and completed, and shall not preclude the requiring of bad, unsound, and imperfect or unskilled Work to be removed and taken away and reconstructed, or re-erected or be considered as an admission of the due performance of the contract, or any part thereof in any respect or the accruing of any claim, nor shall, it conclude, determine or affect in anyway the power of the Bank under these conditions or any of them as to the final settlement and adjustment of the accounts or otherwise or in any other way vary or affect the contract. The final bill shall be submitted by the Contractor within one month of the date fixed for completion of the Work or of the date of certificate of completion furnished by the Engineer and payment shall be made within six (6) weeks from the date of receipt of final Certificate from the Consultant.

33. Cessation of Bank's liability:

The Bank shall not be liable to the Contractor for any matter or thing arising out of or in connection with the Contract or the execution of the Works, unless the Contractor shall have made a claim in writing before the giving of Certificate of Final Completion.

34. Building Cleaning:

On completion the Contractor shall clean all windows and doors including the cleaning and oiling if necessary, of all hardware, inside and outside, all floors, staircases, and every part of the building. He will leave the entire building neat and clean and ready for immediate occupation and to the satisfaction of the Bank.

35. Extension and Claims of Contractor:

The Contractor, in his application for grant of time shall clearly bring out the financial effect of extension of time requested by him. In case no financial effect is stated in the request for grant of extension of time, the same shall be taken as zero and it shall be presumed that the Contractor has mitigated whole of the losses due to the delays of all kinds.

36. In respect of contractor cannot claim extra cost:

Provided that the Contractor shall not be entitled to recover any such extra cost unless he gives written notice to the Consultant of his intention to claim within twenty-eight days of the Consultant's order. The Consultant shall in consultation with the Bank settle and determine such extra payment and/or extension of time to be made to the Contractor in respect of such claim as shall, in the opinion of the Consultant, be fair and reasonable, and provided the Contractor has taken all steps to mitigate the losses.

37. No compensation to contractor for increasing work progress:

In the opinion of the Consultant, if, the rate of progress of the works or any section is too slow to ensure completion by the prescribed time or extended time for completion, the Consultant shall so notify the contractor in writing and the contractor shall thereupon take such steps as are necessary and the Consultant may approve to expedite progress so as to

complete the works or such sections by the prescribed time or extended time. The contractor shall not be entitled to any additional payment for taking such steps.

38. In respect of no additional cost for scheduling and programming:

The contractor shall mobilize or remobilize or adjust his resources according to the priorities set by the Employer at no extra cost to the Employer.

PART-I PARTICULAR SPECIFICATIONS OF CIVIL WORKS AND INTERIOR FURNISHING

SECTION I - EXCAVATION EARTH WORK AND ANTITERMITE TREATMENT

1. General:

The work shall be carried out strictly in accordance with particular specifications and drawings. The drawings, specifications and BOQ shall be taken complementary and supplementary to each other and shall form part this contract. Any work or material shown on drawings and not specifically included in BOQ/specification or vice versa shall be executed and deemed to be included in the scope of work for item rate.

In case there are no specifications for items shown on the drawings or where items are not exhaustively described, the general specifications of CPWD shall be followed for which nothing extra shall be paid.

2. Scope of Works:

The scope of work for buildings under this contract includes for full & final and entire completion of all works including all internal services in all respects described in particular specification Part-I and as shown on drawings forming part of the contract.

Although all the details of construction have been by a large covered in these documents, any item or details of construction not specifically covered but obviously implied and essential to consider. Civil works and all internal services complete and functional shall be deemed to have been covered in the Item Rate. The cost of external development works pertaining to a particular contract shall also be carried out on a final price based on the rates quoted for each item. The tenderer may however, consider a minimum level of specifications conforming to IS code or National Building Code to over these missing details.

3. Sample of Materials:

The Contractor shall produce samples of all materials and shall obtain approval of these in writing from Architect/ Bank before he places bulk order for the materials for incorporation in the works. The samples must be produced at least six week before they are to be incorporated in sample units. Materials to be incorporated in the work shall conform to latest relevant ISI. The items should be ISI marked where manufactured.

4. Slopes :

Adequate slope shall be provided in areas where there is likelihood of ingress of water such as toilets, balconies, verandah, kitchens, terraces, top of chajjas, window sills, plinth protections etc. though these may not be expressly shown in drawings.

5. Curing:

Exposed surfaces of all cement works viz. cement concrete, brick work, flooring, plastering, pointing and the like shall be cured by keeping the surface adequately and continuously wet as directed by Architect and Site Engineer for atleast seven days where ordinary portland cement has been used and minimum 10 days where pozzolana portland cement has been used. Approved curing compound may be used in lieu of moist curing with the permission of Architect and Site Engineer. Such compound shall be applied to all exposed surface of cement works as soon as possible after the initial setting of cement. This shall be without extra cost.

6. The work to be done under this section comprises of supply of all labor, plant, materials and other performance of all work necessary for excavation with necessary close timbering, strutting, shoring & bailing/pumping out water including disposing of all surplus excavated material from the site as directed by Architect/ Site Engineer.

7. Site Clearance:

Before the start of work, the area of the plot shall be cleared of all shrubs, vegetation, grass, bush wood, shrubs etc. All the building shall be laid out to ensure that the layout plan fits at site. After completion of the work, the entire area of the plot shall be cleared from all debris, unwanted materials and level/slope of ground as required at site up to peripheral roads. The debris and unwanted material shall be disposed off away from the land without extra cost.

8. Site Levels:

After site clearance and before commencement of excavation or filling, the contractor shall take levels at 3.0 Mtr. intervals in either directions or at lesser intervals as considered necessary at site for the entire plot. A record of these levels shall be signed jointly by tenderer and Site Engineer/Architect. These records shall be, kept by the Site Engineer.

9. Setting Out of Works:

The tenderer shall set out the works and shall provide and fix all setting out apparatus required and solely be responsible for the true and perfect setting out the same and for the correctness of the position, levels, dimensions and alignment of all buildings as per the drawings. The tenderer shall take in writing the approval of the Architect/Site Engineer for setting out and levels before starting the works. These approvals shall be recorded in the stage passing register and signed by the Architect and contractor and countersigned by the Site Engineer.

10. Dewatering:

Whenever excavation extends below the groundwater level or water accumulates due to rain, seepage, or any other cause, dewatering shall be carried out to maintain the site in a dry and safe condition. The contractor shall provide, operate, and maintain all pumps, wells, trenches, sumps, pipes, and other equipment necessary for effective removal of water. Water shall be pumped out continuously or intermittently, as required, to keep the excavation free from water. The method shall ensure no disturbance or settlement occurs to surrounding soil or structures. All dewatered water shall be discharged safely to designated drainage points or away from the site.

11. Surface Excavation:

The surface area to be occupied by the building shall be cleared of all debris, shrubs and plants, grass and thereafter excavated, if required to an average depth in 150mm including 3.0mtr.all round the building including ramps if any. All roots and organic material shall be cleared from the filling area inside the building.

12. Excavation in Trenches

- (a) Earth work in excavation in any type of soil as existing at site for foundations of columns and walls shall be carried out as indicated on drawings.

(b) The finished floor level of stilt area and ground floor units of each block/other buildings shall be fixed at site by the Architect and Site Engineer. The work shall be executed at site as per levels shown on drawings/approved by the Architect/Site Engineer.

(c) Immediately after the execution of the foundation work and before covering the same the record of the following levels as actually executed at site separately for each unit block/other buildings shall be recorded in the measurement books and jointly signed & dated by the Architect, contractor/ Site Engineer.

- (i) Existing ground level
- (ii) Level of bottom of lean concrete, under footings of columns and walls.
- (iii) Finished floor level of stilt area and ground floor units.

(d) If trenches or foundations are excavated beyond the specified dimensions due to bad workmanship of contractor, the extra excavation shall be filled with lean concrete 1:5:10 (1 cement: 5 coarse sand: 10 graded stone aggregate of 40 mm nominal size) without any extra cost to Employer.

13. Excavation over Areas:

Excavation over areas shall be carried out to the required depths and profiles. Suitable arrangements shall be made by the contractor. The sides of the trench shall be kept vertical up to a depth of 2 mtr. from the bottom. For a greater depth, the excavation profiles shall be widened by allowing steps of 50 cm on either side after every 2 mtr. from the bottom. Alternately the excavation can be done so as to give slopes of 1:4. Where the soil is soft, loose or slushy, the width of steps shall be suitably increased or side sloped or the soil shored up as directed by Architect/Bank. It shall be the responsibility of the contractor to take complete instructions in writing from Architect/Bank regarding the stepping, sloping or shoring to be done for excavation deeper than 2 mtr.

14. Slips :

The contractor shall take all necessary precautions to prevent slips in excavation and shall at his own expense make good any damage or defect and remove top soil dumps and any surplus material caused by slips.

15. Plinth Filling:

(a) Earth obtained from excavation (or approved earth brought from outside for which no extra payment shall be made) shall be filled in layers not more than 20cm. in depth at a time, spread, leveled, watered and well consolidated around foundations, under floors and other locations. The earth used for filling shall be free from all grass, roots debris etc. In case extra earth filling is required for under floors, verandah and court yards/open to sky area within the perimeter of the unit block/ other building the contractor will do so at their own cost. The quoted rate shall be deemed to include the earth filling required under floors for the locations indicated herein before.

(b) Testing of filling layers: After the compaction of each layer, samples shall be taken from the compacted layer and tested for dry density as per IS practice. The next layer of filling shall not be permitted to be deposited until the Architect/Site

Engineer is satisfied that the previous layer has achieved required compaction. The contractor shall inform the Architect/Site Engineer in writing for inspection after filling and compaction of each layer. If any particular layer fails to meet the required compaction, it shall be re-compacted as directed by the Architect/Project Engineer and fresh samples shall be taken to ascertain the compaction density. Such re-compaction shall be continued till the desired compaction is achieved.

16. Sand filling:

Sand shall be free from dust and organic and foreign matters and corresponding to approved grading meeting the approval of the Architect/Site Engineer. Fine sand filling under floors of stilt and ground floor units and other buildings shall be provided with specified thickness as shown on drawing. This shall be dry River fine sand watered and consolidated including dressing and leveling.

17. Disposal of Surplus Soil/Material:

Surplus soil/earth if any shall be disposed off within the site of UNION BANK OF INDIA as directed by the Architect/Project Engineer. The same shall be spread out evenly. All excavated material not so used shall only be disposed off in areas approved by the Architect/site Engineer.

18. Anti-Termite Treatment

(a) This shall be provided to bottom of trenches sides, including treating the back fill, under floors and other locations as specified in IS-6313 Part II for pre construction soil treatment with any of the following:-

Chemical Concentration by weight/Percent

- (i) Chlorpyrifos emulsifiable concentrates to IS 8944-1978
1.00
- (ii) Heptachlor emulsifiable concentrates conforming to IS 6436 - 1978
0.50
- (iii) Chlordane emulsifiable concentrates conforming to IS 2682 - 1966
1.00

(b) The work of anti termite treatment shall be got executed by a specialist firm which must be member of IPCA and approved by the Architect/Site Engineer and shall be carried out as per IS 6313 Part II of 1981 for pre construction soil treatment. The firm shall render a ten year guarantee to the employer through the contractor who will be the principal guarantor. The period of ten year shall be reckoned from the date of completion of the contract.

(c) Such guarantee shall be directly given by the specialist agency to the bank in a form approved by the bank. In the event of re-infestation at any time during guarantee period, the specialist agency shall undertake to the bank to carry out such treatment as may be necessary to render the structure free from termite infestation including breaking and reinstalling any other work that may necessary for the treatment at no extra cost.

SECTION II - CONCRETE (PLAIN AND REINFORCED)

1. **General:**

This section covers the requirements for furnishing of cement concrete including materials proportioning batching, mixing, testing, placing, compacting, finishing, jointing, curing and all other work as required for cast-in-place/plane cement concrete.

2. **Submittals:**

(a) **Materials Reports:** Prior to start of delivery of materials required for cement concrete the following shall be submitted by the contractor to the Architect/Site Engineer for approval.

(i) Recommended suppliers and/or sources of all ingredients for making concrete including cement fine and coarse aggregates, Water and additives.

(ii) Quality Inspection Plan to ensure continuing quality control of ingredients by periodic sampling, testing and reporting to the Architect/Site Engineer on the quality of materials being supplied.

(b) **Plant & Equipment:** The contractor shall submit the proposed Program, methods and details of plant and equipment to be used for batching and mixing of concrete the following to the Architect/Site Engineer well in advance.

(c) **Reports for Inspection and Testing:** During concreting operations, the contractor shall conduct inspection and testing as described above and all reports thereon shall be submitted in summary form to the Architect/Site Engineer.

(d) **Schedules:** The contractor shall prepare working schedule for dates and rate of placing of concrete for each item of work and submit the same to the Architect / Site Engineer when requested.

3. **Materials:**

Before bringing to the site, all materials for cement concrete shall be approved by the Architect/Site Engineer all approved samples shall be deposited in the office of the Architect/Site Engineer. The Architect/Site Engineer shall have the option to have any of the materials tested to find whether they are in accordance with specifications at the contractor's expenses.

(a) **Cement:** shall be ordinary Portland or Portland pozzolana cement and shall be stored in a dry waterproof godown.

(b) **Fine Aggregate:** For all concrete work, it shall be coarse sand/coarse stone dust conforming to the grading given below :-(Zone I or II only applicable to concrete). Silt content not to exceed 8% by weight. The grading of fine aggregate shall be within the limits given in the following table and shall be described as fine aggregate grading Zone I and II:-

IS Sieve Designation	Percentage Passing, (Grading Zone I)	Percentage Passing (Grading Zone II)
10 mm	100	100
4.75 mm	90-100	90-100
2.36 mm	60-95	75-100
1.18 mm	30-70	55-90
600 micron	15-34	35-59
300 micron	5-20	8-30
150 micron	0-10	0-10

- a. **Coarse aggregate:** For concrete it shall be crushed stone graded coarse aggregate. Grading shall be within the limits as given in the following table:-
- b. Coarse aggregate of all grades shall be from the crushers of approved source).

IS Sieve Designation	Percentage Passing (40 mm Nominal Size)	Percentage Passing (20 mm Nominal Size)	Percentage Passing (16 mm Nominal Size)	Percentage Passing (12.5 mm Nominal Size)
80 mm	100	-	-	-
63 mm	-	100	-	-
40 mm	95-100	100	-	-
20 mm	30-70	95-100	100	100
12.5 mm	-	-	-	90-100
10 mm	10-35	25-55	30-70	40-85
4.75 mm	0-5	0-10	0-10	0-10
2.36 mm	-	-	-	-

- c. **Broken Brick aggregate:** - Broken brick aggregate shall be prepared from well burnt bricks. These shall be free from under burnt particles and adherent coating of soil or silt.

Note: If directed by Architect/Site Engineer, the aggregate (fine as well as coarse) shall be washed at contractor's expense.

- d. **Water** Used in concrete, brick work, plasters shall be clean fresh and non saline according to relevant IS. Water samples should be got tested before use if required by Architect/ Site Engineer.
- e. **Admixture & Additives:** Chemically admixtures are not to be used until permitted by the Architect/Site Engineer in case their use is permitted, the type amount and method of use of any admixture proposed by the contractor shall be submitted to the Architect/Site Engineer.

2. **Mixing:** All cement concrete (plain or reinforced) shall be mixed in mechanical mixers.

3. **Consolidation:**

Concrete for all reinforced concrete works in column footings, columns, beams, slabs and the like shall be deposited and well consolidated by vibrating, using portable mechanical vibrators. The rest of the concrete such as chajjas and shelving etc. shall be deposited and well consolidated by pouring and tamping. Care shall be taken to ensure that concrete is not over vibrated so as to cause segregation.

Form Work

4. **General:** The steel/ply wood form work shall be designed and constructed to the shapes, lines and dimensions shown on the drawings. All forms shall be sufficiently watertight to prevent leakage of mortar. Forms shall be so constructed as to be removable in sections. One side of the column forms shall be left open and the open side filled in board by board successively as the concrete is placed and compacted except when vibrators are used. Maximum height of column for which concrete can be placed at a time shall not be more than 1.5mtr.

5. Props may be hard wood/steel. Timber used in centering and props should be suitable & strong. Premoulded cement cubes or plastic blocks will be placed between formwork and reinforcement to achieve uniform cover of concrete.

6. **Cleaning and Treatment of Forms:** All rubbish, particularly chippings, shavings and saw dust, shall be removed from the interior of the forms (steel/ply) before the concrete is placed. The form work in contact with the concrete shall be cleaned and thoroughly wetted or treated with an approved composition to prevent adhesion between form work and concrete. Care shall be taken that such approved composition is kept out of contact with the reinforcement.

7. **Verticality of frame structure:** All the outer columns of the frame will be checked for plumb by plumb-bob as well as by the Theodolite as the work proceeds to upper floors. Internal columns will be checked by taking measurements from outer row of columns for their exact position.

8. **Stripping time:** Forms shall not be struck until the concrete has attained a strength at least twice the stress to which the concrete may be subjected at the time of removal of form work. The strength referred to shall be that of concrete using the same cement and aggregates with the same proportions and cured under conditions of temperature and moisture similar to those existing on the work. Where so required form work shall be left longer in normal circumstances and where ordinary portland cement is used, forms may generally be removed after the expiry of the following periods:-

- | | | |
|-----|--|---------|
| (a) | Walls, Columns and Vertical faces of all structural members | 2 days |
| (b) | Removal of props under slabs: | |
| | (i) Spanning up to 4.5 mtr. | 7 days |
| | (ii) Spanning over 4.5 mtr. | 14 days |
| (c) | Removal of props under beams:- | |
| | (i) Spanning up to 6.0 mtr. | 14 days |
| | (ii) Spanning over 6.0 mtr. | 21 days |
| (d) | In case of cold weather these periods may be increased at the discretion of the Architect/Site Engineer. For other cements (like pozzolana etc.) Stripping time recommended for ordinary Portland cement may be suitably modified. The number of props left under, their size and disposition shall be such as to be able to safely carry full dead load of the slab, beam or arch, as the case may be together with any live load likely to occur during placing of concrete, curing or further construction. | |
9. **Removal of Form Work:** Form work shall be removed in such a manner as would not cause any shock or vibration that would damage the concrete. Before removal of soffits and props, concrete surface shall be exposed to ascertain that the concrete has sufficiently hardened.
10. Where the shape of element is such that form work has re-entrant angles, the form work shall be removed as soon as possible after the concrete has set, to avoid shrinkage cracking occurring due to the restraint imposed.
11. **Finish to concrete work:**
- a. All concrete while being poured against form work shall be worked with vibrators rods & trowels as required so that good quality concrete is obtained.
 - b. All exposed surface of RCC lintels, beams, columns etc. shall be plastered to match with adjoining plastered face of walls after suitably hacking the concrete surface.
 - c. All soffits of RCC slabs, loft slab, cupboard slab, shelves and working platform in kitchen etc. and other exposed surfaces of RCC work not continuous to brick work shall be plastered (6mm thick) with cement mortar 1:3 (1 cement:3 fine sand) to give an even and smooth surface.
 - d. The top of loft slabs and shelves shall be smooth finished while the concrete is green with a floating coat of neat cement to give a smooth and even surface. The exposed front face shall be finished in cement plaster 1:3 (1 cement:3 coarse sand) to bring it in line and level and finished in neat cement. Such thin slabs shall be carefully cast so that they can be finished within 12mm of their specified thickness. Additional thickness of plaster which makes these elements look unnecessarily heavy will not be allowed.

- e. Chicken wire mesh 24 gauge and 20mm mesh will be provided all along RCC surface adjoining brick work giving 150mm lapping on either side using nails etc for fixing mesh while plastering.
- f. The rate shall be deemed to include for small and incidental labor such as chamfer splays, rounded or curved angles, grooves, rebate and drip moulds/courses.
12. **Sampling and testing of concrete:** Samples from fresh concrete shall be taken as per IS-1199-1959(method of sampling of concrete) and cubes shall be made, cured and tested at 28 days in accordance with IS 516- 1959 (method of test for strength of concrete). For testing cement concrete the contractor shall arrange for all the tools/moulds for making necessary cubes and shall bear all the charges for making the cubes, curing and testing through an approved laboratory. Further the contractor shall make available laboratory equipment. A temporary room of adequate size have these facilities, shall also be constructed by the contractor at his expense. After completion of work the contractor shall remove the equipment, dismantle the room and clear the site:
Compressive strength test at 7 days may be carried out in addition to 28 days compressive strength test for a quicker idea of the quality of concrete. In all cases the 28 days, compressive strength alone shall be the criteria for acceptance or rejection of the concrete.
13. **Test Specimen:** Three test specimens shall be made from each sample for testing at 28 days. Additional cubes may be required for such purposes as to determine the strength of concrete at 7 days or to check the testing error.
14. **Test strength of samples:** The test strength of the sample shall be the average of the strength of three specimens. The individual variation shall not be more than + - 15 percent of the average.
15. **Cement boiling test:** Accelerated compressive test as per IS-9013/78 shall be carried out to determine the quality of cement received at site in each consignment. This shall be done as per details below. The test result shall be recorded, signed and kept in a register with the Architect /Site Engineer.
- (a) Prepare 9 cubes with cement concrete mix proposed to be used for the job. Keep the same water cement ratio that will be actually used. Slump could be a good indication.
- (b) After the cubes are cast, 3moulds containing the cubes to be tested by accelerated curing method must be covered on the top with a machine plate. The plate should be of the same size as cube mould plates.
- (c) After 24 hours of casting, the three cubes shall be boiled with the top plates on. In the field these could be boiled in a drum with at least 75mm water standing over the cube moulds. The boiling must be uniform and constant for exactly 3½ hours. Thereafter, the cubes must be taken out of the boiling water, remolded and cooled

for 1 hour and tested. Exact timings are extremely important and must be followed. The anticipated 28 days compressive strength can be calculated from the regression equation given below:-

$$Y = 8.2 + 1.609A$$

Where Y = the predicted 28 days cube result in N/mm²

A = accelerated cube result in N/mm²

- (b) Contractor shall arrange all tools, moulds and cubes etc. and bear all expenses for carrying out the cement boiling test as per above.
16. Mix of cement concrete/reinforced cement concrete required to be used in various locations /situations shall be as shown on drawing. Wherever not mentioned shall be as under:-
- (a) Cement concrete in floors (self finished) and concrete as under layer for floor cast in situ shall be PCC 1:4:8 (1 cement:4 coarse aggregate:8 graded stone aggregate).
- (b) Cement concrete for RCC work in raft, wall, columns footings, columns, beams/ Roof/ floor slabs, landing, fins, lintels, chajjas, shelves, staircases, balconies, Loft slabs and in any other situation shall be of mix cement concrete 1:2:4 (1 cement: 2 coarse sand: 4 stone agg. 20mm nominal size).
- (c) Cement concrete in PCC filling for door frames, hold fast blocks and rain water pipes etc. shall 1:4:8 (1 cement : 4 coarse sand : 8 graded stone aggregate 40 nominal size)
- (d) The mix 1:2:4 shall conform to M 15(nominal) and mix (1:1.5:3) shall conform to M 20 (nominal) as per IS 456-1978 for the purpose of testing and acceptance based on 28 days strength.
- (e) Lean cement concrete below raft columns/walls footings and in sub flooring of stilt floor shall be of mix 1:5:10 (1 cement: 5coarse sand: 10 stone aggregate 40mm nominal psize).
17. **Construction Joints:** Construction joints shall be made only where shown in the drawings. Vertical constructed joints shall be formed against a stop board and horizontal construction joints shall be level.
18. **Contraction Joints:** Contraction joints required will be as shown on the drawings. Contraction joints shall not be hacked, wetted or mortared before concrete is placed against them.
19. **Expansion Joints:** Expansion joints shall be provided where shown on the drawings. They shall be constructed with an initial gap between the adjoining parts of the works of the width specified in the drawings. The contractor shall ensure that

no debris is allowed to enter expansion joints. Expansion joints shall be provided with joints filler, a joint sealing compound and in water proof concrete a water bed.

20. **Open Joint Fillers:** Where shown on the drawings, open joints in the structure shall be filled with one of the following of expansion joint fillers:

- (a) In internal areas a material conforming to IS: 1838 containing bitumen emulsion fibers of cork granules bound together with natural resin.
- (b) In external areas a material comprising closed cell rubber or containing cork granules bound together with natural resin.

The Joints filler shall be easily and uniformly compressible to its original thickness, tamable, easily cut of sawn, robust, durable, resistant to decay due to termite or weathering, unaffected by water and free of any constituent work) will be into or stain the concrete. The joints filler shall be of same thickness of the joint width, it shall extend through the full thickness of the concrete unless otherwise specified and shall be sufficiently rigid during handling and placing to permit the formation straight joints.

21. **Joint Sealing Compounds:** Joints sealing compounds shall seal joints in concrete against the passage of water prevent the ingress of grit or other foreign material and protect the joint filler. The compound shall have good extensibility and adhesion to concrete surfaces and shall be resistant to flow and weathering.

Poly sulfide joints where specified on the drawings shall be sealed with poly sulfide liquid polymer, stored, mixed, handled applied and cured strictly in accordance with the manufacturer's written instructions. Such joints shall be formed to the correct dimensions, thoroughly cleaned and treated with recommended primer strictly in accordance with the manufacturer's written instructions prior to sealing. The contractor shall use only competent personnel experienced in the application of poly sulfide for such work.

22. **P.V.C. Water Bars/Water stop:-**Where water bars are shown on the drawings, the joints shall incorporate an approved PVC external type, water bar complete with all necessary moulded or prefabricated intersection pieces assembled in accordance with the drawings with bends and butt joints in running lengths made by heat welding in an electrically heated jig. Joining and fixing of water bars shall be carried out strictly in accordance with manufacturer's written instruction.

23. **Inserts:** The contractor shall fix all necessary inserts such as steel plates, pipe sleeves, bolts etc. and make holes, pockets, dowels etc., in the form work to enable efficient fixing of supports in the form work to enable efficient fixing of supports, brackets, ceilings, precast members etc. as indicated on the drawings, called for in the schedule of quantities or as required by the Architect/Site Engineer. In-situ concrete inserts shall be as per IS: 1946 and of a type approved by the Architect/ Site Engineer.

24. **Bearing Plaster:** This shall consist of cement plaster 1:3 (1 cement:3 fine sand) 20mm thick finished with a coat of neat cement laid on top of walls as bearing for RCC lintels, beams and slabs, when dry, a thick coat of lime wash shall be given before starting, shuttering. The shuttering shall be started after minimum one day of bearing plaster so that it is set.
25. **Concrete filling for sunken and lowered portions of slab:** This shall be cement concrete 1:5:10 (1 cement:5 coarse sand:10 brick ballast 40mm nominal size) in the entire sunken portions irrespective of what is shown on the drawings over this sub base, flooring as per specifications shall be provided.
26. **Damp Proof Course:**
- a) This shall consist of 40mm thick PCC 1:4:8 (1 cement: 4 coarse sand:8 graded stone aggregate :12.5mm nominal size)withwater proof compound confirming to IS-2645) as per manufacturer's specifications)
 - b) DPC as specified above shall be provided 40mm thick at level with finish floor to the full width of walls (Ground floor only)
 - c) No DPC shall be provided over dwarf walls but floors shall be carried over to the width over the dwarf wall finished 10mm projecting over from the wall.
 - d) The dried up surface of DPC shall be cleared with brushes and finally with a piece of cloth soaked in kerosene oil and then applied with hot bitumen using 1.7 kg per sqm. of DPC area.
 - e) Vertical Damp proof course shall be provided at ground floor on common walls between floors at different levels and shall consist of 20mm thick plaster of mix 1:4 (1 cement:4 coarse sand) with water proofing compound at the rate as unused in as in (d) above before filling earth /sand is carried out.

Piling works, reinforcement and pile load testing

29.General

This chapter covers the detailed specifications for bored cast-in-situ reinforced cement concrete piles, steel reinforcement for reinforced concrete work, demolition of reinforced cement concrete work, and vertical load testing of piles. All works shall be carried out strictly in accordance with CPWD Specifications (latest edition), relevant Indian Standards, approved structural drawings, geotechnical investigation report, and the directions of the Engineer-in-Charge. The contractor shall be fully responsible for proper execution, quality control, structural stability, safety of adjacent structures, and compliance with all statutory requirements.

30.Bored cast-in-situ r.c.c. piles

(a) Scope

The work under this section shall consist of boring, providing and installing bored cast-in-situ reinforced cement concrete piles of specified diameter and length below pile cap level to safely carry the design loads indicated in the structural drawings and Bill of Quantities. The work shall include setting out of pile locations with proper reference to grid lines and benchmarks, mobilization of piling rigs and associated equipment, boring through all types of soil and strata encountered at site, stabilization of bore using bentonite slurry of approved quality, provision and subsequent withdrawal of temporary mild steel casing wherever necessary to prevent collapse of bore, and concreting of the pile using tremie method to ensure continuous and homogeneous concrete placement.

The contractor shall ensure that the bore is vertical and of uniform diameter throughout its depth. The bottom of bore shall be properly cleaned prior to placement of concrete. Reinforcement cages, which shall be measured and paid separately, shall be lowered centrally in the bore with adequate spacers to maintain specified clear cover. Concreting shall be carried out without interruption and in such a manner that segregation and contamination are avoided. The pile head shall be chipped to the required cut-off level to remove laitance and weak concrete before construction of the pile cap. Removal and disposal of excavated earth and slurry, including all lifts and leads, shall form part of the work. The length of pile for payment shall be measured from the cut-off level up to the bottom level of the pile cap.

(b) Materials and Standards

The piles shall conform to the provisions of IS 2911 (Part 1) for bored cast-in-situ piles, IS 456 for plain and reinforced concrete, and IS 2911 Part 4 for load testing of piles. Concrete shall be of Grade M-25 or higher as specified in the BOQ or drawings and shall be design mix concrete. The slump shall be suitable for tremie placement to ensure proper flow without segregation. Cube tests shall be conducted as per IS 456 to verify compressive strength.

Bentonite slurry shall be prepared from approved grade bentonite and shall be maintained at required density and viscosity to ensure bore stability. Slurry properties shall be periodically tested and recorded. Temporary casing, wherever required, shall be of mild steel of adequate thickness to withstand soil pressure and shall be carefully withdrawn during concreting to prevent necking or disturbance of bore.

(c) .Diameter of Piles

Bored cast-in-situ R.C.C. piles shall be provided in 500 mm and 600 mm diameters as specified in the Bill of Quantities. Both diameters shall be executed in strict conformity with the specifications contained herein. The difference in diameter shall not alter the method of execution, material quality, testing requirements or acceptance criteria unless otherwise specified in the structural drawings.

(d) Tolerances and Quality Control

The pile shall be constructed within the permissible tolerances prescribed in IS 2911. The position tolerance, verticality tolerance and dimensional accuracy shall be strictly monitored. Any pile found to be defective due to improper boring, collapse of bore, insufficient concreting, excessive deviation, or structural weakness shall be rejected or remedial measures shall be undertaken as directed by the Engineer-in-Charge at the contractor's cost.

(e) Measurement and Rate

Pile length shall be measured from the cut-off level up to the bottom of pile cap. The rate quoted shall include boring through all strata, bentonite slurry preparation and maintenance, temporary casing, tremie concreting, trimming of pile head, removal of excavated material, labour, plant, machinery and all incidental charges required for complete execution. Reinforcement shall be measured and paid separately.

31. Steel reinforcement for r.c.c. work

(a) Materials

Reinforcement shall consist of Thermo Mechanically Treated (TMT) bars of Grade Fe-500D or higher conforming to IS 1786. All reinforcement shall be clean, free from loose rust, oil, grease, paint or any other deleterious material. Binding wire shall be annealed steel wire of approved gauge and quality.

(b) Fabrication and Placement

Reinforcement shall be fabricated strictly in accordance with the approved bar bending schedule and structural drawings. Proper chairs, spacers and cover blocks shall be provided to maintain specified clear cover. Lap lengths, anchorage lengths and bends shall conform to IS 456. Reinforcement shall be securely tied to prevent displacement during concreting operations.

Measurement shall be by weight based on standard sectional weights. The rate shall include cutting, bending, binding, placing and all labour and tools required for completion of the work.

32. Demolition of R.C.C. work

Demolition of reinforced cement concrete work shall be carried out manually or by mechanical means as directed by the Engineer-in-Charge. The work shall include careful dismantling, stacking of steel reinforcement separately, and disposal of unserviceable material within 50 metres lead. The contractor shall adopt adequate safety precautions and ensure that adjoining structures are not damaged during demolition. All debris shall be cleared from site and disposed of in accordance with local regulations.

Measurement shall be in cubic metres and the rate shall include labour, plant, equipment, stacking of reinforcement and disposal within specified lead.

33. Vertical load testing of piles

(a) General

Pile load testing shall be conducted in accordance with IS 2911 (Part IV) and as directed by the Engineer-in-Charge. Testing shall be undertaken to determine or verify the load carrying capacity of piles constructed at site.

(b) Scope of Testing

The work shall include preparation of pile head, construction of test cap wherever required, installation of reaction system or loading platform, application of load using calibrated hydraulic jacks, and measurement of settlement using dial gauges or approved instruments. Load shall be applied in increments and settlement readings shall be recorded at specified intervals until the required test load is achieved. After completion of testing, the setup shall be dismantled and the site restored.

(c) Type of Tests

Initial load tests shall be conducted on a group of two or more piles up to 50 tonne capacity to determine the ultimate load carrying capacity. Routine load tests shall be conducted on a group of two or more piles up to 50 tonne capacity to verify the safe working load of working piles. Detailed load-settlement records and test reports shall be submitted to the Engineer-in-Charge for approval.

(d) Measurement and Rate

Load testing shall be measured per test conducted. The rate shall include all materials, labour, equipment, hydraulic jacks, gauges, reaction system, preparation of test cap, recording of readings and submission of reports.

SECTION III - BRICK WORK

1. Material -Solid concrete block masonry

(a) Sand for Masonry Mortars: Unless otherwise indicated, sand for masonry mortars shall consist of natural sand (generally termed as coarse sand) crushed stone sand or crushed sand or a combination of any of these conforming to IS 2116-1965 specifications for sand for masonry mortars. Sand shall be hard, durable, clean and free from adherent coatings and impurities such as iron particles, alkalies, salts, coal, mica, shale or similar laminated or other materials exceeding the specified limit. Grading of sand shall be as under:-

IS Sieve Size	Percentage Passing by Weight (Unreinforced Masonry)	Percentage Passing by Weight (Reinforced Masonry)
4.75 mm	100	100
2.36 mm	90-100	90-100
1.18 mm	70-100	70-100
600 micron	40-100	40-100
300 micron	5-70	5-70
150 micron	0-75	0-10

(b) The maximum quantities of clay, fine silt and fine dust in sand shall not be more than 4 percent by weight, Organic impurities shall be below that obtained by comparison the standard solution on specified in 6-2-2 of IS-2386 (Part II 1983).

(c) Solid concrete block masonry (hereinafter referred to as blocks) shall conform to the requirements laid down in IS 2185 Part 1 for precast concrete masonry units. Blocks shall be of approved manufacture and of the specified grade, satisfying the requirements of compressive strength, density, water absorption and dimensional tolerances as prescribed in the relevant Indian Standard.

(d) Blocks shall be factory made, true to shape, with straight edges and square corners, and free from cracks, honeycombing, segregation or other defects. Water absorption shall be within the permissible limits specified in the code. All dimensions shall be within the allowable tolerances.

(e) Blocks not conforming to the specified standards, or those that are damaged, cracked, distorted or otherwise defective, shall be rejected.

(f) Test check on random samples from each lot of solid block brought at site shall be carried out for compressive strength and water absorption test. Results of these tests duly signed and dated by Contractor; Architect and Site Engineer shall be recorded in a separate register, which shall be kept with the Site Engineer.

2. Workmanship - Masonry Mortars

(a) Preparation of Cement Mortars:

Mortar shall be of mix as indicated. The mixing specified is by volume. Mixing shall be done in a mechanical mixer. The mortar shall be mixed for at least three minutes after adding of water. Cement mortar shall be freshly mixed for immediate use. Any mortar which has commenced to set shall be discarded and removed from the site.

(b) Bond:

All masonry work shall be built in English bond unless otherwise indicated in the drawings or specifications. Half-brick walls shall be constructed in stretcher bond. Header bond shall be adopted for walls curved on plan to ensure proper alignment and bonding; header bond shall also be used in foundations, and stretchers may be used where the wall thickness renders the use of headers impracticable. Where the thickness of footings remains uniform for two or more courses, the top course of the footing shall consist of headers. Brick courses at DPC level and at all slab levels immediately below slab bearings shall be laid with bricks placed on edge.

(c) Overlap in stretcher bond:

Overlap in stretcher bond is usually half brick and is obtained by commencing each alternate course with a half brick. The Overlap in header bond which is equally half the width of the brick is obtained by introducing a three quarter brick in each alternate course at quoins. In general, the cross joints in any course of brick work shall not be nearer than a quarter of brick length from those in the course below or above it.

(d) Curing:

The bricks shall be adequately wet before use and brickwork shall be constantly kept wet for atleast seven days.

(e) Half Solid Block Masonry:

Half solid block masonry (100 mm thick or as indicated) shall be constructed using factory-made precast solid concrete blocks laid in stretcher bond in cement mortar 1:4 (1 cement : 4 coarse sand) or as specified. The blocks shall be laid true to line, level and plumb with all joints fully filled and properly compacted to form a solid mass.

(f) Reinforcement

Reinforcement shall consist of 2 Nos. MS round bars of 6 mm diameter or as indicated in drawings and specified under steel and ironwork. The first layer of reinforcement shall be provided at the second course of block masonry and thereafter at every fourth course. The bars shall be properly anchored with a minimum embedment of 150 mm at their ends and at junctions where such walls meet other walls or columns. The reinforcement shall be completely embedded in mortar. Where laps are necessary, the overlap shall not be less than 300 mm. The clear cover, i.e., the thickness of mortar between the reinforcement and the block surface, shall not be less than 6 mm, and the mortar cover along the joints shall not be less than 15 mm.

(g) Dry rubble masonry and solid block in foundation up to plinth:

Masonry in foundations up to plinth level shall be in dry rubble without concrete leveling course using good quality blasted rubble in cement mortar, laid to true lines and levels including all cost of materials, conveyance, and labor, complete as per site directions.

(h) Masonry work in foundations and plinths

Solid block masonry using pre-cast factory-made blocks conforming to IS 2185 Part I of 1979 shall be provided in foundations and plinths with blocks of size 30 × 20 × 20 cm or nearest available size in cement mortar 1:6 with thickness 20 cm and above.

(i) Masonry work in Super structure:

Masonry in superstructure up to floor two level shall be in neatly dressed laterite stones of approximate size 40 × 20 × 15 cm in cement mortar 1:6, including all costs of materials and labor.

Where indicated, 40 × 20 × 15 cm blocks shall be used for superstructure walls up to floor two level with thickness 15 cm, and above floor two up to floor five level.

For 10 cm thick walls up to floor two level, 40 × 20 × 10 cm pre-cast blocks shall be used in cement mortar 1:6 including cost of scaffolding, labor, and materials, complete.

(j) Brick work in steps of staircase:

Stair steps shall be executed as per drawings, using laterite or solid blocks, laid in cement mortar 1:6, including all cost of materials and labor, complete.

(k) Parapets and Railings:

Parapets and railing shall be provided to balconies, Terraces, roof tops and stair landing etc. of upper floors as per details shown on drawings.

SECTION IV- uPVC DOORS AND WINDOWS

1. Frames and shutters for uPVC doors and windows shall be factory made and manufactured from high quality unplasticized PVC (uPVC) profiles conforming to the manufacturer's specifications. The frames and shutters shall be of approved design and profile, true to dimensions and free from defects. Door shutters shall be 24mm thick, fabricated from uPVC hollow sections of size 59×24 mm with a wall thickness of 2 mm (± 0.2 mm) and shall have inbuilt edging on both faces. All corners of styles and rails shall be accurately mitred and jointed at corners using galvanized MS/plastic brackets of size 75×220 mm and stainless steel screws to provide a rigid and durable assembly.
2. Shutter styles shall be reinforced by inserting galvanized MS tubes of size 20×20mm and wall thickness 1mm (± 0.1 mm). The lock rail shall be manufactured from an HMS 'H' section uPVC hollow profile of size 100×24 mm and 2mm (± 0.2 mm) wall thickness, fixed to the shutter styles using plastic or galvanized MS 'U' cleats. The shutter panels shall be formed from multi chambered uPVC sections of minimum 620mm width and 20mm overall thickness with wall thickness not less than 1mm (± 0.1 mm). Panels shall be filled vertically and tied at two locations by inserting horizontal 6mm galvanized MS rods fastened with nuts and washers, ensuring a firm, stable and impact resistant shutter panel. All hardware positions shall be provided as required, in accordance with the manufacturer's instructions and the direction of the Engineer in Charge.
3. Factory made uPVC door frames shall be provided in extruded uPVC sections with overall profile size 48×40mm and wall thickness 2mm (± 0.2 mm). Frame corners shall be permanently joined by plastic welding, supplemented by galvanized brackets and stainless steel screws to ensure rigid joints. The hinge side vertical member shall be reinforced internally with galvanized MS tube 19×19mm, wall thickness 1mm (± 0.1 mm). Three stainless steel hinges shall be fixed to each door frame for proper support of the shutter. Frames shall be lifted, handled and stored carefully to avoid distortion, and shall be fixed in position true to line, level and plumb.
4. Openings in masonry or RCC shall be accurately formed to receive the frames, and frames shall be fixed with approved fasteners or holdfasts as necessary. All necessary provisions and slots for locks, tower bolts, handles, sliding bolts, fittings and hardware shall be provided and finished neatly. Frames shall be securely fixed and sealed, ensuring no gaps remain around the frame periphery.
5. Where fanlights, fixed lights or glazed panels are required, the uPVC frames shall be provided with 12×12mm uPVC or stainless steel beading to receive the glass. Beading shall be fixed to the frame with machine screws, and the thickness and quality of glass shall be as specified in the relevant section of the specifications and as directed by the Engineer in Charge.
6. The contractor shall submit shop/fabrication drawings from the manufacturer for approval prior to commencement of fabrication. Upon approval of shop drawings, the contractor shall produce sample pieces of each profile with required fittings for final approval of the Site Engineer/Architect before bulk production and supply. All work shall be carried out in strict conformity with approved drawings, manufacturer's specifications, and the direction of the Engineer in Charge. Frames shall be delivered to site with all necessary accessories and hardware, complete and ready for installation.

SECTION V - JOINERY

1. **General:**

The type of shutters for doors, windows, ventilators etc. viz. paneled glazed wire gauzed and flush shall be as indicated and detailed in the drawing.

2. **Flush Door shutters:**

Door shutters shall be 35 mm thick flush door shutters/solid core type non decorative factory made confirming to IS- 2202 and ISI marked with block board core (confirming to the requirements as per IS-1659 1969) with internal hard wood clippings and both faces commercial ply veneered. Adhesive used shall be phenyl form aldehyde synthetic resin conforming to BWP types specified in IS-848-1974.

Contractor shall obtain the approval for the name of the manufacturer of the flush door shutters from the Site Engineer/Architect before placing the supply order. While asking for the approval, copy of the "Bureau of Indian Standard" letter under which manufacturer has been authorized to mark the product with ISI marking should be attached. Site Engineer and Architect before giving the approval shall ensure that the validity date of license has not expired.

3. **Testing of Flush Door Shutters:**

On receipt of the shutters at site the Site Engineer or the Architect shall be entitled to get the samples of door shutters tested in any approved laboratory. From each lot of approximately 100 shutters, one shutter shall be selected at random by the Site Engineer/Architect. The cost of replacement of the door shutters selected as samples, their transportation to the laboratory and cost of testing by the laboratory shall be borne by the contractor.

4. **Glazed & Gaused Door Shutters:**

Shutters shall be 35mm thick. These shall consist of first class i.e. champ, haldu, hillock, jamun, mango wood styles, top, bottom and lock rails as per details shown on drawings. Timber to be used for these shutters shall be of good quality, seasoned of material growth and conforming to IS-4021-1963. Seasoning and ASCU treatment shall be done as per IS-402-1962. Styles and rails of shutters shall be in one piece only. Styles and rails shall be jointed to each other by tonen or mortice at right angles. Mountings and glazing bars shall have joints and shall be shrub tanned to the maximum depth, which the size of member would permit.

5. **Wire gauge shutters:**

Provisioning and fixing of wire 35mm thick gauge shutters to all external doors including main entrance door and all openable windows is in the scope of work of this contract. Wire cloth shall be securely housed in rebates by giving a right angled bend and fixing by means of suitable staples at intervals of 75mm. Over this wooden bead of specified size shall be fixed with nails, or screws, where indicated to cover the rebate fully. The space between the beading and the rebate shall be filled with putty to give it a neat finish. Exposed edges of the beads shall be rounded.

6. Door and windows shutters shall be provided as per details shown on the drawings.

7. The bottom of door shutters shall be 5mm above the finished floor level.

8. The glass panes shall be free from flaws, specks or bubbles and shall have square corners and straight edges. The glass panes shall be so cut that it fits slightly loose in the frames. The glass pane shall be fixed to the shutter with first class hardwood beading of size as indicated properly screwed to the shutter with steel nails and necessary adhesive as per details as shown on drawings.

9. Glazing to windows/doors shutters shall be as follows of quality as approved by Project Engineer & Architect.

- | | | | |
|-----|--|---|--------------------------------|
| (a) | Fan light of Doors shutters | : | 4 mm thick plain sheet glass. |
| (b) | Door Shutters fully glazed | : | 5.5mm thick plain sheet glass. |
| (c) | Windows (openable & fixed) except for toilets: | | 4 mm thick plain sheet glass. |
| (d) | Windows openable and fixed of toilets | : | 4 mm thick pin head glass. |

NOTE:

On all toilet door shutters, aluminum sheet 18 gauge bent to U shape shall be provided at the bottom of the flush shutters. This sheet shall be up to 30 cm height on the inner face of the shutters and up to 20 cm height on the outer face of the shutters. This shall be fixed with 12mm steel Nails.

SECTION VI - ALUMINUM DOORS, WINDOWS & VENTILATORS.

1. The Aluminum extruded sections shall conform to Designation 63400 given in IS 737-1986 and shall be of manufacturers such as JINDAL or Hindalco or INDAL or equivalent manufacturers to be approved by the Architect/ Site Engineer.
2. The Aluminum Doors, Windows, Ventilators and Glazing sections shall be anodised (anodic coating shall conform to IS 1868) as per color approved by the Architect and Site Engineer.
3. The fabrication shall be carried out having mechanical joints, accurately machined and fitted to form hair-line joints, with the vertical and horizontal sections at the corners to meet in 45 degrees mitered. The jointing shall be either with accessories such as cleats and cleating screws or by crimping with Hydraulics Press on to heavy duty extruded Aluminum cleats. The relevant arrangement shall be got approved by the Architects. The Glazing shall be fabricated and anchored to withstand wind pressures as per the Indian Standards.
4. Before proceeding with any manufacture, Shop Drawings for each typical elevation shall be submitted for the approval of the Architect and no work shall be performed until the approval of the shop Drawings is obtained.
5. All Glazing shall be airtight and watertight, using appropriate extruded EPDM gaskets/as manufactured by Anand Lescuyer Pvt.Ltd., or equivalent; and sealant which shall be of high quality and performance requirements.
6. Each Glazing shall be tailor-made as per openings at Site. No cutting and making good of exposed grit wash plaster surfaces shall be permitted.
7. All the Aluminum sections shall be wrapped with self-adhesive non-staining thick layer of PVC tapes as Manufactured by M/s Bhor Industries or equivalent as approved by the Architects, and shall be duly packed for avoiding scratches or blemishes to the powder coated surface of the sections till the installation is completed.
8. The frames shall be fixed to concrete/masonry /brick work with dash fasteners and the method of fixing shall be got approved by the Architects before installation. The drilling of holes for inserting the dash fasteners shall be carried out with drilling machines and the frame shall be fixed in plumb, line and level at jambs, sills and heads.
9. The perimeter gap between the outer frame and the masonry shall be sealed with poly sulphide sealant as per the make approved by the Architect.
10. Glazing: The glass panes shall be free from flaws, specks or bubbles and shall have square corners and straight edges. The glass panes shall be so cut that it fits slightly loose in the frames. The glass pane shall be fixed to the shutter with Aluminum beading and E. P.D.M gasket properly shaped as per the drawing. The glass panes shall be of make as specified.

SECTION VII - BUILDERS HARDWARE

1. Fittings and fixtures shall be provided to all doors/windows/ventilator/shutters with necessary matching screws of suitable size
2. Fittings and fixtures to all doors window and ventilators etc. shall be Aluminum anodized Matt finish ISI marked of make as specified. These shall be ISI marked where manufacturer contractor shall obtain the approval of the name of the manufacturer and brand of fittings from page of Director/Architect before placing the supply order. While asking for the approved copy of bureau of Indian Standard letter under which the manufacturer has been issued the license and authorized to make the items of builder hardware with ISI marking should be attached and one sample of each fillings of the particular brand duly ISI marked shall be given by contractor.
3. Butt hinges for doors shall be ISI marked cold rolled mild steel heavy quality of size as specified with mild steel pin and shall be oxidized finish. These shall be welded to pressed steel frames as specified.
4. Handles for window shutters shall be 75mm long & door shutters shall be 125 mm D-Type Aluminum anodized.
5. Link chain and sliding channel shall be sturdy of CP brass and shall be provided to main entrance door of all units as specified.
6. Magic eye for entrance door shall be wide-angle best quality. This shall be fixed at 1400mm height from finished floor level.
7. One sample piece of each fitting shall be produced for approval of Site Engineer /Architect. The bulk supply order shall be placed by the contractor only after approval is accorded by Site Engineer/Architect.
8. Schedule of Builder's Hardware: Schedule of Hardware /fittings to door, window and ventilator shutters shall be as per drawing.
 - (a) **Mortice Latch (Vertical Type):** Mortice latch (Vertical type) shall confirm to IS 5930-1970. Specification for mortice latch (Vertical type). These latches shall be capable of being operated inside and outside and shall be provided with a pair of Aluminum anodized lever handle fitted on the handle plate in order to close the door. The latches shall be of brass alloy. Faceplate shall be provided in front of the ease plate, size of latch shall be 65mm.
 - (b) **Mortice Locks:** These shall conform to IS 2209-1976. Specification for Mortice locks (Vertical Type). These shall have body, body covers, cast plate, faceplate, skirting plate lever, follower of cast brass and locking bolt and latch bolt extruded brass. Lever spring and latch spring shall be of phosphor bronze. The locks shall be supplied with 2 Nos. stainless steel keys. Locks shall be 6 lever. The lock shall be easy working with lever and shall be capable of being opened with from both inside and outside and shall be provided with a pair of Aluminum anodized lever handles on the handle plate in order to close the door from both side.
 - (c) **Hydraulic Door Closer (Floor Type):** The Contractor shall provide double acting Hydraulic Door Closer model No.F-32, Cat No.1204 with SS Plate, Capacity to carry door weight up to 380Kg of EVERITE brand or Cat No.OFS

9621 of OPEL brand. These shall be of approved brand and manufacturer as above (Confirming to IS-6315) for Aluminum door including cost of cutting floor as required, embedding in floors and cover plate etc.

NOTE:

(a) It shall ensure that all builder's hardware are from one manufacturers only for the entire work, However, if due to any reason contractor progress to provide part quantity from other manufacturer approved in Para 2 above, then he may be permitted but he will have to obtain specific approval of Project Engineer/Architect for this change in brand. This will be subject to that all items and fixtures in any particular blocks shall be always of one manufacturer only. In no circumstances items of two manufacturers shall be used in all of the particular blocks.

(b) Project Engineer before giving the approval of the name of the manufacturer and brand shall ensure that the validity date of license for making the fittings, as ISI marked has not expired.

(c) Those fittings which are not manufactured, as ISI marked shall also be of the one brand of which the ISI marked fittings are approved by Project Manager.

SECTION VIII - STEEL AND IRON WORK INCLUDING STEEL DOOR AND ROLLING SHUTTERS
(OTHER THAN PRESSED/COLD ROLLED FORMED STEEL DOORS AND WINDOWS FRAMES)

1. Steel and ironwork shall be executed as indicated in drawing and as per standard practice.
2. Quality of steel shall conform to the following specifications:-

(a) Mild steel (Misc.)	IS 432-1966 Part I
(b) MS reinforcement bars	IS 432 Part II 1962
(c) Structural steel works	IS 226-1962
(d) Steel Deformed Bars	IS-1786/1979
3. **Reinforcement:**
 - (a) Reinforcement bars 6mm dia shall be MS bars.
 - (b) All reinforcement bars 8mm and above shall be deformed twisted steel bars.
 - (c) Laps and crossing shall be tied with mild steel binding wire of size not less than 0.9mm dia.
 - (d) The contractor shall be responsible for accurate fixing and placing of reinforcement shown in drawing and shall not place the concrete until the reinforcement has been checked, passed and recorded by the Architect and Project Engineer.
 - (e) Reinforcement shall be bent and fixed as per IS-2502-1963.
 - (f) Laps in reinforcement for columns, beams and slabs etc. will be as stipulated in IS.
4. **Bar Bending Schedule of Reinforcement:** On receipt of structural drawing contractor shall prepare bar bending schedule of reinforcement and shall be got approved from the Site Engineer / Architect / Bank in advance before starting the work.
5. **Cutting of Reinforcement:** Before steel reinforcement bars are cut, the Contractor shall study the lengths of bars required as per drawing and shall carry out cutting only to suit the sizes required as per drawings so that the wastage is minimum.
6. **Net Measurement:** Reinforcement shall be placed as shown in the structural drawings and payment will be made on the net measurements from drawings. Only such laps, dowels, in reinforcement shown on drawings shall be paid for. The contractor shall allow in his quoted rates for all wastage and rolling margin which will not be paid separately. The measured length of all the bars shall be converted into weight as per latest IS schedule.
7. **Stock Piling of Steel:** Steel required shall be stock piled well in advance of need in the work. Bars should be stacked off the ground so that they do not get covered with mud.
8. **Rates quoted for reinforcement, addition to any factors mentioned elsewhere, shall also include for**

- All cutting to length, labor in bending and cranking, forming hooked ends, handling, hoisting and everything necessary to fix reinforcement in work as per drawings.
 - De-coiling, straightening (coiled bars, bars to facilitate transporting)
 - Cost of binding wire required as described.
 - Cost of pre-cast concrete cover blocks of proper size or nylon spacers to maintain cover and holding reinforcement in position.
 - For fabricating and fitting reinforcement in any structural member irrespective of its location, dimensions and level.
 - Removal of rust and every other undesirable substances, using wire brush, etc. as described.
 - Work at all levels.
 - Stock piling of reinforcement as described.
9. **Holdfasts:** Holdfasts shall be made out of MS flats of size as specified with split fish tail ends coated with anti corrosive paint/tar. Holdfast shall be welded to door/windows frame as specified.
10. **Steel Door frame and shutters:** Size of door and locations shown on drawing and shall comprising of frame and shutter fabricated and welded out of MS angle, plate & sheet and 10mm square tie bar. The door shall be painted with two or more coats of synthetic enamel paint of approved quality & shade over one coat of steel primer. Each MS gate shall have hold fast - 6 Nos, Butt hinges 125mm -3 Nos, MS handles 100mm - 2 Nos and MS sliding bolts 300 x 16 mm - 2 Nos (1 inside and 1 outside). Hold fasts shall be embedded in PCC block (1:4:8) of size 23 x 23 x 15cm.
11. **Grills:** MS grills manufactured out of flat iron, MS square tubes and round bars and of pattern as shown on drawing shall be provided to all windows openable/fixed, glazed portion of doors and fanlight of doors. All Grills shall be fabricated and welded to the pressed steel frames in the factory where the pressed steel frames are manufactured and shall be brought to site as welded. Grills to fully glazed door shutters shall be fixed with steel screws.
12. **Railing to staircases, landings, passages, balconies & parapets:-**
- (a) Railing to staircase, landings, etc. shall be fabricated with stainless steel (Grade 304) hollow tubes, channels, plates and other required sections, complete with vertical supports and top handrail made of stainless steel pipe (Grade 304). All members shall be welded at joints, ground smooth and polished, and fixed into floor/steps or on the side of waist slab as shown in the drawings and as directed by the Engineer-in-Charge.

- (b) Verandah/Balcony railings shall be fabricated with stainless steel (Grade 304) hollow tubes, flats, channels, plates and other required sections, complete with vertical supports and top handrail made of stainless steel pipe (Grade 304). All joints shall be welded, ground smooth, buffed and polished, and the railing securely fixed into the floor/slab as shown in the approved drawings.
- (c) The fixing details and dimensions for items 7(a) and 7(b) shall be strictly as shown in the approved drawings.
- All welded joints shall be properly ground, buffed and polished to achieve uniform finish. The finished railing shall be true to plumb, line and levels as specified. The railing shall be fixed with necessary stainless steel nuts, bolts, dash fasteners and other approved accessories of required size.
13. **Exhaust Fan opening:** In kitchen, toilets, WC, bath etc. provision for fixing of exhaust fan shall be made by fixing 19mm thick BWP grade commercial board with a circular hole 300mm dia in window as shown on drawings. This opening shall be covered by bird guard fabricated out of galvanized iron sheet 18 gauge as shown on drawing.
14. **Welding:** This shall be done by electric process with precautions for health and safety. The places to be welded be cut angularity so that the welding material does not protrude and the members to be welded join properly. The welds shall be ground clean to give a one piece appearance. The welds shall run around the contact surfaces of two meeting sections. Throat thickness should not less than 4mm.
15. **Steel Rolling Shutters:-**Rolling shutters shall be of approved make and of size as shown in drawings. The shutters shall be fabricated from 80 × 1.25 mm M.S. laths, interlocked throughout their entire length and secured at the ends with end locks. The laths shall be mounted on a specially designed pipe shaft with brackets and side guides, suitable for manual push and pull operation, with arrangements for inside and outside locking. The shutters shall be provided with 27.5 cm long wire springs manufactured from high tensile steel wire of adequate strength conforming to IS 4454. The assembly shall be complete with 1.25 mm thick M.S. top cover, guide channels, brackets, locking plates and all necessary fittings and accessories, complete in all respects as directed by the Engineer-in-charge

SECTION IX - ROOF COVERING, WATER PROOFING & RAIN WATER PIPES SS

1. Steel work in built up tubular trusses: Providing, fabricating and erecting steel work in built up tubular sections (round, square or rectangular hollow tubes), using hot finished welded type tubes, including cutting, bending, welding, hoisting, fixing in position, providing and tightening bolts with special shaped washers, and applying one coat of approved steel primer, complete as per drawings and direction of the Engineer-in-charge.
2. Structural steel work in single sections: Providing, fabricating and erecting structural steel work in single sections, with or without connecting plates, including cutting, drilling, welding, hoisting, fixing in position and applying one coat of approved steel primer, complete as directed.
3. Holding down bolts: Providing and fixing mild steel round holding down bolts of required diameter and length, including nuts and washer plates, placed in position and properly secured, complete.
4. Polycarbonate multiwall sheet roofing: Providing and fixing 5 mm thick polycarbonate multiwall plain sheets of approved quality, supplied in single lengths up to 12 m or as directed, fixed over prepared structural framework using 5.5 × 55 mm self drilling/self tapping screws with EPDM seals, including cutting to required sizes and shapes, fixing on horizontal, vertical or curved surfaces up to any pitch, complete, but excluding the cost of purlins, rafters and trusses.
5. Integral Crystalline Slurry Waterproofing :Providing and applying integral crystalline slurry waterproofing treatment of hydrophilic nature to RCC structures from negative (internal) side, mixed in proportion 5:2 (compound : water) and applied in two coats @ 0.70 kg per sqm using synthetic fibre brush, conforming to ACI 212.3R-2010 and tested as per DIN 1048, resistant to 16 bar hydrostatic pressure and capable of self-healing cracks up to 0.50 mm width, complete as directed by Engineer-in-Charge.

Integral Crystalline Slurry Waterproofing: Providing and applying integral crystalline slurry waterproofing treatment to RCC horizontal surfaces from negative side, mixed in proportion 3:1 (compound : water) and applied in one coat @ 1.10 kg per sqm, conforming to ACI 212.3R-2010 and tested as per DIN 1048, resistant to 16 bar hydrostatic pressure and self-healing up to 0.50 mm cracks, complete as directed.

6. Waterproofing to Depressed Portions :Providing and laying waterproofing treatment to depressed portions comprising cement slurry @ 4.4 kg per sqm mixed with waterproofing compound conforming to IS: 2645, 20 mm thick cement plaster in CM1:3 with waterproofing compound, hot applied bitumen @ 1.7 kg per sqm and 400 micron PVC sheet with 100 mm overlaps sealed with bitumen, including rounding of junctions, complete as directed.

Waterproofing Treatment on Roof Slabs :Providing and laying waterproofing treatment on roof slabs by cement slurry with waterproofing compound, fibre glass

cloth with 100 mm overlaps, followed by 1.5 mm thick cement slurry layer with compound and sand, properly cured and extended 300 mm on parapet walls and tucked into groove, complete as directed. Brick tiling above shall be measured separately.

7. Rain Waterpipes:-

- (a) Lead-free PVC-U pipes and heavy-duty ISI-marked fittings shall be provided for all waste and soil piping as per IS 4985 standards. The pipes and fittings shall be free from defects and uniform in quality. All joints shall be made using solvent cement to ensure a leak-proof connection. The system shall include pipes of 40 mm, 50 mm, and 75 mm diameter for waste lines, and 110 mm diameter for soil lines. Pipes passing through floors, walls, or concrete shall be firmly fixed with suitable clamps, and all exposed surfaces shall be replastered and refinished with cement plaster in 1:3 mix (cement: coarse sand). The installed system shall be thoroughly tested for leakage and air tightness. Approved brands such as Supreme or Astral may be used, and the piping system shall be capable of withstanding 4 kg/cm² pressure.
- (b) CPVC pipes with thermal stability suitable for hot and cold water supply shall be provided along walls, ducts, or other open surfaces. All CPVC plain and brass-threaded fittings, including Ts, elbows, Ys, adapters, and air vents, shall be used as required for proper routing and connection. Pipes shall be firmly clamped at intervals of 1 meter, and all joints shall be made with one-step CPVC solvent cement to ensure a secure, leak-proof system. All exposed pipes shall be properly replastered and refinished with cement plaster in 1:3 mix. The system shall be tested for leakage and air tightness. Pipe sizes included are 75 mm and 110 mm for waste, soil, and rainwater lines, as well as 75 mm for vent pipes.
- (c) CPVC pipes shall also be laid in trenches up to 1 meter depth, or as per site conditions, with an appropriate slope for drainage. Pipes shall be fixed with clamps at 1-meter intervals, and all joints shall be made using one-step CPVC solvent cement. All exposed sections shall be replastered with cement plaster in 1:3 mix. The system shall be tested thoroughly for leakage and air tightness. Pipe sizes provided include 75 mm, 110 mm, and 160 mm for waste, soil, and rainwater lines. Excavation for trenching will be in the scope of the contractor.
- (d) Multi-inlet CPVC floor traps shall be provided with proper outlet connections to the piping system, using solvent cement for secure jointing. Stainless steel gratings with cockroach protection or lockable designs shall be installed as required. All traps shall be firmly fixed, and the complete assembly tested for leakage and air tightness to ensure proper drainage and hygiene.

SECTION X - FLOOR FINISHING, SKIRTING & DADO

1. General

a) This section shall cover all flooring and wall tilling work as shown in the drawing. No work under this section shall be started until specifically allowed by the Architect/Site Engineer and until all other major works such as plastering, embedding of conduits and pipes, channels, windows fixing etc. have been completed. Samples of adequate size representing the nature of variation including quality, size, texture after polishing of the tiles to be used in the flooring work fully shall be prepared for all work and got approved by the Architect/Site Engineer before proceeding. The approved samples shall be retained up to the end.

b) Floor shall be laid to level and or to slope as shown on drawings and as required and directed by Site Engineer/Architect. Floor shall be carried through all the doors and other openings and over dwarf walls. Exposed edge of floors shall be finished in the same manner as for top surfaces. Skirting shall match with the floor finish.

2. Sub Flooring

a) For Ground floor:

Sub floors (base concrete under floor finish) 100mm thick lean concrete in 1:5:10 (1cement:5 coarse sand & 10 coarse aggregate 40mm nominal size) for all locations except stilt area. In stilt area (it can be stone aggregate) shall be laid over a layer of fine sand 150mm thick at ground floor only.

b) For Upper Floors:

- Sunken/lower portion of slabs: Sub base shall be in lean concrete in 1:5:10 (1 cement: 5 coarse sand and 10 coarse aggregate nominal size).
- Other floors: Where ever required/directed lean concrete 1:5:10 (1 cement: 5 coarse sand: 10 coarse aggregate 40mm nominal size) of required thickness laid over RCC slab.
- Floors under cupboards/book shelves/kitchen counters etc. in 1:5:10 lean concrete(1 cement: 5 coarse sand & 10 coarse aggregate 40mm nominal size).

3. Plain cement concrete flooring: 1:4:8 (1 cement : 4 coarse sand : 8 graded stone aggregate 40 nominal size) flooring of specified thickness. The thickness of flooring finished shall be 40mm/50mm as specified in schedule of quantities with grooves of 10mm wide shall be left through depth of the flooring (finishes) to form bays as specified in para 5 (b) hereinafter OR . The top surface shall be finished with floating coat of neat cement using steel float while the concrete is green. With 3mm thick 38mm wide glass strips, as specified in Schedule of quantities.

4. **Skirting:** To match PCC floors 18mm thick plaster in cement mortar of mix 1:3 (1 cement: 3 coarse sand) finished with a floating of neat cement shall be applied to skirting. The skirting shall be 100 high and it shall be projecting uniformly from the plastered surfaces of walls and columns and separated with a horizontal groove of 10mmx10mm

5. **Vitrified tile, kota stone, clay tile in situ flooring and wall:**

- (a) Vitrified floor tiles of size 1200 × 600 mm, minimum 9-10 mm thick, conforming to IS:15622, with water absorption less than 0.08%, of approved make, shade, colour and finish shall be provided. Tiles shall be rectified, machine cut and free from cracks, chips or surface defects. Approved samples shall be obtained before commencement of work.
- (b) The base surface shall be thoroughly cleaned and brought to proper line, level and slope. Polymer modified cement based tile adhesive shall be applied uniformly with a notched trowel to required thickness. Back buttering shall be done wherever necessary to ensure full bedding. Tiles shall be laid true to line, level and approved pattern, maintaining uniform joints of 2-3 mm width using spacers. Cutting shall be done mechanically to produce smooth and even edges.
- (c) After setting, joints shall be filled with approved epoxy/cementitious grout of matching shade. The finished flooring shall be even, free from lippage, hollow sound or defects and shall be protected until handing over.
- (d) Vitrified wall tiles of size 1200 × 600 mm, 9 mm thick, conforming to IS:15622, of approved make and shade shall be fixed in dado over prepared wall surface. The wall surface shall be cleaned and made true to plumb and level before fixing tiles with approved polymer modified tile adhesive. Tiles shall be aligned properly with uniform joints and neat edge finishing. Joints shall be filled with white cement/cementitious grout mixed with matching pigment and surface cleaned and finished.
- (e) Matt finish anti-skid vitrified tiles of size 1200 × 600 mm, minimum 9 mm thick, conforming to IS:15622 and having minimum R9 slip resistance rating, of approved make and shade shall be provided. Base preparation, adhesive application, laying, jointing and grouting shall be as specified for vitrified floor tiles above, ensuring proper alignment and anti-skid finish.
- (f) Large format vitrified tiles of size 1800 × 1200 mm, minimum 10 mm thick, conforming to IS:15622, of approved make, shade and finish shall be provided for flooring including matching skirting. The base shall be checked for flatness and tiles shall be laid using high performance polymer modified adhesive suitable for large format tiles. Proper handling, alignment and uniform joint spacing shall be ensured. Joints shall be filled with approved grout of matching shade and the finished surface shall be even, properly aligned and protected until completion

- (g) Providing and laying Kota stone slab flooring 25 mm thick over cement mortar base 1:4 (1 cement : 4 coarse sand), complete as specified. The slabs shall be laid true to line and level and jointed with grey cement slurry mixed with pigment to match the shade of the slabs. After laying, the surface shall be rubbed and machine polished to obtain smooth and even finish, complete as directed.
- (h) Providing and fixing clay tile cladding for wall lining up to 10 m height, complete as specified. The wall surface shall be prepared and provided with 12 mm thick cement mortar bed 1:3 (1 cement : 3 coarse sand). Tiles shall be fixed with special adhesive of approved brand, laid true to line, level and plumb. Joints shall be pointed with white cement mixed with pigment to match the shade of tiles. The surface shall be cleaned and protected, complete with all materials, labour, scaffolding and accessories, as directed by the Engineer-in-Charge.

NOTE: Before starting the work, the contractor shall submit the finish samples for Site Engineer/Architect's approval.

6. Kota stone in situ in skirting, risers to treads and landings of staircases and where indicated.

- (a) Kota stone slab work shall be provided in flooring, risers of steps, skirting, dado and pillars, and at all locations as indicated in the drawings. The flooring shall consist of 25 mm thick Kota stone slabs laid over a 20 mm (average) thick base of cement mortar 1:4 (1 cement : 4 coarse sand), properly bedded, aligned and brought to true line and level. The slabs shall be jointed with grey cement slurry mixed with approved pigment to match the shade of the stone, ensuring close joints and uniform appearance throughout.
- (b) In risers of steps, skirting, dado and pillars, 20 mm thick Kota stone slabs shall be laid over 12 mm (average) thick cement mortar 1:3 (1 cement : 3 coarse sand) base. The stone shall be accurately cut, dressed and fixed to the required dimensions as shown in the drawings, maintaining uniform thickness, proper alignment and neat edges. Joints shall be filled with grey cement slurry mixed with pigment to match the stone shade.
- (c) After laying and setting, the entire surface shall be thoroughly rubbed and machine polished to obtain a smooth, even and dense finish, free from waviness, tool marks or irregularities, complete in all respects as specified.

7. Glazed tiles

- (a) The tiles/ceramic shall be of first quality and shall generally conform to IS: 777. These shall be flat, and true to shape and free from cracks, crazing, spots, chipped edges and corners. The glazing shall be of uniform shade and shall be provided in Dado of kitchen and toilets. The tiles shall be set over screed/ plaster 12mm thick with cement mortar 1:3 (1 cement : 3 coarse sand) to all surface, set and jointed with neat white cement slurry. The joints shall be neat and fine. Tiles face shall be kept flush with the skirting below.

- (b) Size of glazed tiles both for toilets, Baths, WC and kitchen shall be as shown on drawings.
- (c) The colour of tiles shall be white/coloured.
- (d) Height of glazed tiles dado above skirting in toilets and in kitchen, above kitchen platform shall be as shown on the drawings.

8. The glazed tiles shall be first quality vitreous china and of the following makes:-

- (a) Somany Pilkington.
- (b) Johnson
- (c) Orient

9. **Finish of working platforms in kitchens:** Finish of the working platform in kitchen shall with 20 mm thick gang saw cut, mirror polished, premoulded and prepolished granite stone slabs of approved make and shade (Lakha Red / Ruby Red), machine cut to required sizes for kitchen platforms, vanity counters, window sills, facias and similar locations, laid over a 20 mm thick cement mortar bed in CM 1:4 (1 cement : 4 coarse sand), including proper levelling and alignment. The slabs shall be of selected quality, hard, dense and homogeneous in texture, free from cracks, decay and other defects, with the top exposed surface factory polished before delivery to site. Joints shall be finished with white cement slurry mixed with matching pigment, including epoxy touch-ups wherever required, and the surface shall be rubbed and polished to obtain a uniform high gloss finish.

10. **Polished Kota stone flooring:** The Kota stone slabs shall be machine cut and machine polished and of selected quality, hard, sound, dense and homogeneous texture, free from cracks decay watering and flaws. They shall be machine cut to the requisite thickness. The edges shall truly vertical. The colour of the slabs will be approved by the Architect/Project Engineer, before starting of work. The slabs shall have the top (exposed) face polished before being brought to site. The slabs shall conform to the size conform to the size required. The thickness of the slabs shall be 25mm.

- (i) **Dressing:** Every slab shall be cut to the required size and shape and fine chisel dressed in the edges to the full depth. The edges shall be table rubbed with coarse sand or machine rubbed before paving. All angles and edges shall be true and square and the surface shall be true and plane.
- (ii) **Preparation of surface and laying:** The sub grade concrete or RCC slab on which the kota stone slabs are to be laid shall be cleaned, wetted and mopped. The bedding shall be with cement mortar of an average thickness of 20mm and mix 1:5(1 cement :5 coarse sand), over this bedding, neat grey cement slurry of honey lie consistency shall be spread. The edges shall be pasted with cement slurry @ 4.4 kgs of cement per sqm mixed with pigment to match the shade of the slabs. The joints shall be kept as thin as possible.

(iii) **Polishing and finishing:** The floor shall then be kept wet for a minimum period of seven days. The surface thereafter shall be grounded with machine fitted with grit block No.60, then No.120 and finally with No.320. Between every two successive grindings the surface shall be washed, cleaned and covered with a thin coat of grey cement in order to fill any pin hole that appear. After the final polish oxalic acid shall be dusted over the surface at the rate of 33 gm per square meter sprinkled with water and rubbed hard with mamdah block (pad 7% woolen rags) the following day the floor shall be wiped with a moist rag and dried with a soft cloth and finished clean.

11. Polished Kota Stone in Risers of Steps, Skirting and Dado: The Kota stone slabs for skirting shall be as specified in clause 10 above and of thickness 12mm. The height of skirting shall be 100mm and for risers to steps it shall be up to full height. The height of dados shall be as shown on drawings.

(i) **Preparation of surface and laying:** The surface shall be chipped off the projections/productions if any cleaned and wetted 12mm thick plaster of cement mortar 1:3 (1cement:3coarse sand) shall be applied and allowed to harden. The plaster shall be roughened with wire brushes or by scratching diagonal lines 2mm deep at approximately 7.5 cms centre both ways. The back and edges of the stone slabs shall be buttered with a coat of grey cement slurry and set in the bedding mortar.

(ii) **Cutting, Polishing and finishing:** Cutting, grinding and polishing of skirting shall be done in the same manner as of flooring but by hand.

12. (a) **Marble flooring:** 20mm thick marble (Makrana Chak Doongri marble) having black streds stone slabs laid over sub floor with 20mm thick base cement mortar 1:4 (1 cement : 4 coarse sand) Marble shall be jointed with white cement slurry including grinding smooth & polishing complete.

(a) **Marble Skirting:** The marble stone slabs for skirting shall be as specified in clause 12 (a) above and of thickness 20mm. The height shall be laid over 12mm thick cement mortar plaster 1:3 (1cement:3 coarse sand), jointed with white cement slurry including grinding smooth and polishing.

(b) **Marble Skirting:** The marble stone slabs for skirting shall be as specified in clause 12 (a) above and of thickness 20mm. The height shall be laid over 12mm thick cement mortar plaster 1:3 (1cement:3 coarse sand), jointed with white cement slurry including grinding smooth and polishing.

13. (a) **Red or White Fine Dressed Sand Stone Filling :** The stone slabs shall be hard, sound, durable and tough, free from crack decay and weathering. In case of red sand stone, white patches or streaks shall not be allowed. However, scattered spots up to 10mm diameter will be permitted. Before starting the work the contractor shall get samples of slabs approved by the Architect/Project Engineer. The slabs shall be hand or machine cut to the requisite

thickness along planes parallel to the natural bed of stone and should be of uniform size as required.

(b) **Dressing:** Stone slab shall be cut to the required size and shape and chisel dressed on all sides to a minimum depth of 20mm. The top and the joints shall be fine tooled so that straight edge laid along the face is fully in contact with it incase machine cut stone are used chisel dressing and fine tooling of machine cut surface need not be done provided a straight edge laid anywhere along the machine cut surfaces is in contract with every point on it. The thickness of the slabs after dressing shall be as specified in the description of items.

(c) **Preparation of surface and laying:** The sub base concrete or RCC slab on which the stone slabs are to be laid shall be cleaned, wetted and mopped. The bedding shall be with cement mortar of an average thickness of 20mm and mix 1:5(1 cement: 5 coarse sand), over this bedding, neat grey cement slurry of honey like consistency shall be spread over the same @ 4.4 Kg/Sqm. The edges buttered with white cement admixed be with pigment to match the shade of the slabs. The joints shall be kept as thin as possible. The points shall be done with cement mortar as specified in the items. The joints shall be raked out uniformly to a depth not less than 12mm thickness when the mortar is green. The pointing shall be cured for a period 7 days (minimum).

14. **NON - SKID CERAMIC TILES:** Where indicated in Schedule of finishes shall be laid as under:

- (i) It shall be 6 mm to 8 mm thick of size 300x300mm, conforming to IS 13755 hydraulically pressed, high temperature fires (around 1200°C) in single operation having breaking strength 350 to 400 Kg per Sqm. & weighing 17 Kg per Sq.Mof approved make and shall be laid & jointed in white cement paste pigmented to tile shade over 20 mm thick cement & sand screed (1:4) over sub base.
- (ii) **NON-SKID CERAMIC TILES SKIRTING:** where shown/indicated in the drawing / schedule of finishes shall be provided 100mm height over 10mm thick cement mortar (1:3 (1Cement: 3 coarse sand) and Jointed with white cement paste pigmented to the tile shade.

15. **CHEQUERED TERRAZO TILE FLOORING**

- a) Tiles shall generally conform to IS: 1237 the tile shall be supplied with initial grinding and grouting of wearing layer. The size of tile shall be 250 x 250 x 22mm thick or as shown in the drawings or as required by the Architect/Project Engineer. The tile shall be manufactured in a factory under presser process subjected to hydraulic pressure of not less than 140 kg per square cm. The finished thickness of the upper layer shall not be less than 6mm for size of marble chips varying from the smallest up to 20mm.
- b) **PRECAST CEMENT CONCRETE TILES:-** The cement concrete tiles shall be of nominal size of 30x30 Cum with equal sides. The overall thickness of tiles shall not be less

then 22mm. The tiles shall conform to the method of manufacture, the mix of backing and wearing layers.

Where full tile can not be fixed, tile shall be cut (Sawn) from full tile to the required size and their edges rubbed smooth to ensure straight and true joint to be approved by the Project Engineer/Architect before installing at site.

- c) **LAYING:** Base concrete or RCC slab on which the tiles are to be laid shall be cleaned wetted and mopped. The bedding for the tiles shall be 20mm thick cement mortar 1:4 (1cement: 4 coarse sand). Over the bedding neat grey cement slurry shall be spread @ 4.4 Kg of cement per square meter.
- d) **CURING, POLISHING & FINISHING**
- i) The day after the tiles are laid all joints shall be cleaned of the grey cement grout with a wire brush or trowel to a depth of 5mm and all dust and loose mortar removed and cleaned. Joints shall then be grouted with grey or white cement mixed with or without pigment to match the shape of the topping of the wearing layer of the tiles. The same cement slurry shall be applied to the entire surface of the tiles.
- ii) The grinding, curing, polishing & finishing shall be done as specified above for terrazzo flooring

SECTION XI - WALL FINISHES

1. General

- a) **Scope:** This section shall cover internal and external plastering/rendering works as shown in the drawings.
- b) **Mortar:** The mortar of specified mix shall be used.
- c) **Scaffolding:** Stage scaffolding shall be provided for plastering work as per standard practice and as directed by Architect/Site Engineer. This shall be independent of the walls.
- d) **Preparation of Surfaces:** Joints of wall shall be raked-out properly. Dust and loose mortar shall be brushed out. Efflorescence if any shall be removed by brushing and scraping, shuttering imperfections of all concrete shall be roughened by hacking with chisel and all resulting dust and loose particles cleansed and the surface shall be thoroughly hacked or bush hammered to the satisfaction of Architect/Project Engineer. The surface shall be thoroughly washed with water, cleaned and kept wet before plastering is commenced.
- e) **Approval of Architect/Project Engineer to be taken:** No plastering work shall be started before all conduits, pipes fittings and fixtures clamps, hooks etc. are embedded, grouted and cured and all defects removed to the satisfaction of Architect/Project Engineer. Special approval shall be taken from Architect/Project Engineer before starting each plastering work. No cutting of finished plaster shall be allowed. No portion shall be left out initially to be patched up later on.
- f) **Mixing:** The ingredients shall be mixed in specified proportions by volume. The mixing shall be done in a mechanical mixer on water-tight platform. The cement and sand shall first be mixed thoroughly dry in the mixer. Water shall then be added gradually and wet mixing continued for at least a minute until mortar attains the consistency of a stiff paste and uniform colour. Mortar shall be used within 30 minutes of addition of water. Mortar which has partially set shall not be used and removed from the site immediately.

2. Internal Surfaces

- i) Plastering shall be started after the completion of ceiling plaster from top and gradually worked down towards floor. It shall not, at any place be thinner than as specified. To ensure even thickness and a true surface plaster of about 15cm x 15 cm shall be first applied horizontally and vertically at not more than 2m interval over the entire surface to serve as gauges. The mortar shall then be applied to the wall/surface between the gauges and finished even. All corner junctions and rounding shall be truly vertical or horizontal and finished carefully. Inspecting the work at the end of the day plaster shall be cut clean to line, where recommencing the plastering, edge of old work shall be crapped, cleaned and wetted with cement putty before restarting plastering

- ii) Cement plastering internally on all internal surfaces including soffits of RCC slabs, chajjas, lintels, around shelves, inner side of parapets and around of parabolas etc. shall be as shown on drawing. Wherever not shown it shall be as under:-
- (a) 12mm thick plaster in cement mortar 1:6 (1 cement: 6 parts 75%: fine sand & 25% coarse sand) mixed with 10% of lime water over brick and concrete surfaces. Dubbing out wherever required (i.e. bringing up the undulation on the rough face of brick work in level with proudest points) shall also be executed in the same mix along with rendering coat.
 - (b) 6 thick plaster in cement mortar 1:3 (1 cement: 3 fine sand) on soffits of RCC slabs, chajjas, lintels and kitchen platforms and alroundof shelves and para golas.
 - (c) 10mm x 6mm grooves shall be provided in ceiling plaster at junction of wall and ceiling.
 - (d) 12mm thick plaster in cement mortar 1:4 (1cement: 4 parts 75% fine sand & 25% coarse sand) mixed with water proofing compound CICO-1 (liquid) as per manufacturer's instruction to be done on the inside face of the book shelves and cupboards.
 - (e) 15mm thick plaster in cement mortar 1:4 (1 Cement: 4coarse sand) mixed with water proofing compound CICO-1(liquid) as per manufacturer's instruction to be done on the internal surfaces of parapet walls including dubbing wherever required.
 - (f) Before plastering it should be ensured that brick masonry joints are raked out (atleaston even surfaces) to a depth of 12mm and all concrete surfaces are rough enough for proper adhesion of plaster. If not they shall be made rough by hacking or bush hammering at intervals of 2". Efflorescence if any and dust/dirt shall be removed. The surfaces shall be wetted adequately before plastering.
 - (g) G.I. Chicken wire mesh of 24 guage and 20mm mesh shall be fixed all along RCC Surface adjoining brick work given 150mm lapping on either side of the junction in double fold or as called for using nails etc and cement slurry before plastering. Ensuring equal thickness of plaster on both sides of the mesh.
 - (h) Sand used in plaster shall be within the grading zones as stipulated in the IS silt contents shall not exceed 4% by weight. Brick surface shall be raked out at the end of day brick work to afford key to plaster. Plaster surface shall be hard and even without patchy appearance. If they flake or show scratch marks if rubbed by appointed nail the plaster shall be rejected, dislodged and redone.
3. **Drip course:** Drip course shall be provided to all projections as per details shown in drawings.
4. **EXTERNAL SURFACES:**

A. Washed Grit Finish:

Surfaces as shown on the drawings shall be finished with washed grit plaster with necessary grooves and pattern as shown on the drawings.

- (a) Washed grit plaster shall be provided in two layers.
- (b) Apply under layer of 12mm thick plaster of cement mortar 1:4 under layer (1 cement : 4 badarpur sand/Jamuna sand 50:50) after thoroughly wetting the surface. The surface shall be kept wet till top layer is applied.
- (c) Make the surface broom finish by steel brush or scratching tool.
- (d) Grooves of size 15mm wide and 15mm deep (slightly tapered for easy removal) to be formed of uniform size in top layer of plaster using hard wood battens nailed to under layer, to desire patterns of panels truly vertical and horizontal as shown on drawings or as directed by the Architect/Site Engineer.
- (e) All stone chippings to be washed in a clean tub by clean water before use.
- (f) Top layer shall be 15mm thick comprising cement marble powder and marble chips in proportion of 1:0.5:2 (1 cement: 0.5 coarse sand:2 marble chippings 10 mm nominal size) mixed with suitable quantity of approved shade of pigment for 2 shades (dark green or light green) from approved manufacturers as approved by the Site Engineer and Architect for shade pattern as shown on drawings and approve by the Site Engineer and Architect. Before application of top coat the surface of the under coat shall be cleaned and a coat of cement slurry @ 2 Kg. of cement per Sqm. shall be applied. The top layer shall be applied in uniform thickness and sufficiently pressed with wooden float for proper bonding with the under coat and finished to a true and plumb surface. Finished surface of topcoat after the mix has taken the initial set shall be scrubbed.
- (g) Scrub and wash the top layer by clean water with brushes to expose the stone chippings to its natural colour.
- (h) Marble chippings of size 10mm of approved colours, coarse sand of approved quality and pigment of approved colour shall be used.
- (i) The wooden battens to be removed very carefully by a special tool so that the edges of grit wash are not damaged.
- (j) Suitable scaffolding to be used shall have sound and strong supporters tied together with horizontal pieces over which scaffolding planks shall rest to ensure that for horizontal support no holes are made in the walls.

(k) Before application of under coat of plaster the surfaces shall be prepared by racking out joints properly and brushing out the dust and loose mortar and washed thoroughly with water and kept wet.

(l) Contractor to get a sample approved prior to start the work by the Architect/Site Engineer.

B. 18mm thick plastering with terrazo finish

(a) 18mm thick plastering with terrazo finish shall be provided as shown on drawings. It shall be provided in two layers. Under layer

(b) Under layer shall be 12mm thick plaster of cement mortar 1:3 (1cement:3 coarse sand) and shall be brought to truly level and plumbs by using wooden float. The surface shall be further roughened by furrowing with a scratching tool. The surface shall be kept wet till top layer is applied.

(c) Top layer shall be 6mm thick terrazo topping consist of cement marble powder and hand marble chips shall be white or pink, black, yellow, green or any approved colour. Size of marble chips shall be 1B

i) A mixture of ordinary grey cement and approved white marble dust/powder mixed in proportion of 4 parts of cement and 1 part of marble dust/powder by volume.

ii) Marble Chips: Size of marble chips shall be 3mm to 4mm.

iii) Proportion of white marble chips shall be 75% out of white, coloured and black as per approval of the Site Engineer and Architect.

iv) Mix one part by volume of mixture vide (i) above with 1.25 parts by volume of (iii) above.

v) Cutting & polishing shall be done by hand or by machine till a smooth polish surface is obtained after final grinding is over scrubbing, polishing & finishing to be done as per para 5 (e).

1) Glass Mosaic Tiles

(i) 5mm thick glass Mosaic tiles fixed with cement slurry shall be provided as shown on drawings.

SECTION XII - WHITE WASH, DISTEMPER AND PAINTING

1. GENERAL

- 1.1. The form of Contract shall be according to the “Conditions of Contract”. The following clauses shall be considered as an extension and not in limitation of the obligation of the Contractor
- 1.2. Work under this contract shall consist of furnishing all labor, materials, equipment and appliances necessary and required. The Contractor is required to completely furnish all the plumbing and other specialized services as described hereinafter and as specified in the schedule of quantities and /or shown on the plumbing drawings.
- 1.3. Scope of internal water supply, plumbing, internal sewerage and drainage shall consist of providing and fixing of the following for each units of each unit blocks/other buildings as shown on drawings.
- 1.4. White wash shall be provided to all ceiling, and internal surfaces of lofts, staircase, stair lobby and stilt area of all unit blocks /other building as shown on drawings.
- 1.5. Dry distemper of approved shade shall be provided to all internal surfaces of walls as shown on drawings.
- 1.6. Before application of white wash and distemper the surfaces shall be prepared to a clean and even surface.
- 1.7. White wash (lime wash) shall be carried out in three coats.
- 1.8. White wash shall be prepared from lime slacked on site, mixed and stirred with sufficient water to make a thin cream. This shall be allowed to stand for 24 hours and shall be screened through clean cloth. Four kg.of gum dissolved in hot water shall be added to each to cubic meter of the cream (115gm/cft). Blue shall be added to give required whiteness. The approximate quantity of water to be added in making cream shall be five liters per kg.of lime. 10% Zinc Oxide shall also be added to obtain a desired shining in the white wash.
- 1.9. Dry distemper shall be carried out in two or more coats over one coat of suitable cement primer as per manufacturer instructions to give even shade.
- 1.10. White wash and dry distemper shall be applied in specified coats by using flat brushers or spray pumps. Each coat shall be allowed to dry before next coat is applied, if additional coats than what have been specified are necessary to obtain uniform and smooth finish it shall be given at no extra cost.
- 1.11. The finished dry surface shall not show any signs of cracking and peeling nor shall it come off readily on the hand when rubbed.

2. PAINTING

- 2.1. Primer : All wall surfaces shall be prepared by cleaning thoroughly and removing dust, dirt, grease and loose particles. The surfaces shall be made sound and dry before application. One coat of water thinnable cement primer of approved

brand and manufacture shall be applied evenly over the prepared surface as per manufacturer's specifications and as directed by the Engineer-in-Charge.

2.2. White Cement Based Putty: All plastered wall surfaces shall be prepared and white cement based putty of approved brand and manufacture shall be applied over the surface to an average thickness of 1 mm to obtain an even and smooth finish. The putty shall be applied uniformly, allowed to dry, rubbed smooth where necessary and finished complete as directed by the Engineer-in-Charge.

2.3. Internal Painting : All internal wall surfaces shall be prepared by cleaning and making good all undulations and defects. Acrylic emulsion paint of approved brand and manufacture shall then be applied. Two or more coats shall be applied on new work to obtain an even shade of approved quality. The shade shall be as approved by the Site Engineer/Architect.

2.4. Painting on Joineries : All joinery surfaces shall be prepared by rubbing down with sand paper and cleaning thoroughly. A suitable primer coat of approved brand shall first be applied. The surface shall then be finished with two or more coats of synthetic enamel paint of approved brand and manufacture to give an even shade. The tint/shade shall be as approved by the Site Engineer/Architect.

2.5. External Painting : All external plastered surfaces shall be cleaned and prepared properly. One coat of exterior primer shall be applied at the rate of 2.20 kg per 10 sqm as per manufacturer's specifications. Acrylic smooth exterior weatherproof paint of approved brand and required shade shall then be applied. Two or more coats shall be applied at the rate of 1.67 litre per 10 sqm on new work to obtain a uniform and even finish. The shade shall be as approved by the Site Engineer/Architect.

2.6. Painting on Steel Works: All exposed steel surfaces shall be cleaned thoroughly to remove rust, scales, oil and grease by rubbing with sand paper or other approved means. One coat of primer shall be applied at the rate of 0.80 litre per 10 sqm as per manufacturer's specifications. Deluxe Multi Surface Paint of approved brand and manufacture shall then be applied. Two or more coats shall be applied at the rate of 0.90 litre per 10 sqm to obtain an even shade suitable for interior and exterior use. The shade shall be as approved by the Engineer-in-Charge.

2.7. Painting on Parking Marks: All surfaces for runway, taxi track, apron or parking markings shall be cleaned thoroughly to remove dirt, scales, oil, grease and other foreign materials. The lines shall be properly marked out. Road marking paint of superior make as approved by the Engineer-in-Charge shall then be applied. Two or more coats shall be applied on new work to obtain a uniform and durable finish.

SECTION XIII - INTERNAL PLUMBING WORK (WATER SUPPLY, PLUMBING, DRAINAGE)

1. GENERAL

1.1. The form of Contract shall be according to the “Conditions of Contract”. The following clauses shall be considered as an extension and not in limitation of the obligation of the Contractor

1.2. Work under this contract shall consist of furnishing all labor, materials, equipment and appliances necessary and required. The Contractor is required to completely furnish all the plumbing and other specialized services as described hereinafter and as specified in the schedule of quantities and /or shown on the plumbing drawings.

1.3. Scope of internal water supply, plumbing, internal sewerage and drainage shall consist of providing and fixing of the following for each units of each unit blocks/other buildings as shown on drawings.

- (a) GI pipe with fittings and valves for cold and hot water supply.
- (b) Sanitary fixtures, CP fittings and accessories.
- (c) Soil, waste, vent, rain water pipes and fittings
- (d) Overhead water tank at Terrace with supports.
- (e) Internal Drainage including gully traps.

1.4. The entire work shall be carried out by licensed plumbers

2. Water supply.

2.1. All GI pipes and fittings from over head tank to all taps, wall mixers, wash basins, cisterns, sinks, geyser points, washing machine and showers as shown on drawings.

2.2. Provision of hot and cold water supply lines in all toilets and kitchen.

3. MATERIALS

3.1. All GI pipes shall be galvanised steel tubes medium grade conforming to IS-1239 and ISI marked.

3.2. All GI fittings shall be conforming to IS-1879 and ISI marked.

3.3. Valve shall be heavy Gun metal full way confirming to IS-778-1971 class I and ISI marked.

4. SANITARY FIXTURE AND ACCESSORIES

4.1. European Water Closet (EWC)

4.1.1. Supply, delivery and installation of white vitreous china pedestal type European water closet of first quality, complete with ISI marked white solid plastic seat and lid, 10 litre capacity low level white vitreous china flushing cistern with internal fittings, 40mm diameter C.P. flush bend, overflow arrangement with mosquito proof coupling of approved municipal design, all washers, rubber cones, fixing accessories and specials of standard make, complete in all respects.

4.1.2. The water closet shall be firmly fixed to the finished floor using brass screws of suitable length with approved PVC plugs embedded in drilled holes. The cistern shall be fixed with C.I./M.S. brackets, painted with two coats of enamel paint over one coat of primer. The flush pipe connections shall be watertight and aligned properly.

4.1.3. The item shall also include providing and fixing 15mm C.P. brass angle cocks (2 Nos.), health faucet with C.P. hose and hook, and stainless steel wall mounted foldable grab bar with nylon sleeve for disabled toilet (KosmoCare or equivalent approved), securely anchored to the wall with anchor fasteners.

4.1.4. The rate shall include cutting and making good walls and floors, testing for proper flushing, rectification of leakages if any, and commissioning complete as per DSR v2 2021 Item No. 17.3.1.

6.13. Wash Basin

6.13.1. Supply and installation of white vitreous china wash basin of size 630 x 450 mm, wall mounted type, of first quality approved make, fixed on heavy duty C.I./M.S. brackets painted with one coat of primer and two coats of enamel paint.

6.13.2. the basin shall be provided with a pair of 15mm C.P. brass pillar taps, 32mm C.P. brass waste fitting with overflow, C.P. brass bottle trap with extension pipe to wall, C.P. brass wall flange, and 15mm C.P. brass angle cock with wall flange and connecting pipe complete.

6.13.3. The wash basin shall be fixed firmly with brackets and additionally secured with M.S. clips and screws embedded in wall using PVC plugs. All joints shall be watertight and properly aligned. The outlet of bottle trap shall be connected to nearest floor trap using G.I./CPVC waste pipe as per drawings.

6.13.4. The rate shall include cutting, chasing, making good plaster, testing and commissioning complete as per DSR v2 2021 Item No. 17.7.1.

6.14. Urinal

6.14.1. Supply and installation of white glazed vitreous china flat back or wall corner type lipped front urinal of approved size, complete with 5 litre capacity white PVC automatic flushing cistern, C.P. brass spreader, flush pipe, brass unions, G.I. clamps and brackets.

6.14.2. The urinal shall be fixed securely to wall using C.P. brass screws and anchor fasteners as per manufacturer's instructions. The flushing cistern shall be fixed firmly and connected with flush pipe concealed in wall chase. The waste outlet shall be connected to bottle trap and waste line complete.

6.14.3. The item shall include providing C.P. brass angle cock, health faucet, painting of brackets, cutting and making good walls and floors, testing of flushing arrangement and commissioning complete as per DSR v2 2021 Item No. 17.4.1.

5. C.P. FITTINGS, VALVES & ACCESSORIES

6.15. Stop Cocks

6.15.1. Supply and installation of 20mm and 25mm dia C.P. brass stop cocks (concealed/exposed type) inside bathrooms and service areas, of approved make, including all fittings, wall flanges, extensions where required, cutting chases in walls, fixing securely and making good the surface to original finish complete.

6.15.2. All stop cocks shall be of heavy quality brass, chromium plated, conforming to relevant BIS standards and tested for leak tightness before commissioning.

6.16. Angle Valves: Providing and fixing 20mm dia C.P. brass angle valves with wall flange and connecting pipes, properly aligned and securely fixed, including cutting and making good walls wherever required, complete in all respects.

6.17. Bib Taps: Providing and fixing 15mm dia C.P. brass bib taps / hose connectors with wall flange, screwed to pipe outlets using PTFE tape, tested for leakage and finished neatly.

6.18. Brass Valves: Supply, installation, testing and commissioning of brass valves of specified diameters including all fittings, supports, jointing materials and accessories complete.

All gunmetal valves shall conform to IS 778, and shall be hydrostatically tested at shell pressure of 25 kg/cm² and seat pressure of 16 kg/cm². The valves shall include 25mm, 32mm, 40mm and 50mm dia ball valves, non-return valves and air release valves of approved make, installed in true alignment and tested for performance.

6. INSTALLATION OF SANITARY FITTINGS:

6.1. European Type water closets shall be fixed with brass screws of suitable length with PVC plugs embedded in the floor after drilling hole in floor. It should be coupled with low level flushing cistern complete with rubber cone adapters etc, all as per manufacturer instructions.

6.19. Wash hand basins shall be fixed firmly to wall with MS angle iron brackets. The brackets shall be given two coats of white enamel paint over a coat of primer. In addition the wash basin shall be securely fixed to walls with a pair of 25x3mm MS clips screwed with raw plugs to walls (placing of basin over the brackets without secure fixing on wall shall not be accepted).

6.20. Indian type Water Closets shall be embedded firmly in the floor and its surrounding packed with cement concrete 1:3:6 (1 cement : 3 coarses and : graded aggregate 40mm graded aggregate) below the level of top of the Closet to receive the top layer of floor finish. WC shall be set in the CI trap in cement concrete 1:3:6 (1cement:3 coarse sand:6 graded stone aggregate 20mm nominal size), joint between WC and Flush pipe will be made in the pre-moulded rubber joint.

6.21. Urinals: Urinals shall be lipped type half stall (small) white glazed vitreous china of first quality and size 610x 400 x 380 mm size.

6.21.1. Half stall urinal shall be provided 15 mm dia spreader, 32 mm dia CP domical waste and C.P. cast brass bottle trap with pipe and wall flange, and shall be fixed to wall by one CI bracket and two CI wall clips complete as recommended by manufacturer's directives/Site Engineer.

6.21.2. Half stall urinals shall be fixed with C.P. Brass screws.

6.21.3. Flushing cistern for urinals shall be automatic type vitreous china as given in the schedule of quantities. Each flushing cistern shall have a copper siphon and inlet nozzle cock to control the flow. Flushing cistern shall be fixed to wall with R.S. or C.I. brackets painted with two coats of white enamel paint.

6.21.4. Flush pipes shall be G.I. pipes concealed in wall chase but with chromium plated bends at inlets and outlets.

6.21.5. Urinals may be flushed with flush valves as described in the item.

6.21.6. Waste pipes for urinals shall be any of the following.

7. INTERNAL DRAINAGE

6.22. Scope of internal sewage disposal and drainage system for all buildings/blocks included in Schedule A part I under this contract will include the following and shall be provided as per the layout/locations shown on drawings:

6.22.1. GI floor drains in toilets and kitchen

6.22.2. HCI waste pipes and their connections up to Gully traps.

6.22.3. HCI soil pipes and their connections up to nearest manholes.

6.22.4. Vent pipes with vertical stacks

6.22.5. All floor traps and gully traps.

6.23. Note: SWG sewerage lines from Gully Trap and nearest manholes onwards shall be measured and paid separately under schedule A part III (External sewerage)

8. SOIL, WASTE & RAIN WATER PIPING

6.24. PVC-U Pipes Through Floor / Concrete

6.24.1. Supply and installation of lead-free PVC-U pipes conforming to IS 4985, of specified diameters for soil and waste lines, jointed with approved solvent cement, laid through floor slabs and concrete members.

6.24.2. The pipes shall be properly aligned to required slope, securely supported, and encased where required. After laying, the chases shall be filled with cement mortar 1:3 (cement : coarse sand) and finished flush with adjoining surface.

6.24.3. The entire system shall be tested for leakage and air tightness before covering.

6.25. CPVC Pipes Through Walls / Ducts

6.25.1. Providing and fixing CPVC pipes for hot and cold water supply conforming to IS 15778, including all CPVC plain and brass threaded fittings such as tees, elbows, bends, adapters and air vents.

6.25.2. Pipes shall be fixed with G.I. clamps at 1.0 metre intervals and supported firmly. Jointing shall be done using approved one-step CPVC solvent cement. Exposed pipes shall be properly aligned; concealed pipes shall be laid in chases and plastered neatly after testing.

6.25.3. Testing shall be carried out hydrostatically and any leakage rectified before approval.

6.26. CPVC Pipes Through Trench / Ground

6.26.1. Providing and laying CPVC pipes through trench up to 1 metre depth including excavation, preparation of bed, maintaining required slope, jointing with solvent cement, backfilling with selected earth and compacting complete.

6.26.2. Excavation, disposal of surplus earth and restoration of surface shall be included in the scope.

6.27. Floor Traps

6.27.1. Providing and fixing multi-inlet floor traps of specified sizes complete with stainless steel gratings of approved pattern with cockroach trap arrangement and lockable type wherever specified.

6.27.2. The traps shall be set in cement concrete block and connected to waste line with proper slope. All joints shall be watertight and tested before final flooring.

9. WATER SUPPLY PIPING

6.28. CPVC Pipes - Above Terrace

Providing and fixing CPVC pipes of specified diameters above terrace floor for hot and cold water supply including fittings, clamps at 1 metre spacing, solvent welded joints and hydrostatic testing complete.

6.29. CPVC Pipes - Concealed in Walls

6.29.1. Providing and fixing CPVC pipes of 20mm, 25mm and 32mm dia concealed in walls and ceilings, jointed using solvent cement fittings with metal inserts suitable for working pressure.

6.29.2. The pipes shall be tested at 10 kg/cm² hydrostatic pressure for specified duration. Chases shall be filled with cement mortar and finished flush.

6.30. ASTM Schedule 80 Pipe - Well to OH Tank

Providing and laying 50mm dia ASTM Schedule 80 pipe from well to overhead tank through trench and duct, including fittings, clamps, supports at 60cm interval, jointing, testing and commissioning complete.

10. GULLY TRAPS & MANHOLES

6.31. Gully Trap

Providing and constructing gully trap of 160mm inlet and 200mm outlet complete with excavation, PCC bed, brick masonry chamber in cement mortar, internal plastering with waterproof cement mortar, CI grating, backfilling and disposal of surplus earth complete.

6.32. Manholes

Providing and constructing 45cm x 45cm manholes up to 1 metre depth including excavation, PCC base, brick masonry in cement mortar, internal plastering with waterproof compound, benching, curing, backfilling and testing complete.

6.33. FRP Manhole Covers

Providing and fixing ISI marked FRP manhole covers and frames of 25-ton load bearing capacity embedded in cement concrete, complete in all respects.

11. PIPE SUPPORTS & CORE CUTTING

6.34. Pipe Supports

Providing and fixing pipe supports fabricated from G.I. slotted channels with 12mm dia adjustable threaded rods, anchor fasteners and U-clamps capable of carrying operational loads of pipes and fluids, properly aligned and fixed at specified intervals.

6.35. Core Cutting

Providing labour for core cutting in RCC slabs/beams for pipes of specified diameters including sealing of gaps with approved waterproof compound and finishing complete.

12. TESTING OF GI PIPES:

6.36. All pipe lines shall be tested hydraulically to pressure of 7 kg/Sq.cm for a minimum period of 24 hours for check for leakage.

6.37. The pipe line in chase or under floors/ground shall be covered up only after the testing is carried out satisfactorily and passed by Architect/Site Engineer.

6.38. The instrument, equipment and water for testing shall be arranged by the contractor without extra charges. (i.e. Hydraulic testing machine with pressure gauge)

6.39. A test register shall be maintained by the Site Engineer and all entries shall be signed and dated by contractor, Architect and Site Engineer.

6.40. **Insulation:** 24 Hot water lines in chases shall be provided with 20 mm thick insulation by wrapping 6 mm dia asbestos rope and finishing with a coat of 85% magnesia.

6.41. Approval of layout of GI pipes and position of fixtures at site: The contractor shall mark the location of all fixtures and fittings and layout of GI pipes on the terrace walls/ ground at site and take approval of Site Engineer/Architect before commencement of cutting chases for GI pipes within the building and digging trenches outside the building.

13. ACCESSORIES& PUMPS

6.42. Robe Hooks & Soap Dishes: Providing and fixing robe hooks and soap dishes complete with screws, wall plugs and proper alignment.

6.43. Water Level Float Switch: Providing and fixing automatic water level float switch system for overhead tank complete with wiring, float sensors, testing and commissioning.

6.44. Sewage Submersible Pump: Supply, installation, testing and commissioning of sewage submersible pump having minimum discharge of 120 LPM at 10m head, including delivery pipe, clamps, fittings, electrical connections and testing complete.

6.45. Open well Submersible Pump: Supply, installation, testing and commissioning of open well submersible pump having minimum discharge of 150 LPM at 30m head, including foot valve, clamps, fittings, testing and commissioning complete.

14. TESTING:

6.46. HCI soil and waste and vent pipes. These shall be tested to hydraulic test of 8 mtr. head.

6.47. The joints of CI pipes coming under floors/walls shall be covered up only after testing is carried out satisfactorily and passed by Project Engineer/Architect.

6.48. For SWG pipes test as indicated in particular specification part III shall be carried out.

6.49. A test register shall be maintained which shall be signed and dated by Contractor, Architect and the Site Engineer.

6.50. Approval of layout of waste/soil/GI/CI/SWG pipes, Floor traps, gully traps and manholes. The contractor shall mark the location of these pipes, floor traps, gully trap and MH on floors/walls/ ground at site and take approval of Project Engineer/ Architect before commencement and cutting of holes in walls, digging of trenches and laying of pipe lines. Record of these approvals should be recorded in a register and kept in Project Engineer's office.

15. CI MH covers for UGT:

Manhole covers and frame for UGT shall be of CI. These shall be embedded in cement concrete slabs/brick works as shown on drawings. These shall be of medium duty, the weight of the same is mentioned in schedule of quantities.

16. FITTINGS

6.51. Fittings shall conform to the same Indian Standard as for pipes. Contractor shall use pipes and fittings of matching specifications.

6.52. Fittings shall be of the required degree of curvature with or without access door of rear, LH or RH .

SEC.XIV - CONSTRUCTION OF STRONG ROOM AND WINDOW GRILL

BIS certified (labeled) Strong Room Door of class B, as per BIS specifications is to be constructed for Kozhikode Main branch as per the architectural drawing.

1. WALLS

Walls of strong room shall be of reinforced concrete of grade minimum M20 (1:1.5:3) and shall be of minimum thickness 300 mm. The reinforcement shall be of mild steel rods of minimum 12 mm diameter placed vertically and horizontally at 150 mm c/c distance to form mesh and two meshes shall be at every 75 mm c/c in cross section. An opening of 182 X 274 cm should be provided for erecting strong room door. An RCC platform of 6" height should be provided in the opening. The reinforcement from the walls should project to the opening at a length of 6". Strong room door will be provided by the bank and placed in position by the supplier's technician. The door space of the strong room should be fixed in such a way that the direct view from customers' area to the inner side of the strong room is restricted. Air holes should be provided as per the direction of our architect.

2. ROOF AND FLOOR

Roof and floor shall be reinforced concrete of grade minimum M20 and of minimum 300 mm thickness. The reinforcement shall be minimum 12mm diameter mild steel rods placed both ways at 150mm c/c to form mesh. The number and diameter of the rods shall vary if span and thickness of floor is increased. The reinforcement shall be checked and certified by bank officials/panel engineer before concreting.

3. TECHNICAL SPECIFICATIONS FOR BIS LABELLED, CLASS B,STRONG ROOM DOOR WITH AIR VENTILATOR EXHAUST FAN & CAGE

BIS certified (labeled) Strong Room Door of class B, as per BIS specifications given in IS11188 (Part1):2014 to be supplied and installed for the strong room. Minimum dimensions and other technical specifications for class B Strong Room door should be as follows:

Sr. No.	Particulars	Dimensions / Details
1	Door Type	Class B
2	Overall Dimension of Doors - Height (H)	Max 2300 mm, Min 2100 mm
3	Overall Dimension of Doors - Width (W)	Max 1400 mm, Min 1250 mm
4	Inside Dimension / Clear Opening at 180° - Height (H)	Minimum 1950 mm
5	Inside Dimension / Clear Opening at 180° - Width (W)	Minimum 900 mm
6	Number of Locks	2
7	Shooting Bolts on Hinge Side (Minimum)	6
8	Shooting Bolts on Opposite Side (Minimum)	6
9	Shooting Bolts on Top (Minimum)	-
10	Shooting Bolts at Bottom (Minimum)	-
11	Diameter of Shooting Bolts (Minimum)	38 mm

Sr. No.	Particulars	Dimensions / Details
12	Depth of Engagement of Shooting Bolts (Minimum)	15 mm

4. STRONG ROOM (VAULT) DOOR - ADDITIONAL REQUIREMENTS

4.1. Ventilating Grill Gate:

4.1.1. A ventilating grill gate shall be hinged to the Strong Room door frame to open inward.

4.1.2. The grill gate shall be made of mild steel angles, plates, or channels with mild steel rods welded into a rigid frame.

4.1.3. An unpickable dual-control locking device, operable from both sides of the door, shall be fitted on the grill gate.

4.2. **Shooting Bolt Mechanism:** The shooting bolt mechanism of the Strong Room door shall be controlled by two high-precision dual-control unpickable special-key locks of minimum 8 levers in case of Class B.

4.3. **Locking Mechanism Provision:** The locking mechanism, shooting bolt mechanism, and construction of the Strong Room door shall be designed to facilitate the provision and fixing of a time lock at any later date.

4.4. **Certification by BIS:** The Strong Room doors shall be certified by the Bureau of Indian Standards (BIS) as Class B.

4.5. Each Strong Room door shall bear a metallic BIS Label containing the following information

- a. Manufacturer's / Brand Name
- b. Class & Rating of Strong Room (Vault) Door, i.e., Class B; TRTL30FR 30
- c. Serial Number of the door
- d. Year of manufacturing of Strong Room door
- e. The ISI mark of BIS (along with the Standards No. of BIS)
- f. The CML Number allotted by BIS to the Manufacturer

5. TECHNICAL SPECIFICATIONS FOR AIR VENTILATOR, EXHAUST FAN & CAGE

5.1. Air ventilator of class B (as per BIS specifications given in IS 14387:2005), exhaust fan and cage shall be supplied along with the Strong Room Door

5.2. The minimum dimensions and other technical specifications for the Air Ventilator should be as follows:

Sr. No.	Particulars	Specification / Dimensions (mm)
1	Vault / Strong Room Class	Class B
2	Overall Dimensions of Air Ventilator	
2a	- Height (H) - Minimum	410

Sr. No.	Particulars	Specification / Dimensions (mm)
2b	- Width (W) - Minimum	410
2c	- Depth (D) - Minimum	300
3	Inside Dimensions of Air Ventilator	
3a	- Height (H) - Minimum	300 ± 25
3b	- Width (W) - Minimum	300 ± 25
4	Thickness of Outer Slab	22
5	Thickness of Oxy-Acetylene Torch Resisting Material in Outer Slab (Minimum)	5
6	Thickness of Inner Slab / Plate (Minimum)	10
7	Thickness of Vestibule Frame (Minimum)	5
8	Thickness of Fire Insulating Material	5
9	Burglary Resistance (Minimum)	20 Minutes

SECTION XIV - EXTERNAL WATER SUPPLY & GARDEN HYDRANT SYSTEM

1. SCOPE OF WORK:

Work of external water supply shall consist of furnishing all labor, material, equipment and appliances necessary and required to install complete external water supply from water supply main of Local Authority up to UG tank and from UGT to OH tanks at terraces. Providing and installation of garden hydrant system including provisioning and installation of pumping sets and pipe connections within the pump house including all control valves, masonry chambers, etc.

2. SAMPLES OF MATERIALS:

The contractor shall produce samples of all materials and shall obtain approval to these in writing from Architect/Site Engineer before he places bulk order for the materials for incorporation in the works. Materials to be incorporated in the work shall conform to latest relevant ISI marked goods where manufactured.

3. APPROVAL OF LAYOUT:

The layout of all external water supply lines including valves and chambers shall be marked out on the site and get approved from the Architect/Site Engineer before execution and also before laying of pipe lines.

4. G.I. PIPES

4.1. MATERIAL

4.1.1. All pipes, fittings, accessories etc. to be incorporated in the work shall be of standard quality strictly (complying with the current appropriate Indian Standard Specifications) conforming to IS 1239(Part I of 1979) and IS 1239 (Part II of 1969) and ISI marked

4.1.2. Water supply tubing, fittings and accessories shall be of galvanised steel. The galvanized steel pipes shall be screwed and socketed of medium grade and manufactured by Jindal Hissar, Prakash and ISI marked.

4.1.3. Fittings shall be of Malleable iron galvanised, ISI marked and of approved make.

4.1.4. Ferrule shall be brass 20mm or of required dia of Leader make with shut off arrangements.

4.1.5. Cast iron bell mouth cover for protection of ferrule shall be provided. M.S. addles of suitable size shall also be provided.

4.2. WORKMANSHIP

4.2.1. **Trenches:** The width and depth of trenches for different diameter of GI/CI pipes shall be as under:-

Pipe Type	Diameter of Pipe	Width of Trench	Depth of Trench
G.I. Pipes	15 to 50 mm	30 cm	60 cm
G.I. Pipes	Exceeding 50 mm but not exceeding 100 mm	45 cm	75 cm
C.I. Pipes	80 mm to 150 mm	55 cm	1 m
Note: At joints the width of trench shall be widened where necessary.			

4.2.2. **Cutting and Threading:** Where pipes have been cut or re threaded the ends shall be carefully filed out so that no obstruction to flow is offered. The ends of pipes shall then be carefully threaded, in such a manner as will not result in slackness of joints.

4.2.3. **Jointing:** G.I. pipes shall be jointed with screw and socketed joints using screwed fittings. All screwed joints, both internal and external shall be examined before jointing to ensure that the threads are perfect for the full depth of the joints. The jointing work shall be so arranged in case of every joint that the two ends of the pipe or special jointed thereby shall be equidistant from the middle of the socket and shall have a space of not more than 3mm between them in center of socket. Teflon tapes instead of conventional white lead and yarn is more effective and nearer. A paste of white lead shall be lightly smeared over the threads to act as lubricant and to make up for imperfections in the threads when the pipes are screwed up. A few strands of fine yarn of thread wrapped round the screwed end. The pipes shall be screwed up tightly with pipe fitters tongs or pipe wrenches to ensure that each and every joint shall be perfectly water tight.

4.2.4. **Protection:** GI pipes below ground shall be protected against corrosion by the application of two coats of bitumen paint covered with polythene tape and a final coat of bitumen paint.

4.2.5. **Trench filling of GI pipes:** The pipes shall be laid on layer of 10 cm sand and filled up to 15 cm above the pipes. The remaining portion of the trench shall then be filled with excavated earth & the surplus earth shall be disposed off as directed with in the UNION BANK OF INDIA plot.

4.2.6. **Ferrule connection:** Ferrule connection shall be inclusive of necessary excavation, boring a hole in cast iron/mains, tapping it, providing necessary saddles, and bailing out of water.

4.2.7. **Testing of GI pipe line:** On completion, the GI pipe line shall be tested to a hydraulic pressure of 7 kg/sqm(70 meter). Pressure shall be maintained for a period of two hours without drop. Any joint found leaking shall be redone and all leaking pipes removed and replaced. Testing shall be done before the trenches are refilled. The contractor shall arrange all the equipments required for testing and rate quoted shall be deemed to be inclusive of this cost.

4.2.8. **Test Register:** A test register shall be maintained by Site Engineer and tests shall be recorded in it. The entries shall be signed and dated by

Architect, Site Engineer and Contractor. This register shall be handed over to the Site Engineer on completion of work.

4.2.9. **Measurement:** GI pipes shall be measured per linear meter (to the nearest centimeter) and shall be inclusive of all fittings, earth work, pipe protection and other items as specified.

5. C.I. PIPES

5.1. MATERIAL

5.1.1. **Cast iron pipes:** The cast iron spun pipes shall be spigot and socket conforming to IS-1536-1976. These shall be centrifugally cast of class LA suitable for Tyton joints.

5.1.2. **Cast iron specials:** The Cast iron specials shall be spigot and socket or flanged as required and conforming to IS-1538-1976.

5.1.3. **Caulking Lead:** Pig lead and lead/wood shall comply with IS-782-1978.

5.1.4. **Rubber Gasket:** Rubber gasket for tyton joints shall be of approved quality and of Orient make for flanged joints shall comply with IS-5382-1969 and shall be of thickness between 1.5mm to 3mm.

5.2. Workmanship:

5.2.1. Trenches

5.2.1.1. Width of the trenches at bottom shall be as per para herein before above the nominal dia of the pipe plus 40cm, but it shall not be less than 55 cm. Additional width shall be provided at position of sockets and flanges for jointing to be made properly. The required depth to be excavated at any point of the trench shall be regarded as directed by the Project Engineer/Architect. The depth of the trench shall not be less than 1.0m measured from the top of the pipe to the ground under roads and not less than 0.75m elsewhere. Contractor shall not be entitled for any extra payment if he makes the trench width more than specified above for any reason.

5.2.1.2. The bottom of trench excavations shall be carefully prepared so that the barrels of the pipes when laid are well bedded for their whole length on firm ground and are true to line and gradient. Joint holes shall be made to such dimensions as will allow the joints to be conveniently made and thoroughly caulked.

5.2.1.3. **Detection of cracks in pipes:** All pipes and fittings shall be inspected carefully before being laid. Broken or defective pipes shall not be used and removed from the site of work. Pipes shall be rung with a light hammer preferably while suspended to detect cracks. If doubt persists, confirmation may be obtained by pouring a little paraffin of the inside of the pipe at the suspected spot; if a

crack is present, the paraffin seeps through and shows on the outer surface.

5.2.1.4. **Preparing Pipes:** The pipe shall be carefully cleared of all foreign matter before laid. They shall be thoroughly brushed out internally with a well fitting hard brush and after laying, the open end shall be temporarily plugged to preventing ingress of water, soil etc. Precautions shall be taken to prevent flotation of the plugged pipes, should the trench become flooded.

5.2.2. Laying of pipes:

5.2.2.1. Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the line. If the pipe cannot be laid without earth entering it, a heavy, tightly woven canvas bag of suitable size shall be placed over each end and left there until the connection is to be made to the adjacent pipe. During laying operation no tools, clothing or other materials shall be placed in the pipe.

5.2.2.2. Laying of pipes shall always proceed up grade of a slope if the pipes have spigot and socket joints, the socket ends shall face upstream. In the case of pipes with joints to be made with loose collars, the collar shall be slipped before the next pipe is laid.

5.2.2.3. While laying pipes, the trenches shall be kept free from water until the material in the joints hardens. Walking or working on the completed pipe line shall not be permitted until the trench has been backfilled to a height of at least 30cm over the pipes.

5.2.2.4. After placing a length of pipe in the trench, the spigot end shall be centered in the socket and the pipe forced home and aligned to gradient. The pipe shall be secured in place with approved backfill material tamped under it except at the socket.

5.2.2.5. When pipe laying is not in progress the open ends of pipe shall be closed by a water tight plug.

5.2.3. Cutting of pipes:

The cutting of pipes for inserting valves fittings shall be done in a neat and workman like manner without damage to the pipe so as to leave a smooth end at right angles to the axis to the pipe. Pipes shall be cut with a ring cutter and not with chisels.

5.2.4. Jointing of pipes:

5.2.4.1. Spigot and socket joints of CI pipe shall be with tyton joints, but the joint of these CI pipes with specials shall be lead caulked joints.

5.2.4.2. Run lead joints: The spigot shall be centered in the adjoining socket by tightly caulking in sufficient turns of tarred gasket or hemp yarn to leave unfilled half the depth of socket for lead. When gasket or hemp yarn has been caulked tightly home, a jointing ring shall be placed round the barrel against the faces of the socket. Molten pig lead shall then be poured into fill the remainder of the socket. The lead shall then be solidly caulked with suitable tools and hammers of not less than 3 kg. weight, right round the joints to make up for the shrinkage of the molten metal on cooling and shall be preferable dry before run lead joints are made, otherwise blow holes may occur in the lead.

5.2.4.3. The lead shall be heated to proper temperature so that when stirred it will show a rapid change of colour. Before pouring, all scum shall be removed. Each joint shall be made in one continuous pouring. Care shall be taken that no dross enters the joints. Spongy or imperfectly filled joints shall be burnt out and re-poured.

5.2.4.4. The joint runner shall fit snugly against the face of the socket and the outside of the pipe shall be dammed with clay to form a pouring lip to provide for filling the joint flush with the face and to the top of the socket.

5.2.4.5. Any deviation either in plan or elevation less than 11 1/4 deg. shall be effected by laying the straight pipes round a flat curve such each radius that the minimum thickness of lead at the face of socket shall not be reduced below 6mm or the opening between the spigot and socket increased beyond 12mm at any point. A deviation of about 2-1/4 deg. can be effected at each joint this way.

5.3. The quantity of lead and spun required for different size of pipes shall be as under:

Nominal Size of Pipe	Lead per Joint	Depth of Lead per Joint	Spun Yarn per Joint
80 mm	1.8 kg	45 mm	0.1 kg
100 mm	2.2 kg	45 mm	0.18 kg
150 mm	3.4 kg	50 mm	0.20 kg
250 mm	6.1 kg	50 mm	0.25 kg

5.4. Inspection and Testing

5.4.1. Inspection of pipes and fittings: The pipes and fittings shall be inspected on site before laying and shall be sounded to disclose cracks. Any defective items shall be clearly marked as rejected and forthwith removed from the site.

5.4.2. Testing of pipe lines: After laying and jointing, the pipe line shall be tested in sections as the work of laying proceeds, before testing the trench shall be partly backfilled. The joints shall be kept fully exposed for inspection during testing. The pipe line shall be slowly and carefully charged with water so that all air is expelled from pipe line by providing a 25mm inlet with a stop cock and then allow to stand full of water for two days and then tested under pressure. The test pressure shall be 6 kg/cm. The pressure shall be applied by means of a manually operated test pumps. Pressure gauge shall be accurate and shall preferably be calibrated before test. The test pump having been stopped the test pressure shall maintain itself without measurable loss for at least half an hour. If any leakages are observed then the joint shall be redone and cracked pipe if any shall be replaced and the complete test shall be repeated till satisfactory results are obtained. The record of the test shall be maintained in a register jointly signed by contractor, Architect and Site Engineer indicating the section of the pipe line tested test pressure maintained, date and time of the test. The instruments, equipments, equipment and water for testing shall be arranged by the contractor. The rates quoted against the respective items of CI pipes and specials shall be deemed to be inclusive of the cost of testing.

5.4.3. Disinfection of CI/GI pipe lines: All CI/GI pipe lines shall be disinfected by flushing with water containing bleaching powder at 0.5gm per litre of water and cleaning the same with fresh water, operation to be repeated three times including getting the samples of water from the disinfected main tested in the municipal laboratory. Cost of disinfecting the CI/GI pipes shall be deemed to be included in the rates quoted against the respective items of pipes in Schedule 'A' Part II.

5.4.4. Measurement: All CI pipe lines shall be measured (without any allowance of cutting and waste) as laid including fittings and specials such as bends junctions and tail pieces near sluice valves etc. Length shall be measured along the centre line of the pipes and fittings. Pipe fittings and specials like bends junctions, tail pieces and joints shall not be measured separately. The cost of these shall be deemed to be included in the quoted rates, against the respective item of pipes in Schedule 'A' part II.

6. Full way valve:

The full way valve shall be of heavy gun metal with cast iron wheel conforming to IS-778-1971 class I of leader make ISI marked and of sizes as specified.

7. Sluice valve:

Sluice Valves 80mm and above dia shall be cast iron double flanged with non rising spindle. Sluice valves below ground shall be provided with caps suitable for operations by a key, Sluice valves shall conform to IS-780 class -I and tested to 10kg/sq.cm (100 meter head). The fixing of the valve shall be done by means of bolts and nuts and 3mm thick rubber insertions with the flanges of spigot and the socketed tail piece drilled to the same specifications. In case of S&S pipes tail pieces jointed to line by means of lead caulked joints and with flanges in case of flanged pipes.

8. Butterfly Valves:

Valves 50mm dia and above shall be cast iron butterfly valve to be used for isolation and/or flow regulation. The valves shall be bubble tight, resilient seated suitable for flow in either direction and seal in both direction. Butterfly valve shall be of best quality conforming to IS: 13095.

9. Non Return Valve:

Where specified non return valve (swing check type) shall be provided through which flow can occur in one direction only. It shall be single door swing check type of best quality conforming to IS: 5312.

10. Testing:

All pipes, fittings and valves, after fixing at site, shall be tested by hydrostatic pressure of 1.5 times the working pressure or 14 kg/sqcm whichever is more. Pressure shall be maintained for a period of at least thirty minutes without any drop. A test register shall be maintained and all entries shall be signed and dated by Contractor(s), Site Engineer and Architect.

11. Ferrules:

The ferrules for connection with CI main shall generally conform to IS: 2692-1969 and ISI marked. It shall be of non ferrous material with a CI bell mouth cover and MS saddles and shall be of nominal bore as specified. The ferrule shall be fitted with a screw and plug or valve capable of completely shutting off the water supply to the communication pipe if and when required. (Leader make)

12. Masonry Chambers and Covers:

For material and workmanship masonry chambers and covers respective items of particular specification part I-A shall be followed.

13. PVC Pipes & Fittings

13.1. Garden hydrant mains shall be rigid uPVC pipes conforming to IS:4985 of class specified. If class is not mentioned in the schedule of quantities the same shall be class IV (10 kg. /Sq.cm).

13.2. Fittings for UPVC pipes shall be injection moulded fitting with spigot & sockets suitable for solvent weld joints. Fittings must have suitable provision for expansion.

13.3. Solvent shall be of make and type approved by pipe and fittings manufacturer. Joint shall be made in an approved manner as recommended by the manufacturer.

13.4. Provide uPVC flanges at intervals of 20-25 m. for all pipes 65 mm dia and above.

13.5. Provide suitable uPVC to thread adaptor for connection between pipes & valves.

13.6. Provide cement concrete supports and anchor blocks at all bends, tees and other locations as directed by Site Engineer. Connections at garden hydrant outlet, near valves must also be anchored.

14. G.I. Pipes & Fittings

Vertical connection for garden hydrant points shall be galvanised steel tubes to IS : 1239 (medium class) with matching malleable iron fittings of approved make.

15. Garden Hydrants:

Garden hydrants shall be 25 mm dia gunmetal valves installed on G.I. pipes as per details.

16. Valves

16.1. Valves 65 mm dia and below shall be heavy gunmetal globe valves conforming to I.S. 778 class I. Valves shall be tested at manufacturer's works and the same stamped on it.

16.2. Valves 80 mm dia and above shall be C.I. Double flanged sluice valves with non rising spindle to IS: 780. Each sluice valve shall be provided with wheel in exposed positions and cap top for underground valves. Contractor shall provide suitable operating keys for sluice valves with cap tops.

17. Trenches

All pipes below ground shall be laid in trenches with a minimum cover of 100 cms. The width and depth of the trenches shall be as follows:

Diameter of Pipe	Width of Trench	Depth of Trench
15 mm to 50 mm	30 cm	100 cm
65 mm to 100 mm	45 cm	100 cm

18. Testing

All pipes, fittings and valves, after fixing at site, shall be tested by hydrostatic pressure of 7 kg/sq.cm or 1.5 times the working pressure, whichever is higher. Pressure shall be maintained for a period of at least thirty minutes without any drop. A test register shall be maintained and all entries shall be jointly signed and dated by Contractor(s), Site Engineer and Architect.

18.1. In addition to the sectional testing carried out during the construction, Contractor shall test the entire installation after connections to the pumping system. He shall rectify all leakages and shall replace all defective materials in the system. Any damage done due to carelessness, open or burst pipes or failure of fittings, to the building, furniture and fixtures shall be made good by the Contractor during the defects liability period without any cost.

18.2. After commissioning of the water supply system, Contractor shall conduct performance test to ensure that the system operates as specified. The test shall be conducted over a period of 15 days.

19. MEASUREMENT

19.1. **Pipes:** Pipes shall be measured per linear meter (to the nearest cm) and shall be inclusive of fittings, e.g. couplings, tees, bends, elbows, unions, deductions for valves shall be made. Rates quoted shall be inclusive of all fittings.

Excavation, back filling & disposal of surplus earth shall be paid by volume per cubic meter. Gunmetal, cast iron valves and masonry chambers shall be paid by numbers.

20. PUMPS & ALLIED PIPING

20.1. Scope of work:

The work shall consist of furnishing all labor, materials, equipment and appliance necessary and required to completely install electrically operated and Diesel operated pumps as specified hereinafter or given in the Schedule of Quantities. Without restricting to the generality of the foregoing, the pumps and ancillary equipment all include the following:

20.1.1. (i) Electrically operated pumping set

- (a) Electrically operated pumps with motors, base plates and accessories.
- (b) All accessories wiring and connections, with panel board including provisioning & fixing of panel boards.
- (c) Pressure gauges with isolation valves and piping bleed and block valves.
- (d) M.S. and G.I. pipes, valves, suction strainers, suction and delivery headers and accessories.
- (e) Foundations, Vibration eliminator pads and foundation bolts.

20.1.2. (ii) Diesel Engine operated pumping set:

This shall be complete all as per (i) above, but with diesel engine of suitable Horse Power.

20.2. General Requirements:

20.2.1. Pumps shall be installed true to level on suitable concrete foundations, base plate shall be firmly fixed by foundation bolts properly grouted in the concrete foundations.

20.2.2. Pumps and motors shall be truly aligned by suitable instruments.

20.2.3. All pump connections shall be standard flanged type with appropriate number of bolts. In case of non standard flanges, companion flanges shall be provided with the pumps.

20.2.4. Manufacturer's instructions regarding installation connections and commissioning shall be followed with respect to all pumps and accessories.

20.2.5. Contractor shall provide necessary Test Certificates and performance Charts with NPSH requirement of the pumps from the manufacturer. The Contractor shall provide facilities to the Engineer of his Authorized representative for inspection of equipment during manufacturing and also to witness various tests at the manufacturer's Work without any cost to the Owner.

20.2.6. Each pump shall be provided with a 150mm dia. pressure gauge, isolation cock and connecting piping, bleed and block valve.

20.2.7. Provide vibration eliminating pad and connectors for each pump.

20.2.8. The contractor shall submit with this Tender a List of recommended spare parts for two years of normal operation and quote the price for the same.

21. Water Supply Pumps

Pumps for Hydro-pneumatic system shall be of variable speed and of vertical multistage centrifugal type with stainless steel SS 304 stage casing and SS 304 impellers with stainless steel SS 316L shaft as per IEC standards and GJL 250 cast iron suction and discharge casing connected to TEFC ventilated induction bottom of motor of pole, 2900 Rpm, suitable for 400 volts 3 phase, 50 Hz AC supply. The system shall also include FRP composite construction lined pressure vessels of required capacity, control panel with details as specified in bill of quantities, pressure switches, non-return valve, etc.

22. Sump Pumps:

22.1. Sump pumps shall be vertical drainage wet pit type for muddy water. Pump shall be grease lubricated and shall have ample supporting arrangement for suspension from sump top slab. The suspension shall be as given in the Schedule. The impeller shall be cast iron with open vane suitable for handling solids up to 38mm dia.

22.2. The pump shall have capacity of delivering 150 L.P.M. to delivery head of 7 meters including suction left of 10 meter.

23. Vibration Eliminators:

Provide on all suction and delivery lines double flanged reinforced neoprene pipe connectors. Connectors should be suitable for a working pressure of each pump and tested to the test pressure given in the relevant head. Length of the connector shall be as per Manufacturer's details. Flexible connectors shall be as manufactured by Reley Corporation, New Delhi.

24. Piping:

24.1. Pipes for water supply services shall be galvanised steel tubes to IS:1239 (Class mentioned in Schedule of Quantities). The fittings and flanges shall be mild galvanised iron.

24.2. Full-way valves and check valves above 65mm dia. shall be CI double flanged conforming to IS :780 (Class -I) manufactured by Leader or Zoloto.

24.3. Full-way and check valves 65mm dia and below shall be gunmetal. Seat tested to 20 kg/ sq.cm. pressure (Leader or CG make certified and conforming to IS:778 (Class I)).

24.4. Suction strainer or foot valves shall be gunmetal.

24.5. Joints:

- i) M.S. pipes shall be double welded with electric arc welding.
- ii) All GI pipes and fittings shall be provided with screwed joints.

25. Testing:

All GI piping work in pump house shall be tested hydrostatically for a period of two hours to a pressure or 1.5 times the working pressure without drop in pressure.

SECTION XIV - EXTERNAL SEWERAGE & STORM WATER DRAINAGE

1. SCOPE OF WORK

1.1. Work under this section shall consist of furnishing all labor, materials, equipment and appliances necessary and required to completely install the sewerage system as specified hereinafter shown in the drawings and given in the schedule of quantities.

1.2. Work of external sewerage shall start from the first manholes of size as shown in Drawings

2. GENERAL REQUIREMENTS

2.1. All materials shall be of the best quality conforming to specifications and subject to the approval of the Site Engineer/Architect.4. All sewerage work shall be done in accordance with the local bye laws.

2.2. The layout of all pipe lines, manholes, Catch Basins/Road Gully Chambers and their locations as shown in the drawings shall be marked out on site with relative levels and got approved from the Architect / Site Engineer before excavation and also before laying of the pipe -lines.

2.3. Excavation for manholes, Catch Basins/Road Gully Chambers shall not be measured separately and shall deem to be included in the rates quoted for the construction of manholes including extra depths where required. This shall also be inclusive of disposal of surplus soil within UNION BANK OF INDIA plot as directed by Site Engineer/Architect.

2.4. All excavation for laying of pipe lines marked external shall be measured and paid separately as provided in schedule of quantities. The rate for excavation shall be deemed to include filling back where necessary and disposal of surplus soil within UNION BANK OF INDIA plot as directed by Site Engineer/ Architect.

2.5. Width of the trench for 100/150mm dia SWG pipe at the bottom of the trench and width of bed concrete shall be 55cms and for 250mm dia SWG pipe it shall be 70cms. No extra payment shall be admissible for width excavated greater than the specified.

3. SALT GLASED STONE WARE PIPES

3.1. Stone ware pipes shall be of first quality salt glazed and free from rough texture inside and outside and straight. All pipes shall have the manufacturers name marked on it and shall comply to IS-651-1980. Approved makes are PERFECT/ANAND makes. Pipes are liable to be damaged in transit and not withstanding tests they may have been damaged before dispatch, each pipe shall be examined carefully on arrival at site. Each pipe shall be rung with a wooden hammer or mallet and those do not ring and clear shall be rejected.

4. LAYING AND JOINTING OF SWG PIPES

4.1. The pipes shall be laid with sockets leading uphill and should rest on 15cm thick 1:5:10 (1 cement : 5 coarse sand: 10 stone aggregate 40 mm graded) cement concrete bed foundation for the full length of the barrel. Socket holes shall be formed in the foundation sufficiently deep to allow the pipe as short as practicable to admit the socket and allow the joint to be made.

4.2. Tared gasket shall first be wrapped round the spigot of each pipe and the spigot shall then be placed into the socket of the pipe previously laid. The pipe shall then be adjusted and fixed in its correct position and the gasket caulked tightly so as to fill not more than one quarter of the total length of the socket. The remainder of the socket shall be filled with a stiff mixture of cement mortar 1:1 (1 cement: 1 clear sharp wash sand). When the socket is filled fillet should be formed round the joint with a trowel forming an angle of 45 degree with the barrel of pipe. The mortar shall be mixed as needed for immediate use.

4.3. After the joint has been made by any extraneous spout shall be removed from inside the joint with a suitable scrapper or badger. The newly made joint shall be protected until set, from the sun, drying winds, rains or dust. The joint shall be left exposed and space left round the pipes for inspection by the Site Engineer/ Architect. The inside of sewer must be left absolutely clear in bore and free from cement mortar or other obstructions through out its entire length and should efficiently drain and discharge.

5. TESTING:

5.1. All length of the sewer shall be fully tested for water tightness by means of water pressure maintained for not less than 30 minutes. Testing shall be carried out from manholes. All pipes shall be subjected to a test pressure of at least 1.5 meters head of water at the highest point of the section under test. In long lengths the test pressure shall not exceed 6 meters head at any point. The pipe shall be plugged preferably with standard drain plugs with rubber plugs on both ends. The upper end shall, however, be connected to a pipe for filling with water and getting the required head.

5.2. Sewer line shall be tested for straightness by:-

5.2.1. Inserting a smooth ball 12mm less than the diameter of the pipe. In the absence of obstructions such as yarn or mortar projecting at the joints the ball should roll down the invert of the pipe and emerge at the lower end.

5.2.2. Means of a mirror at one end and at the other end, if the pipe line is straight the full circle of light will be seen other wise obstruction or deviation will be present.

5.2.3. The contractor shall give a smoke test to the drains and sewer at his own expense and carry out changes if directed by the Site Engineer/ Architect.

5.2.4. A test register shall be maintained which shall be signed and dated by the contractor and Site Engineer/ Architect and shall be handed over to Site Engineer on completion of work.

5.2.5. No payment for testing the sewer lines for water tightness and straightness as stated above shall be admissible. The rates quoted for the items of "Providing and laying stoneware pipes" shall be deemed to include the cost of testing the pipe lines.

6. PCC IN ENCASING AND HAUNCHINGS:

6.1. The bed concrete and the concrete for haunches and encasing of SWG Pipes shall be of mix 1:5:10 (1 cement :5 coarse sand :10 graded stone aggregate 40mm nominal size) and shall be laid to the dimensions as shown on drawings. The pipes with their crown level at 1.20 m depth and less from ground shall be covered with 15 cm thick concrete above the crown of the pipe and sloped off to meet the outer edges of the concrete to give a minimum thickness of 15 cm all around the pipe. Pipe laid at a depth greater than 1.2 m at crown shall be concreted at the sides up to the level of the centre of the pipe and sloped off from the edges to meet the pipe tangentially.

6.2. Measurement: For providing, laying and jointing of SWG pipes measurements shall be recorded for the finished length of the pipe line i.e. lengths between manholes shall be recorded from inside of one manhole to the inside of other manhole.

6.3. Refilling: After the sewer or other work has been laid and tested and passed by Site Engineer/Architect as per para 13 above, the trench or other excavation shall be refilled. Utmost care shall be taken in doing this, so that no damage shall be caused to the sewer and other permanent work. The filling in the haunches and up to 75 cms above the crown of the sewer shall consist of the finest selected materials placed carefully in 15 cms layers and flooded and consolidated. After this has been laid, the trench and other excavation shall be refilled carefully in 15 cms layers with materials taken from the excavation, each layer being watered to assist in the consolidation unless the Site Engineer/Architect otherwise direct.

7. MANHOLES:

7.1. Manholes shall be constructed as per the details indicated in the drawings. Foundation concrete shall be PCC 1:4:8 (1 Cement: 4 coarse sand: 8 graded stone aggregate 40mm nominal size). Side walls shall be with brick of class designation 75 in cement and coarse sand mortar 1:4. Inside of the manholes shall be plastered, 12mm thick with cement mortar 1:3 (1 cement :3 coarse sand) with a floating coat of neat cement and external plaster 12mm thick with cement mortar 1:6 (1 cement :6 fine sand) PVC rungs heavy duty shall be embedded in PCC blocks of mix 1:3:6 (1 cement: 3 coarse : 6 graded stone aggregate of 20mm nominal size) in manholes exceeding 700mm depth concrete in benching and channels shall be PCC 1:2:4 mix (1 cement :2 coarse sand :4 graded stone aggregate 20mm nominal size) trowelled smooth using extra cement. All junctions and changes in directions in PCC channels shall be formed by smooth curve. The benching shall have slopes of 10 cm towards the channel. The depth of the channel shall be the full diameter of the pipe. The manholes frames and covers shall be of steel fibre reinforced concrete (medium duty with clear opening 560mm dia) Thickness of frame should be 130mm and thickness of cover 80mm and conforming to IS-12592.

7.2. Measurement: All manholes shall be measured by numbers and shall include cost of all items specified above and necessary excavation, refilling and disposal of surplus earth.

7.3. Manholes with depths greater than specified under the main item shall be paid for under "Extra Depth" and shall include all items as given for manholes. Measurement shall be done to the nearest cm Depth of the manhole shall be measured from top of the manholes cover to bottom of channel.

8. STORM WATER DRAINAGE: EXCAVATION AND BACK FILLING

8.1. Trenches: The width and depth of trenches for different diameter of SWG and RCC pipes shall be as under:

8.1.1. Width of trenches at bottom up to 150mm diameter shall be 550 mm and for the above diameter from 150 mm dia width of trench shall be nominal dia of pipe plus 400 mm. Additional width shall be provided at the position of sockets.

8.1.2. The depth of the trench shall not be less than 1.00 measured from the top of the pipe to the surface of the ground under road and not less than 0.60 m elsewhere. The required depth to be excavated at any point of the trenches shall be regarded as directed by the Architect/Site Engineer. Contractor shall not be entitled for any extra payment if he makes the trenches width more than specified.

8.1.3. Refilling: Same as per para 6.3 above.

8.1.4. The bottom of trench excavations shall be carefully prepared so that the barrels of the pipes when laid are well bedded for their whole length on firm ground and are true to line and gradient. Joint holes shall be made to such dimensions as will allow the joints to be conveniently made and thoroughly caulked.

9. REINFORCED CEMENT CONCRETE PIPES:

9.1. All underground storm water drainage lines where specified shall be centrifugally spun RCC pipes class NP2 conforming to IS 458-1971 shall be true to shape and straight with uniform bore throughout. Cracked, wrapped pipes shall not be used on the work. All pipes shall be tested by manufacturer and the contractor shall produce, when directed a certificate to this effect from the manufacturer.

9.2. Laying: RCC spun pipes shall be laid on cement concrete bed or cradles as specified and shown on the detailed drawings. The cradles may be precast and sufficiently cured to prevent cracks and breakage in handling. The invert of the cradles shall be left 12mm below the invert level of the pipes properly placed on the soil to prevent any disturbance. The pipe shall then be placed on the bed concrete or cradles and set for the line and gradient by means of sight rails and bonding rods etc. Cradles or concrete bed may be omitted, if directed by the Architect.

9.3. Jointing: After setting out the pipes the collar shall be centered over the joint and filled in with tarred gasket, so that sufficient space is left on either side of the

collar to receive the mortar. The space shall then be filled with cement mortar 1:2 (1cement:2 fine sand) and caulked by means of proper tools. All joints shall be finished at an angle of 45 deg. to the longitudinal axis of the pipe on both sides of collar neatly.

9.4. Testing: All pipes shall be tested to a hydraulic test of 1.5 m held for at least 30 minutes at the highest point in the section under test. Test shall be carried out similar to those for stoneware pipes given above. The smoke test shall be carried out by the Contractor, if directed by the Architect.

9.5. Measurement: Same as provided for in para 6.2 above

10. ROAD GULLY CHAMBERS:

10.1. The chamber shall be of brick masonry with Bricks of class designation 75 in cement mortar 1:5 (1cement:5 coarse sand and shall have a SFRC gully grating with frame fixed in 150mm thick cement concrete 1:2:4 (1cement:2 coarse sand: 4 hard stone ballast 20mm nominal size) on top the size of the chamber shall be taken as the clear internal dimensions as specified in the schedule of quantities. The brick walls, the top of the bed concrete 1:5:10 (1cement:5 coarse sand:10 hard stone ballast 40 mm and down gauge) of the chamber shall be plastered with 12mm thick cement plaster 1:3 (1 cement :3 coarse sand) finished with a floating coat of neat cement. The excavation shall be done true to dimensions and level shown in the drawings.

10.2. All Road gully chambers wherever required shall have SFRC gratings with frame of approved design and manholes with SFRC covers and frame of heavy quality.

11. MASONRY DRAINS

11.1. Brick masonry drains shall be of a minimum width of 30 cms for depth up to 45cm and a maximum width of drains shall be 45cms for depths beyond 45cms. Brick masonry drains shall be constructed in brick masonry in cement mortar 1:5 in cement concrete foundations as specified in the schedule of quantities. Wherever specified, masonry drains shall be plastered with cement mortar inside. The outer surface shall be flush pointed without additional charge.

11.2. Wherever specified, all brick masonry covered drains shall be provided with cast in situ or precast R.C.C slabs. All drains shall be plastered with cement mortar 1:4, 12mm thick with a coat of neat cement. All finished works shall afford specified gradient to ensure free and efficient discharge.

11.3. Payment for masonry drains shall be made under individual items of masonry, cement concrete and plaster by volume of area as given in the drawings and schedule of quantities.

12. MAKING CONNECTIONS

12.1. Item for making connection to municipal sewer shall be paid for by number and shall include all items given in the Schedule of Quantities and Specifications.

SECTION XV - ROADS, PATHWAYS, RAMPS, KERBS AND EARTH FILLING OVER AREAS

1. SCOPE OF WORK:

1.1. The road work in this contract comprises of provision of roads with sub base course 150mm thick consolidated, base courses 100mm thick consolidated 40mm thick Premix Carpet, Kerb stones, and earth filling as described in schedule items and as specified in succeeding paragraphs.

2. MATERIALS

2.1. Sub Base & Base Course:

This shall be water bound macadam with stone aggregates. Stone aggregate shall be quartzite. This shall be crushed/broken stone as per grading requirement given in the table shown below:-

Grading	Size Range	Sieve Designation	Percent by Weight Passing	Test Requirement
1	90 mm to 40 mm	100 mm	100	One test per 100 cum
	90 mm to 40 mm	80 mm	65-85	One test per 100 cum
	90 mm to 40 mm	63 mm	25-60	One test per 100 cum
	90 mm to 40 mm	40 mm	0-15	One test per 100 cum
2	63 mm to 40 mm	80 mm	100	One test per 100 cum
	63 mm to 40 mm	63 mm	90-100	One test per 100 cum
	63 mm to 40 mm	50 mm	35-70	One test per 100 cum
	63 mm to 40 mm	40 mm	0-15	One test per 100 cum
	63 mm to 40 mm	20 mm	0-5	One test per 100 cum

The stone shall be hard, durable and free from excess of flat elongated soft and disintegrated particles, dirt and other objectionable matter.

2.2. Stone Screenings for Sub base and Base Courses:

Screening to fill voids in the stone aggregate shall consist of the same material as the stone aggregate. The screenings shall have grading shown in the following table:

Grading	Size of Screenings	Sieve Designation	Percent by Weight Passing	Quantity Required for 10 sqm
Sub-base course	12.5 mm	12.5 mm	100	0.63 cum
		10.0 mm	90-100	
		4.75 mm	10-30	
Base course	10.0 mm	150 micron	0-8	0.40 cum
		10.0 mm	100	
		4.75 mm	85-100	

Grading	Size of Screenings	Sieve Designation	Percent by Weight Passing	Quantity Required for 10 sqm
		150 micron	10-30	

The screening shall be clean, durable, and free from disintegrated pieces and other objectionable material.

2.3. Stone chippings for Premix carpet:

Stone chippings shall consist of fairly cubical fragment of clean, hard, tough and durable rock of uniform quality throughout. This shall be crushed stone and shall be free of elongated or flaky pieces, soft or disintegrated stone, salt, alkali, vegetable matter and dust. These shall conform to the quality requirements given below:-

Physical requirements of Stone aggregate and stone chippings

S.No.	Type of Course	Test	Test Method	Requirements	Frequency of Test
i)	Sub-base course	Los Angeles Abrasion value or Aggregate Impact value	IS:2386 (Part IV), IS:5640	60% max. (*50% max. for Agg. Impact value)	One test per 200 cum of aggregate
ii)	Base course	a) Los Angeles Abrasion value or Aggregate Impact value	IS:2386 (Part IV), IS:5640	50% max. (*40% max. for Agg. Impact value)	- do -
		b) Flakiness Index	IS:2386 (Part I)	**15% max.	- do -
iii)	Screenings / Stone chippings	a) Los Angeles Abrasion value or Aggregate Impact value	IS:2386 (Part IV)	-	One test per 50-100 cum of aggregate
		b) Flakiness Index	IS:2386 (Part I)	-	One test per 50-100 cum of aggregate
		c) Stripping Value	IS:6241	-	- do -
<ul style="list-style-type: none"> Aggregate may satisfy requirements of either of the two tests (Abrasion or Impact). The requirements of flakiness index shall be enforced only in case of crushed broken stone and crushed slag. 					

2.4. Binding Material:

The binding material shall consist of fine-grained material possessing plasticity index value 4-6 which shall be determined in accordance with IS 2720(Part V). The quantity of binding material required shall be as under: -

Per 10 sqm.

- a) Sub base 0.15 cum
- b) Base course 0.12 cum

2.5. Bitumen:

2.5.1. Paving bitumen shall conform to IS:73-1961 and shall be of grade 80-100, solvent like kerosene oil shall be mixed, i.e. 70g/kg. of the bitumen.

2.5.2. The bitumen shall be obtained from approved manufacturers and delivered to site in sealed containers bearing ISI marking. This shall be stacked as directed by the Site Engineer and Architect on one side of the roadway.

3. WORKMANSHIP

3.1.1. **Preparing formation:** The ground shall be formed to proper gradient, camber, super elevation, etc. corresponding to the required surface, by trimming the surface. Surplus soil (if any) shall be thrown clear of the road formation. The formation shall be watered and rolled.

3.1.2. **Preservation of property:** Road side trees, shrubs, poles, fences, monuments buildings pipelines, sewers etc. within or adjacent to the road which are not to be disturbed shall be protected from injury or damage.

3.1.3. **Preparation of sub-grade:** The surface of the formation for a width equal to that of base course shall first be cut to the depth below the proposed finished level, equal to the combined depth of base course and wearing courses (due allowance being made of consolidation). It shall then be cleared off all foreign substances and sub-grade dressed off parallel to the finished profile.

3.1.4. **Consolidation of sub-grade:** The sub-grade shall then be sprinkled with water and rolled with minimum of 5 numbers of passes of 8-10 tonne smooth wheeled roller, till the soil is evenly and densely consolidated.

3.1.5. All undulations in the surface that might develop due to rolling shall be made good with earth or quarry soils as the case may be and sub grade re-rolled.

4. SUB-BASE:

The sub-base shall be water bound macadam with stone aggregate of size 90mm to 40mm. This shall be laid on prepared sub-grade in conformity with line, grades and thickness. The consolidated thickness of the sub-base shall be 150mm. Loose quantity of the aggregate shall be 2.02 cum per 10sqm. The stone aggregate shall be mechanically inter locked by rolling and voids thereof filled with screening and binding material with the assistance of water, laid on a prepared sub-grade. The coarse aggregate shall be spread uniformly and evenly upon the prepared sub grade in required quantities with a twisting motion to avoid segregation. In no case shall these be dumped in heaps directly on the area where these are to be laid. This shall be laid on proper profile, grades, by using templates. The surface of the aggregate

spread shall be carefully trued up and all high or low spots corrected by removing adding aggregate as required.

5. Rolling:

Immediately after spreading of the coarse aggregate it shall be compacted to the full width by rolling with a power roller of 8-10 ton capacity. Initially light rolling is to be done which shall be discontinued when the aggregate is partially compacted with sufficient voids to permit application of screening. The rolling shall begin from the edges with roller runner forward and backward and adding the screenings simultaneously until the edges have been firmly compacted. The roller shall then progress gradually from the edges to the centre, parallel to central line of thread and over lapping uniformly each preceding rear wheel track by 1/2 width and shall continue until the entire area of the sub base has been rolled by the rear wheel. Slight sprinkling of water may be done during rolling. On super-elevated curves the rolling shall proceed from the lower edge and progress gradually continuing towards the upper edge of the road.

6. Application of Screening:

After the coarse aggregate has been lightly rolled to the required surface, screening shall be applied gradually over the surface to completely fill the inter sticks. Dry rolling shall be continued while screenings are being spread so that the jarring effect of the roller causes them to settle in the voids of the aggregate. The screening shall be spread uniformly in successively thin layers, which shall be applied at a slow rate. To ensure filling of all voids, rolling and brooming shall continue with the spreading of screening. Damp and wet screening shall not be used under any circumstances.

7. Sprinkling and Grouting:

After spreading the screening and rolling, the surface shall be copiously sprinkled, swept in brooms and rolled, to distribute the screenings evenly, additional screenings be applied wherever necessary, until the stone aggregate is well bonded and firmly set for the entire depth and until a grout has been formed of screening and water and form a wave of grout ahead of the wheels of the roller.

8. Application of binding material:

After the application of screening and rolling, the binding material shall be applied at a uniform and slow rate into two or more successive thin layers. After each application, the surface shall be copiously sprinkled with water and the resulting slurry swept in with hand broom to fill the voids. The surface shall then be rolled by an 8-10 tone roller, water being applied to the wheels. This process shall be continued till the slurry forms a wave ahead of the wheels of the roller.

9. Setting and drying:

After final compaction of the sub base course, the road shall be allowed to cure over night. Next morning, the defective spots shall be filled with screening or binding material lightly sprinkled with water if necessary and rolled. No traffic shall be allowed till the macadam sets.

10. Surface Evenness:

10.1. The surface evenness of the completed W.B.M. sub base course in the longitudinal and transverse direction shall be as under:-

10.2. Longitudinal profile undulation when measured with a 3 meter, straight edge shall not be more than 15mm Cross profile - undulation when measured with a camber template shall not be more than 12mm.

11. Rectification of Defects:

When the surface irregularity of the WBM sub base course exceeds the tolerance specified above, or where the base course is otherwise defective due to sub-grade soil mixing with the aggregate, the layer of its full thickness shall be scarified over the affected area, re-shaped with added material and re-compacted. The depressions shall not be filled with screenings and binding material.

12. Base course:

Base course of water bound macadam shall be with stone aggregate of size 63 to 40mm in 100mm consolidated thickness. The base course shall be laid over the prepared sub base course with operations as described in the succeeding paragraphs. The quantities of the loose aggregates required for base course should not be less than 1.33 cum per 10 Sq.m. of road surface.

13. Spreading of stone aggregate:

13.1. This shall be as specified above for sub base course except that the base course shall be constructed with a consolidated thickness of 100mm thick.

13.2. Surface Evenness: This surface evenness of the completed base course in the longitudinal and transverse direction shall be as under:-

13.2.1. Longitudinal profile: Maximum permissible undulation when measured with a 3.0m straightedge-12mm.

13.2.2. Cross profile: Maximum permissible undulation when measured with a camber template-6mm.

13.2.3. The longitudinal profile shall be checked with 3.0m long straight edge at the middle of each traffics line.

13.2.4. The transverse profile shall be checked with a series of 3 camber boards at intervals of 10m.

13.3. Rectification of defective construction-same as for sub base course

14. PREMIX CARPET (40mm CONSOLIDATED THICKNESS)

14.1. **Preparation of base:** Before the carpet is applied on the existing base, the surface shall be ensured free from dust or caked mud or other foreign matters. Pothole or ruts if any in the existing surface shall be filled with premixed chippings and well rammed about a week before the carpets laid.

14.2. **Priming coat:** The bituminous primer shall be heated to the temperature as recommended by the manufacturer and applied uniformly to the base by means of sprayer just before spreading of the premix.

14.3. **Preparation of Premix:** Mechanical mixers shall be employed for mixing. For small quantities of work, the aggregates and the bitumen are heated separately up to the required temperature.

14.4. **Rolling and finishing:** After the premix obtained is a thorough and homogeneous mix, the same is carried out at site for spreading and rolling. Suitable rakes are used for spreading. At one operation 15m of premix is laid and rolled with a power roller of (8-10 tones). The roller/wheels shall be kept damp with water so as to avoid adhesion of the mix. The rolling is continued in a process as explained above till there is no sign of creep or formation of ruts and etc. and a smooth uniform surface is obtained.

15. Foot path/Pathways and Ramps

15.1. **Under layer:** Earth shall be properly rammed and consolidated in required slope over which PCC of mix 1:4:8 (1 cement :4 coarse sand:8 graded stone aggregate of 40mm nominal size) shall be laid and thoroughly rammed by heavy iron rammers of 4.5 to 5.5 kg. Ramming shall be continued till a skin of mortar cover the surface completely. The cost of ramming of earth is also deemed to be included in the item of PCC. Thickness of under layer PCC shall be as shown on drawings or as approved by Architect and Site Engineer.

15.2. **Topping:** 75mm thick concrete of mix 1:2:4 shall be laid in pattern as shown on the drawing. Excessive troweling shall be avoided. Use of dry cement or cement and sand mixture sprinkled on the surface to stiffen the concrete or absorb excessive moisture, shall not be permitted. The surface shall be finished rough and grooves be provided as per the required pattern.

16. PCC kerb stone etc.:

These shall be in precast/cement concrete as per drawings and as approved by Architect and Site Engineer finished even and concrete cured well.

17. Earth filling over areas:

17.1. Earth filling over areas shall be by bringing earth from outside UNION BANK OF INDIA land by the contractor. The entire plot levels shall be taken in a grid of 3.0x3.0m and jointly signed before fillings. Earth shall be spread in layers of 20cm in the entire width of the road. Each layer shall be rolled with a roller of minimum 1/2 tonne weight by providing 5 passes. Every 3rd layer and top most layer shall be consolidated with a power roller of minimum 8 tonne weight by giving 5 passes. Light watering shall also be done for each layer while consolidating. Final levels shall be attained as indicated by Site Engineer/ Architect.

17.2. Computing the gross filling volume shall be by prismatic formula Simpson's Rule or Trapezoidal formula as the case may be. Area covered by buildings shall be deleted. Any excess excavation in foundation after plinth filling etc. shall also be deducted. The net payable volume shall be arrived after deducting 10% from the gross volume arrived after above procedure. Rate quoted shall be deemed to include all operations and above provisions including for net volume only.

18. SEAL COAT

A premix seal coat shall be applied immediately after laying the carpet. The binder shall be heated in boilers of suitable design in the temperature appropriate to the grade of bitumen. The fine aggregate shall be dry and suitably heated to a temperature as directed by Project Engineer before the same are placed in the mixer of suitable design. Mixing of binder with aggregate to the specified proportions shall be continued till the later are thoroughly coated with binder. The mix shall be immediately transported from the mixing plant to the point of use and spread uniformly on the bituminous surface to be sealed. As soon as sufficient length has been covered with the premixed material, the surface shall be rolled with 8 to 10 tones roller. Rolling shall be continued till hot premixed material completely seals the void in the bituminous course and a smooth uniform surface is obtained.

19. Rough Chisel Dressed Stone (CUL - DE - SAC)

Cul-de-sac shall be provided with rough chisel dressed stone of approx. size 20x15x 10cm laid over sub base course (WBM) including filling the earth in joints as per the drawing.

17. Mode of Measurements

The method of measurement for various items in the tender shall be generally in accordance with IS: 1200 subject to the following:

17.1. Excavation:

(a) Footings: Area of excavation for footing shall be measured equal to the area of the lowest concrete course as shown on the drawing. Depth shall be measured vertically from ground level to bottom of concrete course or dry rubble packing as the case may be.

(b) Plinth beams: Depth of excavation for plinth beam shall be measured from ground level up to bottom of beam and width equal to width of beam. If a leveling course is ordered, it shall be measured up to the bottom of the leveling course.

(c) Where excavation is made in trenches, measurements for cutting shall be taken by means of tape and staff and the width of concrete or rubble packing as shown on the drawing shall be considered as width of excavation.

(d) Where excavation is made for leveling the site, levels shall be taken before start and after completion of work and total quantity of excavation computed from these levels in manner approved by the architect.

(e) Where soil including soft rock and hard rock are mixed, hard rock after excavation shall be stacked separately. Measurement of the entire excavation shall be measured from stocks of excavated hard rock and reduced by 50% for bulking and voids. The quantity so arrived at shall be paid for under hard rock. The difference between the quantity of entire excavation and quantity payable under hard rock shall be paid as soil including soft rock.

17.2. Earth filling:

In open space: filling shall be measured from cross sections of embankments, levels of which are recorded by means of levels before start of work and after completion of work. When it is not possible to measure filling from cross sections, it may be measured from loose stacks or lorry measurements with previous written permission from the architect and 20% deduction shall be made from the measured quantity to arrive at the net quantity payable.

17.3. Cement concrete (plain & reinforced):

(a) Cement concrete in P.C.C. and R.C.C. items shall be measured exclusive of reinforcement and plaster thickness but shall include necessary coats of shuttering, centering, hire charges of all equipment, curing, hacking and fair finish. Reinforcement and plaster shall be measured and paid separately.

(b) Item like R.C.C. precast jalli, RCC pipes and other such items which are normally manufactured in factories as well as those items which have been specifically mentioned in schedule of quantities shall be measured inclusive of reinforcement.

(c) No deduction will be made for openings up to 0.1 sq.m. and no extra labor for forming such openings or voids shall be paid.

(d) Columns shall be measured from the top of the footing and shall be measured through, including flare of the column in case of flat slab construction.

(e) Beams shall be measured from face to face of columns/beams and shall include haunches, if any. The depth of the beam shall be measured from the top of the slab to bottom of the beam.

(f) In case of combined footings with connecting beams or strap beam the exposed portion of beam rib shall be measured as beam and the remaining portion measured in footing.

(g) Slabs shall be measured in bays (clear of beams) with deductions for column portion.

17.4. Chajja: Only projected portion shall be measured in sq.mts.

17.5. Staircase: Measurements shall be in cu.m. Staircase comprising of step, soffit slab, landing slab shall be measured and paid under this item. Side parapet walls, failings, finishing of risers and trades M.S. reinforcement and plastering etc. shall be paid separately under respective items.

17.6. Reinforcement:

Shall be measured in lengths of bars as actually placed in position on standard weight basis; no allowance being made in the weight for rolling margin. Wastage and binding wire shall not be measured. Authorized overlaps and spacers shall only be measured.

17.7. Brick work:

(a) Except walls of half-brick thickness or less, all brick work shall be measured in cubic meters.

(b) Walls of half-brick thickness or less shall each be measured separately and given in sq.mts. stating the thickness.

17.8. Thickness of wall:

(a) Brick walls up to and including three bricks in thickness shall be measured in multiples of half-brick which shall be deemed to be inclusive of the mortar joints. Where fractions of half-brick occur due to Architectural or other reasons, the measurement shall be taken as full half-brick.

(b) For walling, which is more than three bricks in thickness, the actual thickness of wall shall be measured to the nearest centimeters.

(c) Honeycombed brick walling shall be given in square meters stating the thickness of wall and the pattern of honeycombing. Honeycomb opening shall not be deducted.

(d) Deductions: No deductions or additions shall be made on any amount for.

- Ends of dissimilar materials (i.e. joists, beams, lintels, lofts, girders, rafters, purlins, trusses, corbels, steps, etc.) up to 500 sq. centimeter in section.
- Openings up to 0.1 sq.mt. in section.

- Wall plates, bed plates and bearing of slabs, chajjas and the like where the thickness does not exceed 10 cm. And the bearing does not extend over the full width of the wall.

17.9. Stone masonry:

- Except where otherwise described, stone work and stone walling generally shall be given in cubic meter and facia work in sq.mts.
- When measuring walls, the thickness shall be measured to the nearest one centimeters.
- Deductions shall be made as described under brick work.

17.10. Wood work:

- All work shall be measured not as fixed. No extra measurement will be given for shape, joints, splayed, meeting stiles of doors and windows and shall be measured in sq.meters.
- Area over one face inclusive of exposed frame thickness (excluding width of cover mould) shall be measured in case of doors, windows and ventilators when frames are included in the item. Portions embedded in masonry or flooring shall not be measured. Where frames are measured separately mode of measurements shall be as per CPWD practice.

17.11. Steel doors, windows, ventilators, louvers:

Clear area over one face inclusive of exposed frame shall be measured. Holdfasts or portions embedded in masonry or flooring shall not be measured.

17.12. Steel rolling shutters and rolling grilles:

Clear width between side jambs and clear height between floor and bottom of lintel / beam shall be measured. Hood shall not be measured separately. The rate should be inclusive of the cost of hood.

17.13. Flooring, skirting, dado:

- Flooring shall be measured from skirting to skirting and where the wall surfaces are plastered or provided with dado it shall be measured from plaster to plaster or dado to dado.
- The skirting and dado shall be measured clear from the floor to the top of tile, and the length shall be between finished tile faces measured along the floor.

17.14. Plastering & pointing:

- All plastering and pointing work shall be measured in sq.mts. unless otherwise described.
- Net area of surface plastered shall be measured. No deductions will be made for ends of joists, beams, posts, etc. and openings not exceeding 0.5 sq.mt. each and no addition shall be made for revalue, jambs, soffits, sills, etc. of these openings nor for finishing the plaster around openings, ends of joints, beams and posts, etc.

17.15. Painting, white washing colour washing and distemping:

- (a) All painting work shall be measured in sq.mts.
- (b) Net area of the surface painted shall be measured. No deductions will be made for unpainted surfaces of ends of joists, beams, posts, etc. and openings not exceeding 0.5 sq.mt. each and no addition shall be made for reveals, jambs, soffits, sills, etc. of these openings.
- (c) The following multiplying factors for obtaining equivalent areas shall be adopted:

Sr. No	Description of work	How measured	Multiplying factor
i.	Paneled, framed, ledged, braced and battened.	Measured flat (not girthed) including frame, edges, chocks, cleats, etc., shall be deemed included in the item.	1.12 (for each side)
ii.	Flush, part paneled and part glazed or gaused.	- do -	1.00 (for each side)
iii.	Fully glazed or gaused or glazed louvered ventilators	- do -	0.5 (for each side)
iv.	Fully ventioned or louvered (not with glazing)	- do -	1.5 (for each side)
v.	Weather boarding	Measured flat (not girthed) supporting frame work shall not be measured separately.	1.13 (for each side)
vi.	Trellis (or Jaffri work one way or two way.	Measured flat overall; shall be made for opening (supporting members shall not be measured separately)	1 (for each side)
vii.	Guard bars, balustrades, gratings, grille, railings, grille doors, grille partitions, etc.	Measured flat overall; no deduction shall be made for opening. (Supporting members shall not be measured separately).	1 (for painting all over)
viii.	Gates and open palisade fencing including standards, braces, rails, stays, etc.	See note below	1 (for painting all over)
ix.	Carved or enriched work	Measured flat	2 (for each side)
x.	Steel rolling / alligator type shutters.	Measured flat over jamb, guides, bottom rails and locking arrangement, etc. shall be deemed to be included in the item.	1.25 (for each side)
xi.	Fully glazed or gaused steel windows or partitions.	Measured flat.	1.25 (for each side)

Note: The height shall be taken from the bottom of the lowest rail, if the palisades do not go below it (or from the lower end of palisades, if they project below the lowest rail up to the top of palisades, but not up to the top of standards, if they are higher than the palisades. Similarly for gates, depth of roller shall not be considered while measuring the height.

PART II- SPECIFICATIONS FOR ELECTRICAL WORKS & SPECIAL CONDITIONS OF CONTRACT

1. COMPLETENESS OF TENDER:-

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

2. RATES:

The rates tendered shall be for complete items of work inclusive of Cost of material, erection, connection, testing, labor, supervision, tool & plants, storage, contingencies, breakage, wastage, execution at any level & height, all taxes (including works contract tax, if any), duties, and levies etc. and all charges for items contingent to the work, such as, packing, forwarding, insurance, freight and delivery at site for the materials to be supplied by the contractor.

3. WORKS TO BE DONE BY THE CONTRACTOR :-

3.1. The scope of internal and external electrification under this contract shall include the design, engineering, manufacture, assembly, testing, delivery, erection and commissioning of electrical system including supply of all material, labor, T&P etc for followings -

- (a) Main Switches, Main L T Panels, meter board and external cable connection.
- (b) 11 KV HT Panel.
- (c) 11 KV / 0.433 KV Transformers.
- (d) D. G. Sets with fuel tank, piping, fuel pump, exhaust piping with lagging and supports, cooling system complete.
- (e) Sub and branch distribution boards, MCB's and RCCB's etc.
- (f) Mains and Sub mains between various panels, meter boards and distribution boards.
- (g) Point wiring with Conduits for all type of wiring including circuits, sub mains, light, fans, power and AC etc.
- (h) Switches and socket outlets for light, fans, plug, power, Tel, TV, computer network etc with suitable MS/GI boxes with accessories complete.
- (i) Earthing and Lightning Protection with earth leads/strips.
- (j) Conduits and wiring for Telephone, EPABX, TV system, PA system, Music system and Computer networking, fire alarm, broad band etc.
- (k) Cables and other allied works.
- (l) Provision of emergency electrical supply and distribution for complete light, fans and other specified points are also included in the scope of work.

For the purpose of emergency distribution separate DB's shall be installed for Light/fans and fax machines & staircase lighting at every place, so that these can be separated.

(m) Lighting Fixtures fans and exhaust fans. (If these are supplied by the client, then the contractor will erect the fixture as required without any extra payment beyond the contract)

(n) External lighting including underground cables and connection with the external cables and earthing.

(o) Feeder pillars with circuit breakers.

(p) Underground cables.

3.2. All the above work shall be complete in all respects up to the satisfaction of architect, consultant, Client and Engineer in charge as per the details mentioned in BOQ and drawings supplied time to time.

3.3. Unless and otherwise mentioned in the tender documents the following scope of works shall be done by the contractor, and therefore their cost shall be deemed to be included in their tendered cost:

3.3.1. Furnishing of all labor, skilled and unskilled, supervisory and administrative personnel, erection tools and tackles, testing equipment, implements, supplies, consumables like welding rods and gas, oil and grease, cleaning fluids, insulating tape, anti corrosive paints, jute cotton waste etc., and hardware for timely and efficient execution of the erection work.

3.3.2. Transport vehicles necessary for efficient transportation of equipment from Owner's stores to site of erection and excess materials back to owner's stores.

3.3.3. Complete assembly, erection and connection, testing and commissioning, putting into successful and satisfactory commercial operations of above equipment.

3.4. The items of work to be performed on all equipment and materials shall include but not limited to the following:

(a) Receiving, unloading and transportation at site. (To Owner or Contractor's stores and from there up to actual place of erection).

(b) Opening, inspecting and reporting all damages and short supply items.

(c) Arranging to repair and/or re-order all damaged and short supply items.

(d) Storing at site with suitable all weather protection.

(e) Assemblies, erection and complete Installation.

(f) Necessary coordination between work done by other Contractors.

(g) Final check-up, testing and commissioning in presence of Owner's representative.

- (h) Obtaining Owner's written acceptance of satisfactory performance.

4. INFORMATIONS REQUIRED FROM CONTRACTOR

- 4.1. Typical GA drawing of all equipment to be supplied and disposition of various fittings and loading.
- 4.2. All Annexure of this specification duly filled in and signed by the contractor.
- 4.3. Catalogue of all equipment and components explaining construction features.
- 4.4. Transportation/shipping dimensions and weights, space required for handling parts for maintenance.
- 4.5. Type test certificates for all equipment on similar type of equipment.
- 4.6. Final Single line diagram complete with cable sizes etc.
- 4.7. Bill of Materials, Control & schematic line diagram for meter & relay panel, terminal connection/Master Terminal box diagram, wiring diagram with physical location of components for all equipment.
- 4.8. Detailed cabling layout showing cable trench / tray layout, earthing layout.
- 4.9. Detailed lighting layout showing position of fixtures / type of fixtures, circuiting and route of wires / cables / fixing details, DB details.
- 4.10. Protection relay settings.
- 4.11. Cable schedule & interconnection chart.
- 4.12. Foundation details and plan, loading details for all equipment.
- 4.13. Test certificates.
- 4.14. Instruction manuals of all major equipment.
- 4.15. Test Procedures at sites.
- 4.16. Test reports of all tests carried out at site.
- 4.17. 'AS BUILT' drawings (2 sets of soft copies on CD and six sets of hard copies duly wound).
- 4.18. All layout drawings shall be made in scale of 1:50 or 1:100 unless until agreed by the Owner/ Consultant.

5. PRICES

- 5.1. The price quoted for supply items shall include all packing, crating, excise duty, sale tax/ GST, insurance, freight, loading/ unloading, handling & all other charges.
- 5.2. The price quoted for erection & commissioning shall include cost of all consumables, taxes & duties (if any). No additional taxes/duties shall be payable by Bank.
- 5.3. Prices quoted shall be Firm and no Variation shall be allowed during the entire Contract Period.

5.4. Contractor shall furnish prices separately for spare parts for two (2) year's trouble free operation of the equipment and shall furnish the list of the same.

6. ELECTRIC POWER SUPPLY AND WATER SUPPLY:

Unless and otherwise specified, power supply and water supply as may be required shall be arranged by the contractor for installation and testing of the equipment's at the site of work.

7. PROVISIONS AGAINST ACCIDENTS AND SAFETY MEASURES

7.1. All safety rules and codes as applicable to work including rules applicable as per factory inspector shall be followed during execution of above work.

7.2. All safety appliances and protective devices including hand gloves, aprons, helmets, shields, goggles, safety belts etc. shall be provided by Contractor for his personnel.

7.3. The Contractor shall arrange to provide guards and prominent display caution notices if access to any equipment / area is considered unsafe and hazardous.

8. SPECIFICATIONS

In the absence of specifications for any work or materials, relevant Indian Standard Specifications shall be applicable. If such codes for a particular subject have not been framed, the decision of the Employer / Consultant will be final and binding.

9. VARIATION IN QUANTITY

9.1. The Bank/ Owner shall have right to delete or increase/ decrease quantity specified in this specification as specified in preamble to Bill Of Materials.

9.2. Quantities indicated in Bill of Materials are based on engineering status of the project as on date. It is necessary that proper engineering is carried out by the contractor before procurement of material.

9.3. For procurement of any material & sequential delivery at site from point of view of erection etc. Contractor shall take prior approval from the employer.

9.4. All left over materials for which payment has been made by the employer, has to be taken back by the contractor. The employer shall make necessary deduction from the bills of contractor.

10. SITE VISIT

A site visit for the prospective bidders is scheduled on 18.05.2026 at 12.00 PM, immediately after the pre-bid meeting. Prospective bidders are advised to visit and familiarize themselves with the site conditions before submission of their offer. Submission of the bid shall be deemed to imply that the bidder has inspected the site, understood the scope of work and site conditions, and has taken all such factors into account while submitting the offer. No claim arising out of lack of site knowledge shall be entertained at a later stage.

11. TOOLS FOR HANDLING AND ERECTION:

All tools and tackles required for handling of equipment and materials at site of work as well as for their assembly and erection and also necessary test instruments shall be the responsibility of the contractor.

12. CO-ORDINATION WITH OTHER AGENCY:

The contractor shall co-ordinate with all other agencies involved in the building work so that the building work is not hampered due to delay in his work. Recessed conduit and other works, which directly affect the progress of building work, should be given priority.

13. CARE OF BUILDINGS:

Care shall be taken by the contractor to avoid damage to the building during execution of his part of the work. He shall be responsible for repairing all damages and restoring the same to their original finish at his cost. He shall also remove at his cost all unwanted and waste materials arising out of his work from the site, from time to time as designed by the Engineer-in-charge.

14. STRUCTURAL ALTERATIONS TO BUILDINGS:

14.1. No structural member in the building shall be damaged/altered, without prior approval from the competent authority through the Engineer-in-charge.

14.2. Structural provisions like openings, cutouts if any, provided by the department for the work, shall be used. Where these require modifications, or where fresh provisions are required to be made, such contingent works shall be carried out by the contractor at his cost.

14.3. All such openings in floors provided by the department shall be closed by the contractor after installing the cables/conduits/rising mains etc. as the case may be, by any suitable means as approved by the Engineer-in-charge without any extra payment.

14.4. All chase required in connection with the electrical works shall be provided and filled by the contractor at his own cost to the original architectural finish of the buildings.

15. WORK IN OCCUPIED BUILDINGS:

15.1. When work is executed in occupied buildings, there should be minimum of inconvenience to the occupants. The work shall be programmed in consultation with the Engineer-in-charge and the occupying department. If so required, the work may have to be done even before and after working hours.

15.2. The contractor shall be responsible to abide by the regulations or restrictions set in regard to entry into, and movement within the premises.

15.3. The contractor shall not tamper with any of the existing installations including their switching operations or connections there to without specific approval from the Engineer-in-charge.

16. STATUTORY REGULATION AND APPROVALS:

16.1. All electrical works shall be carried out only by those Contractors who are licensed by the concerned local authorities to execute this type of work. Only “A” Class government approved electrical contractor shall execute the job.

16.2. It shall be the responsibility of the Contractor to comply with the regulations laid down by the Indian Electricity Rules and local authorities. The Contractor shall also be responsible for obtaining all the statutory approvals/certificates for the work from the concerned Departments and these certificates shall be handed over to the Architects/Clients at the completion. All coordination with the local electric supply authorities, submitted of application, getting the desired load sanctioned shall be in the scope of contractor. The fees required to obtain the desired load sanctioned and other legal and miscellaneous charges by local electric supply authority/ undertaking shall be given by the client but all follow-ups etc. shall be the contractor’s responsibility.

16.3. On completion of the work, the contractor shall obtain the certificates of final inspection and approval by the local electric supply authority and deliver these certificates to the Owner/Architects in original. The contractor shall bear all expenses and fees required to obtain these certificates without which the work shall not be taken over and shall not be considered complete.

17. FIRE SAFETY REGULATIONS AND APPROVALS:

17.1. All fire safety-related works shall be executed only by qualified and authorised contractors / agencies. The contractor shall be fully responsible for ensuring that all works are carried out in compliance with the National Building Code (NBC), local fire safety regulations, and any other applicable statutory guidelines.

17.2. The contractor shall obtain all necessary statutory approvals, clearances, and no-objection certificates (NOCs) from the Fire Department and other competent authorities as applicable. These approvals/ certificates must be handed over to the Bank / Architect at the completion of the work. Coordination for obtaining these approvals—including preparation and submission of drawings, follow-ups, inspections, and any other compliance measures—shall lie entirely within the scope of the contractor. Notwithstanding the bill of materials for the various fire safety systems and equipment’s given in the tender, the contractor shall check for the adequacy of the bill of materials at the time of execution, and in case of any shortage or deficiency, the same shall be made good during execution at no extra cost.

17.3. Any official fees payable to the Fire Department shall be borne by the client, but the contractor shall be responsible for initiating and pursuing the process until completion. The contractor shall ensure that final NOC and fire clearance certificates are obtained and delivered to the Owner/Architects in original.

17.4. The work shall not be deemed complete, nor shall it be taken over by the Owner, unless and until the required approvals and certificates from the Fire Department are received and submitted in original.

18. STANDARDS AND CODE OF PRACTICE:-

The work shall be carried out as per the enclosed Specifications of work and the construction drawings to be issued from time to time. These specifications shall be

read in conjunction with National Building Code, National Electrical Code 1985, Relevant Codes of Practices and Standards as issued by ISI and Indian Electricity Rules, CPWD specifications for electrical works (all with the latest amendments). The installation shall conform in all respects to Indian Standard code of Practices. Following BIS codes shall be referred -

- a) National Electrical Code
- b) IS: 694 - 1977: PVC insulated cables for working voltage up to and including 1100 volts
- c) IS: 732 -1989: Electrical wiring installation
- d) IS: 1225 -1938: Installation and Maintenance of power Cables up to and including 33 KV Rating
- e) IS: 1554: PVC insulated heavy-duty electrical cables.
- f) IS: 1860: Installation operation and maintenance of passenger and goods elevator.
- g) IS: 2309 -1989: Protection of building and allied structures against lightning.
- h) IS: 3043 -1987: Earthing
- i) IS: 3646 (Part-1) -1992: Interior Illumination
- j) IS: 3661 (Part-2) -1967: Current rating for cable
- k) IS: 3661 (Part-5) -1968: Current rating for cable
- l) IS: 5216 (Part-1) -1982: Recommendations on safety procedures and practices in electrical work.
- m) IS: 7098 (1 & 2): XLPE insulated cables
- n) IS: 10028 (Part-1) -1985: selection, Installation and Maintenance of Transformers
- o) IS: 10118 (Part-1) -1982: Selection, Installation and Maintenance of switchgear and Control gear

19. MATERIAL SAMPLES AND SHOP DRAWINGS:-

19.1. It shall also be the responsibility of the Contractor to submit without any extra charge the samples of the materials/equipment as and when asked by the Architect/Consultant. If the Contractor wishes to use an alternative make due to non-availability of the approved one, he should take the prior approval of the Architect/Consultant. Under such situations the Contractor shall show such promptness as not to hamper the progress of the work.

19.2. The Contractor shall submit for Architect/Consultant's approval the shop drawings at approved scale indicating the custom built equipment, L.T. Panels, run of cables and conduits he proposes to install.

20. ELECTRICAL DRAWINGS: -

20.1. The electrical drawings issued from time to time to the contractor are diagrammatic but shall be following as closely as actual construction and work will

permit. The Contractor at his own expenses shall make any deviation from the drawings required to conform to the building construction. The architectural drawings shall take precedence over the electrical drawings as far as the civil and other trades works are concerned.

20.2. If there is any discrepancy due to in-complete description, ambiguity or omission in the drawings and other documents relating to this Contract found by the Contractor either before starting the work or during execution or after completion, the same shall be immediately brought to the attention of the Architect/Consultant and his decision would be final and binding on the Contractor.

21. TESTING AND COMMISSIONING: -

The Contractor shall be responsible for testing and commissioning the entire electrical installation described in these specifications and relevant IS specifications and will demonstrate the operation of the systems to the entire satisfaction of the Architect/Consultant and to the Client approval.

22. GUARANTEE

At the close of work and before issue of final certificate of virtual completion by Owner / Consultant, the contractor shall furnish a written guarantee indemnifying the owner against defective materials and workmanship for a period of one year after commissioning. The contractor shall hold himself fully responsible for reinstallation or replacement of defective material free of cost to the owner.

23. COMPLETION DRAWINGS

The contractor shall submit, after the completion of the work, one set of originals and two sets of prints of the As-Fitted drawings/Completion drawings, giving the following information:

23.1. Run and size of conduits, inspection, junction and pull boxes.

23.2. Size of conductor in each circuit.

23.3. Location and ratings of sockets and switches controlling the light/fan and power outlets.

23.4. Location and details of distribution boards, mains, switches, switchgears and other particulars.

23.5. A complete wiring diagram as installed and schematic drawings showing all connections in the complete electrical system.

23.6. Location of telephone outlets, junction boxes and sizes of various conduits.

23.7. Location of all earthing stations, route and size of all earthing conductors etc.

23.8. Layout and particulars of all cables.

23.9. Location of all equipments with dimensions and connections.

24. INSPECTION

All equipment / material covered under this specification is liable for inspection by the Owner/ his representative. The vendor shall inform two weeks in advance for

inspection to be carried out at the manufacturer's works. The contractor shall furnish data Sheets & other details. Additional information, if desired by the bidder can also be furnished separately.

SECTION I- SYSTEM DESCRIPTION (ELECTRICAL)

1. GENERAL INFORMATION

1.1. Ambient air temperature shall be taken as 50 deg. C for the purpose of designing of electrical equipment.

1.2. This specification shall be read and constructed in conjunction with the drawings and annexure to determine the scope of work.

1.3. All equipment shall be capable of continuous operation satisfactorily under the following conditions:

- | | | |
|---|---|-------|
| a) voltage variation | : | ± 10% |
| b) frequency variation | : | ± 5% |
| c) combined voltage & frequency variation | : | ± 10% |

1.4. Nominal system supply available shall be as follows:

- | | | |
|----------------|---|----------------------------|
| a) Incoming | : | 11 kV, 3 Ph., 50 Hz, |
| b) Utilization | : | 415V, 3 Ph., 4 wire, 50 Hz |

2. CODES AND STANDARDS

2.1. All equipment and materials specified herein or not, shall be designed, manufactured and tested with the latest applicable standards & bureau of Indian standards.

2.2. All electrical equipment shall also conform to the latest electricity rules as regards safety and other essential provisions.

2.3. All electrical installation work shall comply with the requirements of the following Act / rules / codes as amended up to date:

- a) Indian electricity act.
- b) Indian electricity rules.
- c) National electric code published by 818.
- d) All relevant IS codes of practice.
- e) Regulations published by tariff advisory committee.

3. SYSTEM DESCRIPTION

3.1. GENERAL

- a) One independent radial feeder is envisaged from State Electricity Board for receiving incoming supply on 11 kV.
- b) Two poles structure consisting of LAs, Isolator, drop out fuses etc. or 11 KV incoming supply shall be connected to Metering Panel through 11 kV XLPE cable. On two Pole structure 11 kV XLPE cable shall be terminated through outdoor termination.
- c) 11 kV XLPE cable from two pole structure to metering Panel to shall be buried in ground

- d) 11 KV Panel shall have one incomer cum outgoing (unit panel), which will feed power to the Transformer.
- e) 415V L T panel shall receive power from Transformer / DG sets and shall feed power to various Blocks & Common Services as per enclosed single line diagram. The panel will be PLC controlled for automatic operation in case of power failure for DG synchronization and auto load sharing arrangements.
- f) Further routing of cables and Power Distribution shall be as per Single Line Diagram.

4. DESIGN CRITERIA

4.1. GENERAL

- a) The equipment shall be used in high voltage system having characteristics as listed in this specification.
- b) The equipment shall be installed in a hot, dusty, humid and tropical atmosphere.
- c) There shall be no radio interference when the equipment are operated at maximum service voltage.
- d) The max. temp. in any part of the equipment at specified rating shall not exceed the permissible limits as stipulated in the relevant standards.
- e) The equipment shall be capable of withstanding the dynamic and thermal stresses of listed short circuit current without any damage or deterioration.
- f) All equipment, accessories and wiring shall have tropical protection, involving special treatment of metal and insulation against fungus, insects and corrosion.
- g) The safety clearances of all live parts of the equipment shall be as per relevant standards.
- h) All equipment/components of identical rating shall be physically and electrically interchangeable.
- i) All outdoor equipment shall be suitable to mount on steel structure. Connectors shall be bimetallic conductor.
- j) Wherever single core cables are terminated in any equipment, gland plate shall be of Aluminum (3-4 mm thick).
- k) There shall be no straight through joints in power & control cables.
- l) All cable terminations shall be with Double compression cable gland with armor holding system.
- m) The lighting fixture shall have loop in & loop out facility.

4.2. D G SET

- a) DG Sets are intended to provide emergency load of 415V, 3 Ph. 4 wire, 50 Hz to various loads of campus.

- b) DG Sets shall be provided with Electronics governor and shall be suitable for parallel operation.
- c) DG sets shall be silent type and should be provided in a suitable acoustic enclosure.
- d) All controls shall be of 24V DC.
- e) DG Sets shall be suitable for continuous operation.
- f) DG Sets shall be started / stopped from Engine / DG Panel / Remote.
- g) The height of exhaust pipes shall be in line with requirements of pollution control rules.
- h) DG set shall **be radiator cooled** and shall be silent type (In acoustic enclosure).
- i) Main features of DG sets shall be as follows:
 - i. Rating : As per B.O.Q. at 0.8 PF, 415V, 3 Ph, 50 Hz.
 - ii. Duty : Continuous
 - iii. Diesel Engine : 4 stroke, multi Cylinders, turbo charged after cooled.
 - iv. Speed : 1500 rpm
 - v. Type of cooling : Radiator cooled
 - vi. Type of alternator: Brushless, separately-excited (PMG), self-regulated
 - vii. Starting : Electrical Self-Starting
 - viii. Batteries : Lead Acid type

SECTION II- POINT WIRING : GENERAL & TECHNICAL

1. DEFINITION:-

A point (other than socket outlet point) shall include all work necessary in complete wiring to the following outlets from the controlling switch or MCB. The scope of wiring for a point shall, however, include the wiring work necessary in tapping from another point in the same distribution circuit.

- 1.1. Ceiling rose or connector (in the case of points for ceiling/exhaust fan points, pre wired light fittings and call bells).
- 1.2. Ceiling rose (in the case of pendants except stiff pendants)
- 1.3. Back plate (in the case of stiff pendants).
- 1.4. Lamp holder (in the case of goose neck type wall brackets, batten holders and fittings which are not pre wired).

2. SCOPE:

Following shall be deemed to be included in point wiring.

- 2.1. Conduit/casing and capping as the case may be, accessories for the same and wiring cables between the switch box and the point outlet.
- 2.2. All fixing accessories such as clips, nails, screws, Phil plug, rawl plug etc as required.
- 2.3. Metal switch boxes for control switches, regulators, sockets etc, recessed or surface type, and phenolic laminated sheet covers over the same.
- 2.4. Outlet boxes, junction boxes, pull-through boxes etc, but excluding metal boxes if any, provided with switchboards for loose wires/conduit terminations.
- 2.5. Any special block required for neatly housing the connector.
- 2.6. Control switch or MCB, as specified.
- 2.7. 3 pin or 6-pin socket, ceiling rose or connector as required.
- 2.8. Connections to ceiling rose, connector, socket outlet, lamp holder, switch etc.
- 2.9. Interconnecting wiring between points on the same circuit, in the same switch box or from another.
- 2.10. Protective (loop earthing) conductor from one metallic switch box to another in the distribution circuits, and for socket outlets. (The length of protective conductor run along with the circuits/sub mains is excluded from scope of points)
- 2.11. Bushes conduit or porcelain tubing where wiring cables pass through wall etc.

3. MATERIAL :

The system of wiring shall consist of ISI marked single core PVC insulated flexible copper conductor wires as per IS: 694 amended up to date.

4. MEASUREMENT:

4.1. Contractor shall measure the work jointly with the site engineer and prepare measurement sheets in triplicate. Three copies of measurement sheets shall be submitted along with running account bills. Bills received without proper measurements of work shall not be considered submitted.

4.2. Should the contractor neglect to measure the work, then the measurement taken by Engineer/Architect or a person approved by the Bank shall be final and binding to him. Such measurements shall be taken in accordance with the mode of measurements wherever specified or as per actual executed quantities.

4.3. All Authorized extra works, omissions and all variations made without the Engineer/Architect/Bank's knowledge, or subsequently sanctioned by him in writing (with the prior approval of the contractor in writing) shall be included in such measurement.

4.4. All bills for the work shall be submitted in the tender price bid format.

5. POINT WIRING

5.1. POINT WIRING (OTHER THAN SOCKET OUTLET POINTS) :-

5.1.1. Unless and otherwise specified, there shall be no linear measurement for point wiring for light points, fan points, exhaust fan points and call bell points. These shall be measured on unit basis by counting.

5.1.2. No separate measurement will be made for interconnections between points in the same distribution circuit and for the circuit protective (loop earthing) conductors between metallic switch boxes.

5.2. POINT WIRING FOR SOCKET OUTLET POINTS:

5.2.1. The light plug (5A/6A) point and power (15A/16A) point wiring shall be measured on linear basis, from the respective tapping point of live cable, namely switch box, another socket outlet point, or the sub distribution board as the case may be, up to the socket outlet.

5.2.2. The metal box with cover, switch/MCB socket outlet and other accessories shall be measured and paid as a separate item.

5.2.3. The power point outlet will be 15A/5A or 16A/6A six-pin socket outlet.

5.3. GROUP CONTROL POINTS WIRING:-

5.3.1. In the case of points with more than one point controlled by the same switch, such point shall be measured in parts i.e.(a) from the switch to the first point outlet as one point, and (b) for the subsequent points each shall be treated as separate point.

5.3.2. No recovery shall be made for non-provision of more than one switch in such cases.

5.4. TWIN CONTROL LIGHT POINT WIRING: -

5.4.1. A light point controlled by two numbers of two way switches shall be measured as two points from the fitting to the switches on either side.

5.4.2. No recovery shall be made for non-provision of more than one rose ceiling or connector in such cases.

5.5. MULTIPLE CONTROLLED CALL BELL POINTS WIRING:

5.5.1. In the case of call bell points with a single call bell outlet, controlled from more than one place, the point shall be measured in parts i.e. (a) from the call bell outlet to one of the nearest ceiling roses meant for connection to bell push, treated as one point and (b) from that ceiling rose to the next one and so on, shall be treated as separate point(s).

5.5.2. No recovery shall be made for non-provision of more than one ceiling rose or connector for connection to call bell in such cases.

6. CIRCUIT AND SUBMAIN WIRING:-

6.1. CIRCUIT WIRING:

Circuit wiring shall mean the wiring from the distribution board up to the tapping point for the nearest first point of that distribution circuit, viz. up to the nearest first switch box.

6.2. SUB MAIN WIRING:-

Sub main wiring shall mean the wiring from one main/distribution switchboard to another and from Distribution Board to Power Outlet / AC Outlet.

7. MEASUREMENT OF CIRCUIT AND SUBMAIN WIRING:-

7.1. Circuit and sub main wiring shall be measured on linear basis along the run of the wiring. The measurement shall include all length from end to end of conduit or casing and capping as the case may be, exclusive of interconnections inside the switchboard etc. The increase on account of diversion or slackness shall not be included in the measurement.

7.2. The length of circuit wiring with two wires shall be measured from the distribution board to the first nearest switch box in the circuit irrespective of whether the neutral conductor is taken to switch box or not.

7.3. When wires of different circuits are grouped in a single conduit/casing and capping, the same shall be measured on linear basis depending on the actual number and sizes of wires run.

7.4. When circuit wires and wires of point wiring are run in the same conduit/casing and capping, circuit wiring shall be measured on linear basis depending on the actual number and sizes of wires run in the existing conduit/casing capping.

7.5. Protective (loop earthing) conductors, which are run along the circuit wiring and the sub main wiring, shall be measured on linear basis and paid for separately, if not included in item.

7.6. Except as specified above for point wiring, circuit wiring and sub main wiring, other types of wiring shall be measured separately on linear basis along the run of wiring depending on the actual number and sizes of wires run.

8. SYSTEM OF DISTRIBUTION AND WIRINGS:-

8.1. Main distribution board shall be controlled by the circuit breaker. Each outgoing circuit shall be controlled by a circuit breaker on the phase or live conductor.

8.2. The branch distribution board shall be controlled by a circuit breaker. Each outgoing circuit shall be provided with a MCB of specified rating on the phase or live conductor.

8.3. The load of the circuits shall be divided, as far as possible, evenly between the number of ways of the distribution boards, leaving at least one spare circuit for future extension.

8.4. The neutral conductors (incoming and outgoing) shall be connected to a common link (multi way connector) in the distribution board and be capable of being disconnected individually for testing purposes.

8.5. Wiring shall be separate for essential loads (i.e. those fed through stand by supply) and non-essential loads throughout.

9. BALANCING OF CIRCUITS:-

The balancing of circuits in three wire or poly phase installations shall be arranged up to the satisfaction of the Engineer-in-charge.

10. WIRING SYSTEM :-

10.1. Unless and otherwise specified the wiring shall be done only by the “Looping system”. Phase or live conductors shall be looped at the switch boxes and neutral conductors at the point outlets.

10.2. Lights, fans and call bells shall be wired in the ‘lighting’ circuits. 15A/16A socket outlets and other power outlets shall be wired in the ‘Power’ circuits. 5A/6A socket outlets shall also be wired in the “Lighting” circuit both in residential as well as non-residential buildings.

10.3. The wiring throughout the installation shall be such that there is no break in the neutral wire except in the form of linked switchgear.

10.4. Surface wiring shall run, as far as possible, along the walls and ceiling so as to be easily accessible for inspection.

10.5. In no case, the open wiring shall be run above the false ceiling without the approval of Engineer-in-charge.

10.6. In all types of wiring, due consideration shall be given for neatness, good appearance and safety.

11. PASSING THROUGH WALLS OR FLOORS:-

11.1. When wiring cables are to pass through a wall, these shall be taken through a protection (steel/PVC) pipe or porcelain tube of suitable size such that they pass through in a straight line without twist or cross in them on either end of such holes. The ends of metallic pipe shall be neatly bushed with porcelain, PVC or other approved material.

11.2. Where a wall pipe passes outside a building so as to be exposed to weather, the outer end shall be bell mouthed and turned downwards and properly bushed on the open end.

12. JOINTS IN WIRING:-

12.1. No bare conductor in phase and/or neutral or twisted joints in phase, neutral, and/or protective conductors in wiring shall be permitted.

12.2. There shall be no joints in the through-runs of cables. If the length of final circuit or sub main is more than the length of a standard coil, thus necessitating a through joint, such joints shall be made by means of approved mechanical connectors in suitable junction boxes.

12.3. Termination of multi-stranded conductors shall be done using suitable crimping type thimbles.

13. CONFORMITY TO I.E. ACT, I.E. RULES AND STANDARDS:-

13.1. All electrical works shall be carried out in accordance with the provisions of the Indian Electricity Act, 1910 and Indian Electricity Rules 1956 amended up to date.

13.2. The work shall also conform to relevant Indian Standard codes of practice for the type of work involved.

13.3. In all electrical installation works, relevant safety codes of practice shall be followed.

13.4. The complete wiring installation shall conform to IS: 732 amended up to date.

14. GENERAL REQUIREMENTS OF COMPONENTS:-

14.1. **QUALITY OF MATERIALS:** All materials and equipment supplied by the contractor shall be new. They shall be of such design, size and material as to satisfactorily function under the rated conditions of operation and to with stand the environmental conditions at site.

14.2. **RATING OF COMPONENTS:-**

All components in a wiring installation shall be of appropriate ratings of voltage, current and frequency, as required at the respective sections of the electrical installation in which they are used.

All conductors, switches and accessories shall be of such size as to be capable of carrying the maximum current, which will normally flow through them, without their respective ratings being exceeded.

14.3. **CONFORMITY OF STANDARDS:** All components shall conform to relevant Indian Standard specification, wherever existing. Materials with ISI certification mark shall be preferred. However for conduits, wiring cables, piano/tumbler switches and socket outlets, ISI marked materials shall only be permitted.

14.4. **INTERCHANGEABILITY:** Similar parts of all switches, lamp holders, distribution fuse boards, switch gears, ceiling roses, brackets, pendants, fans and all other fittings of the same type shall be interchangeable in each installation.

SECTION V- SWITCHES & RECEPTACLES (PIANO TYPE)

1. CONTROL SWITCHES FOR POINTS:-

1.1. The switch box or regulator box shall be made of metal on all sides, except on the front. In the case of cast boxes, the wall thickness shall be at least 3 mm and in case of welded mild steel sheet boxes, the wall thickness shall not be less than 1.2 mm (18 gauge) for boxes up to a size of 20 cm x 30 cm, and above this size 1.6 mm (16 gauge) thick MS boxes shall be used. The metallic boxes shall be duly painted with anticorrosive paint before erection.

1.2. Where a large number of control switches and/or fan regulators are required to be installed at one place, these shall be installed in more than one outlet box adjacent to each other for ease of maintenance.

1.3. An earth terminal with stud & 2 metal washers shall be provided in each MS box for termination of protective conductors and for connection to socket outlet/metallic body of fan regulator etc.

1.4. Clear depth of the box shall not be less than 50 mm, and this shall be increased suitably to accommodate mounting of fan regulators in flush pattern.

1.5. The fan regulators can also be mounted on the switch box covers, if so directed by the Engineer-in-charge.

1.6. Control switches (single pole switches) carrying not more than 16 A shall be of piano type, as specified, and the switch shall be "ON" when the nob is down.

1.7. Only MCB's shall be used for controlling industrial type socket outlets.

1.8. Control switch shall be placed only in the live conductor of the circuit. No single pole switch or fuse shall be inserted in the protective (earth) conductor, or earthed neutral conductor of the circuit.

1.9. All switches, regulators, outlets & other accessories shall be white colour with matching white cover plate. In no case ivory or off-white switches shall be accepted.

2. SOCKET OUTLETS:

2.1. Socket outlet shall be of the same type, white piano type as their control switches. These shall be rated either for 5A/6A or 15A/16A. Combined 5A/15A or 6A/16A six pin socket outlet shall be provided in Rs. power' circuits.

2.2. In an earthed system of supply, socket outlets and plugs shall only be of 3 pin type, the third pin shall be connected to earth through protective (loop earthing) conductor. 2 pin or 5 pin sockets shall not be permitted to be used.

2.3. Every socket outlets shall be controlled by a switch or MCB, as specified. The control switch/MCB shall be connected on the Rs. live' side of the line.

2.4. Outlet boxes for socket outlets (both 15A/16A and 5A/6A) points shall be of size 175 mm x 100mm.

2.5. Unless and otherwise specified, the control switches for the 5A/6A and 15A/16A socket outlets shall be kept along with the socket outlets.

3. SWITCH BOX COVERS:-

3.1. Phenolic laminated sheets of approved white shade shall be used for switch box covers. These shall be of white 3 mm thick synthetic phenolic resin bonded laminated sheet as base material and conforming to grade P-I of IS:2036-1974, Secured to the box with counter sunk C.P. Brass Screws. The corners of cover plates shall be at right angle.

4. SWITCHES & BOXES (Modular Type)

4.1. The switch box or regulator box shall be made of metal on all sides, except on the front. Since Modular type switches are to be used in the project, hence the boxes shall also be used of the same make and model. The size of box shall be governed by the number of switches/outlets/regulators on the respective board. The boxes shall be with zinc plating and yellow passivation to complies with the rust test as per IS 3854. The boxes should have slotted holes for level adjustments. The boxes shall be fitted with riveted brass earth terminals for earth connections.

4.2. Clear depth of the box shall not in a range of 50 mm to 65 mm depending upon the size of board and manufacturer.

4.3. Control switch shall be placed only in the live conductor of the circuit. No single pole switch or fuse shall be inserted in the protective (earth) conductor, or earthed neutral conductor of the circuit. The switches shall be provided with silver contacts. The neutral should make first and breaks last.

4.4. Socket outlet shall be rated either for 5A/6A or 15A/16A. 5/6 Amp sockets shall be of 5 pin type with shutters. Combined 5A/15A or 6A/16A six pin shuttered socket outlet shall be provided in Rs. power' circuits. The earth pin shall be connected to earth through protective (loop earthing) conductor. All sockets shall be provided with safety shutters to allow easy entry of two pin plugs without the need to force the earth terminal by unsafe means. All sockets shall confirm to IS: 1293.

4.5. Every socket outlet shall be controlled by a switch, as specified. The control switch shall be connected on the Rs. live' side of the line.

4.6. The switches and sockets shall be manufactured using engineering plastic to make it fire retardant and highly resistant to impact.

4.7. The fan speed regulators shall be of electronic and stepped type

4.8. The RJ-45 data socket shall be suitable for cat5/cat 6 data cables.

4.9. Gold plated contacts shall be provided in all communication jacks to enhance data and voice transmission.

SECTION III- SWITCHGEAR AND CONTROL GEAR

1. GENERAL ASPECTS: -

- 1.1. All items of switchgear and distribution boards (DB's) shall be metal clad type.
- 1.2. The types, rating and/or categories of switchgear and protective gear shall be as specified in the tender schedule of work.
- 1.3. RCCB's, ELCB's and RCBO's where specified, shall conform to the requirements of current rating, fault rating, single phase or three phase configuration and sensitivity laid down in the tender documents.
- 1.4. While each outgoing way of distribution board (D.B.) shall be of miniature circuit breaker (MCB) as specified, and of suitable rating on the phase conductor, the corresponding earthed neutral conductor shall be connected to a common neutral terminal block and shall be capable of being disconnected individually for testing purpose.
- 1.5. Independent earth terminal block: Every distribution board (single phase as well as three phase) shall have an earth terminal block identical to, but independent from neutral terminal block, to enable termination of protective (loop earthing) conductors (incoming as well as out goings) individually by screwed connection and without twisting.
- 1.6. Earthing terminal (1 for single phase and 2 for three phase) shall be provided on the metal cladding of switches and D.B.'s for body earthing. These shall be suitably marked.
- 1.7. Knock out holes, with or without end plates as per standard design of manufacturers, shall be provided in the metal cladding of switches and D.B.'s for termination of conduits/cables.
- 1.8. Each distribution board shall be provided with a circuit list giving details of each circuit, which it controls, and the current rating of the circuit, and the size of the fuse element.

2. MCB TYPE DISTRIBUTION BOARDS (MCB DB):-

- 2.1. MCB DB's may be of single phase, three phase (horizontal type) suitable for feeding single phase loads or 3 phase (vertical type) suitable for feeding single phase as well as three phase loads, each phase isolation type three phase DB in which each phase can be isolated by a separate circuit breaker or RCCB, as specified. These shall be complete with accessories, but without MCB's, which shall be specified as a separate item in the tender documents.
- 2.2. The current ratings and the number of ways shall be as specified. Blanking plates shall be provided to close unused ways. These shall be indicated as a separate item in the Schedule of work.
- 2.3. MCB DB's shall be of surface/flush mounting pattern according to the requirement of their location, and shall be suitable to accommodate MCB's and MCB type isolators and RCCB (ELCB) at incoming in single pole or multi pole configuration, as required.

- 2.4. MCB DB's shall be double door type; dust and vermin proof conforming to IP 42, and shall be fabricated out of CRCA sheet steel, 1.6 mm thick, with stove enameled paint finish.
- 2.5. In case of Concealed / Recessed D.B.'s, cutting of brick work, providing suitable lintel, making good the wall including plastering etc. with necessary civil work including all Civil material shall be included in contractor's scope for proper completion of work.
- 2.6. MCB DB's shall have removal type end plates with knockouts at the bottom and top, and shall have hinged covers with locking arrangement.
- 2.7. Only the knobs of the MCB's shall protrude out of the front covers through openings neatly machine made for the purpose.
- 2.8. The bus bars used shall be solid electrolytic copper of appropriate sections.
- 2.9. Din bar(s) shall be provided for mounting the MCB's.
- 2.10. The complete board shall be factory fabricated and shall be duly pre-wired in the works, ready for installation at site.
- 2.11. The board shall be fully pre wired with single core PVC insulated copper conductors/insulated solid copper links, and terminated on to extended type terminal connectors, suitable for connections to the sizes of the respective conductors.
- 2.12. All incoming and outgoing wiring to the pre wired MCB DB's shall be terminated only in the extended terminal connectors to be provided within the DB. The terminal connectors shall therefore be so provided as to facilitate easy cable connections and subsequent maintenance.

3. MCCB TYPE DISTRIBUTION BOARDS (MCCB DB) :

- 3.1. All MCCB DB' s shall be of three phase suitable for feeding single phase loads or 3 phase loads through SP/TP MCB's, IP 42 enclosure, sheet steel, double door with tinned copper bus bar, neutral bar, earth bar, knock outs etc. The DB's shall be original factory fabricated of approved make.
- 3.2. The current ratings of Incomer MCCB shall be up to 250 amp and the number of ways shall be as specified. Blanking plates shall be provided to close unused ways.
- 3.3. MCCB DB shall be of surface/flush mounting pattern according to the requirement of their location, and shall be suitable to accommodate Four pole MCCB at incomer and SP/TP MCB's at outgoing, as required.
- 3.4. MCCB DB's shall be dust and vermin proof conforming to IP 42, and shall be fabricated out of CRCA sheet steel, 1.6 mm thick, with stove enameled paint finish.
- 3.5. In case of Concealed / Recessed D.B.'s, cutting of brick work, providing suitable lintel, making good the wall including plastering etc. with necessary civil work including all Civil material shall be included in contractor's scope for proper completion of work.

- 3.6. MCCB DB' s shall have removal type end plates with knock-outs at the bottom and top, and shall have hinged covers with locking arrangement.
- 3.7. The bus bars used shall be solid electrolytic copper of appropriate sections.
- 3.8. Din bar(s) shall be provided for mounting the MCB's.

4. WORKMANSHIP: -

4.1. Good workmanship is an essential requirement to be complied with. The entire work of manufacture/fabrication, assembly and installation shall conform to sound engineering practice.

4.2. The work shall be carried out under the direct supervision of a first class licensed foreman, or of a person holding a certificate of competency issued by the state Government for the type of work involved, employed by the contractor, who shall rectify then and there the defects pointed out by the Engineer-in-charge during the progress of work.

5. COMMISSIONING ON COMPLETION: -

Before the workman leaves the work finally, he must make sure that the installation is in commission, after due testing.

6. COMPLETION PLAN AND COMPLETION CERTIFICATE:-

6.1. For all works completion certificate after completion of work shall be submitted to the Engineer-in-charge.

6.2. Completion plan drawn to a suitable scale in tracing cloth with ink indicating the following, along with three blue print copies of the same shall also be submitted.

- a) General layout of the building.
- b) Locations of main switch board and distribution boards, indicating the circuit numbers controlled by them.
- c) Position of all points and their controls.
- d) Types of fittings, viz. fluorescent, pendants, brackets, bulkhead, fans and exhaust fans etc.
- e) Name of work, job number, accepted tender reference, actual date of completion, names of Division/Sub-Division and name of the firm who executed the work with their signature.

7. ADDITION TO AN INSTALLATION: -

An addition, temporary or permanent, shall not be made to the Authorized load of an existing installation until it has been definitely ascertained that the current carrying capacity and the condition of the existing accessories, conductors, switches etc affected, including those of the supply Authorities, are adequate for the increased load.

SECTION IV- CIRCUIT BREAKERS

1. MINIATURE CIRCUIT BREAKERS (MCB):-

- 1.1. Miniature Circuit Breaker shall comply with IS-8828-1996/ IEC898-1995 amended up to date.
- 1.2. Miniature circuit breakers shall be quick make and break type for 240/415 V AC, 50 Hz application with magnetic thermal release for over current and short circuit protection.
- 1.3. The breaking capacity shall not be less than 10kA at 415V AC.
- 1.4. MCBs shall be DIN mounted.
- 1.5. MCBs shall be current limiting type (class-3).
- 1.6. MCBs shall be C-curve.
- 1.7. MCBs shall have minimum power loss (watts) per pole defined as per the IS/IEC and the manufacturer shall publish the values.
- 1.8. MCBs shall be of self-extinguishing ULV0 grade thermoset plastic material. The housing shall be heat resistant and having high impact strength. The terminals shall be protected against finger contact to IP20 Degree of protection.
- 1.9. All DP, TP, TPN and 4pole MCBs shall have a common trip bar independent to external operating handle.
- 1.10. Mechanical Life shall be 20000 operations and Service life at rated load for In below 32A shall be 20000 and for In above 32A shall be 10000 operations.

2. Earth Leakage Circuit Breaker / Residual Current Circuit Breaker - Current Operated Type (ELCB / RCCB / RCBO)

- 2.1. **System of operation:** ELCB/ RCCB/RCBO shall work on the principle of core balance transformer. The incoming shall pass through toroidal core transformer. As long as the currents in the phase and neutral shall be the same, no electro motive force shall be generated in the secondary winding of the transformer. In the event of a leakage to earth, an unbalance shall be created which shall cause a current to be generated in the secondary winding, this current shall be fed to a highly sensitive miniature relay, which shall trip the circuit if the earth leakage current exceeds a pre-determined critical value. ELCB/RCCB/RCBO shall be current operated independent of line voltage. Current sensitivity shall be of 30mA at 240/415V AC or as specified in BOQ / drawings and shall have a minimum of 10000 electrical operations. The RCBO shall also provide over load and short circuit protection in addition to the earth leakage protection.
- 2.2. **Mechanical Operation.** The moving contacts of the phases shall be mounted on a common bridge, actuated by a rugged toggle mechanism. Hence, the closing/opening of all three phases shall occur simultaneously. This also shall ensure simultaneous opening of all the contacts under tripping conditions.
- 2.3. **Neutral Advance Feature.** The neutral moving contact shall be so mounted on the common bridge that, at the time of closing, the neutral shall make contact.

First before the phases; and at the time of opening, the neutral shall break last after allowing the phases to open first. This is an important safety feature which is also required by regulations.

2.4. Testing Provision. A test device shall be incorporated to check the integrity of earth leakage detection system and the tripping mechanism. When the unit is connected to service, pressing the test knob shall trip the ELCB/RCCB/RCBO and the operating handle shall move to the “OFF” position.

3. MOULDED CASE CIRCUIT BREAKER (MCCB's)

3.1. General

3.1.1. The rated normal current should be specified at 40°C

3.1.2. Moulded case circuit breakers shall be incorporated in the switchboard wherever specified. MCCB shall conform to IS: 13947 (Part-2): 1993 or IEC-60947-2 in all respects. MCCB shall be suitable either for single phase AC 230 Volts or three phase 415 volts \pm 10%. The rated insulation voltage shall be 600 volts. Suitable discrimination shall be provided between upstream and downstream breakers in the range of 10-20 milli seconds. The MCCBs will have earth fault module (if specifically asked) and front operated.

3.1.3. MCCB shall indicate its suitability for isolation and this should appear clearly on the MCCB with the symbol as specified in standard IS: 13947/IEC 60947

3.2. Construction

3.2.1. The MCCB cover and case shall be made of high strength heat-resistant and flame retardant thermosetting insulating material; operating handle shall be quick make/quick break. The operating handle shall have suitable 'Rs.ON', 'Rs.OFF' and 'Rs.TRIPPED' mechanical indicators notable from outside. Three phase MCCBs shall have a common operating handle for simultaneous operation and tripping of all the three phases.

3.2.2. Suitable arc extinguishing device shall be provided for each contact. Tripping unit shall be thermal-magnetic type up to 250A and Microprocessor based above 250A (or as specified specifically in Bill of Quantities and drawings) provided on each pole and connected by a common trip bar such that tripping of any one pole operates all three poles to open simultaneously. Tripping device shall have IDMT characteristics for sustained over load and short circuits.

3.2.3. Contact tips shall be made of suitable arc resistant, sintered alloy for long electrical life. Terminals shall be of liberal design with adequate clearances.

3.3. Accessories: All the accessories shall be mounted from the front and shall be adjustment free. MCCBs shall have the electrical accessories fitted even without removing the circuit breaker from the switchboard so that site changes, if any, can be carried out easily. MCCB shall be provided with the following accessories, if specified in schedule of quantities, such as Under voltage trip, Shunt trip, Alarm

switch, auxiliary switches, Rotary and motorised operating mechanism, Plug in and with drawable mechanism etc.

3.4. Interlocking: Moulded case circuit breakers shall be provided with the following interlocking devices for interlocking the door of a switchboard.

- 3.4.1. Handle interlock to prevent unnecessary manipulations of the breaker.
- 3.4.2. Door interlock to prevent the door being opened when the breaker is in ON position.
- 3.4.3. Defeat-interlocking device to open the door even if the breaker is in ON position.

3.5. Rupturing capacity

3.5.1. The moulded case circuit breaker shall have a rupturing capacity as mentioned against each in Schedule of Quantity at 415 volts. Wherever required, higher rupturing capacity breakers to meet the system short circuit fault shall be used. In absence of any capacity specifically mentioned in the bill of quantities and drawings, following rupturing capacities shall be used -

- 100 / 125 Amp : 25 KA
- 160/200/250 Amp : 35 KA
- 300/400/630/800 Amp : 50 KA

3.5.2. The MCCB shall be current limiting type and comprise of quick make - break switching mechanism. MCCBs shall be capable of defined variable overload adjustment. For thermal magnetic protection the O/L adjustment should be 75%-100% and for microprocessor-based release the adjustment should be 40%- 100% and S/c for 2 to 12 times .All MCCBs rated 200 Amps and above shall have adjustable magnetic short circuit pick-up.

3.6. Electrical Features:

3.6.1. All MCCB's & shall be selected on the basis of rated current. Four poles MCCBs shall be always supplied with neutral protection. The MCCBs having 400A & should have category B as per the IEC standards to ensure the selectivity. Minimum Electrical & Mechanical Endurance of MCCB Shall be as follows:

Rating of MCCB	Electrical Endurance (Operations)	Mechanical Endurance (Operations)
Up to 160 A	7,000	22,800
Above 160 A	4,000	12,800

3.6.2. The trip command shall override all other commands. The manufacturer shall provide both the discrimination tables (with test certificates) and let-through energy curves. Line and Load connections shall be interchangeable.

3.7. Installation

3.7.1. It should be possible to terminate Aluminum cable of required size for the defined current carrying capacity. The requisite size should be made available by means of extended terminals (as a standard offer) in case the direct terminals are not of adequate size. Adequate phase to phase clearance has to be ensured in case of extended terminations.

3.7.2. The circuit breaker should provide the flexibility of terminating line and load from any direction. Manufacturers should test the circuit breaker for this condition and requisite test certificate should be available.

3.7.3. Phase barrier should be provided as a standard feature.

3.8. Testing

3.8.1. Original test certificate of the MCCB as per BS 3871 or JS-C-8370 shall be furnished.

3.8.2. Pre-commissioning tests on the switchboard panel incorporating the MCCB shall be done as per standard specifications.

4. AIR CIRCUIT BREAKER

4.1. General

Air circuit breakers shall be incorporated in power control center and motor control centers wherever specified. ACB shall conform to IEC60947 / IS: 13947 Part-2 1993 in all respects. ACBS shall be suitable for operation on 660 volts, 3 phase, 50/60 Hz, AC supply. The rated insulation voltage shall be equal to or greater than 1000V. The rated impulse withstand voltage shall be equal to 12kV, so that the device can be used for every installation category, in compliance with the international standards CEI IEC 664-1.

4.2. Type and construction

4.2.1. Air circuit breakers shall be of enclosed pattern, dead front type with trip free operating mechanism. Air Circuit breakers shall be withdraw able type with horizontal draw out carriage. The mechanism shall be mechanical if not specifically mentioned for electrical. The ACBs shall be strong and robust in construction with suitable arrangement for anchoring when in fully engaged or fully drawn out positions. The carriage or cradle on which the breaker is mounted shall be of robust design made of fabricated steel, supported on rollers. Cradle shall also comprise of main and secondary separable contacts and all drawout mechanisms in a completely fig welded assembly short circuit on top. There shall be no dependence upon the panel board frame for any critical alignment. The withdrawal arrangement shall be such as to allow smooth and easy movement.

4.2.2. The draw out operation shall be possible through a closed door. Three positions of the moving part shall be possible:

- 1 - Connected / service position - all auxiliary and main circuits engaged
- 2 - Test position - all auxiliary circuits engaged all main circuits disconnected

3 - Isolated position - all circuits disconnected.

4.2.3. All three positions should be indicated discreetly on the cradle. Safety shutter to be provided as standard

4.2.4. All the current carrying parts of the circuit breakers shall be silver-plated. Suitable arcing contacts shall be provided to protect the main contacts. The contacts shall be of spring-loaded design. The sequence of operation of the contacts shall be such that arcing contacts 'make' before and 'break' after the main contacts. Arcing contacts shall be provided with efficient arc chutes on each pole. The arc chutes shall be suitable for ready replacement. Self-aligning isolating contacts with automatic shutters to screen the live parts shall be provided. The design of the breaker shall be such that all the components are easily accessible to inspection, maintenance and replacement. The ACB at its rated current shall be suitable for operation in extremely tropical humid climate at 50°C ambient temp. The manufacturer shall declare ideal de-rating charts.

4.2.5. There should be total segregation between the power circuit and control circuit, thus making double insulation and ensuring fitting of accessories while the circuit breaker is in the ON position. It shall be possible to inspect the arcing chamber and main contacts. The ACB shall have metal load bearing structures. The main contacts shall be separate from the arc-breaking contacts. It shall be possible to check the wear of the main contacts with the ACB in its racked-out position, removing the arcing chambers. No mechanical junctions in the main contact shall be there so that losses are minimal.

4.3. **Operating Mechanism:**

Air circuit breaker shall be provided with a quick-make, trip-free operating mechanism. The operating mechanism shall be strain-free spring operated. The operating shall be "handle front of the panel" type. The design shall be such that the circuit breaker compartment door need not be opened while moving the breaker from completely connected, through test, in to the disconnected position. The spring shall be charged automatically during the closing operation. Mechanical Indication of the position of the spring charge shall be provided.

4.4. **Interlocking and safety arrangement**

4.4.1. Air circuit breakers shall be provided with the following safety and interlocking arrangements:

4.4.2. It shall not be possible for breaker to be withdrawn when in 'ON' position.

4.4.3. It shall not be possible for the breaker to be switched on until it is either in fully inserted position or for testing purposes it is in fully isolated position.

4.4.4. The breaker shall be capable of being raked in to 'testing' isolated and maintenance positions and kept locked in any of these positions.

4.4.5. A safety latch to ensure that the movement of the breaker, as it is withdrawn is checked before it is completely out of the cubicle.

4.4.6. If under voltage release is provided then circuit breaker will close only if it is energised. Under voltage release should have time delay to avoid nuisance tripping for transient voltage failure

4.4.7. The operating mechanism shall provide for raking the breaker in to connect, test and disconnected positions without opening the compartment door.

4.4.8. Mechanical interlocks shall be provided between the operations of different breakers (if specified in Bill of Quantities).

4.4.9. The circuit breaker shall provide as a standard feature, the following mechanical indicator in the front Panel

- 1 Contact portion indicator (on/off)
2. Stored energy status indicator
3. Trip indicator on fault

4.5. Rating

The CTs range from 250A to 6300A: all the CTs shall have a structure made of self-extinguishing thermoplastic material. The breaking capacity of the ACB shall be greater than or equivalent to 50kA. The Breaking Capacity of the circuit breaker shall be as indicated in the BOQ with minimum of 50kA for up to 1250A, 65kA for 1600 to 2000A and 80kA for 2500 to 3200A. Icu=Ics for all ACBs. Icw rating at 1 sec/3sec should be declared. The minimum Electrical & Mechanical Life of ACB at 415/440V shall be as follows:

Rating of ACB	Electrical Endurance (Operations)	Mechanical Endurance (Operations)
Up to 1600 A	10,000	20,000
2000-4000 A	2,800	12,800
Above 4000 A	1,500	10,000

4.6. Accessories

All the accessories like U/V, shunt opening, shunt closing shall be accessible from the front. Circuit breakers shall be provided with the following Accessories: -

- (a) Under-voltage relay for the incoming ACB.
- (b) Microprocessor based Overload releases with IDMT characteristics.
- (c) Microprocessor based Instantaneous earth fault release.
- (d) Alarm switches (if specifically asked for)
- (e) Auxiliary switches

- (f) NO and NC auxiliary contacts rated for 10 Amps at 415 V AC and 6 Amp at 48V DC, in addition to ones already in use for the operation of the breaker and will be used in subsequent interlocks to be incorporated in future.

4.7. Mechanical indicators

Mechanical indication on the front of the air circuit breaker shall be provided to indicate the following:

- (a) main contacts closed "ON"
- (b) main contacts open "OFF"
- (c) springs charged
- (d) springs discharged
- (e) circuit breaker in "service" position (drawout only)
- (f) circuit breaker in "test" position (drawout only)
- (g) circuit breaker in "isolated" position (drawout only)

4.8. Mounting

Circuit breakers shall be mounted as per the standard specification of power control centers.

4.9. Testing

Testing of each circuit breaker shall be carried out at the works as per IEC:60947 and the original test certificate shall be furnished in triplicate. The tests shall incorporate atleast the following:

- (a) Impulse withstand test
- (b) Insulation test
- (c) Di-electric rigidity /Insulation test
- (d) Mechanical operation checking
- (e) Thermal protection with a current of 3ith starting from cold conditions.

4.10. Protection

The ACB shall be with an integral self-powered microprocessor based current release for Overload, Short-Circuit and Earth Fault protection which works on true rms values for ensuring accurate protection, if specifically asked for. The protection unit should meet the EMI/EMC requirement as per latest standard. Online Test Fault shall be provided to test healthiness of release and ACB.

4.11. Setting range of protection release

- (a) Overload protection shall have adjustable setting from 40% to 100% of the ACBs rated current in steps of 10% and adjustable time setting from 3-18m sec.

(b) Short circuit protection shall have adjustable current setting from 100% to 1000% of the overload setting and adjustable time delay setting for fault discrimination from 50-500 m sec.

(c) E/F protection if specified will have adjustable current setting from 40% to 100% of ACB rated current and adjustable time setting from 100-800m sec. It shall be possible to charge the release setting on load.

SECTION V- METALLIC CONDUIT WIRING SYSTEM

1. SCOPE:-

This section covers the detailed requirements for wiring work in metallic conduits. This chapter covers both surface and recessed types of works.

2. APPLICATION:-

2.1. Recessed conduit is suitable generally for all applications. Surface conduit work may be adopted in places like workshops, plant rooms, pump rooms, wiring above false ceiling/below false flooring, and at locations where recessed work may not be possible to be done. The type of work, viz. surface or recessed, shall be as specified in the respective works.

2.2. Flexible conduits may only be permitted for interconnections between switch gear, DB' s and conduit terminations in wall.

3. MATERIALS:-

3.1. CONDUITS:-

3.1.1. All rigid conduit pipes shall be of steel and be ISI marked. The wall thickness shall be not less than 1.6 mm (16 SWG) for conduit up to 32 mm dia. and not less than 2 mm (14 SWG) for conduits above 32 mm. These shall be solid drawn or reamed by welding, and finished with galvanised or stove enameled surface.

3.1.2. The maximum number of PVC insulated cables conforming to IS: 694-1990 that can be drawn in one conduit is given size wise in table 1, and the number of cables per conduit shall not be exceeded. Conduit sizes shall be selected accordingly in each run.

3.1.3. No steel conduit less than 20 mm in diameter shall be used.

3.2. CONDUIT ACCESSORIES:

3.2.1. The conduit wiring system shall be complete in all respects, including their accessories.

3.2.2. All conduit accessories shall be of threaded type, and under no circumstances pin grip type or clamp grip type accessories shall be used.

3.2.3. Bends, couplers etc. shall be solid type in recessed type of works and may be solid or inspection type as required, in surface type of works.

3.2.4. Saddles for surface conduit work on wall shall not be less than 0.55 mm (24 gauge) for conduits up to 25 mm dia. and not less than 0.9 mm (20 gauge) for larger diameter. The corresponding widths shall be 19mm & 25mm.

3.2.5. The minimum width and the thickness of girder clips used for fixing conduits to steel joists, and clamps shall be as per table 2.

TABLE - 1

Maximum number of PVC insulated 650/ 1100 Volt grade copper conductor cable that can be drawn into rigid steel conduit.

Nominal cross sectional area of conductor in Sq. mm.	20 mm	25 mm	32 mm	40 mm
1.50	5	10	14	-
2.50	5	8	12	-
4.00	3	8	10	-
6.00	2	5	8	-
10.00	-	3	5	6
16.00	-	-	3	6
25.00	-	-	2	4

Note: The above table shows the maximum capacity of conduits for a simultaneous drawing of cables.

TABLE - 2
Girder clips or clamps

S.No.	Size of conduit	Width	Thickness
i.	20 mm	19 mm	0.9 mm (20 SWG)
ii.	25 mm	19 mm	0.9 mm (20 SWG)
iii.	32 mm & above	25 mm	1.2 mm (18 SWG)

4. INSTALLATION:

COMMON ASPECTS FOR RECESSED AND SURFACE CONDUIT WORKS:

4.1. CONDUIT JOINTS:-

4.1.1. The conduit works of each circuit or section shall be completed before the cables are drawn in.

4.1.2. Conduit pipes shall be jointed by means of screwed couplers and screwed accessories only. Threads on conduit pipes in all cases shall be between 13 mm to 19 mm long, sufficient to accommodate pipes to full threaded portion of couplers or accessories.

4.1.3. Cut ends of conduit pipes shall have no sharp edges, nor any burrs left to avoid damage to the insulation of the conductors while pulling them through such pipes.

4.1.4. The Engineer-in-charge, with a view to ensuring that the above provision has been carried out, may require that the separate lengths of conduit etc., after they have been prepared, shall be submitted for inspection before being fixed.

4.1.5.

4.1.6. No bare threaded portion of conduit pipe shall be allowed, unless such bare threaded portion is treated with anticorrosive preservative or covered with approved plastic compound.

4.2. BENDS IN CONDUITS:

4.2.1. All necessary bends in the system shall be done either by neatly bending the pipes without cracking with a bending radius of not less than 7.5 cm, or alternatively, by inserting suitable solid or inspection type normal bends, elbows or similar fittings, or by fixing cast iron inspection boxes, whichever is most suitable.

4.2.2. Conduit fittings shall be avoided as far as possible on conduit system exposed to weather; necessary solid type fittings shall be used.

4.3. OUTLETS:

4.3.1. All outlets such as switches, wall sockets etc. may be either flush mounting type, or of surface mounting type, as specified and as required on site.

4.3.2. All switches and accessories shall be fixed in flush pattern.

4.4. PAINTING AFTER ERECTION:

After installation, all accessible surfaces of conduit pipes, fittings, switch and regulator boxes etc shall be painted.

5. ADDITIONAL REQUIREMENTS FOR SURFACE CONDUIT WORKS:

5.1. PAINTING BEFORE ERECTION:-

The outer surface of conduit including all bends, unions, tees, junction boxes, etc. forming part of the conduit system, shall be adequately protected against rust when such system is exposed to weather by being painted with 2 coats of red oxide paint applied before they are fixed.

5.2. FIXING CONDUIT ON SURFACE:

5.2.1. Conduit pipes shall be fixed by saddles, screwed to suitable approved plugs with screws in an approved manner at an interval of not more than one meter, on either side of the couplers or bends or similar fittings.

5.2.2. Where conduit pipes are to be laid along the trusses, steel joists etc. the same shall be secured by means of saddles or girder clips or clamps as required by the Engineer-in-charge.

5.2.3. In long distance straight run of conduit, inspection type couplers at reasonable intervals shall be provided, or running threads with couplers and jam nuts shall be provided.

5.3. FIXING OUTLET BOXES:

Only a portion of the switch box may be sunk in the wall, the other portion being projected out for suitable entry of conduit pipes into the box.

6. ADDITIONAL REQUIREMENTS FOR RECESSED CONDUIT WORK:

6.1. MAKING CHASE:-

6.1.1. Chase in the wall shall be neatly made, and of ample dimensions to permit the conduit to be fixed in the manner desired.

6.1.2. In the case of buildings under construction, the conduits shall be buried in the wall before plastering, and shall be finished neatly after erection of conduit.

6.1.3. In case of exposed brick/rubble masonry work, special care shall be taken to fix the conduit and accessories in position along with the building work.

6.2. FIXING CONDUIT IN CHASE:

6.2.1. The conduit pipe shall be fixed by means of staples, J-hooks, or by means of saddles, not more than 40 cm apart or by any other approved means of fixing.

6.2.2. All threaded joints of conduit pipes shall be treated with some approved preservative compound to secure protection against rust.

6.3. FIXING CONDUIT IN R.C.C. WORK:

6.3.1. The conduit pipes shall be laid in position and fixed to the steel reinforcement bars by steel binding wires before the concreting is done. The conduit pipes shall be fixed firmly to the steel reinforcement bars to avoid their dislocation during pouring of cement concrete and subsequent tamping of the same.

6.3.2. Fixing of standard bends or elbows shall be avoided as far as practicable, and all curves shall be maintained by bending the conduit pipe itself with a long radius which will permit easy drawing of conductors.

6.3.3. Location of inspection/junction boxes in RCC work should be identified by suitable means to avoid unnecessary chipping of the RCC slab subsequently to locate these boxes.

6.4. FIXING INSPECTION BOXES:

6.4.1. Suitable inspection boxes to the minimum requirement shall be provided to permit inspection, and to facilitate replacement of wires, if necessary.

6.4.2. These shall be mounted flush with the wall or ceiling concrete. Minimum 65 mm depth junction boxes shall be used in roof slabs.

6.4.3. Suitable ventilating holes shall be provided in the inspection box covers.

6.5. FIXING SWITCH BOXES AND ACCESSORIES:

Switch boxes shall be mounted flush with the wall. All outlets such as switches, socket outlets etc. shall be flush mounting type, unless otherwise specified in the Additional Specification.

6.6. FISH WIRE:

To facilitate subsequent drawing of wires in the conduit, GI fish wire of 1.2 mm (18 SWG) shall be provided along with the laying of the recessed conduit.

7. BUNCHING OF CABLES:-

7.1. Cable carrying alternating current, installed in metal conduit, shall always be bunched so that the outgoing and return cables are drawn into the same conduit.

7.2. Where the distribution is for single phase loads only, conductors for these phases shall be drawn in one conduit.

7.3. In case of three phase loads, separate conduits shall be run from the distribution boards to the load points, or outlets as the case may be.

8. EARTHING REQUIREMENTS:

8.1. The entire system of metallic conduit work, including the outlet boxes and other metallic accessories, shall be mechanically and electrically continuous by proper screwed joints, or by double chuck nuts at terminations. The conduit shall be continuous when passing through walls or floors.

8.2. Protective (loop earthing) conductor(s) shall be laid along the runs of the conduit between the metallic switch boxes and the distribution boards/switch boards, terminated thereto. These conductors shall be of such size and material, the protective earth conductors shall be either drawn inside the conduits along with the cables, or shall be laid external to the conduits. When laid external to the conduits, this shall be properly clamped with the conduit at regular intervals.

8.3. The protective conductors shall be terminated properly using earth studs, earth terminal block etc. as the case may be.

8.4. Gas or water pipe shall not be used as protective conductor (earth medium).

SECTION VI- PVC CONDUIT WIRING SYSTEM

1. SCOPE:

This chapter covers the detailed requirements for wiring work in non-metallic conduits. This chapter covers both surface and recessed types of wiring work.

2. APPLICATION:

2.1. Recessed conduit work is generally suitable for all applications. Surface conduit work may be adopted in places like workshops etc. and where recessed work may not be possible to be done. The type of work shall be as specified in individual works.

2.2. Flexible non-metallic conduits shall be used only at terminations, wherever specified.

2.3. Special precautions:-

2.3.1. If the pipes are liable to mechanical damages, they should be adequately protected.

2.3.2. Non-metallic conduit shall not be used for the following applications:-

- (a) In concealed/ inaccessible places of combustible construction where ambient temperature exceeds 60oC.
- (b) In places where ambient temperature is less than 5oC.
- (c) For suspension of fluorescent fittings and other fixtures.
- (d) In areas exposed to sunlight.

3. MATERIAL:

3.1. CONDUITS:

3.1.1. All non-metallic conduit pipes and accessories shall be of suitable material complying with IS: 2509-1973 and IS: 3419-1988. for rigid conduits and IS: 9537(V)-2000 for flexible conduits. The interior of the conduits shall be free from obstructions. The rigid conduit pipes shall be ISI marked.

3.1.2. The conduit shall be circular in cross-section. The conduit shall be designated by their nominal outside diameter. The dimensional details of rigid non-metallic conduits are given in Table-3.

3.1.3. No non-metallic conduit less than 20 mm in diameter shall be used.

3.1.4. WIRING CAPACITY:

The maximum number of PVC insulated aluminum/copper conductor cables of 650/1100 V grade conforming to IS: 694-1990 that can be drawn in one conduit of various sizes is given in table-4. Conduit sizes shall be selected accordingly.

3.2. CONDUIT ACCESSORIES:

3.2.1. The conduit wiring system shall be complete in all respect including accessories.

3.2.2. Rigid conduit accessories shall be normally of grip type.

3.2.3. Flexible conduit accessories shall be of threaded type.

3.2.4. Bends, couplers etc. shall be solid type in recessed type of works, and may be solid or inspection type as required, in surface type of works.

3.2.5. Saddles for fixing conduits shall be heavy gauge non-metallic type with base.

3.2.6. The minimum width and the thickness of the ordinary clips or girder clips shall be as per Table-5.

3.2.7. For all sizes of conduit, the size of clamping rod shall be 4.5mm (7 SWG) diameter.

4. **INSTALLATION:**

4.1. **Common aspects for both recessed and surface conduit works:** The erection of conduits of each circuit shall be completed before the cables are drawn in.

4.2. **CONDUIT JOINTS**

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

4.2.2. The Engineer-in-charge, with a view to ensuring that the above provision has been carried out, may require that the separate lengths of conduit etc. after they have been prepared shall be submitted for inspection before being fixed.

4.3. **BENDS IN CONDUITS:**

4.3.1. All bends in the system may be formed either by bending the pipes by an approved method of heating, or by inserting suitable accessories such as bends, elbows or similar fittings, or by fixing non-metallic inspection boxes, whichever is most suitable. Where necessary, solid type fittings shall be used.

4.3.2. Radius of bends in conduit pipes shall not be less than 7.5 cm.

4.3.3. Care shall be taken while bending the pipes to ensure that the conduit pipe is not injured, and that the internal diameter is not effectively reduced.

4.4. **PAINTING:**

After installation, all accessible surfaces of metallic accessories shall be painted.

5. **ADDITIONAL REQUIREMENTS FOR SURFACE CONDUIT WORK:**

5.1. Conduit pipe shall be fixed by heavy gauge non-metallic saddles with base, secured to suitable approved plugs with screws in an approved manner, at an interval of not more than 60 cm, on either side of couplers or bends or similar fittings, saddles shall be fixed at a closer distance from the center of such fittings. Slotted PVC saddles may also be used where the PVC pipe can be pushed in through the slots.

5.2. Where the conduit pipes are to be laid along the trusses, steel joists etc. the same shall be secured by means of saddles or girder clips as required by the Engineer-in-charge. Where it is not possible to use these for fixing, suitable clamps with bolts and nuts shall be used.

6. ADDITIONAL REQUIREMENTS FOR RECESSED CONDUIT WORK:-

6.1. MAKING CHASE:

6.1.1. Chase in the wall shall be neatly made, and of ample dimensions to permit the conduit to be fixed in the manner desired.

6.1.2. In the case of buildings under construction, the conduits shall be buried in the wall Before plastering, and shall be finished neatly after erection of conduit.

6.1.3. In case of exposed brick/rubble masonry work, special care shall be taken to fix the conduit and accessories in position along with the building work.

6.2. FIXING CONDUITS IN CHASE:

6.2.1. The conduit pipe shall be fixed by means of staples, or by means of non-metallic saddles, placed at not more than 40 cm apart, or shall be fixed by any other approved means of fixing.

6.2.2. At either side of the bends, saddles/staples shall be fixed at a distance of 15 cm from the center of the bends.

6.3. ERECTION IN RCC WORK:

6.3.1. The conduit pipes shall be laid in position and fixed to the steel reinforcement bars by steel binding wires before the concreting is done. The conduit pipes shall be fixed firmly to the steel reinforcement bars to avoid their dislocation during pouring of cement concrete and subsequent tamping of the same.

6.3.2. Fixing of standard bends or elbows shall be avoided as far as practicable, and all Curves shall be maintained by bending the conduit pipe itself with a long radius which will permit easy drawing of conductors.

6.3.3. Location of inspection/junction boxes in RCC work should be identified by suitable means to avoid unnecessary chipping of the RCC slab subsequently to locate these boxes.

6.4. FIXING INSPECTION BOXES:-

6.4.1. Suitable inspection boxes to the minimum requirement shall be provided to permit inspection, and to facilitate replacement of wires, if necessary.

6.4.2. These shall be mounted flush with the wall or ceiling concrete. Minimum 65 mm

6.4.3. Depth junction boxes shall be used in roof slabs.

6.4.4. Suitable ventilating holes shall be provided in the inspection box covers.

6.5. FIXING SWITCH BOXES AND ACCESSORIES:

Switch boxes shall be mounted flush with the wall. All outlets such as switches, socket outlets etc. shall be flush mounting type, unless otherwise specified in the additional specification.

6.6. FISH WIRE:

To facilitate subsequent drawing of wires in the conduit, GI fish wire of 1.2 mm (18 SWG) shall be provided along with the laying of the recessed conduit.

7. BUNCHING OF CABLES :

7.1. Cable carrying alternating current, installed in metal conduit, shall always be bunched so that the outgoing and return cables are drawn into the same conduit.

7.2. Where the distribution is for single phase loads only, conductors for these phases shall be drawn in one conduit.

7.3. In case of three phase loads, separate conduits shall be run from the distribution boards to the load points, or outlets as the case may be.

8. EARTHING REQUIREMENTS:

8.1. A protective (earth) conductor shall be drawn inside the conduit in all distribution circuits to provide for earthing of non-current carrying metallic parts of the installation. These shall be terminated on the earth terminal in the switch boxes, and/or earth terminal blocks at the DB's.

8.2. Protective conductors of large size which may not be possible to be carried inside the conduits (as in the case of some sub mains etc.) may be laid external to the conduits and clamped thereto suitably.

8.3. Gas or water pipes shall not be used as protective conductors (Earth medium).

TABLE - 3.

DIMENSIONAL DETAILS OF RIGID NON-METALLIC CONDUITS.
(All dimensions in mm)

S.No.	Nominal outside diameter	Maximum outside diameter	Minimum inside diameter	Maximum permissible eccentricity	Maximum permissible ovality

1.	20	20 ^{+0.3}	17.2	0.2	0.5
2.	25	25 ^{+0.3}	21.6	0.2	0.5
3.	32	32 ^{+0.3}	28.2	0.2	0.5
4.	40	40 ^{+0.3}	35.8	0.2	0.5
5.	50	50 ^{+0.3}	45.0	0.4	0.6

TABLE - 4

MAXIMUM NUMBER OF PVC INSULATED 650/ 1100 VOLT GRADE COPPER CONDUCTOR CABLE THAT CAN BE DRAWN INTO RIGID PVC CONDUIT.

Nominal cross sectional area of conductor in Sqmm.	20 mm	25 mm	32 mm	40 mm
1.50	5	10	14	-
2.50	5	8	12	-
4.00	3	8	10	-
6.00	2	5	8	-
10.00	-	3	5	6
16.00	-	-	3	6
25.00	-	-	2	4

Note : The above table shows the maximum capacity of conduits for a simultaneous drawing of cables.

TABLE - 5.

ORDINARY CLIPS OR GIRDER CLIPS.

S.No.	Size of conduit	Width	Thickness
1.	20 mm & 25 mm	19 mm	20 SWG (0.9144mm)
2.	32 mm & above	25 mm	18 SWG (1.219mm)

SECTION VII- EARTHING

1. SCOPE:

This section covers the essential requirements of earthing system components and their installation. For details not covered in these specifications. IS code of Practice on earthing (IS: 3043-1987) shall be referred to.

2. INSTALLATION:

2.1. ELECTRODES:

2.1.1. Plate electrode shall be buried in ground with its faces vertical, and its top not less than 3 m below the ground level. The installation shall be carried out as per standard drawing.

2.1.2. When more than one electrode is to be installed, a separation of not less than 2 m shall be maintained between two adjacent electrodes.

2.1.3. The strip or conductor electrode shall be buried in trench not less than 0.5 m deep.

2.1.4. If condition necessitate the use of more than one strip or conductor electrode, they shall be laid as widely distributed as possible, in a single straight trench where feasible, or preferably in a number of trenches radiating from one point.

8.3.1. Earth Electrodes shall be kept clear of the building foundation & in no case shall it be nearer than 2 meters from the outer surface of the wall.

3. WATERING ARRANGEMENT:

3.1. In the case of plate earth electrodes, a watering pipe 20mm dia. medium class pipe shall be provided and attached to the electrodes. A funnel with mesh shall be provided on the top of this pipe for watering the earth.

3.2. The watering funnel attachment shall be housed in a masonry enclosure of size not less than 30cm*30cm*30cm.

3.3. A cost iron/MS frame with MS cover, 6 mm thick, and having locking arrangement shall be suitably embedded in the masonry enclosure.

4. EARTHING CONDUCTOR (Main earthing lead):

4.1. The earthing conductor shall be securely terminated on to the plate with two bolts, nuts, check nuts and washers.

4.2. A double C-clamp arrangement shall be provided for terminating tape type earthing conductor with GI watering pipe coupled to the pipe earth electrode. Galvanised "C" shaped strips, bolts, washers, nuts and check nuts of adequate size shall be used for the purpose.

4.3. The earthing conductor from the electrode up to the building shall be protected from mechanical injury by a medium class 15 mm dia GI pipe in the case of wire, and by 40 mm dia, medium class GI pipe in the case of strip. The protection pipe in ground shall be buried at least 30 cm deep (to be increased 60 cm in case of

road crossing and pavements). The portion within the building shall be recessed in walls and floors to adequate depth in due co-ordination with the building work.

4.4. The earthing conductor shall be securely connected at the other end to the earth stud/earth bar provided on the switchboard by:

- (a) Soldered or preferably crimped lug, bolt, nut and washer in the case of wire, and,
- (b) Bolt, nut and washer in case of strip conductor.
- (c) Earthing Terminal / neutral point / earth bus in case of equipments / sub stations.

5. PROTECTIVE (LOOP EARTHING/ EARTH CONTINUITY) CONDUCTOR:

5.1. Earth terminal of every switchboard in the distribution system shall be bonded to the earth bar/terminal of the upstream switchboard by protective conductor(s).

5.2. Two protective conductors shall be provided for a switchboard carrying a 3 phase switch gear thereon.

5.3. All the mountings of industrial type switchboards shall be bonded to the earth stud/earth bar using a protective conductor looping from one to another. Loop earthing of individual units will not be however necessary in the case of cubical type switchboards.

5.4. The earth connector in every distribution board (DB) shall be securely connected to the earth stud/earth bar of the corresponding switchboard by a protective conductor.

5.5. All metallic switch boxes and regulator boxes in a circuit shall be connected to the earth connector in the DB by protective conductor (also called circuit protective or loop earthing conductor), looping from one box to another up to the DB.

5.6. The earth pin of socket outlets as well as metallic body of fan regulators shall be connected to the earth stud in switch boxes by protective conductor. Where the switch boxes are non-metallic type, these shall be looped at the socket earth terminals, switch or at an independent screwed connector inside the switch box. Twisted earth connections shall not be accepted in any case.

5.7. Double earthing strips in rising mains, bus trunking etc. shall be securely connected to the earth bar/earth stud at the sending end switchboard. In the case of overhead bus bar systems, protective conductors shall be provided in addition to feeder cable armouring connection.

6. EARTH RESISTANCE:

6.1. The earth resistance at each electrode shall be measured. No earth electrode shall have a greater ohmic resistance than 5 ohms as measured by an approved earth testing apparatus. In rocky soil the resistance may be up to 8 ohms.

6.2. Where the above stated earth resistance is not achieved, necessary improvement shall be made by additional provisions, such as additional electrode(s), different type of electrode, or artificial chemical treatment of soil etc., as may be directed by the Engineer-in-charge.

6.3. If the earth resistance is too high and the multiple electrode earthing does not give adequate low resistance to earth, then the soil resistivity immediately surrounding the earth electrodes shall be reduced by adding sodium chloride, calcium chloride, sodium carbonate, copper sulphate, salt and soft coke or charcoal in suitable proportions.

7. MARKING:

7.1. Earth bars/ terminals at all switchboards shall be marked permanently either as "E".

7.2. Main earthing terminal shall be marked "SAFETY EARTH - DO NOT DISCONNECT".

SECTION VIII- LIGHTNING PROTECTION SYSTEM

1. GENERAL:

1.1. The entire lightning protective system should be mechanically strong to withstand the mechanical forces produced in the event of a lightning strike.

1.2. Conductors shall be securely attached to the building, or other object to be protected by fasteners, which shall be substantial in construction, not subject to breakage, and shall be of galvanised steel or other suitable materials, which suitable precautions to avoid corrosion.

1.3. The lightning conductors shall be secured not more than 1.2 m apart for horizontal run, and 1.0 m for vertical run.

2. AIR TERMINATION:-

All air terminals shall be effectively secured against overturning either by attachment to the object to be protected, or by means of substantial bracing and fixings which shall be permanently and rigidly attached to the building. The method and nature of the fixings should be simple, solid and permanent, due attention being given to the climatic conditions and possible corrosion.

3. DOWN CONDUCTORS:-

3.1. The down conductor system must, where practicable, be directly routed from the air termination to the earth termination network, and as far as possible, be symmetrically placed around the outside walls of the structure starting from the corners.

3.2. a) Practical reasons may not be some times allow the most direct route to be followed. While sharp bends, such as arise at the end of a roof are in-escapable (and hence permissible), re-entrant loops in a conductor can produce high inductive voltage drops so that the lightning discharge may jump across the open side of a loop. As a rough guide, this risk may arise when the length of the conductor forming the loop exceeds 8 times the width of the open side of the loop.

b) When large re-entrant loops as defined above cannot be avoided, such as in the case of some cornices or parapets, the conductors should be arranged in such a way that the distance across the open side of a loop complies with the requirement indicated above. Alternatively, such cornices or parapets should be provided with holes through which the conductor can pass freely.

3.3. Bonding to prevent side flushing: Any metal in, or forming a part of the structure, or any building services having metallic parts which are in contact with the general mass of the earth, should be either isolated from, or bonded to the down conductor. This also applies to all exposed large metal items having any dimension greater than 2 m whether connected to the earth or not.

4. JOINTS AND BONDS :-

4.1. JOINTS:-

- 4.1.1. A lightning protective system should have as few joints as possible.
- 4.1.2. Joints should be mechanically and electrically effective, for example, clamped, screwed, bolted, crimped, riveted or welded.
- 4.1.3. With overlapping joints, the length of the overlap should not be less than 20 mm for all types of conductors.
- 4.1.4. Contact surfaces should first be cleaned, then inhibited from oxidation with a suitable non-corrosive compound.
- 4.1.5. Joints of dissimilar metals should be protected against corrosion or erosion from the elements, or the environment, and should present an adequate contact area.

4.2. BONDS:-

- 4.2.1. Bonds have to join a variety of metallic parts of different shapes and composition, and cannot therefore be of a standard form.
- 4.2.2. There is the constant problem of corrosion and careful attention must be given to the metal involved, i.e. the metal from which the bond is made, and those of the items being bonded.
- 4.2.3. The bond must be mechanically and electrically effective, and protected from corrosion in, and erosion by the operating environmental.
- 4.2.4. External metal on, or forming part of a structure, may have to discharge the full lightning current, and its bond to the lightning protective system should have a cross sectional area not less than that employed for the main conductors.
- 4.2.5. Structures supporting overhead electric supply, telephone and other lines must not be bonded to a lightning protective system without the permission of the appropriate authority.
- 4.2.6. vi. Gas pipe in no case shall be bonded to the lightning protective earth termination system.

5. TEST JOINTS:-

Each down conductor should be provided with a test joint in such a position that, while not inviting unauthorized interference, it is convenient for use when testing.

6. EARTH TERMINATION NETWORK:-

- 6.1. An earth station comprising one or more earth electrodes as required, should be connected to each down conductor. This shall be specified.
- 6.2. Each of the earth station should have a resistance not exceeding the product given by 10 ohms multiplied by the number of earth electrodes to be provided their in. The whole of the lightning protective system, including any ring earth, should have a combined resistance to earth not exceeding 10 ohms without taking account of any bonding.

6.3. If the value obtained for whole of the lightning protection system exceeds 10 ohms, a reduction can be achieved by extending or adding to the electrodes, or by interconnecting the individual earth terminations of the down conductors installed below ground, some time referred to as a ring conductor. Buried ring conductors laid in this manner are considered to be an integral part of the earth termination network, and should be taken into account when assessing the overall value of resistance to earth of the installation.

6.4. A reduction of the resistance to the earth to a value below 10 ohms has the advantage of further reducing the potential gradient around the earth electrode when discharging lightning current. It also further reduces the risk of side flashing to metal in, or of structure.

6.5. Earth electrodes should be capable of being isolated and a reference earth point should be provided for testing purposes

SECTION IX- CABLES

1. GENERAL

1.1. All cables shall be supplied, inspected, laid tested and commissioned in accordance with drawings, specifications, relevant Indian standards specifications and cable manufacturer's instructions. The cable shall be delivered at site in original drums with manufacturer's name clearly written on the drum.

1.2. The recommendations of the cable manufacturer with regard to jointing and sealing shall be strictly followed.

1.3. The laying of cable shall be done as per IS 1255 amended up to date.

2. Cable Identification

(i) Cable identification shall be provided by embossing on the outer sheath the following:

(ii) Manufacturer's name or trade mark

(iii) Voltage grade

(iv) Year of manufacture

(v) Type of insulation

(vi) Printing of cable length on each meter

2.1. Core Identification

Respective cores of power/control cables shall be identified with the following pattern :

2 core : red (R), black (BK)

3 core : 5 core red (R), yellow (Y),blue (BL)

4 core : red (R),yellow (Y),blue (BL), black (BK)

5 core : red (R), yellow (Y),blue (BL), black (BK) & grey (GY)

7&14 cores : cores shall be numbered.

2.2. Tests

(i) Shop Tests

(ii) The cables shall be subject to shop tests in accordance with relevant standards to prove the design and general qualities of the cables as below:

(iii) Routine tests on each drum of cables.

(iv) Acceptance tests on drums chosen at random for acceptance of the lot.

(v) Type tests on each type of cable, inclusive of measurement of armour D.C. resistance of power cables.

3. MATERIAL

3.1. **11 kV HT Cables:** The 11 KV cable shall be cross linked polyethylene insulated, GI strip armoured, PVC inner and outer sheath (to be extruded type)

earthed grade cable. The outer sheath shall be resistant to water, fungus, termite & rodent attacks. Colour of outer sheath shall be black. The cable shall be conforming to IS : 7098 (Part - II) with aluminum conductor as per I.S. 8130.

3.2. L T Power Cables: The 1.1 KV cables shall be XLPE insulated PVC sheathed aluminum conductor armoured conforming to IS : 7098 (part - 1) amended up to date or PVC insulated, extruded PVC inner sheath, steel strip armored and extruded PVC overall sheath conforming to 15:1554 (PI).as mentioned in the Bill of Quantities and drawings, laid in trenches, ducts and underground as shown on drawing or as per instruction given by engineer-in-charge.

3.3. Control Cables: Control cables shall be of stranded annealed copper conductors with cross section area of 1.5/ 2.5 sq.mm, PVC insulated, colour coded or with core identification, extruded inner sheathed, steel wire armoured and over all PVC extruded outer sheath etc. The cable shall conform to 15: 1554 (P-I).

3.4. Cable Termination

a) HT Cable Terminations

Cable termination shall be heat shrinkable type/cold shrink type suitable for sizes as specified in BOQ, XLPE insulated 11 kV (E) grade, and aluminum conductor armoured cables. Termination shall confirm to IS 3573 with latest amendment.

b) L T power, control cable termination

- (i) L T cable termination shall be provided with compression cable glands of brass suitable for holding the armour of the cable.
- (ii) Lugs shall be crimping type and shall be of copper suitable for copper conductor cable and of aluminum for aluminum conductor cable.
- (iii) Termination shall be carried out as per details furnished in this specification.

3.5. Compression Glands

3.5.1. Cable glands shall be made of brass casting, machined accurately to the required size with protective coating of nickel.

3.5.2. Cable glands shall be of heavy duty type and shall consist of: gland nipple, neoprene seal for inner sheath, armour clamping cone, gland body, neoprene seal for outer sheath, skid washer, gland body nut.

3.5.3. The Aluminum conductor shall be stranded, grade H4 class 2 as per IS 8130 and copper conductor shall be annealed copper class 2 as per IS 8130.

3.5.4. Technical data sheets for above cables, including all electrical & mechanical parameters shall be furnished with offer.

SECTION X- 11 KV TWO POLE STRUCTURE SYSTEM

1. GENERAL

1.1. Two pole structure is intended to receive 11 kV 3 Ph. 50 Hz power supply through 11 kV XLPE cable from overhead line of State Electricity Board.

1.2. Two pole structure shall be fabricated from steel member and shall comprise of 11 kV Lightning Arrestors, Isolator, Drop out fuses (DO), Supporting channel, ACSR, Disk & pin insulators for cable support, Conductor, Outdoor end termination disc and pin insulators for XLPE 11 kV cable, 150 dia. GI pipe for cable protection, nut, bolts etc.

1.3. All structural work shall conform to relevant Indian Standards, specifications & codes etc.

1.4. Necessary guy wires shall be provided for supporting the structure (wherever required).

1.5. The structure shall be painted with two coats of red oxide.

2. Lightning arrestors

2.1. Lightning arrestors shall be in single pole assembly heavy duty, station type suitable for outdoor installation & suitable to mount on steel structure.

2.2. Lightning arrestors shall be adequately rated to discharge the energy of voltage surges and shall be provided complete with mounting brackets as well as line and earth connections.

2.3. Lightning Arrestors shall be suitable for termination to ACSR conductor.

3. Isolator

3.1. Isolator shall, be suitable to mount vertically on two pole structure

3.2. Isolator shall have operating handle with locking arrangement

3.3. Isolator shall have operating handle with necessary arrangement to operate the isolator from ground

3.4. Isolator shall also be suitable for ACSR conductor termination

4. Drop out fuses

4.1. Drop out fuses shall be provided of suitable rating.

SECTION XI- 11 KV HT SWITCHGEAR

1. DESIGN CRITERIA

- 1.1. 11 KV HT Panel shall be used to receive the power from SEB and to feed supply to the plant through the step down transformer.
- 1.2. Switchgear shall be located in a clean but hot, humid and tropical atmosphere.
- 1.3. For continuous operation at specified ratings, temperature rise of the various switchgears components shall be limited to the permissible values stipulated in the relevant standards.
- 1.4. The switch gears and components thereof shall be capable of withstanding the mechanical forces and thermal stresses of the short circuit current listed in the annexure without any damage or deterioration material.
- 1.5. Circuit breakers, instrument transformers, bus-bars cable compartment etc. shall be housed in separate compartment within the cubicle. The design shall be such that failure of one equipment shall not affect the adjacent units.
- 1.6. Circuit breakers of identical rating shall be physically and electrically interchangeable.

2. SPECIFIC REQUIREMENTS

2.1. Construction Features

- (i) The Switchgear shall be indoor, metal-clad, floor mounted, drawout type.
- (ii) The Switchgear shall be such as to allow extension at either end.
- (iii) The Switchgear enclosure shall conform to the degree of protection IP4X.
- (iv) The minimum thickness of sheet steel used shall be 2 mm.
- (v) The switchgear shall be dead-front, free standing type vertical cubicle.
- (vi) Switchgear shall have a front hinged door with latches and a removable back cover.
- (vii) All covers and doors shall be provided with neoprene gaskets.
- (viii) All relays, meters, switches and lamps shall be flush mounted on the respective cubicle door or on control cabinet built on the front of the cubicle.
- (ix) The complete structure shall be free, rigid, self supporting, free from twist and bends etc.

2.2. Bus and Bus Taps

- (i) The main buses and connections shall be of high conductivity aluminum / aluminum alloy, sized for specified current ratings with maximum temperature limited to 85 degree C (i.e. 35 degree Crise over 50 degree C

ambient)

(ii) Bus-bars and connection shall be fully insulated for working voltage with adequate phase! ground clearances. Insulating sleeves for bus-bars and cast-resin shrouds for joints shall be provided.

(iii) All buses and connections shall be supported and braced to withstand stresses due to maximum short circuit current and also to take care of any thermal expansion.

(iv) Bus-bars shall be colour coded for easy identification and so located that the sequence R-Y-B shall be from left to right, top to bottom or front to rear, when viewed from front of the switchgear assembly.

2.3. **Circuit Breakers**

(i) Circuit breakers shall be triple pole, single throw and shall be Vacuum type / SF₆ type.

(ii) Circuit breakers shall be drawout type, having SERVICE, TEST and DISCONNECTED position with positive indication for each position.

(iii) The operating time (break time) of the breaker shall be maximum of 3 cycles.

(iv) Circuit breaker shall have motor wound spring charged trip free mechanism with anti-pumping feature and shunt trip. In addition, facility for manual charging of spring shall be provided.

(v) For motor wound mechanism, spring charging shall take place automatically after each breaker closing operation. One open-close open operation of the circuit breaker shall be possible after failure of power supply to the motor.

(vi) Mechanical safety interlock shall be provided to prevent:

(a) The circuit breaker from being racked in or out of the service position when the breaker is closed.

(b) Racking in the circuit breaker unless the control plug is fully engaged.

(vii) Automatic safety shutters shall be provided to fully cover the female primary disconnects when the breaker is withdrawn.

(viii) Each breaker shall be provided with an emergency manual trip, mechanical ON-OFF indication, an operation counter and mechanism charge! discharge indicator.

(ix) Each breaker shall be provided with following:

(a) Auxiliary switch, with 6 NO + 6 NC contacts, mounted on the drawout portion of the switchgear.

(b) Position/cell switch with 3NO + 1 NC contacts, on each for TEST and SERVICE position.

(x) **Control & Indication:** Breaker cubicle shall be equipped with following:

- (a) One (1) No. spring return type TNC switch for closing and tripping of the breaker.
- (b) One (1) No. Push button operated mechanical mechanism for tripping.
- (c) Three (5) Nos. indicating lamps on front of compartment

GREEN	Breaker Open	
RED	Breaker Closed	
AMBER	Breaker Trip	
	BLUE	Spring Charged
	WHITE	Trip circuit healthy

- (d) Lamps shall be of LED type. Lamps and lens shall be replaceable from the front.
- (e) Each circuit breaker shall be provided with a anti-pumping relay. Trip coil supervision relay and fast trip relay in addition to those shown in the drawing.
- (f) Metering device and protective relays for switchgear shall be provided as shown in the attached drawings.

2.4. Current Transformers

- (i) Current transformer shall be cast resin type. All secondary connections shall be brought out to terminal blocks where wye or delta connections will be made.
- (ii) Accuracy class of Current Transformers shall be :
 - Class 5P20 for relaying
 - Class 1.0/0.5 as specified and ISF<5 for metering.

2.5. Voltage Transformers

- (i) Voltage Transformers shall be of cast-resin type having accuracy class of 1.0/ 0.5 and shall be mounted on drawout trolley.
- (ii) High voltage winding of voltage transformer shall be protected by current limiting fuse. The voltage transformer and fuse shall be completely disconnected and visibly grounded in fully draw-out position.
- (iii) Low voltage fuses, sized to prevent overload, shall be installed in all ungrounded secondary leads. Fuse shall be suitably located to permit easy replacement while the switchgear is energised.

2.6. Relays

- (i) Relay shall be of draw out design with built - in testing facilities. Small auxiliary relays may be in non-drawout execution and mounted within the cubicle.

(ii) Relays shall be rated for operation on secondary voltage and secondary currents as shown on drawings. Number and rating of relay contacts shall suit the job requirements.

2.7. **Meters**

Indicating instruments (96 x 96 mm) shall be digital meter, switch board type and accuracy class of + (1% full scale + 1 count).

2.8. **Secondary Wiring**

(i) The switchgear shall be fully wired at the factory to ensure proper functioning of control, protection, transfer and interlocking schemes.

(ii) Fuse and links shall be provided to permit individual circuit isolation from bus wires without disturbing other circuits. All spare contacts of relays, switches and other devices shall be wired up to terminal blocks.

(iii) Wiring shall be done with flexible, 650V grade, PVC insulated switchboard wires with stranded copper conductors of 2.5 sq. mm for control and current circuits and 1.5 sq. mm for voltage circuits.

(iv) Each wire shall be identified, at both ends, with permanent markers bearing wire numbers as per contractor's Wiring Diagram.

(v) Wire terminations shall be made with crimping type connectors with insulating sleeves. Wires shall not be spliced between terminals.

2.9. **Terminal Blocks**

(i) Terminal blocks shall be 660 V grade box-clamp type with marking strips similar to ELMEX 6 Sq. mm or equal. Terminals for CT secondary leads shall have provision for shorting.

(ii) Not more than two wires shall be connected to any terminal. Spare terminals equal in number to 20% active terminals shall be furnished.

2.10. **Cable Termination**

(i) Switchgear shall be designed for cable entry from the bottom. Sufficient space shall be provided for ease of termination and connection.

(ii) Power cables shall be XLPE insulated, armoured, overall PVC sheathed with stranded Aluminum conductor.

(iii) Control cables shall be PVC insulated, armoured, overall PVC sheathed with 2.5 Sq. mm stranded copper conductor.

(iv) The gland plates shall be minimum 4 mm thick. The gland plate and supporting arrangement for IIC power cables shall be such as to minimise flow of eddy current. In such case, gland plate shall be non ferrous metal.

(v) Sufficient space shall be provided between the power cable termination (end-boxes) and gland plate. Core accommodated within this space.

2.11. Ground Bus

- (i) A ground bus, rated to carry maximum fault current, shall extend to full length of the switchgear.
- (ii) The ground bus shall be provided with two- bolt drilling with G.I. bolts and nuts at each end to receive 50 x 6 mm G.I flat.
- (iii) Each stationary unit shall be connected directly to the ground bus. The frame of each circuit breaker and drawout V.T. unit shall be grounded, through heavy multiple contacts at all times.
- (iv) Wherever the schematic diagrams indicate a definite ground at the switchgear, a single wire for each circuit thus grounded shall be run independently to the ground bus and connected thereto.
- (v) C.T. and P.T. secondary neutrals shall be earthed through removable links so that earth of one circuit may be removed without disturbing other.

2.12. Nameplates

- (i) Nameplates of anodised aluminum shall be furnished at each cubicle and at each instrument, device mounted on or inside the cubicle.
- (ii) Caution notice on suitable metal plate shall be affixed at the back of each vertical panel.

2.13. Space Heaters

Cubicle shall be provided with thermostat-controlled space heaters.

2.14. A.C/D.C Power Supply

- (i) The following power supplies shall be made available at each switchgear by the, contractor:
 - AC. Supply : Single Feeder
 - D.C supply : Double Feeder
- (ii) Isolating switch fuse units shall be provided at each switchgear for the incoming supplies, 4- pole, single throw for A.C. and 2-pole, double throw for D.C.
- (iii) Bus-wires of adequate capacity shall be provided to distribute the incoming supplies to different cubicles. Isolating switchfuse units shall be provided at each cubicle for ACtD.C. supplies.
- (iv) AC. load shall be so distributed as to present a balance loading on three-phase supply system.

2.15. Tropical Protection

- (i) All equipment, accessories and wiring shall have fungus protection, involving special treatment of insulation and metal against fungus, insects & corrosion.

(ii) Screen of corrosion resistant material shall be furnished on all ventilating louvers to prevent the entrance of insects.

2.16. Painting

(i) All surfaces shall be sand blasted, pickled and grounded as required to produce a smooth, clean surface free of scale, grease and rust.

(ii) After cleaning, the surfaces shall be given a phosphate coating followed by 2 coats of high quality primer and stoved after each coat.

(iii) The panels shall be finished in Siemens Grey, RAL7032 with polyester enamel paint.

3. TESTS

The switchgear shall be completely assembled, wired, adjusted and tested at the factory as per the relevant standards.

3.1. Routine Test

The tests shall include but not necessarily limited to the following:

(i) Operation under simulated service condition to ensure accuracy of wiring, correctness of control scheme & proper functioning of the equipment.

(ii) All wiring and current carrying part shall be given appropriate High Voltage test.

(iii) Primary current and voltage shall be applied to all instrument transformers.

(iv) Routine test shall be carried out on all equipment such as circuit breakers, instrument transformers, relays, meters etc.

3.2. Type Test

Type test reports of similar switchgear shall be furnished.

3.3. Test Witness

All tests shall be performed in presence of *Owner's* representatives, if so desired by the Owner's. The Contractor shall given at least fifteen (15) days advance notice of the date when tests are to be carried out.

4. SYSTEM DESCRIPTION & REQUIREMENTS

Sl. No.	Section	Parameter	Specification
1	System Details	Voltage	11/12 KV (Nom./Max.)
2		Nos. of Phase	3
3		Frequency	50 Hz ± 5%
4		System Neutral	Non-effectively earthed

Sl. No.	Section	Parameter	Specification
5	Insulation Level	1 min 50 Hz withstand	28 KV rms
6		Impulse withstand	75 KV peak
7	Short Circuit Rating	Interrupting	350 MVA
8		Withstand time	1 Sec
9	Circuit Breaker	Breaking Current	18.3 kA
10	Auxiliary Power Supply	Available	24V DC
11	Heater/Lamp/Socket	Supply	415V/240V $\pm 10\%$, 50 Hz $\pm 5\%$, 3Ph./1Ph.
12	Spring Wound Motor for CB	Supply	220V-240V, 1Ph., 50 Hz
13	Shunt Trip Coil & Closing Coil	Supply	24V DC

SECTION XII- TRANSFORMER

1. DESIGN CRITERIA

- a) Transformer is intended to step down incoming 11 KV power supply to 433 V for feeding power supply to 415V Main L T PCC for further distribution.
- b) Transformer shall be installed indoor in hot, humid and tropical atmosphere. All equipment, accessories and wiring shall be provided with tropical finish to prevent fungus growth.
- c) The transformer shall be capable of withstanding the short circuit stresses due to a terminal fault on one winding with full voltage maintained on the other winding for minimum period of three (3) seconds.
- d) The transformer shall be free from annoying hum or vibrations. The design shall be such as not to cause any undesirable interference with radio or communication circuits.
- e) Transformer shall be provided with **OFF LOAD TAP CHANGER** on HV side.
- f) The safety clearances of all live parts of equipment shall be as per relevant standard.

2. SPECIFIC REQUIREMENTS

a Tank

- a) Tank shall be of all welded construction and fabricated from good commercial grade low carbon steel of adequate thickness. All seams shall be properly welded. All welding shall preferably be stress relieved.
- b) The tank wall shall be reinforced by stiffener to ensure rigidity so that it can withstand without any deformation, mechanical shock during transportation and during oil filling by vacuum.
- c) Transformer tank shall be provided with one set of bi-directional flanged wheels for rolling the transformer parallel to either center line.
- d) All heavy removable parts shall be provided with eye bolt for ease of handling.
- e) Hand holes of sufficient size shall be provided for access to leads, windings, bottom terminals of bushings and taps.

b Core & Coils

- a) The transformer may be of core type. The core shall be built up with high grade, non-aging, low loss, high permeability, grain oriented, cold-rolled silicon steel laminations specially suitable for core material.
- b) The coils shall be manufactured from electrolytic copper conductor and fully insulated for rated voltage.
- c) Insulating material shall be of proven design. Coils shall be so insulated that impulse and power frequency voltage stresses are minimum.
- d) Coil assembly shall be suitably supported between adjacent sections by

insulating spacers and barriers. Bracing and other insulation used in assembly of the winding shall be arranged to ensure a free circulation of the oil and to reduce the hot spot of the winding.

- e) All leads from the windings to the terminal board and bushings shall be rigidly supported to prevent injury from vibration or short circuit stresses. Guide tube shall be used where practicable.

c Radiators

- a) Radiators shall be made from pressed steel and shall be detachable type.
- b) Radiators shall be interchangeable type. Top and bottom shut off valve shall be provided for each radiator.
- c) Each radiator shall be provided with air release plug, drain valve and lifting lugs.

d Tapings

- a) Off load taps shall be provided on the high voltage winding.

3. Insulating Oil

- a) The transformer shall be filled with mineral insulating oil suitably inhibited to prevent slugging.
- b) First filling of oil along with 10% excess shall be furnished for each transformer. Oil shall be supplied in non-returnable containers suitable for outdoor storage.

4. Terminal Arrangements

- a) Terminals on HV shall be through HT cable where as the LV side shall be through bus duct.
- b) Cable-end box shall be weatherproof, air filled type with sufficient space inside for termination and connection of cables.
- c) Cable-end box shall be furnished complete with removable gland plate.
- d) A separate LV. neutral bushing shall be provided for connection to station earthing. Necessary insulators shall be provided on transformer body for bringing down the conductor.

5. Marshalling Box

- a) A sheet steel, weatherproof, IP55 marshalling box shall be provided for each transformer. The box shall contain all auxiliary devices except those, which must be located directly on the transformer.
- b) All terminal blocks for cable connection shall be located in this box. The terminal blocks shall be Phoenix 10 sq.mm.

6. Wiring

- a) All control, alarm and indication devices provided with the transformer shall be wired up to the terminal blocks.
- b) Wiring shall be done with PVC wires in conduit or PVC armoured cable. Minimum wire size shall be 2.5 sq. mm copper. Not more than two wires shall be connected to a terminal. 10% spare terminals shall be provided.
- c) All devices and terminal blocks within the marshalling box shall be identified

by symbols corresponding to those used in applicable schematic or wiring diagram.

7. Grounding

- a) Two grounding pads, located on the opposite sides of the tank, shall be provided for connection to station ground mat
- b) Grounding pad shall have clean buffed surface with two tapped holes, M10 GJ. bolts and spring washers for connection 50 x 6 mm G.I. flat.
- c) Ground terminals shall be also provided on marshalling box to ensure its effective Earthing.
- d) Bonding shall be provided between various non-current carrying parts of transformer wherever the same are connected thru' gaskets.

8. Fittings and Accessories

Each transformer shall be equipped with fittings and accessories as listed below:

- a) Oil conservator with filter cap, drain plug and plain oil level gauge (with coloured prismatic front).
- b) Silica gel breather with connecting pipe and oil seal.
- c) Air release plugs.
- d) Pressure release device. Explosion vent should be double diaphragm type.
- e) 150mm dial magnetic oil level gauge with low level alarm contact.
- f) 150 mm dial oil temperature indicator with maximum reading pointer and electrically separate contacts for trip and alarm.
- g) 150 mm dial winding temperature indicator with maximum reading pointer and electrically separate sets of contacts for trip and alarm.
- h) Thermometer pockets.
- i) Double float Buchholz relay with gas release cock, shut-off valve on either side and separate sets of contacts for trip and alarm.
- j) Sampling valve/ Filter valve with threaded adopted (top and bottom).
- k) Drain valve with threaded adopted.
- l) Jacking pads, handling and lifting lugs.
- m) Cover lifting eyes.
- n) Bi-directional rollers and skids.
- o) Radiators (Detachable type).
- p) Clamping devices.
- q) Two grounding pads.
- r) Remote tap changer control panel.

- s) Weatherproof marshalling box for housing control equipment and terminal connections.
- t) Rating and terminal marking plates.
- u) Neutral bushing with earthing conductor bringing down duly supported on insulators.
- v) HT cable box! L T suitable for Bus Duct connection.
- w) CTs in neutral as specified.

9. Painting

- a) All steel surfaces shall be thoroughly cleaned by sand blasting or chemical agents, as required, to produce a smooth surface free of scales, grease and rust.
- b) The internal surfaces in contact with insulating oil shall be painted with heat resistant insulating varnish, which shall not react with and be soluble in the insulating liquid used.
- c) The external surfaces, after cleaning, shall be given a coat of high quality red oxide or yellow chromate primer followed by filler coats.
- d) The transformer shall be finished with two coats of Siemens Grey (RAL 7032) polyester enamel paint.

10. TESTS

a ROUTINE TESTS

During manufacture and on completion, all transformer shall be subjected to the IS routine tests.

b TEST WITNESS

Tests shall be performed in presence of Owner's representative if so desired by the Owner. The Contractor shall give at least fifteen (15) days' advance notice of the date when the tests are to be carried out.

c SYSTEM DESCRIPTION & REQUIREMENT

Sl. No.	Parameter	Specification
a)	Application	LT Transformer
b)	Service	Outdoor/Indoor, Step-down
c)	Type	Oil immersed
d)	Rated Output	As per Bill of Quantities
e)	Cooling	ONAN
f)	Rated Voltage (Line to Line)	11 KV / 0.433 KV
g)	Number of Phases	3
h)	Rated Frequency	50 Hz

Sl. No.	Parameter	Specification
i)	System Fault Level at 11 KV	350 MVA
j)	Temperature Rise Above 50 °C	
	i) In Oil by Thermometer	45 °C
	ii) In Winding by Resistance	50 °C
k)	Insulation Level on HV Side	75/28 KV (peak/rms)
l)	Vector Group	Dyn 11
m)	Type of Radiator	Detachable type
n)	Type of Taps Provided	Off Load
o)	Taps Provided On	HV Winding
p)	Range of Taps	+10% to -15% in total of 15 steps
q)	Percentage Impedance	6% at 75 °C on full load
r)	Method of Tap Changer Control	a) Manual Mode b) Electrical Local c) Electrical Remote
s)	Terminal Connection	HV Cable end box suitable for XLPE cable LV Terminal box suitable for XLPE cable
t)	Additional Neutral Bushing for Earthing	1 No.
v)	Full Load Losses	12.0 KW (Maximum)*
w)	No Load Losses	1.75 KW (Maximum)* *Transformers having losses more than specified above are not acceptable.

SECTION XIII - 415V L T PANEL

DESIGN CRITERIA OF 415 V LT PANEL

- a) One nos. transformers of 1000 KVA each and two DG sets of 200 KVA each have been envisaged to cater the campus loads.
- b) Generally in normal condition, Transformer shall feed power to Main L T Panel with bus coupler in open condition.
- c) As long as SEB power supply shall be available, the whole plant load shall be fed through Transformers.
- d) There shall be two positions selector switch (Auto/ Manual) on each breaker of L T panel
 - (i) In Auto Mode: Closing/ switching off of breaker shall be automatic.
 - (ii) In Manual Mode: Closing/switching off of breaker shall be manual through TNC switch, located on breaker panel.
 - (iii) In no condition, two different supplies shall get paralleled.
- e) There shall be three positions selector switch (Auto/test/Manual) on each DG set breaker panel
 - (i) In Auto Mode of breaker panels:
All operation i.e. starting of required DG set, their parallel operations, load sharing (Active/Reactive), outgoing breakers closing, switching off breakers on power resumption, switching off DG sets etc. shall be totally automatic.
 - (ii) In Manual Mode of breaker panels
All operation defined above shall be manual.
 - (iii) In test mode of DG power Panel
It shall be possible to check the system without energizing its breaker.
- f) In case of failure of power, following shall happen:
(If selector switches of breakers of L T panel & breakers of DG power panel are kept on Auto Mode).
 - (i) DG sets shall be started automatically (Based on load requirement) one by one.
 - (ii) DG set shall get paralleled automatically. Their breakers of DG synchronization panel (whatever is required) shall get closed on parallel operation. '
 - (iii) Outgoing breakers of DG Synchronization panel shall get closed automatically
 - (iv) At Main L T panel side, respective breaker from transformer supply shall open out and breakers from D G supply shall get closed automatically.
 - (v) DG Sets shall share active / reactive load automatically.
- g) On resumption of power, following shall happen: (if selector switch of breakers of LT panel & breakers of DG Power Panel are kept on Auto mode)
 - (i) An Alarm shall be sounded for resumption of power for a fixed duration.
 - (ii) First one outgoing of DG Panel shall be switched off and through reducing the load of DG Sets.

- (iii) After some time, second outgoing breakers shall be switched off.
 - (iv) Breakers from D G supply on Main Panel shall get switched off automatically.
 - (v) Subsequently breakers from Transformer supply shall be switched ON automatically.
 - (vi) DG sets shall run on NO Load for the prescribed time before they are switched off.
- i) Main L T Panel shall receive power supply from transformer through cables & DG synchronization panel through cables and shall feed power supply various feeders / services
 - j) Further power distribution shall be as indicated in the enclosed single line diagram.
 - k) Operating height of boards shall be limited within 350 mm to 1900mm from floor level.
 - l) The type and rating of the Panels covered herein shall be as follows:

System voltage	:	415V
System Frequency	:	50 Hz
No. of phases	:	3 Phase (4 wires)
Busbar rating	:	As specified in drawings.
High voltage Test	:	2.5KV for 1 minute.
Degree of Enclosure	:	IP52 (as per IS 2147)
 - m) All switchgear and its components provided in the panel shall have same fault withstand capacity as indicated for bus bar in single line diagram.

1. CONSTRUCTION FEATURES

- a) Panels shall be indoor, metal clad, modular construction, fix type (except circuit breaker cubicles) air insulated and floor mounted type.
- b) Unless otherwise mentioned, panels shall be of single front construction and shall be of dead front type.
- c) All panels shall be extensible on both sides.
- d) All panels shall be dust proof and vermin proof.
- e) The panels shall have horizontal Busbar Chamber at top of the panel even for top cable entry.
- f) All panels shall have provision for cable entry from top or from bottom or both as required. The same shall be confirmed to the Vendor during detailed engineering approval of shop drawing of panel manufacturer.
- g) All panels including capacitor panels shall be fully compartmentalised with metal! insulating partitions between individual compartments.
- h) The Horizontal busbar chamber shall be separate & totally enclosed.
- i) Minimum thickness of CRCA MS sheet member shall be 1.6 mm for non load bearing members and 2.0 mm for load bearing members.

- j) All panels shall comprise a continuous line up of dead front, free standing vertical sections. The installation of circuit breakers shall be limited to the bottom two tiers only. In two tiers formation two nos. of up to 1000 Amp. breakers can be provided.
- k) All doors and cutouts shall be provided with neoprene gaskets.
- l) The back doors of the panels shall be double door leaf type where the panels have more than 400 mm width.
- m) Strong concealed type hinges shall support all doors.
- n) All relays, meters, and switches etc. shall be flush mounted type.
- o) All incoming terminals shall be provided with shrouds. Support shrouds shall be transparent and shall be made of SMC/DMC material. However Bakelite/Hylam material is not acceptable and shall not be used anywhere in panels.
- p) The complete structure shall be rigid, self-supporting free from vibration, twists and bends etc.
- q) The panels housing circuit breaker feeders shall be in single front draw out execution. The incoming & bus coupler circuit breaker feeders shall be in single tier formation while the outgoing circuit breaker feeders may be in double tier formation, unless otherwise specified.
- r) A suitable barrier shall be provided between the circuit breaker and the associated control.
- s) The number of modules shall be so decided that the cable alleys are not over crowded. However the number of module in any panel shall not exceed six. The minimum size of module shall be 300mm and 225mm for starter and switch fuse / MCCBs feeders respectively. The minimum clear width of cable alley shall be 300mm.
- t) In cable alley, outgoing terminals shall be identified with feeder number.

2 BUS AND BUS TAPS

- a) The main buses and connection shall be of high grade of aluminum bus bars conductivity aluminum 1 aluminum alloy (Grade EC-91 E), sized for specified current ratings with max, temp. limited to 85 deg.C (35 deg. above 50 deg. ambient temp.).
- b) Vertical bus bars shall be designed depending upon the actual feeder requirement. Bimetallic connector shall be provided for connection between dissimilar metals.
- c) Busbars and connections shall be fully insulated for working voltage with adequate phase 1 ground clearances. Insulating sleeves for Bus bars and shrouds for joint shall be provided. Minimum clearance of 25 mm is required between phases and between phase& earth.
- d) Shrouds for busbars joints tapping points shall be of fiber glass only. Bus insulators shall be flame retardant, track resistant type with high creepage

surface and of non-hygroscopic material such as epoxy SMC DMC.

- e) Busbars shall be supported and braced to withstand the stresses due to max. short circuit current and also to take care of any thermal expansion. .
- f) The busbar size shall be of similar size as of busduct.

3 CHANGEOVER SWITCHES

- a) Changeover switches shall be 4 pole, heavy duty, group operated load break fault make type with AC 23A duty.
- b) The switches shall be capable of successfully withstanding the thermal stress for one sec. caused by the short circuit corresponding to the fault level specified.
- c) The switches shall be able to withstand mechanical stresses caused by the peak short circuit currents corresponding fault level specified.
- d) The switches shall be provided with operating handle compartment door and shall be so interlocked that on the hinged compartment door and shall be so interlocked that :
 - i) The door can be opened only when the switch is in OFF position.
 - ii) It shall not be possible to close the switch when the door is open.
- e) The switch shall be provided with pad-locking arrangement for 250A and above rating.
- f) The switch shall be provided with defeat interlock facilities.

4 FUSES

- a) All fuses shall be HRC cartridge link type.
- b) The fuses shall be provided with visible indication when they have operated.
- c) Rating of the fuses shall be so chosen so as to have co-ordination with switch. Fuses shall preferably mounted directly on plug in type fuse bases & sufficient number of insulated fuse pullers shall be supplied.
- d) Fuses and links functionally associated with the same circuit shall be mounted side by side.

Earthing and neutral links in main supply circuits shall be of silver plated copper & of bolted pattern.

5 CONTACTORS

- a) Contactors shall be of double break, single throw and electromagnetic and non-gravity type.
- b) Contactors shall be suitable for interrupted duty and shall be rated for class AC-3 duty.
- c) Main contacts of contactors shall be silver faced.
- d) Operating coils of contactors shall be suitable for operation on 220/240V AC, 1 phase, 50 Hz supply.

- e) Contactors shall be provided with at least two pairs of 'NO' and 'NC auxiliary contacts.
- f) Contactors shall not drop out at voltages down to 70% of coil rated voltages and min. pick up voltage shall be 85%.

6 OVERLOAD RELAYS

- a) Overload protection for each motor feeder (wherever required) shall be provided by thermal overload relay on each of the three phases.
- b) The relay shall be duly compensated against fluctuations on ambient temp. and frequency and shall have single phasing preventer feature.
- c) Relay shall be hand reset type from the front of the cubicle door.

Overload relay for fan applications shall be of heavy duty type with provision of bypassing the same during starting of the fan.

7 CAPACITORS

- a) The capacitor shall be of mixed dielectric type rated for 440Volts. Capacitors shall be provided with discharge resistors. The value of discharge resistors should be such that the residual voltage be less than 50V in one minute.
- b) Capacitors shall be suitable for prolonged operation at an rms. voltage between terminals not exceeding 1.10 times the rated voltage, excluding transients.
- c) Capacitors shall be suitable for continuous operation at an rms. line current not exceeding 1.30 times the current which occurs at rated sinusoidal voltage and rated frequency excluding transients.
- d) The maximum continuous reactive output of a capacitor (including any due to flow of harmonic currents) shall not exceed 30% over rated reactive output of a capacitor.
- e) Loss in the capacitors shall be kept as low as possible. (Max. 0.5W/KV AR).
- f) Wherever capacitor consists of several elements inside the units, each element shall be provided with individual fuses, so that the unit need not be discharged or disconnected (although with moderate reduction in output), if one of short circuit to any of the elements.

8 AUTOMATIC POWER FACTOR CONTROL RELAY

- a) Automatic Power factor control relay (APFCR) shall operate its auxiliary relay by sensing the power factor of the plant thru' current and voltage signals.
- b) APFCR shall have no. of steps specified in drawings.
- c) APFCR shall be provided with Built in PF meter (0.5 lag to 0.5 lead), calibrated setting dial.
- d) APFCR shall be suitable for 5A secondary current.
- e) APFCR shall be suitable for flush mounting in capacitor panel/MCCs.

- f) Current rating of its auxiliary relay shall be compatible with switching and continuous energization of main contactor of capacitors. Otherwise, additional relay shall be provided.

9 COOLING

- a) All the Capacitor Panels shall be properly ventilated. If required a small exhaust fan of suitable ratings shall be provided on the rear door of the panel, with the opening properly covered with fine wire mesh. The fan shall start/stop automatically along with normal start/stop provision.
- b) Louvers shall be provided on the door on rear side with a fine wire mesh.

10 CURRENT TRANSFORMERS

- a) Current Transformers shall be cast - resin type .All secondary connections shall be brought out to terminal blocks where connection will be made.
- b) Accuracy class of the current transformers shall be:
 - (i) Class 5P20 for protection.
 - (ii) Class 1.0 for metering.
 - (iii) Class PS for differential Protection & REF.
- c) Current transformer shall be provided with test links and shorting on both secondary leads for setting purpose.
- d) All current transformers shall be earthed by a separate earth link on terminal blocks.
- e) Additional nameplate of CTs/PTs shall be provided (if required) at such a place that it shall be possible to find out details of CTs/ PTs after mounting in the panel.

11 VOLTAGE TRANSFORMERS

- a) Voltage transformers shall be cast-resin, fixed type and shall have an accuracy class of 1.0.
- b) Low voltage fuses, sized to prevent overload, shall be installed in all ungrounded secondary leads. Fuses shall be suitably located to permit easy replacement while the board is energised.

12 RELAYS

Relays wherever provided shall be of draw-out design with built-in testing facilities. Small auxiliary relays may be in non-drawout execution-.

13 CONTROL AND SELECTOR SWITCHES

- a) Control and selector switches shall be of rotary type having enclosed contacts, which are accessible by the removal of cover.
- b) Control and selector switches shall be of flush mounted type and on front of panels. .

- c) Selector switches shall be of stay-put maintained contact type.
- d) Control switches shall be provided with escutcheon plate clearly marked to show the position.

14 INDICATING METERS AND INSTRUMENTS

Indicating instrument (96 x 96 mm) shall be digital meter, switch board type and accuracy class of 1 (1 % full scale \pm 1 count).

15 INDICATING LAMPS

- a) Indicating lamps shall be of LED type, low watt consumption and provided with appropriate value of resistors. The LEDs shall also have an in-built surge suppressor.
- b) Bulbs and lenses shall be interchangeable and easily replaceable from the front of the panel.

16 PUSH BUTTONS

- a) All push buttons shall be of the push to actuate the contact type.
- b) All push buttons shall be oil tight and shall be provided with adequate no. of contacts.

17 POWER AND CONTROL CABLE TERMINATION

- a) Suitable supporting arrangement shall be provided for all power and control cables entering the panel.
- b) Removable undrilled gland plate of 3 mm thick of MS for multicore cables and 4mm thick of Aluminum for single core cables sufficient in size to accommodate all compression type, heavy duty brass glands shall be provided.
- c) Adequate termination arrangement shall be provided for all power cables which shall be aluminum/ copper conductor, PVC insulated, sheathed, armoured PVC sleeved overall, heavy-duty cables, 1.1 KV grade. Power cables termination shall be by means of crimping type lugs on conductor cables.
- d) The terminal blocks shall be bolted lug type for cables. These shall be protected type and rated for 1100 Volts service. The minimum current rating of terminal block shall be 16 Amp. The construction shall be such that after the connection of cable by means of lugs, necessary clearance and creepage distance are available.
- e) Wherever there is more than one equipment connected on the same feeder, separate terminals shall be provided.

18 INTERNAL WIRING

- a) All internal wiring shall be carried out with stranded copper conductors, PVC insulated, 1100/650 V grade.

- b) Min. size of conductor for power wiring shall be 2.5 sq.mm, 1.5 sq.mm for AC control wiring and 4.0 sq.mm. for DC control wiring. Current transformer secondary wiring shall be with 2.5 sq.mm conductor.
- c) All wiring shall be run on the sides of the panels and shall be neatly bunched and shall not affect access to equipment mounted in the panels.
- d) Wiring shall be terminated on terminal blocks using crimping type lugs and without joints or tees on their runs.
- e) Power wiring shall be done either by phase identifying coloured wires or suitably coloured PVC sleeves shall be provided at each end of wire.

The following wiring codes shall be used.

Instrument Transformer	:	Red, yellow or blue depending upon phase with which wire is associated.
A-C phase wire	:	White
A-C Neutral wire	:	Black
Earth connection	:	Green

- f) PVC identification ferrules, yellow colour with black engraved letter shall be provided at each end of all control wires marked to correspond with equipment designation & termination numbers.
- g) Ferrules provided shall be oil tight and numbered from left to right.

19 TERMINAL BLOCKS

- a) Terminal blocks for control wiring shall be 650V grade 10 sq.mm size.
- b) Terminal blocks shall be grouped depending on circuit voltage. Different voltage groups of terminals blocks shall be segregated.
- c) Terminals blocks shall be numbered for identification and provision shall be provided for terminal labels.
- d) Terminal blocks requiring duplication shall be provided with solid bonding links.
- e) Terminal blocks for current transformer secondary lead wires shall be provided with shorting, disconnecting / earthing facilities.
- f) Terminal blocks and control wiring shall be so arranged that only one conductor of external wiring required to be terminated in at each terminal.

20 GROUND BUS

- a) A ground bus, rated to carry maximum fault current, shall extend to full length of the panel.
- b) The ground bus shall be provided with two-bolt drilling with GJ. bolts and nuts at each end to receive 75X 10 mm G.I. flat. .
- c) Each stationary unit shall be connected directly to the ground bus. The frame of each circuit breaker and shall be grounded through heavy multiple contacts at all times.

- d) Wherever the schematic diagrams indicate a definite ground at the switchgear, a single wire for each circuit thus grounded shall be run independent to the ground bus and connected thereto.
- e) C.T. shall be earthed through removable links so that earth of one circuit may be removed without disturbing other.
- f) Frames and noncurrent carrying metal parts of all equipment mounted shall be effectively to earth bus.
- g) All hinged doors shall be connected to earth bus by flexible tinned bare copper wire.
- h) Instrument and relay cabinets shall be connected to earth by 2.5 sq.mm stranded copper insulated wire 1100 V grade.

21 SPACE HEATERS

Each cubicle shall be provided with thermostat-controlled space heaters.

22 AC/DC POWER SUPPLY

- a) The panels shall be suitable to receive following power supplies.
 AC Supply : Single Feeder
 DC Supply : Double Feeder
- b) Isolating switch fuse units shall be provided at each switchgear for the incoming supplies, 4-pole, single throw for AC.
- c) Bus-wires of adequate capacity shall be provided to distribute the incoming supplies to different cubicles. Isolating switch-fuse units shall be provided at each cubicle for AC supplies.
- d) AC load shall be so distributed as to present a balance loading on three phase supply system.

23 NAME PLATES

- a) Name plates of anodised aluminum shall be furnished at cubicle and at each instrument, device mounted on and inside the cubicle.
- b) Caution notice on suitable metal plate shall be affixed at the back of each vertical panel.
- c) Name plates for feeders shall be provided on front and back of the panel.

24 TROPICAL PROTECTION

- a) All equipment, accessories and wiring shall have fungus protection, involving special treatment of insulation and metal against fungus, insects and corrosion.
- b) Screens of corrosion resistant material shall be furnished on all ventilating louvers to prevent the entrance of insects.

25 PAINTING

- a) All surfaces shall be sand blasted, pickled and grounded as required to produce a smooth, clean surface free of scale, grease and rust.
- b) After clearing, the surfaces shall be given a phosphate coating followed by 2 coats of high quality primer and stoved after each coat.
- c) The panels shall be finished with two coats of Siemens Grey (Shade RAL 7032) powder coated / Polyester enameled.

26 TESTS & INSPECTION

- a) The following routine and acceptance tests shall be carried out during final acceptance list.
 - i) Mechanical operation test.
 - ii) Electrical operation test.
 - iii) High voltage test on power circuits.
 - iv) High voltage test on control circuits.
 - v) Millivolt test on the circuit breakers.
 - vi) Millivolt Drop test on Busbar joints
- b) All tests shall be performed in the presence of Owner's representative, if so desired by the owner. The contractor shall give at least 15 days advance notice of the date when tests are to be carried out.
- c) Contractor shall furnish test certificate indicating that equipment has been tested by their quality control department for compliance of technical specification and approved drawings. The same shall be forwarded to owner! consultants along with inspection call.
within the quoted price and time schedules.

BATTERY & BATTERY CHARGER

1. BATTERY

General

- a) The battery shall be maintenance free type
- b) The plates shall be designed for maximum durability during all service conditions including high rate of discharge and rapid fluctuation of load.

2. BATTERY CHARGER

General

- a) The charger shall be natural air cooled, solid state type with full wave, fully controlled, bridge configurations.
- b) The charger shall be provided with automatic voltage regulation, current limiting circuitry smoothing filter circuit and soft start feature.
- c) Voltage control shall be step-less, smooth and continuous.
- d) The charger shall be self-protecting against all A-C and D-C transients and

steady state abnormal currents and voltages.

- e) Voltage setters shall be provided for setting the output of float boost charge. Setting shall be independent of each other so that setting of one voltage shall not require resetting other.
- f) There shall be separate transformers for float and boost charger.
- g) Charger A-C input and D-C output shall be electrically isolated from each other and also from panel ground.
- h) Isolation shall also be provided between power and control circuits.
- i) Batteries shall also be housed into the Battery Charger cubical.

Construction

- a) The charger shall be freestanding, floor mounted with sheet steel enclosure with all access from the front.
- b) The panel shall conform to the degree of protection IP 42. Minimum thickness of sheet metal used shall be 2 mm.
- c) Access door shall be with concealed hinges and neoprene gaskets. Ventilating louvers shall be covered with fine wire mesh.
- d) All equipment within the panels shall be arranged in modular units and laid out with sufficient space for easy maintenance.
- e) Switches, meters, relays etc. shall be flush mounted on the front of the panels. Nameplates of approved size and type shall be provided for all circuits and devices.

Charger Equipment

- a) All power diodes and control rectifiers shall be silicon type. Rectifier Transformer shall be dry type, double wound, with copper conductor and class B insulation.
- b) Blocking diodes shall be fully rated and redundant so that failure of a single diode shall not incapacitate the system in any way.
- c) Isolating switches shall be heavy duty, load break type, operated by an external handle with provision for padlocking in ON and OFF position.
- d) Changeover switch shall be 3 position, 4 pole, load break type with 2 NO + 2 NC auxiliary contacts.
- e) Contactor shall be air-break type with thermal overload relays having in built single phase preventor.
- f) Fuses shall be HRC type and arranged for easy replacement. Semi conducting device fuses shall be fast-acting.
- g) Indicating lights shall be low-watt filament type with series resistor. Both lamp and lens shall be replaceable from front.

- h) Meters shall be 96 x 96mm switchboard type, 250 deg. scale, antiglare glass, :!: 2% accuracy with zero adjuster on the front.

Alarms

- a) One (1) ten-points alarm facia shall be provided on charger panel, complete with proper actuating devices, circuitry and legends.
- b) The arrangement shall be such that on occurrence of a fault the corresponding window will light up and stayslighted until the fault is cleared and reset button is pressed.
- c) Each time a window lights up, a master relay will get energised to provide group alarm signals for Owner's remote panel.
- d) Following minimum annunciation shall be provided:
- i) A. C. Supply failure *
 - ii) D. C. Voltage low *
 - iii) D. C. Voltage high *
 - iv) D. C. System ground *
 - v) Charger overload *
 - vi) SCR fuse blown
 - vii) Filter fuse blown
 - viii) D. C. Output fuse blown
- e) Alarm points marked with an asterisk (*) shall have electrically separate spare set of contacts wire_ up to the terminal block for Owner's use.
- f) Alarm contacts shall be rated 2A at 24V D. C. And 5A at 240V A.C.

Outgoing Feeders

- a) Each Outgoing feeder shall be provided with double pole switch and with HRC fuses.
- b) Outgoing feeders shall be located in separate module forming part of charger panel with separate cable alley for terminated outgoing cable.

Lamp / Space Heaters / Receptacles

- a) The charger panels shall be provided with:
- Internal illumination lamp with door switch.
 - Space heater with thermostat control.
- b) Lamp, heater circuits shall have individual switch fuse units.

Wiring / Cabling

- a) The panels shall be completely wired-up. All wiring shall be routed through wiring troughs. Wires shall be ferruled at both ends for identification.
- b) Panels shall have removable gland plates at the bottom for cable entry. All

incoming / outgoing cables shall be terminated in suitable terminal blocks.

- c) Control terminal blocks shall be box-clamp type ELMEX 10 Sq. mm or approved equal.

Grounding

- a) The charger panels shall be fully rated ground bus with two ground terminals, one at each end.
- b) Each terminal shall comprise two-bolt drilling with M10 G.I. bolts and nuts to receive Owner's ground connection of 50 x 6 mm G.I. flat.

Tropical Protection

- a) All equipment accessories and wiring shall have fungus protection, involving special treatment of insulation and metal against fungus, insects and corrosion.
- b) Screens of corrosion resistant material shall be furnished on all ventilating louvers to prevent the entrance of insects.

Painting

- a) All surfaces shall be sand blasted, pickled as required to produce a smooth, clean surface free of scale, grease and rust.
- b) After cleaning, the surfaces shall be given a phosphate coating followed by 2 coats of high quality primer and stoved after each coat.
- c) The panels shall be finished in powder coated Siemens Grey, RAL7032.

Tests

- a) All equipment and components there of shall be subject to shop tests as per relevant IS standards. The tests shall included but not limited to:
- b) Tests on battery charger.
 - Dielectric tests.
 - Voltage regulation check from 0 to 100% load with $\pm 10\%$ input voltage variation.
 - Ripple content measurement.
 - Heat run test on current limiting value.

Test Witness

All tests shall be performed in presence of Owner's representatives, if so desired by the Owner. The contractor shall give at least fifteen (15) days advance notice of the date when tests are to be carried out.

3. REQUIREMENT

Battery

- i) Type : Lead Acid
- ii) Nos. of Cells per Battery : 12
- iii) Battery nominal voltage : 24 V

iv) Ten hour rating to : 300 AH
1.85 Volt/Cell at 27 deg. C.

Battery Charger

i) Charger : Float & Boost
ii) Type : Solid state, rectifier
iii) Rating : 40A
iv) A.C. Input Supply : 415V, 3ph,4 w/230V,
1Ph., 50Hz.,
2 wire.
v) Ripple content in charger DC output : $\pm 1\%$
vi) Outgoing feeders - 12 Nos : Each consisting of double pole
MCB of 32A.

PART III - DIESEL GENERATING SET

1. ENGINE

1.1. GENERAL

- a) Engine shall be internal combustion type, multi stroke, multi-cylinder, V type, turbo charged after cooled, suitable for High Speed Diesel Fuel
- b) The engine shall be capable to run on 10% overload for 1-hour duration in every 12 hours of service as per ISO regulations.
- c) The engine shall be directly coupled with the generator set.
- d) The engine shall be designed to have provision for easy maintenance, overhaul, cleaning, inspection & replacement of parts.
- e) The engine shall be of similar design and shall permit interchangeability of parts among various units.
- f) All parts subjected to substantial temperature variations shall be designed & supported to permit free expansion and contraction without resulting in leakage, excess of clearance, harmful distortion or misalignment.
- g) Vibration, noise, mechanical, thermal stresses& exhaust gas conditions shall be not exceed the permissible or acceptable limits of the guiding standards / codes.
- h) DG Sets and its governor / A VR shall be suitable for auto parallel operation. However, Governor shall be electronics type

1.2. COOLING

- a) The engine cooling shall be done through a closed loop forced circulation system. Engine driven pumps shall be used to circulate the primary cooling water through the cylinder jackets, charge air cooler, lube oil cooler, valves, cylinder block and other water cooled moving parts.
- b) Thermostat, temperature gauge, with high temperature alarm trip shall be provided in the control circuit.
- c) Secondary cooling shall be through radiator.

1.3. LUBRICATION

- a) The engine lubricating oil system shall comprise an engine driven pump complete with oil coolers, duplex oil filters, strainers etc. Priming pump if required shall also be provided.

b) Lubricating system shall also consist of pressure gauge, temperature and oil level indicators, pressure switch for "oil pressure low" alarm for interlock and alarm along with necessary piping, fittings, valves etc.

1.4. FUEL SYSTEM

a) Engine shall be suitable to run on High-Speed Diesel fuel.

b) The fuel oil system of the engine shall be direct injection type provided with fuel piping, governor injectors, shutdown valve with fuel strainer and filters.

c) Fuel day tank of suitable capacity for each DG set shall be provided with stand, level gauge, valve and complete piping up to engine.

1.5. ASPIRATION AND EXHAUST

a) Engine shall be turbo-charged radiator cooled. Air intake shall be provided either with dry type replaceable filters or oil bath type filters. Air cleaner assembly shall also have service indicator.

b) Exhaust manifold and exhaust pipe shall be suitably legged with asbestos rope. Exhaust system shall be insulated and shall be fitted with bellows type coupling and supported suitably with anti vibration spring mountings.

c) Silencer shall be of the residential type.

d) The height and size of the exhaust hooks shall be fixed considering the emission of gases and the environmental law of Government of India and the local authorities.

e) The noise level and gas emission temperature and volume shall be as per relevant standards.

1.6. STARTING SYSTEM

a) Engines shall be started with 24 volts starter motors. Charging of battery shall be through panel-mounted static Battery charger. AH rating of Battery shall be suitable for three successive starts of DG Set, and control supply of DG panel completes with battery leads etc.

1.7. ENCLOSURE

a) The complete DG Set shall be housed in a sheet steel enclosure with suitable acoustic system to reduce the noise level.

- b) The enclosure shall also be provided with Air Cooling System to maintain the temperature of the Engine.
- c) Enclosure shall have necessary doors for maintenance of Engine /Alternator.
- d) Enclosure shall also be provided with Fuel Tank.
- e) Side walls of enclosure shall be fabricated from 1.6 mm CRCA sheet and shall be filled with 100mm thick acoustic material having 96 Kg/m³ density which should be then be covered with fibre cloth/ tissue paper and finally with perforated MS Sheets.
- f) The D.G. chamber shall be fitted with internal lighting system for ease of maintenance.
- g) Residential type silencer shall be provided and shall be isolated from main D.G. chamber to avoid excess heat in genset operational area.
- h) Air inlet and outlet space should be provided with sound dampers.
- i) Enclosure shall level the Noise Level to 68-72 db or as per DPCC norms (whatever is lower).

2. ALTERNATOR

2.1. General features of the alternators shall be as follows:

Capacity	:	As per BOQ at 0.8 PF, 415V, 3 Ph. 50 Hz.
Voltage	:	415V, 3 Phase, 4 wire, 50 Hz.
Speed	:	1500 rpm
Enclosure	:	IP23
Insulation	:	"H"
Temp. Rise	:	"H"
Excitation	:	Separately-excited (PMG), self regulated with brushless system and static voltage control unit suitable to maintain terminal voltage constant at all loads. The voltage control unit has to be provided with facility for adjusting the output voltage ($\pm 5\%$ of rated voltage).

2.2. Alternator winding shall have 2/3 Pole pitch winding to take care of heating due to "Harmonics" in the system.

2.3. Damper winding shall be provided to assist parallel operation of Alternators. The damper bars of copper brased to heavy copper and connector shall be located in semi-closed circular slots situated in the pole faces.

2.4. The generator shall be capable of delivering rated output at rated p. f. with:

- a) The terminal voltage shall not differ by more than $\pm 0.5\%$ of set value

of terminal voltage.

b) The frequency shall not differ by more than $\pm 4\%$ of rated value.

2.5. The Generator shall withstand 10% overload for 1 hour at every six hours.

2.6. Transient Voltage Dip shall not be more than 14% on application of full load at rated power factor.

2.7. The Generator shall be capable of withstand minimum 25% unbalance load of its rated load without exceeding the current in any of the phases beyond full load current.

2.8. Alternator winding shall be suitable to take minimum 70% Thyristor load of rated capacity.

2.9. Anti Condensation heater of 240V, 1 Ph, 50Hz shall be provided with thermostat control switch.

2.10. All alternators shall be suitable for paralleling operation

3. LIST OF FITTINGS & ACCESSORIES

Following standard accessories shall be provided with DG Set.

3.1. WITH ENGINE

- a) Tachometer with hour meter
- b) Flywheel
- c) Flexible coupling with guard
- d) Electronics Governor
- e) Electronic control panel (ECP)
- f) Radiator for cooling
- g) Corrosion resistor
- h) Heat Exchanger
- i) Air cleaner
- j) Turbo charger
- k) Fuel pump
- l) Fuel Tank for 990 lts. with low level alarm switch
- m) Fuel/lube oil filter
- n) Air intake manifold
- o) Residential type silencer
- p) Exhaust pipe with asbestos, vibration isolators (if required), rain water hood
- q) Exhaust manifold
- r) Anti vibration pads
- s) Engine mounted instrument panel with control key switch and gauges for
 - i) Lube oil pressure
 - ii) Cooling water temperature
- t) Starter Motor
- u) Speed switch

v) Lube oil pressure switch for low pressure

3.2. WITH ALTERNATOR

- a) Terminal box suitable for cable connection.
- b) Space Heater
- c) Energy meter to record DG power consumption (as per requirement of PWD).

3.3. 24V LEAD ACID BATTERIES: Suitable for 3 starts of engine and for control of DG Set.

3.4. Master Engine control switch.

3.5. Engine Running Hour Meter & Engine operation counter.

ERECTION & COMMISSIONING

1.0 GENERAL

1.1 EQUIPMENT ERECTION

- a) The equipment in disassembled condition shall be received at site by the contractor.
- b) The contractor shall unpack, assemble all parts, mount and wire up loose equipment, fitting and accessories and complete all connections.
- c) The contractor shall mount the equipment on respective foundation/ supports, level & align the same & arrange for necessary grouting/anchoring.
- d) The erection work shall be carried out in compliance with manufacturer's instruction and shall include all adjustments, checks and measurements.
- e) The contractor shall record results of all erection tests and measurements and furnish copies of the same to the owner for his reference and record.
- f) Any internal wiring of the equipment, which has been left incomplete because of shipping, split or which requires minor modifications shall be carried out by the contractor. This includes mounting of items like relays, meters etc. and connecting the same as per wiring scheme diagram furnished by the original manufacturers.

1.2 CONSUMABLES AND HARDWARE

The contractor shall furnish all erection materials, hardware and consumables required for the completion of the installation. The materials shall include but not limited to the following:

- a) Consumables : welding rods & gas, oil & grease, cleaning fluids, paints, electrical tape, soldering materials etc.
- b) Hardware : bolts, nuts, washers, screws, brackets, supports, clamps, hangers, saddles, cleats, sills, shims etc.
- c) Materials : junction boxes, terminal blocks, connectors, ferrules, lugs, brass glands, rigid/flexible conduits, cables, ground wires etc.

Supply of cement, sand, stone etc. required for the execution of the contract shall be responsibility of the contractor.

1.3 ERECTION TOOLS & TACKLES

- a) The contractor shall provide all tools, tackle, implements, module equipment such as chain pulley block, trailers etc. which are required for transportation, handling and erection of equipment.
- b) Special erection tools, if any, furnished by the Manufacturer along with the equipment may be used by the contractor. such tools and equipment, however, shall be returned in good working conditions to the owner on completion of the job.
- c) The contractor shall also arrange for major testing equipment as list below:
 - Insulation Tester : Motor operated Megger 1000V & 10KV grade.

Hand operated Megger 1000V.

- Hand driven earth resistance megger, range 0-1/3/30 ohms.
- Tong testers of suitable ranges.
- Contact resistance measuring set for micro-ohms.
- Torque wrench.
- Primary / secondary injection set and relay testing kit.
- Multimeters, test lamp, field telephone with buzzer sets, different gauges etc.
- Streamline filter.
- Chain pulley block, cable jacks & spindle, cable, collars, electricians tool kit, jointer's tool kit, fitters tool kit, welding transformer, phase sequence meter, HV testing kit, primary & secondary injection kit.

other test equipment as required for testing and commissioning of the equipment shall have to be arranged by the contractor.

1.4 METHODS AND WORKMANSHIP

- a) All work shall be installed in a first class, neat workman like manner by mechanics / electricians skilled in the trade involved.
- b) The erection work shall be supervised by competent supervisors holding relevant supervisory license from the Government.
- c) All details on installation shall be electrically and mechanically correct.
- d) The installation shall be carried out in such a manner as to preserve access to other equipment installed.
- e) If in the opinion of the contractor any work is insufficiently specified or require modification, the contractor shall refer the same in writing to the owner and obtain his instruction / approval before proceeding with the work.
- f) If the contractor fails to refer such instances, any excuse for the faulty erection, poor workmanship or delay in completion shall not be entertained.
- g) Equipment and material, which are wrongly installed shall be removed and re-installed to comply with the design requirement at the contractor's expense, to the satisfaction of the owner/consultant.
- h) All scaffolding pipes and frames shall be of tubular steel. Bamboo's/ *ballies* timer frames are not permitted under any circumstances. All vertical & horizontal scaffolds shall be of MS pipes of adequate size to withstand the loads & pressures. The working platforms shall be either of conduit pipes or MS bars.

1.5 ALLOWABLE WASTAGE

- a) The erection contractor shall make every effort to minimize wastage during erection work. In any case, the wastage shall not exceed 1 %
- b) Measurement shall be taken at site jointly by contractor and owner's representative.
- c) If the actual wastage be more than the quoted figure then equivalent price of

the balance amount will be deducted from contractor's bills.

- d) The contractor shall submit a detailed account of materials issued to him after completion of work. The excess materials after completion of job shall be returned back to the owner's store.

1.6 FOUNDATION AND CIVIL WORK

- a) The contractor shall check the foundations before commencement of erection to ensure their suitability.
- b) All final adjustments of foundation levels, chipping and dressing of foundation surfaces, drilling holes on foundation channels to suit the equipment setting and grouting of anchor bolts, sills, inserts and fastening devices shall be carried out by the contractor including minor modification of civil work as may be required for erection.
- c) Any cutting of masonry work which is necessary shall be done by the Contractor at his own cost and shall be made good to match the original work. The contractor shall obtain approval of owner/ consultant before proceeding with any cutting of masonry / concrete work.

1.7 EXCAVATION AND BACK FILLING

- a) The contractor shall perform all excavation and back filling as required for the scope of work specified.
- b) The contractor shall make his own arrangement for pumping out any water that may accumulate in the excavation.
- c) All excavation shall be back filled to the original level with good consolidation.

1.8 REPAIR OF DAMAGE SUBSTAINED DURING TRANSIT

The contractor shall repair minor damages sustained during transit or subsequent storage in purchaser's store. The repair charges shall be paid to the contractor on the basis of extra work.

1.9 INSPECTION

- a) After completion of erection / installation, each piece of equipment shall be thoroughly tested as per approved procedure and inspected in presence of the owner/consultant for correctness and completeness of erection and acceptability for start up.
- b) A check list in triplicate will be furnished by the owner/consultant wherein all details to be checked and necessary instruction shall be listed. the inspection and checking shall strictly follow the checklist.
- c) on completion of the inspection (2) copies of the check list duly filled-in shall be handed over to the owner/consultant.
- d) This check list shall be jointly signed by the contractor and the owner/consultant. Such endorsement, however, shall not relieve the

contractor of his obligations under the contract.

2.0 11 KV SWITCHGEARS

- 2.1 11 KV HT Switchgears shall be installed in accordance with IS: 3072 and manufacturer's instructions. The contractor shall be required to install and align any channel sills which form part of the foundation. The HT Switchgears shall be made absolutely vermin proof.
- 2.2 Control wiring (if any) between 11 KV HT switchgears & other electrical equipment shall be carried out as per the instructions of the manufacturers & site-in-charge.

3.0 TRANSFORMER

- 3.1 Installation of the transformer shall be in accordance with the IS : 1886, manufacturer's instructions and as per the enclosed drawings.
- 3.2 Care shall be taken during handling of insulating oil to preventing ingress of moisture or foreign material. Testing and sampling of oil shall be in accordance with manufacturer's instructions and related IS. If oil filtration is required the same shall be carried out at site by the Contractor.
- 3.3 Control wiring between Transformer & other electrical panels shall be carried out as per the manufacturer's drawings and as per the instructions of site - in - charge.

4.0 415 V BUS DUCT

- 4.1 Bus duct will be received in transportable pieces. The Contractor shall erect the bus duct including bends, wall seating copper flexible at both ends and complete all connections in accordance with Manufacturer's drawings. The work also includes erection of steel hangers / supports for these bus ducts wherever necessary.
- 4.2 All steel structure / support / hardware for supporting bus duct shall be calculated by the contractor.

5.0 MAIN PCC / CAPACITOR PANELS

- 5.1 All above panels & DBs will be available in split - up - sections for ease of transportation and handling. However in some cases, breakers, busbars relays, meters and control switches may be supplied loose to be mounted and connected at site as per the relevant drawings.
- 5.2 All alignments leveling, grouting, anchoring and adjustments shall be carried out in accordance with manufacturer's instructions and/or as directed by the Engineer. All boards shall be cleaned by using blower before installation.
- 5.3 All connections in the panels shall be completed, checked and adjusted to ensure safety and satisfactory operation of the equipment. This includes the following activities:
 - a) Functional test on circuit breakers.
 - b) Setting of protective relays and thermal over load relays.
 - c) Adjustment of zero error of various indicating instruments.

- d) Testing of thermal overload relays by primary injection and protective relays by secondary injection.

5.4 In some cases, minor modifications may have to be carried out at site in the wiring of an equipment to meet the requirements of the desired control scheme and the Contractor shall have to do the same at no extra cost.

6.0 MISC. ITEMS AND LOCAL PANEL INSTALLATION

6.1 The contractor shall install miscellaneous items such as local control station, start-stop push button stations, and local starter units. control panels, misc. panel etc.

6.2 This equipment will be generally wall or column mounted excepting a few which are floor mounted. The exact locations will be as decided by the Engineer at site.

6.3 All supports or brackets need for installation shall be fabricated by the Contractor.

6.4 All welding, cutting, chipping and grinding as and when necessary shall be carried out by the Contractor at no extra cost.

7.0 CABLING SYSTEM

7.1 CABLE TRAYS AND RACKS

- a) The contractor shall install the cable racks, trays, risers, shafts and supports.
- b) Cable trays and risers shall be aligned and leveled correctly. All runs shall be installed parallel to the trench/building walls and floors except otherwise noted on the drawings.
- c) The contractor shall provide embedded steel inserts/supports on wall, ceiling or floor by suitable anchoring & shall secure racks and supports by welding these to inserts.
- d) The trays in general shall be supported at a distance of 1.5 to 2 meters on horizontal and vertical run.
- e) Cable trays shall be installed as per drawings furnished to the Contractor. Any deviation in routes shall have the prior approval of the Engineer In charge.
- f) Prefabricated cable trays and accessories shall be assembled and erected at site as per instructions of Manufacturer. Alternately, the Contractor shall fabricate and install all cable trays, risers, shafts and supports as agreed upon during finalization of the award.
- g) Sufficient spacing not less than 250 mm shall be provided between trays and maintained to permit adequate access for installing and maintaining the cables.
- h) Contractor shall co-ordinate with other contractors (such as for piping etc.) where there is a common support for cable trays and for other services.
- i) All necessary steel & all consumables as specified elsewhere shall be provided by the contractor.

7.2 STORAGE AND HANDLING

- a) Cable drums shall be stored on hard and well drained surface so that they may not sink. In no case the drum shall be stored on the flat Le. with flange horizontal.
- b) Rolling of drum shall be avoided as far as practicable. For short distance, the drums may be rolled provided they are rolled slowly and in proper direction as marked on the drum.
- c) In absence of any indication the drums may be rolled in the same direction as it was rolled during taking up the cable.
- d) For unreeling the cable, the drum shall be mounted on jacks or on cable wheel. The spindle shall be strong enough to carry the weight without bending.
- e) The drum shall be rolled on the spindle slowly so that cable should come out over the drum and not below the drum.
- f) While laying cable, cable rollers shall be used at an interval of 2000 mm. The cable shall be pushed over the roller by a gang of people positioned in between rollers.
- g) Cable shall not be pulled from the end without having intermediate pushing arrangement. Bending radius of the cable shall not be less than that is specified by the manufacturer.
- h) All possible care shall be taken during unreeling and laying to avoid damage due to twist, kink or sharp bends.

7.3 CABLE LAYING

- a) Cable shall generally be installed in ladder type / perforated trays in trenches or buried in ground except for some short runs in conduit for protection or crossings the roads etc.
- b) Each length of run shall be physically measured at site before cutting the cable. Contractor shall furnish cable cutting the schedule to engineer in charge with respect to cable drum length available at site and runs of cables & sizes of cables.
- c) Cable may also be laid through hume pipes in road crossings etc. The hume pipes shall be supplied and placed in position by the Contractor.
- d) Cable laid on trays and risers shall be neatly dressed and clamped at an interval of 3000 mm and 900 mm for horizontal and vertical cable run respectively and at each bend of cable.
- e) All power cables shall be clamped individually and control cables shall be clamped in groups of three or four cables.
- f) Clamps for multicore cables shall be fabricated of 25 x 3 mm G.I. flats. Single core power cables shall be laid in trefoil formation and clamped with trefoil clamps made of Fiber glass/PVC.
- g) Cable openings etc. in walls/floor made by the Contractor or by others shall be sealed by the Contractor suitably by Hessian tape and bitumen compound or by

any other proven method to prevent ingress of water.

- h) Directly buried cables shall be laid as per detail shown in drawing. These cables shall be laid on and covered with sand/raddle earth and protected by brick barriers as sides and precast concrete slab brick on top. Job also involve digging/excavation of earth and refilling the same after laying of cables. For cables laid underground a loop of diameter of 3 meters shall be provided near each terminating ends.
- i) After completion of installation and prior to connection, all High Voltage Power cables shall be given a high potential test. The contractor shall provided this Hipot Test set having provision of leakage current measurement.
- j) Laying cost shall include all above activities including supply and fixing of clamps etc.
- k) Cables for machines in clean area shall be laid in suitable size of stainless steel conduit.

7.4 CABLE TAGS AND MARKERS

- a) Each cable and conduit run shall be tagged with numbers that appear in the cable schedules. Cables and conduits shall be tagged at every thirty (30) meters. Cables and conduits shall also be tagged on either side of a floor/wall passage.
- b) The tags shall be of PVC or Aluminum with the number engraved on it and securely attached to the cable by not less than two turns of G.I. wire.
- c) Location of cables laid directly underground shall be indicated clearly by cable marker made of cast iron.
- d) The location of cable joints, if any, shall be clearly indicated with cable marked with an additional inscription "Cable Joint".
- e) The marker shall project 100 mm above ground and shall be spaced at an interval of 30 meters at every change of direction.
- f) Where cables are cut from the drums the ends of the cables at the drums shall be properly sealed.
- g) The power and control cable shall be laid with a provision of extra length at one of the end terminations. This length shall be confirmed by the Engineer in charge before laying.
- h) Cost of laying shall also include supply and fixing of tags, cable markers etc.

7.5 TERMINATIONS JOINTS AND CONNECTION

- a) The termination, Joints and connections of cables shall be done by qualified jointers strictly in accordance with manufacturer's instruction drawings and/or as directed by the Engineer.
- b) The work shall include all clamping, fittings, fixing, plumbing, soldering, taping, compound filling, epoxy cable jointing, crimping, connecting, shorting

and earthing as required for all such operations should be available with concerned contractor. For all size of L T termination, crimping tool (Hydraulic type) shall be used. Further, inhibiting compound shall be provided before termination.

- c) The equipment will be generally provided with blank plates for cable/conduit entry and cable end box for power cables.
- d) The Contractor shall perform all drilling, cutting on the blank plates and any minor modification work required to complete the job.
- e) If the cable-end box or terminal enclosure provided on the equipment is found unsuitable and requires major modification, the same shall be carried out by the Contractor as extra work item.
- f) Control cable cores entering control panel/switch gear / MCC etc. shall be neatly bunched and served with nylon cord or PVC perforated tape to keep in position at the terminal block.
- g) The contractor shall provide oil resistance ferrules for all control cable cores at all terminations including at all junction boxes and at all terminations. The ferrules shall carry terminal numbers as per drawing. The ferrules shall be of interlocked plastic type or approved equal.
- h) Spare cores shall be similarly tagged, crimped with lug and taped on the ends. Spare cores shall be tagged with individual cable number.
- i) Terminations and connections shall be carried out in such a manner as to avoid strain on the terminals.
- j) All cable entry points shall be sealed and made vermin and dust proof. Unused opening, if any shall be effectively closed.
- k) Termination kits for HT cables, Straight through joint kits for HT & L T cables, cable of all glands lugs shall be arranged by the Contractor, which includes furnishing consumable materials such as plumbing and soldering material, electrical tape including bitumen compound/resin if not a part of kit shall be included in the erection rates.

8.0 IMPORTANT NOTES FOR ERECTION ACTIVITIES

8.1 CABLES AND CONDUITS

- a) Approximate lengths of cables and conduits runs will be given in the cable schedule. Before commencement of work the Contractor shall take actual measurements and prepare his own cable cutting schedules to reduce wastage to a minimum.
- b) During the erection period the Contractor shall furnish weekly/ fortnightly report on cable position in an approved proforma so as to keep the Engineer In Charge apprised of the position and to enable him to intimate any procurement action in time.
- c) The Contractor shall also maintain and submit when requested, a record of cable insulation value when drawn from store, after laying, before and after

termination/jointing.

8.2 EXCAVATION AND BACK FILLING

- a) The Contractor shall perform all excavation and back filling as required for the scope of work specified.
- b) The Contractor shall make his own arrangement for pumping out any water that may accumulate in the excavation.
- c) All excavation shall be back filled to the original level with good consolidation.

8.3 FOUNDATION AND CIVIL WORK

- a) The contractor shall provide foundations wherever required & in case same has been provided by the employer earlier, same shall be checked for correctness before commencement of erection to ensure their suitability.
- b) All final adjustments of foundation levels, chipping and dressing of foundation surfaces, drilling holes on foundation channels to suit the equipment setting and grouting of anchor bolts, sills, inserts and fastening devices shall be carried out by the Contractor including minor modification of civil work as may be required for erection.
- c) Any cutting of masonry work which is necessary shall be done by the Contractor at his own cost & shall be made good to match the original work.

The Contractor shall obtain approval of Engineer before proceeding with any cutting, of masonry /concrete work.

8.4 STRUCTURAL FABRICATION WORKS

- a) All chequered plate covers, cable racks, trays, supports, hangers and brackets wherever necessary shall be supplied/ fabricated by the Contractor. Steel for fabrication shall be straightened and cleaned of rust and grease. All fabrication shall be free of sharp edge.
- b) Every effort shall be made to minimize the wastage of steel as far as practicable during fabrication. The wastage in no case shall exceed as specified elsewhere in this specification.

8.5 TESTING AND COMMISSIONING

- a) On completion of erection work, the Contractor shall request the Engineer, for inspection and tests with minimum of fourteen (14) days' advance notice.
- b) The Engineer shall arrange for joint inspection of the installation for completeness and correctness of the work. Any defect pointed out during such inspection shall be promptly rectified by the Contractor.
- c) The installation shall be then tested and commissioned in presence of the Engineer.
- d) The Contractor shall provide all men, material and equipment required to carry out the tests.

All rectification, repairs or adjustment work found necessary during inspection, testing and commissioning shall be carried out by the Contractor, without any extra cost. The handing over of the installation shall be effected only after the receipt of written instruction from the Purchaser/his Authorized representative.

9.0 SCHEDULE OF PRE-COMMISSIONING TESTS

9.1 CIRCUIT BREAKER

- a) Insulation resistance test on each pole by Megger (Testing Instrument).
- b) Insulation resistance test on control circuit.
- c) Checking of all joints for leakage in breaker.
- d) Measurement of contact resistance for all the Three Phases.
- e) Checking the auxiliary circuits associated with circuit breaker.
- f) Functional check of breaker operation electrically at 70% and 110% of rated D.C. supply voltage.
- g) Checking of interlock provided in Control Circuits and tripping through simulated protective relay contacts.
- h) Auto-reclosing duty cycle check wherever auto-reclosing is required.
- i) Measurement of resistance of closing and tripping coils.

9.2 CURRENT TRANSFORMER

- a) Insulation Resistance test on each winding by Megger to earth and between windings.
- b) Checking of all ratios on all cores by Primary injection set.
- c) Polarity check on each winding.
- d) Continuity test.
- e) Check for connection to correct taps.
- f) Oil level check.

9.3 EARTHING

- a) Continuity of earthing connection.
- b) Testing of Earth Resistance of Individual Electrode.
- c) Testing of Earth Resistance of the combined earthing system.

9.4 SWITCHBOARDS / MCC / DISTRIBUTION BOARD / PANELS

- a) Measurement of insulation Resistance of Bus-bar System.
- b) Measurement of I. R. of Control Circuit.

- c) Functional check of circuit components
- d) Continuity check of different circuits.
- e) Calibration test of Relays and Meters.
- f) Space heater operation.
- g) Annunciations.

9.5 RELAYS & METERS

- a) Calibration test.
- b) Operation / performance test.

PART IV - MECHANICAL STACK CAR PARKING

Supply and installation of Electro-Mechanical SDP-2G (Semi-Dependent Parking system, Two-Grid / Two-Level (Ground + One level). Mechanical/Stack parking system to be installed to carry minimum SUV Cars with semi-automated operation system. The technical details are as follows

System Dimensions		
Specification	Legend	SDP 2G OP
Length (mm)	L	5300(mm)
Width (mm)	W	2600(mm)
Height (mm)	H	4100-3600 (mm)
Pallet width (mm)	PW	2250(mm)
Car Dimensions		
Length (mm)	5000 (mm)	
Width (mm)	2000 (mm)	
Height (mm)	1650-2000 (mm)	
Max Weight (Kg)	2000 (Kg)	

Warranty Period	Minimum 5 Years from the date of Commissioning of the mechanical/ stack car parking. Manufacturer's Warranty Certificate to be submitted along with the bill by the contractor.
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1. Contractor shall design, supply, install, test, and commission a car parking system suitable for parking standard passenger vehicles. The system shall be robust, safe, and reliable for regular operation and shall be designed to accommodate vehicles within the dimensional and load limits specified in this document. The parking system shall be suitable for the intended site conditions and shall comply with all applicable statutory, safety, and engineering requirements.

2. System Dimensions: The car parking system shall be designed with overall dimensions not less than the following. The minimum overall system length shall be 5300 mm, and the minimum overall system width shall be 2600 mm. The overall system height shall be configurable between 3600 mm and 4100 mm to suit site conditions and vehicle height requirements. The pallet or parking platform width shall not be less than 2250 mm. The system layout shall ensure sufficient clearance for safe vehicle entry, parking, lifting, and retrieval operations without risk of damage to the vehicle or the system components.

3. Vehicle Design Parameters: The car parking system shall be capable of safely handling passenger vehicles with a maximum length of up to 5000 mm, a maximum width of up to 2000 mm, and a vehicle height ranging from 1650 mm to 2000 mm. The maximum allowable gross vehicle weight shall be 2000 kg. The system design shall consider the worst-case combination of vehicle dimensions and weight to ensure safe and reliable operation at all times.

4. Load and Structural Design: All structural members, pallets, lifting mechanisms, and supporting frames of the car parking system shall be designed to safely carry a minimum

vehicle load of 2000 kg per bay, including appropriate safety factors for dynamic loading, impact forces, and operational stresses. The structure shall be designed to withstand repetitive loading and unloading cycles without deformation or structural failure. Materials used shall be durable and corrosion-resistant, suitable for indoor or semi-outdoor installations as applicable.

5. Clearance and Safety Requirements: Adequate lateral, longitudinal, and vertical clearances shall be provided beyond the maximum vehicle dimensions to allow safe parking, retrieval, and user movement. The system shall include safety interlocks and limit switches to prevent operation if vehicle dimensions or weight exceed permissible limits. Wheel stoppers, edge protection systems, and vehicle guiding aids shall be provided wherever necessary to ensure safe alignment and positioning of vehicles.

6. Pallet / Platform Requirements: The pallet or parking platform shall have a minimum clear width of 2250 mm and shall be designed to ensure uniform load distribution across the supporting structure. The pallet surface shall be provided with an anti-skid finish to prevent vehicle movement during parking operations. The pallet design shall be compatible with different vehicle wheelbases and tyre widths within the specified vehicle envelope.

7. Operational Requirements: The car parking system shall be suitable for parking standard passenger vehicles including hatchbacks, sedans, and SUVs within the specified height and weight limits. The system shall accommodate vehicle height variations between 1650 mm and 2000 mm without requiring manual mechanical adjustments for individual vehicles. Operation shall be smooth, vibration-free, and noise-controlled, ensuring user comfort and system longevity.

TECHNICAL SPECIFICATION OF ELEVATOR

Number of Units	1
Number of Units	Passenger Lift
Rated Capacity Persons / Kgs / Class of Loading	6 Persons / 408 Kgs / P - Passengers
Number of stops / openings	6 Stops With (all opening on the same side)
Power Supply	400/415 Volts (3 Phase AC)
Machine Location / Type	Machine Roomless - Gearless
Car Width mm X Car Depth mm	1000 X 1100
Car Clear Height mm	2200
Car Door Type Center/Side	Power Operated Side Opening Sliding Door
No Of Door Panels	2 Panel
Car Door (W X H) mm	800 X 2000
Design Of Lift Cabin	Stainless Steel 304
Lift Cabin Finish	Stainless Steel 304 Hairline Finish
Car Door	Stainless Steel 304
Car Door Finish	Stainless Steel 304 with glass- Hairline Finish
Ceiling Finish	Stainless Steel 304 Hairline Finish

Fan	Regular (Circular) - Fan
Light	Led Lights-03
Handrail Type	Ss 304 Round Handrail
Handrail Location	Rear Side
Over Speed Governor	Yes
Door Protection	Infra Red Door Screen
Counterweight Screen	Inbuilt
Over Load Indicator	Yes
Fireman Switch	Yes
Automatic Rescue Device	Yes
Battery Operated Emg Alarm Light	Yes
Two Way Intercom with Press & Speak in COP	Yes
Warranty Period	5 Years from the date of Commissioning of the Elevator. Manufacturer's Warranty Certificate to be submitted along with the bill by the contractor.

PART V - ROOF TOP SOLAR POWER STATION

SYSTEM COMPONENTS:

A Grid-Tied Rooftop Solar Photo Voltaic (SPV) Power Plant of 30 kW (AC) shall comprise an SPV Array, Module Mounting Structure, Power Conditioning Unit (PCU) consisting of Maximum Power Point Tracker (MPPT), Inverter with required Controls & Protections, Interconnecting Cables, Junction Boxes, Distribution Boards and Switches, and a Remote Monitoring System. The PV Array shall be mounted on suitable structures. The grid-tied SPV system shall be without battery and shall be designed to supplement the grid power during daytime.

All components and parts used in the SPV power plant – including PV modules, metallic structures, cables, junction boxes, switches, PCUs and protection devices – shall conform to the latest BIS/IEC standards wherever such standards exist and are applicable. All equipment shall be MNRE/BIS approved, IEC/IS compliant, reputed make and new, unused.

The Solar PV system shall consist of (but not be limited to) the following equipment/components:

- Solar PV Modules: Monocrystalline, half-cut PERC/TopCon; 585 Wp each, 51 Nos. (aggregate DC capacity ≈ 29.835 kWp).
- Grid-interactive PCU/Inverter: 30 kVA, three-phase, with MPPT and all protections, complete with Remote Monitoring System.
- Module Mounting Structures: Hot-dip galvanized steel/aluminium, fixed-tilt, rooftop compatible.
- Junction Boxes: String/Array (DC) and AC distribution boxes with isolators, fuses/MCB/MCCB and Type II SPD.
- Cabling & Accessories: UV/IR-resistant solar-grade DC cables with MC4-compatible connectors; XLPE/PVC AC power and control cables; conduits, trays and glands.
- Earthing & Lightning Protection: Dedicated earth pits for DC, AC and lightning protection as per IS standards; lightning arrestors and bonding.
- Labelling & Safety Signage: As per applicable IS/CEA/IE rules for electrical safety.
- Power Optimizers (where specified): For improved module-level performance and mismatch mitigation.
- Net-Metering Interface: DISCOM-approved bidirectional energy meter and related interfacing as per prevailing regulations.

SPECIFICATION OF SOLAR PV MODULES:

The PV modules used must qualify to the latest edition of IEC PV module qualification test or equivalent BIS standards. Crystalline Silicon Solar Cell Modules shall conform to IEC 61215 / IS 14286. In addition, the modules must conform to IEC 61730 Part-1 - requirements for construction and Part-2 - requirements for testing, for safety qualification or equivalent IS.

- a) For the PV modules to be used in a highly corrosive atmosphere throughout their lifetime, they must qualify to IEC 61701 (Salt Mist Corrosion Test).
- b) The total solar PV array capacity shall not be less than the allocated project capacity and shall comprise of Monocrystalline half-cut PERC/TopCon modules of minimum 530 Wp and above wattage. Modules below 530 Wp shall not be accepted. For this project, modules of 585 Wp (51 Nos.) shall be deployed, aggregating to approximately 29.8 kWp DC capacity.
- c) Protective devices against surges at the PV module shall be provided. Low voltage drop bypass diodes shall be provided.
- d) PV modules must be tested and approved by one of the IEC/MNRE/NABL authorized test centres.
- e) The module frame shall be made of corrosion-resistant materials, preferably anodized aluminium.
- f) The bidder shall carefully design and accommodate the requisite number of modules to achieve the rated plant capacity in their bid. Minor adjustments in array configuration may be permitted at the time of execution subject to approval.
- g) Other general requirements for PV modules and subsystems shall include the following:
 - i. The rated output power of any supplied module shall have a tolerance within $\pm 5\%$.
 - ii. The peak-power point voltage (V_{mpp}) and the peak-power point current (I_{mpp}) of any supplied module and/or any module string (series-connected modules) shall not vary by more than 2% from the respective arithmetic means for all modules and/or for all module strings, as the case may be.
 - iii. The module shall be provided with a junction box with either provision of external screw terminal connection or sealed type, with arrangement for provision of bypass diode. The box shall have hinged, weatherproof lid with captive screws and cable gland entry points, or may be of sealed type, and shall be at least IP-65 rated.
 - iv. I-V curves at STC shall be provided by the bidder for all modules supplied.

SOLAR PV MODULES

The plant is to be installed in conditions that may involve dust, humidity, and environmental exposure. Therefore, the solar PV modules deployed must be tested with relevant dust standards, specifically IEC 60068-2-68 (Dust and Sand Test).

Each module shall be provided with an RFID identification tag embedded inside the laminate, which shall be tamper-proof and readable for the lifetime of the module. The following information must be mentioned in the RFID tag for each module:

- a) Name of the manufacturer of the PV module.

- b) Name of the manufacturer of the solar cells.
- c) Month & Year of manufacture (separately for solar cells and modules).
- d) Country of origin (separately for solar cells and modules).
- e) I-V curve for the module, including rated wattage, I_m , V_m , and Fill Factor (FF).
- f) Unique Serial Number and Model Number of the module.
- g) Date and Year of obtaining IEC PV module qualification certificate.
- h) Name of the test laboratory issuing the IEC certificate.
- i) Other relevant information on traceability of solar cells and modules as per ISO 9001 and ISO 14001 requirements.
- j) Every module shall be equipped with a power optimizer or equivalent arrangement for efficient operation and maximum power output.

WARRANTIES:

- a) **Material Warranty:**
 - i. The manufacturer shall warrant the Solar PV Module(s) to be free from defects and/or failures due to materials or workmanship for a period not less than ten (10) years from the date of commissioning.
 - ii. Defects and/or failures shall include:
 - iii. Defects arising due to faulty manufacturing.
 - iv. Failures due to poor quality of materials used.
 - v. Non-conformity to specifications due to faulty manufacturing and/or inspection processes. If the solar Module(s) fails to conform to this warranty, the manufacturer will repair or replace the solar module(s), at the Owners sole option.
- b) **Performance Warranty:**

The PV module will have product warranty of 10 Years and performance warranty with degradation of power generated not exceeding 20% of the minimum rated power over the 25 years period and not more than 10% after 10 years period.

Note :Manufacturer's Warranty Certificate to be submitted along with the bill by the contractor.

MODULE MOUNTING STRUCTURE:

- a) Hot-dip galvanized Mild Steel (MS) with minimum galvanization thickness of 120 microns or Aluminium structures may be used for module mounting.
- b) Each structure shall be designed with an inclination angle suitable to site conditions to achieve maximum solar insolation. To accommodate the required capacity, tilt angle may be reduced, if necessary, provided the system meets the specified Performance Ratio (PR) requirements.
- c) The structure shall be designed to withstand wind speeds of up to 150 km/h as per the wind zone of installation site. The design must be certified by a recognized laboratory or institution, and wind loading calculation sheets shall be submitted to the Owner for approval.

- d) The mounting structure steel shall be as per latest IS 2062: 1992 and galvanization of the mounting structure shall be in compliance of latest IS 4759.
- e) All fasteners used shall be made of stainless steel to ensure corrosion resistance.
- f) Structural materials shall be corrosion resistant and electrolytically compatible with module frame materials, fasteners, nuts, and bolts. Aluminium structures are also permitted, provided they can withstand wind loads.
- g) Suitable fastening arrangements such as grouting and clamping shall be provided to secure the installation against the specified wind load. Roof structures shall not be punctured directly; mounting shall be done on RCC pedestals or dummy structures as per site standards.
- h) The mounting structure shall allow easy replacement of any module without disturbing adjacent modules.
- i) The array structure shall be designed to occupy minimum space without sacrificing energy output.
- j) The bidder shall ensure that the roof has adequate load-bearing capacity and shall design suitable mounting solutions accordingly.

CABLES:

Cables of appropriate size shall be used in the system with the following characteristics:

- a) All cables shall conform to IEC 60227 / IS 694 (PVC insulated), IEC 60502 / IS 1554 (XLPE insulated) standards as applicable.
- b) Temperature range: -10°C to $+80^{\circ}\text{C}$.
- c) Voltage rating: 660 / 1000 V.
- d) Cables shall have excellent resistance to heat, cold, water, oil, abrasion, and UV radiation.
- e) The sizes of cables between array interconnections, array to junction boxes, and junction boxes to inverter shall be selected to minimize power losses. The voltage drop in the entire solar system shall not exceed 3%.
- f) For DC cabling, XLPE/XLPO insulated, UV-stabilized, single-core, multi-stranded flexible copper cables shall be used. Multi-core cables shall not be permitted on the DC side.
- g) For AC cabling, PVC insulated flexible copper cables shall be used to connect inverter to ACDB. From ACDB to LT panel / net metering panel, XLPE insulated multi-core aluminiumarmoured cables shall be used. Outdoor AC cables shall have UV-stabilized outer sheath.
- h) All cables shall be insulated with a special grade compound formulated for outdoor use. Outer sheath of cables shall be electron-beam cross-linked XLPO, flame retardant, UV resistant, and black in colour.
- i) DC cables from SPV modules to array junction boxes shall run through UV-stabilized PVC conduit pipes of adequate diameter and minimum wall thickness of 1.5 mm.
- j) Solar PV connectors (MC4 or equivalent) and couplers shall be used for DC interconnections.
- k) All cables and conduit pipes shall be clamped to rooftops, walls, or ceilings with thermoplastic clamps at intervals not exceeding 50 cm. Minimum cable size: 4.0 mm^2 copper for DC side; 4.0 mm^2 copper for AC side. In three-phase systems, the neutral conductor shall be equal in size to phase conductors.

- l) Cable routing: All cables shall be routed in GI trays, properly tagged and marked using ferrules or other approved methods. Cable drum/batch number shall be embossed or printed at one-metre intervals.
- m) All solar field cables shall be solar-grade, capable of withstanding harsh conditions including UV radiation, high temperature, humidity, dust, and microbial attack, for a life of at least 25 years.
- n) Cable jackets shall be electron-beam cross-linked XLPO, flame retardant, UV resistant, and black in colour.
- o) The total voltage drop from PV modules to inverter (DC side) shall not exceed 3%, and from inverter to distribution panel (AC side) shall not exceed 3%.
- p) All cables and connectors shall be of MNRE/BIS approved, IEC/IS compliant, reputed make.

PROTECTIONS:

The system shall be provided with all necessary protections, including Earthing, Lightning, Surge, and Grid Islanding, as specified below.

LIGHTNING PROTECTION:

The SPV power plant shall be provided with adequate lightning and over-voltage protection. The main purpose of this protection shall be to reduce the over-voltage to a tolerable value before it reaches the PV array or other subsystem components. The sources of over-voltage can be lightning, atmospheric disturbances, etc. The entire area occupied by the SPV array shall be suitably protected against lightning by deploying a sufficient number of lightning arrestors. Lightning protection shall conform to IEC 62305 standards. Protection against induced high voltages shall be provided by the use of Metal Oxide Varistors (MOVs) and suitable earthing, such that induced transients find an alternate path to earth.

SURGE PROTECTION:

Internal surge protection shall consist of three MOV-type surge arrestors connected from positive and negative terminals to earth (via “Y” arrangement). Surge Protection Devices (SPD) of Class II shall be used on both AC and DC sides, compliant with IEC 61643.

EARTHING PROTECTION:

Each array structure of the PV system shall be properly earthed in accordance with IS: 3043-1987. In addition, lightning arrestors/masts shall also be earthed inside the array field. Earth resistance shall be tested in the presence of the Owner’s representative, using a calibrated earth tester, whenever required. PCU, ACDB, and DCDB shall be separately earthed. Earth resistance of any pit shall not exceed 5 ohms. It shall be ensured that all earthing points are bonded together to maintain a common potential.

GRID ISLANDING:

In the event of a power failure in the electric grid, it is required that all grid-connected inverters shut down within a short period of time. This prevents the DC-AC inverters

from continuing to feed power into small sections of the grid, known as “Islands.” Powered islands present a safety hazard to utility workers who may expect the area to be unpowered, and they may also damage grid-tied equipment. The rooftop PV system shall therefore be equipped with anti-islanding protection. In addition to automatic grid disconnection during islanding, the system shall also disconnect under Over-voltage / Under-voltage conditions, and Over-frequency / Under-frequency conditions. All protection functions shall comply with CEA (Technical Standards for Connectivity of Distributed Generation Resources) Regulations.

JUNCTION BOXES:

- a) The junction boxes are to be provided in the PV array for termination of connecting cables. The J. Boxes (JBs) shall be made of GRP / FRP / Powder Coated Aluminium / cast aluminium alloy with full dust, water & vermin proof arrangement. All wires / cables must be terminated through cable lugs. The JB's shall be such that input & output termination can be made through suitable cable glands.
- b) Copper bus bars / terminal blocks housed in the junction box with suitable termination threads conforming to IP65 standard and IEC 62208 Hinged door with EPDM rubber gasket to prevent water entry. Single / double compression cable glands. Provision of earthing's. It should be placed at 5 feet height or above for ease of accessibility.
- c) Each Junction Box shall have High quality Suitable capacity Metal Oxide Varistors (MOVs) / SPDs, suitable Reverse Blocking Diodes. The Junction Boxes shall have suitable arrangement monitoring and disconnection for each of the groups.
- d) Suitable markings shall be provided on the bus bar for easy identification and the cable ferrules must be fitted at the cable termination points for identification.
- e) All fuses shall have DIN rail mountable fuse holders and shall be housed in thermoplastic IP 65 enclosures with transparent covers.

ARRAY STRUCTURE:

- a) Hot dip galvanized Mild Steel (MS) or Aluminium mounting structures shall be used for supporting the modules/arrays. Minimum galvanization thickness shall be 120 microns.
- b) Each structure shall have an angle of inclination as per site conditions to ensure maximum solar insolation. To accommodate more capacity within limited space, the tilt angle may be reduced, provided that the specified Performance Ratio (PR) is maintained.
- c) The mounting structure shall be designed to withstand wind speeds of up to 150 km/hour or as per the wind zone classification of the site. The design shall be certified by a recognized laboratory/institution, and a wind loading calculation sheet shall be submitted to the Owner.
- d) The mounting structure steel shall be as per latest IS 2062: 1992 and galvanization of the mounting structure shall be in compliance of latest IS 4759.
- e) The structural material shall be corrosion resistant and electrolytically compatible with module frames, fasteners, nuts, and bolts. Where Aluminium structures are used, they shall also be capable of withstanding wind speeds of the respective zone. Additional rust protection shall be provided by coating or anodization.

- f) All fasteners shall be of stainless steel.
- g) The structure shall be designed to allow easy replacement of any module without disturbing adjacent modules.
- h) The array structure shall be designed to occupy minimum rooftop space without compromising energy output.
- i) The bidder shall confirm the load-bearing capacity of the roof and provide suitable support structures to ensure safe installation, without causing direct puncture of the terrace slab. RCC pedestals or dummy structures shall be used where required.

DC DISTRIBUTION BOARD:

- a) DC Distribution panel to receive the DC output from the array field.
- b) DC DPBs shall have sheet from enclosure of dust & vermin proof conform to IP 65 protection. The bus bars are made of copper of desired size. Suitable capacity MCBs/MCCB shall be provided for controlling the DC power output to the PCU along with necessary surge arrestors.

AC DISTRIBUTION PANEL BOARD:

- a) The AC Distribution Panel Board (ACDB) shall control and protect the AC power from the PCU/Inverter and shall be provided with necessary surge arrestors. The interconnection from the ACDB to the LT Bus Bar / Net Metering Panel in grid-tied mode shall be carried out by the bidder.
- b) All switches, circuit breakers, and connectors shall conform to IEC 60947, Part I, II and III / IS 60947, Part I, II and III.
- c) The changeover switches, cabling, and interconnection work shall be undertaken by the bidder as part of the project.
- d) The ACDB shall be of metal-clad, totally enclosed, rigid, floor-mounted, air-insulated, cubical type construction, suitable for operation on three-phase, 415 V or single-phase, 230 V, 50 Hz.
- e) The ACDB panels shall be designed to withstand a minimum ambient temperature of 45°C, relative humidity up to 80%, and dusty site conditions.
- f) The degree of protection shall be IP54 or better for indoor panels and IP65 or better for outdoor panels.
- g) The design, installation, and operation of ACDB shall conform to the Indian Electricity Act and Rules (latest amendment).
- h) All 415 V AC / 230 V AC devices and equipment such as bus support insulators, circuit breakers, VTs, etc., mounted inside the ACDB shall be suitable for continuous operation under the following supply conditions:
 - i. Supply voltage variation: $\pm 10\%$
 - ii. frequency variation: ± 3 Hz

ARRAY SIZE RATIO:

- a) The combined DC capacity of the solar PV array (total module wattage) shall be appropriately designed to match the rated AC output capacity of 30 kW.
- b) The combined wattage of all inverters (PCUs) shall not be less than the rated capacity of the power plant (30 kW).

- c) Each inverter shall have an integrated Maximum Power Point Tracker (MPPT) to maximize the energy extracted from the solar array.
- d) The DC:AC ratio (Array Size Ratio) shall be designed to ensure optimum energy yield, typically in the range of 1.1 to 1.25, without exceeding the permissible limits as per MNRE guidelines.

INVERTER:

As the array produces direct current electricity, it is necessary to convert this into alternating current and adjust the voltage levels to match the grid voltage. Conversion shall be achieved using an electronic inverter and associated control and protection devices. All these components together form the Power Conditioning Unit (PCU).

Technical Features of the Inverter/PCU:

- Switching Devices: IGBT / MOSFET
 - Control: Microprocessor / DSP based
 - Nominal AC Output Voltage & Frequency: 415 V, 3 Phase, 50 Hz
 - Output Frequency: 50 Hz
 - Grid Frequency Synchronization Range: ± 3 Hz or better
 - Ambient Temperature Considered: -20°C to $+50^{\circ}\text{C}$
 - Relative Humidity: Up to 95% (non-condensing)
 - Enclosure Protection: IP-20 (minimum, indoor) / IP-65 (minimum, outdoor)
 - Grid Voltage Tolerance: -20% to +15%
 - No-load Losses: Less than 1% of rated power
 - Inverter Efficiency: $\geq 95\%$ (for ≥ 10 kW capacity)
 - THO: $< 3\%$
 - Power Factor: > 0.9 (configurable to operate at lagging/leading as per grid requirement)
- a) Three-phase PCU/inverter shall be used for the 30-kW system.
 - b) Inverter shall support automatic operation including wake-up, synchronization, shutdown.
 - c) Inverter shall provide reactive power management and comply with grid codes.
 - d) Built-in metering and data logging to monitor plant performance with remote access.
 - e) PCU shall comply with IEC 61683 / IS 61683 (efficiency measurement) and IEC 60068-2 (environmental tests).
 - f) Inverter shall have inbuilt protections against DC reverse polarity, AC/DC over-voltage, over-current, short circuit, earth fault, and anti-islanding as per IEEE 1547/IEC standards.
 - g) Inverter shall be tested and approved by MNRE/BIS/NABL/IEC accredited test centres.
 - h) Combined inverter wattage shall not be less than 30 kW.
 - i) MPPT shall be integrated into the inverter for maximum energy harvest.

DATA ACQUISITION SYSTEM / PLANT MONITORING:

- a) A Data Acquisition System (DAS) shall be provided for the solar PV plant to enable comprehensive monitoring, control, and performance assessment.

- b) The DAS shall include provision for data logging with time and date stamping of system parameters, using a high-quality, industrial-grade data logger connected to a suitable PC. The system shall record all essential parameters for analysis and reporting.
- c) Temperature probes shall be installed for recording both the solar module back-surface temperature and the ambient temperature. These sensors shall be integrated with the data logging system to provide real-time and historical temperature profiles.
- d) The following parameters shall be accessible via the operating interface display in real time separately for solar power plant:
 - i. AC Voltage
 - ii. AC Output Current
 - iii. Output Power
 - iv. Power Factor
 - v. DC Input Voltage
 - vi. DC Input Current
 - vii. Time Active
 - viii. Time Disabled
 - ix. Time Idle
 - x. Power Produced
- e) The system shall also monitor protective function limits including AC over-voltage, AC under-voltage, over-frequency, under-frequency, ground fault detection, PV starting voltage, and PV stopping voltage.
- f) All major parameters shall be made available on the digital bus, with logging facilities provided through an internal microprocessor. Current values, historical values for up to one month, and average values shall be stored for energy auditing and accessible via the inverter's digital front panel at any time.
- g) Array energy production shall be logged using digital energy meters of 0.5 accuracy class (with CT/PT). These meters shall record actual values of AC/DC voltage, current, and energy generated by the PV system.
- h) Computerized DC string/array monitoring and AC output monitoring shall be provided as part of the inverter, string/array combiner box, or separately, as appropriate.
- i) The system shall provide monitoring of string and array DC voltage, current, and power, as well as inverter AC output voltage and current (for all three phases and lines), AC power (active, reactive, and apparent), power factor, AC energy (for all three phases and cumulative), and frequency.
- j) In addition to digital AC energy meters, computerized AC energy monitoring shall be included to ensure redundancy and accurate reporting.
- k) All data shall be recorded chronologically in a common worksheet, fully compatible with MS Excel. Data shall be presented in both tabular and graphical form for ease of analysis.
- l) All instantaneous data shall be displayed on the computer screen in real time for operator visibility.
- m) Software shall be provided to enable USB download and analysis of DC and AC parametric data for the individual plant.

- n) A solar radiation and environmental monitoring system shall be installed on the rooftop of one of the project buildings, integrated with the PV plant monitoring system.
- o) The monitoring system shall consist of sensors, signal conditioning units, data acquisition devices, an LCD display, and provisions for remote monitoring.
- p) The system shall continuously measure global and diffuse solar radiation in the plane of array (POA).
- q) Ambient temperature and relative humidity near the array, as well as control room temperature, shall also be monitored on a continuous basis.
- r) Solar module back-surface temperature shall be measured and logged continuously to evaluate system performance.
- s) The system shall allow simultaneous monitoring of DC and AC electrical voltage, current, power, and energy, along with solar radiation and environmental data, to establish accurate correlations.
- t) The solar radiation and environmental monitoring system shall include a real-time clock, internal battery backup, and sufficient data storage capacity to record parameters continuously for a minimum of one year.
- u) All data shall be stored in chronological order in a worksheet compatible with MS Excel and represented in both tabular and graphical formats.
- v) All instantaneous data shall be available for display on the computer screen or mobile application.
- w) Historical data shall be made available for download via USB for offline analysis.
- x) Provisions shall be included for internet-based monitoring and remote download of performance and environmental data.
- y) Remote monitoring and data acquisition software shall be supplied at the owner's location, with appropriate hardware, software, and connectivity to ensure real-time and online data monitoring and control.
- z) The monitoring system shall also include provision for future integration of this data with the owner's server or portal, ensuring scalability and long-term usability.

EVACUATION OF SOLAR POWER:

- a) The power generated from the 30-kW rooftop solar PV plant shall be evacuated at a suitable voltage level, typically 415 V (three-phase) or 230 V (single-phase), depending on the site requirements and interconnection point.
- b) The generated power shall be injected into the building's internal electrical system at the LT bus bar through an appropriate interconnection arrangement, ensuring safe and reliable synchronization with the existing grid supply.
- c) The power generated shall be primarily consumed for internal load requirements of the facility. Excess generation, if any, shall be exported to the utility grid in compliance with the prevailing State DISCOM/KSEB net-metering regulations.

CIRCUIT BREAKERS:

- a) The circuit breakers provided for the solar PV system shall be of suitable type and rating for the plant feeder, ensuring safe interruption capacity and reliable operation under all expected duty conditions.

- b) The circuit breakers and accessories shall conform to the relevant IEC standards, including IEC 60947 series, and IS equivalents, ensuring compliance with international and Indian electrical safety norms.
- c) The circuit breaker shall be totally re-strike-free under all duty conditions and shall be capable of breaking transformer magnetizing currents and capacitive currents of unloaded cables or overhead lines without causing abnormal overvoltage.
- d) The circuit breakers shall be suitable for continuous use within the plant switchgear, ensuring reliable performance under all rated operating conditions.
- e) The closing coil of the breaker shall be designed to operate satisfactorily at all voltages between 85% and 110% of the rated voltage.
- f) The shunt trip mechanism shall function correctly under all operating conditions of the breaker, including at all supply voltage levels between 70% and 110% of rated voltage, up to the rated breaking capacity.

DANGER BOARDS AND SIGNAGES:

Danger boards should be provided as and where necessary as per IE Act. /IE rules as amended up to date. Three signages shall be provided one each at battery -cum- control room, solar array area and main entry from administrative block. Text of the signages may be finalized in consultation with owner.

PLANNING AND DESIGNING:

- a) The bidder should carry out Shadow Analysis at the site and accordingly design strings and arrays layout considering optimal usage of space, material and labour. The bidder should submit the array layout drawings along with Shadow Analysis Report to UBI for approval.
- b) UBI reserves the right to modify/change the site and specification of sub-systems and components at any stage as per local site conditions/requirements.
- c) The bidder shall submit preliminary drawing for approval and based on any modification or recommendation, if any, the bidder shall resubmit revised drawings. The bidder shall submit three sets and soft copy of final approved drawings to UBI before proceeding with construction work.

DRAWINGS & MANUALS:

- a) Two sets of Engineering and Electrical drawings, along with Installation and O&M (Operation & Maintenance) manuals, shall be supplied by the bidder.
- b) The bidder shall provide complete technical data sheets for each equipment giving details of the specifications along with make/makes in their bid, together with the basic design of the power plant and power evacuation system, synchronization scheme, and protection equipment.
- c) Approved ISI and reputed makes for all equipment shall be used.
- d) For complete electro-mechanical works, the bidder shall supply detailed designs, drawings, and specifications for approval to UBI before commencing installation work.

DRAWINGS TO BE FURNISHED BY BIDDER AFTER AWARD OF CONTRACT:

- a) The Contractor shall furnish the following drawings after receipt of Letter of Award/Intent and obtain approval from UBI before execution.
- b) General arrangement and dimensioned layout of the plant.
- c) Schematic drawing showing the requirement of SPV panels, Power Conditioning Unit(s)/inverter, Junction Boxes, AC and DC Distribution Boards, meters, and associated equipment.
- d) Structural drawings along with foundation details for module mounting structures.
- e) Itemized bill of material for the complete SPV plant covering all components and associated accessories.
- f) Layout of solar power array including string configurations.
- g) Shadow analysis report of the rooftop/installation site.

TOOLS & TACKLES AND SPARES:

- a) After completion of installation and commissioning of the power plant, the bidder shall provide all necessary tools and tackles required for operation and maintenance, free of cost. The list of tools and tackles to be supplied shall be submitted for approval of specifications and makes from UBI.
- b) A list of requisite spares for the Power Conditioning Unit/inverter, such as control logic cards, IGBT driver cards, fuses, MOVs/arrestors, MCCBs, junction boxes, etc., shall be indicated by the bidder. A spare set of PV modules shall also be supplied.
- c) A minimum set of essential spares shall be maintained at the plant site throughout the warranty and O&M period. In case such spares are used, they shall be replenished by the Contractor at no additional cost to UBI.

SAFETY MEASURES:

- a) The bidder shall take full responsibility for the electrical safety of the installation, including connectivity with the grid, and shall comply with all applicable safety rules, regulations, and standards as per the Electricity Act, 2003, CEA guidelines, and relevant BIS/IEC codes.
- b) All necessary safety equipment, devices, and precautions shall be incorporated into the design, supply, installation, and commissioning of the plant to ensure protection of personnel, equipment, and property during both execution and operation phases.
- c) The bidder shall ensure adherence to Environmental, Health, and Safety (EHS) norms during construction, commissioning, and O&M activities.

DISPLAY BOARD:

- a) The bidder shall display a permanent board at the project site (on every rooftop installation, if multiple roofs are used) with the following details clearly mentioned: Plant Name, Capacity, Location, Date of Commissioning, and Estimated Power Generation (year-wise).
- b) The size, material, and type of the display board shall be appropriate for outdoor conditions, durable, and resistant to weathering.
- c) The text, layout, and design of the display board shall be finalized in consultation with UBI prior to installation.

INSURANCE OF PLANT:

- a) The Contractor shall be responsible for arranging comprehensive insurance for the PV modules and all associated components of the 30-kW rooftop solar PV plant for the entire contract period. The insurance shall cover all probable risks including theft, fire, natural calamities, accidental damage, and force majeure events.
- b) The insurance policy shall be taken in the name of UBI, and a copy of the policy document shall be submitted to UBI prior to commissioning of the plant.
- c) The performance warranty shall be supported with indemnity insurance against excessive loss of output of PV modules during the warranty period.

MODULE TESTING:

PV modules must be tested and approved by one of the IEC authorized test centres. Factory test as well as third party testing of the random sample by the Solar Energy Centre is also mandatory. The cost of these testing shall be borne by Contractor. The acceptance criteria for all these tests shall be as per the applicable IEC/IS. Standard Industry practice will be adopted with mutual understanding in case if no such guidelines are available in IEC for any of the tests.

FACTORY TESTS & INSPECTIONS:

- a) Manufacturing date of all modules used in the project shall not be more than 12 months prior to the date of transfer of ownership to UBI.
- b) CONTRACTOR shall depute its representatives in the module manufacturer's factory for witnessing of QAP (Quality Assurance Plan) and flash tests of complete production of the modules. And daily production/inspection report shall be communicated to UBI by email, same day. UBI may also depute its Authorized Representative to be present at the time. In such cases, all the expenses of the Authorized Representative of UBI towards this visit shall be borne by UBI. The CONTRACTOR shall provide the electrical characteristics, of each solar PV module that is to be supplied these electrical
- c) characteristics includes current-voltage (I-V) performance curves and temperature coefficients of power, voltage and current etc.
- d) Modules deployed must use a RF identification tag. The RFID tag must be fixed only by the module manufacturer in the factory at the time of testing and before dispatch of modules. The following information must be mentioned in the RFID used on each module (This can be inside or outside the laminate but must be able to withstand harsh environmental conditions).
 - i. Name of the manufacturer of the PV module
 - ii. Name of the manufacturer of Solar Cells.
 - iii. Month & year of the manufacture (separate for solar cells and modules) 1v. Country of origin (separately for solar cells and module)
 - iv. I-V curve for the module
 - v. Wattage, Im, Vm and FF for the module
 - vi. Unique Serial No and Model No of the module
 - vii. Date and year of obtaining IEC PV module qualification certificate.
 - viii. Name of the test lab issuing IEC certificate.

- ix. Other relevant information on traceability of solar cells and module as per ISO 9001 and ISO14001.

PART VI - LIST OF MATERIAL OF APPROVED MAKER / BRANDS

The contractor shall quote for the best of the materials specified below with ISI mark wherever applicable. The contractor shall obtain prior approval from the Bank / Architect before placing order for the specific materials agencies. In case of non-availability of any of the approved /specified materials /agency. During the execution of the work, the Bank /Architect may approve suitable equivalent brand/agency and his decision shall be final and binding on the contractor and the price variations. If any, shall be adjusted accordingly.

APPROVED MAKER / BRANDS - CIVIL WORKS

Sr. No.	Material	Approved Manufacturers / Brands
1	Reinforcement Steel (TMT - Fe500D)	SAIL / Tata Steel / Jindal Steel & Power / JSW Steel Ltd.
2	White Cement	Birla White / J.K. White
3	Grade 53 Ordinary Portland Cement	ACC / Ultratech / Ambuja / Sankar / Ramco
4	Tubular Truss / Structural Steel	SAIL / Tata Steel / RINL / Jindal Steel & Power Ltd. / JSW Steel Ltd.
5	Polycarbonate Sheet	GE Plastics / Lexan
6	Decking Steel Sheet	Ezydec (TATA) / Lloyd Superdeck / Multicolor
7	Vitrified Tiles	RAK / Kajaria / CERA / Johnson / Somany / Nitco
8	Ceramic / Glazed Tiles	Somany / Kajaria / Johnson / Nitco / RAK / CERA
9	Heat Resistant Tiles	Thermatek / Orient / Star Shield
10	Chemical Emulsion for Anti-Termite Treatment (Chlorpyriphos EC)	Dursban 50 TC / Terrashield 50 TC / Tafaban
11	Distemper / Paints	Asian / Berger / Nippon / Nerolac / Indigo / Sheenlac / Waxpol
12	Plastic Emulsion Paint	Asian / Berger / Nerolac / Nippon
13	Synthetic Enamel Paint	Asian / Berger / Nerolac / Nippon
14	Oil Bound Distemper	Nerolac / Berger / Asian Paints
15	Steel Primer	Nerolac / Berger / Asian Paints
16	Wood Primer	Nerolac / Berger / Asian Paints
17	Exterior Waterproofing Paint	Polydeck / Dr. Fixit / Asian / Nippon / Fosroc / Berger / Nerolac
18	Wood Finish (Melamine / PU Polish)	Asian / Berger / Nerolac
19	Curing Compound	Fosroc / Sika / Cico / Dr. Fixit

20	Anti-Corrosive Epoxy Paint (Concrete)	BASF / Fosroc / Sika / Asian / Pidilite / Epoke
21	Anti-Corrosive Epoxy Paint (Steel)	BASF / Fosroc / Sika / Asian / Pidilite / Epoke
22	Ply Board / Plywood	Greenply / Century / Kitply
23	Laminate	Merino / Greenlam / Century / Royal Touche
24	Laminated Particle Board	Merino / Green
25	Veneer Ply	Merino / Green / Century
26	Flush Door (Pine Filled)	Merino / Green / Century / Kuttys
27	Locks	Godrej / Golden / Indo Brass / Dorma / Dorset / Ozone / Assa Abloy
28	Anodised Aluminium Fittings (Doors & Windows)	Nulite / Argent / Hindalco / Jindal Aluminium
29	Door Closers	Everite / Godrej / Dorma
30	Floor Springs	Everite / Godrej / Dorma
31	Factory Pressed Laminated Doors	Merino / Green / Century
32	Inherent Fire-Retardant Fabric	Trevira CS Fabric (RSWM Ltd.) / Jotun
33	Fire Retardant Paint	Nullifire / Signum / Godrej / Jotun
34	Steel Fire Rated Doors	Navair / Godrej / Promat
35	Non-Hermetically Sealed HPL Swing / Sliding Doors	Dorma / Metaflex
36	Non-Hermetically Sealed SS Swing / Sliding Doors	Dorma / Metaflex
37	Hermetically Sealed HPL / SS Automatic Sliding Doors (BMT)	Dorma / Metaflex
38	Wooden Fire Rated Doors	Navair / Signum / Abacus
39	Fire Rated Vision Panels	Pilkington / Schott / Ferilite / Saint-Gobain
40	Fire Rated Hardware	Dorma / Becker FS / Assa Abloy
41	Skylights - Thermoform	McCoy Architectural Systems / Vergola / Abucob / Tata Blue Scope
42	G.I. Steel Door Frame	Kutty Doors / Shakti Metdoor / Navair / Romat / Synergy Thrislington
43	Friction Stay Hinges	Earl Bihari / Ebco / Roto / Cotswold / GU / Dorset / Hettich
44	Steel Windows / Pressed Steel Frames	San Harvic / Steelman Industries / PD Industries / Metal Windows / Bhawani / Ganpati Udyog / JMD Steel / Tata Pravesh
45	Paver Blocks & Kerb Stones	Nitco / Unitile / NTC / Ultra
46	Glass Mosaic Tiles	Italia / Opio / Mridul
47	Wood Adhesives	Jovan / Fevicol / 3M

48	Tile Adhesives	Ardex Endura / Fibrex / Pidilite / BASF
49	Grouting Compounds	Ardex Endura / Pidilite / Laticrete / BASF / Fibrex
50	Mosaic Tiles	Italia / Nitco / Modern / NTC / GICO
51	Dash / Anchoring Fasteners	Hilti / Fischer / Excel
52	High-Performance Epoxy Resin Anchor Systems	BASF / Fosroc / Fibrex
53	Nuts, Bolts & Screws	GKW / Mettle Fold / Atul/ Unbrako / TVS Group
54	Dholpur / Red Sand Stone	Gang Saw Cut from Bansi Paharpur Quarry
55	Aluminium Sections (Doors & Windows)	Jindal / Hindalco
56	Hardware Fittings (Doors & Windows)	Pulse (LGF Sysmac India) / Alutec / Dorma / Dorset / Ozone
57	Polyester Powder Coating Shades	Nerolac / Berger / J&N
58	Metal Ceiling	Hunter Douglas / Aura (ASIPL) / CKM / Armstrong
59	Mineral Fibre Ceiling	Armstrong / OWA / CKM
60	Extruded Polystyrene Sheets (XPS)	Dow / Supreme
61	Aluminium Composite Panel (ACP)	Alucobond / Reynobond / Alpolic
62	Specialized Agency - Aluminium Glazing / ACP	Bharat Archimetal / Green Facade Solutions / AGV Alfab
63	Silicone Sealant	GE / Dow Corning
64	Solvent-Based Silicone Water Repellent	Pidilite / Fibrex / BASF
65	PVC Continuous Fillet (Glazing Packing)	Roop / Forex
66	Backer Rod	Supreme Industries Ltd. or Equivalent
67	Anti-Static Vinyl Flooring	Armstrong / Tarkett / Forbo
68	Anti-Static Homogeneous PU Flooring	BASF / Sika
69	PU Flooring	BASF / Fibrex
70	Float Glass	Modi Glass / Saint-Gobain
71	Reflective Glass	Saint-Gobain / Asahi India
72	Hermetically Sealed Performance / Toughened Glass	Saint-Gobain / Asahi
73	Glass Processing (DGU / Toughening)	AIS (Roorkee) / Sheesh Mahal (Rohtak) / Balaji Safety Glass (Bangalore) / Fishwa Glass (Mumbai)

74	Looking Glass / Mirror	Saint-Gobain / HNG / Modi Guard
75	Vertical / Venetian Blinds	Vista Levolor / Cape Décor / Hunter Douglar
76	Stainless Steel Railings & Accessories	Jindal / Dorma / Geze
77	Gypsum Board	India Gypsum / Gyproc (Saint-Gobain) / Asian
78	Pre-Coated Galvanised Sheets	Multicolor / Interarch / JSW / Jindal
79	Wall Putty	JK / Birla / Berger / Asian
80	Floor Hardener	Pidilite / Fosroc / Sika / BASF / Fibrex
81	Polysulphide Sealant	Pidilite / Fosroc / Sika / BASF / Fibrex
82	Specialized Agency - Expansion Joint Treatment	Technocrats / Tuff Waterproofing Co. / BASF / Sika / Fosroc
83	Admixtures for Structural Glazing	Fosroc / BASF / Sika
84	Aluminium	Hindalco / Jindal
85	Stainless Steel Screws / Bolts	Unbrako / Hilti/ Kundan / Puja / Atul
86	Dash Fasteners	Hilti / Fischer
87	Stainless Steel Friction Stay	Hettich / Dorset/ Alu Alpha / Securistyle

LIST OF APPROVED MAKES - INTERIOR

Sl. No.	Item Description	Approved Makes
1	Gypsum Boards	Saint-Gobain / Lafarge / USG
2	Plywood (IS 303 BWR Grade)	Century / Greenply
3	Laminates	Formica / Greenlam / Century Laminates / Merino
4	Veneer	Jacson / Century / Greenply
5	Vitrified Tiles	Johnson / Kajaria / Simpolo / Somany
6	Tile Adhesive	Endura / Laticrete / Mapei / Kerakoll
7	Ceramic Tiles	Johnson / Kajaria / Somany
8	Paints	Jotun / ICI / Asian Paints / Berger
9	Base Putty	National / Jotun / Birla
10	Melamine / Wood Finish	ICI / Asian Paints / MRF
11	Glass / Mirrors	Saint-Gobain / Asahi / FGI / Modi
12	Vertical Blinds	Vista / Hunter Douglas
13	Locks	Godrej / Häfele / Hettich / Ozone / Ebco
14	Hinges & Slides	Blum / Hettich / Ebco / Häfele
15	Adhesives	Pidilite / Vamicol
16	Door Closers / Floor Springs	Everite / Dyna / Ozone / Häfele / Godrej / Dorma XL

17	Handles	Godrej / Häfele / Hettich / Ozone / Ebco / Kitch
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APPROVED MAKER / BRANDS - ELECTRICAL

Sl. No.	Description	Approved Make(s)
1	PVC Flexible Copper Wires (FRLS / HFFR)	Lapp / Finolex / Gloster / Anchor / RR Kabel / Polycab / V-Guard
2	UPS	Vertiv / APC / Riello / Piller / EPI / Socomec / Numeric (Legrand) / Eaton / Keltron / Aplab / Delta / Dubas / Consul-Neowatt
3	Cable Glands	Dowells / Comet / OBO Bettermann / Polycab / Cape
4	Capacitors	Schneider / EPCOS / L&T / Vishay / Sprague / Siemens / ABB / Shreem
5	Ceiling Roses / Angle Batten	Precision / Anchor / Legrand / Polycab / MK
6	Contactors	ABB / Schneider / Legrand / Siemens / L&T
7	Crimping Sockets / Lugs	Dowells / Jaison / Comet
8	Current Transformers	ABB / PGR Power / Kapco Elec Pvt. Ltd. / Kappa / Legrand / Resitek / Intrans / Schneider
9	Horizontal & Vertical Distribution Boards (DBs)	Legrand / Schneider / Hager / ABB / Luker / L&T
10	HT, LT & Control Cables	Unistar / Gloster / Polycab / Havells / RPG / CCI / Torrent / KEI / Finolex / Rallison / V-Guard / Bonton
11	HT Cable Termination Kits (Heat Shrinkable)	Raychem / M-Seal (3M) / Denson / Gee Seal
12	Batteries & Battery Chargers	Quanta / Exide / Amaron / Amara Raja
13	Indicating Meters	L&T / Schneider / Meco / Circutor / AE / Secure / Elmeasure / Rishabh
14	Isolator / SFU / COS	L&T / Siemens / Schneider / HPL
15a	Maintenance-Free Earthing System	OBO Bettermann / Cape / ERICO / Ashlok
15b	Lightning Protection Accessories	OBO Bettermann / Cape / ERICO / Dhen
15c	Exothermic Welding	OBO Bettermann / ERICO (GEM) / Cape Electric / JMV LPS
16a	Surge Arresters	OBO Bettermann / Cape / Legrand / L&T / Schneider / Siemens
16b	Surge Protection Devices (SPDs)	OBO Bettermann / Legrand / Schneider / Siemens / ABB / ERICO / Dhen / Raycap / Novaris

17	MCB, RCBO, RCCB & Modular Switchgear	Legrand / Schneider / ABB / GE / Siemens / L&T / Hager
18	ACB (SCADA compatible with metering & communication)	Schneider / L&T / ABB / Siemens / Legrand
19	MCCB (Microprocessor-based)	ABB (Tmax) / Schneider (NSX) / Legrand (DPX ³) / L&T (DSine) / Wipro / Indo-Asian / V-Guard
20	MCCB (Thermal-Magnetic)	ABB (Tmax) / Schneider (Compact NSX) / Legrand (DPX ³) / Siemens (3VA) / L&T (DU)
21	Metal-Clad / IP67 Sockets / EV Charger	ABB / Legrand / North-West / BCH / Schneider / Crabtree / Salzer / Crompton / Hensel
22	Multifunction / DIN-Rail Meters	L&T / Schneider / Meco / Circutor / AE / Secure / Elmeasure / Rishabh / Krykard / Legrand
23a	PVC Conduits	Supreme Industries / Finolex Ind. / Balco
23b	MS Conduits	Gupta / Bharat / BEC (ISI)
24	HT Bi-Directional TOD Meter	Schneider / Siemens / Circutor / L&T
25	Relays & Controls	ABB / Siemens / L&T / Schneider / C&S / Prok DV
26	Switches, Sockets & Accessories	Legrand / ABB / MK / Crabtree / North-West / Anchor Roma / L&T
27	Ceiling & Exhaust Fans	Usha / Orient / Havells / Crompton
28	LT Panel - Fully Type Tested	ABB (ArTu-K) / Schneider (Block-Set) / L&T (Ti) / Siemens (Siepan) / Legrand
29	LT Panel - Partially Type Tested	ABB / Schneider / L&T / Siemens / Rittal / Legrand
30	LT Panel / Enclosures (Others)	CPRI-Approved Manufacturers / Rittal / ABB / Schneider
31	Lighting Controls & Sensors	Crabtree (Havells) / Honeywell / Philips / Wipro
32a	Indoor Light Fixtures	Philips / Wipro / Osram / Bajaj / Havells / Crompton Greaves / Lighting Technologies
32b	Outdoor Light Fixtures	Philips / Wipro / Osram / Bajaj / Havells / Crompton Greaves / Lighting Technologies / K-Lite
32c	Solar Street Lights (Standalone)	Philips / Bajaj / Tata Power / MNRE-Approved Vendors
32d	Emergency Light Fittings	Philips / Eveready / Wipro
32e	Lamps, Control Gear & Accessories	Philips / Wipro / Osram / Bajaj / Havells / Crompton Greaves
33	SMDB	L&T / Siemens / Legrand
34	Transformer	ABB (Hitachi) / Intrans / Siemens / Schneider / Crompton
35	DG Set - Engine	Mitsubishi / Cummins / MTU / Caterpillar / Volvo Penta
36	DG Set - Alternator	Stamford / Leroy-Somer / Kirloskar

37	Cable Trays	Cablofil (Legrand) / Sumip / Profab / Indiana / OBO Bettermann / L&T
38	Synchronization Relay	DEIF
39	Rubber Insulating Mat	Electromat / Safevolt
40	Rising Mains / Busbar Trunking / Tap-Off Box	Legrand / Schneider / L&T
41	HT Panel (Factory Built)	Siemens / ABB / L&T / Schneider
42	PLC / UNCO / Breaker Interface	Siemens / L&T / Schneider / ABB
43	Quick-Spot Fire Protection	Ceasefire / Minimax / Safex
44	EMS / SCADA System	L&T / Siemens / Schneider
45	Fire-Resistant Mortar, Bandage, Fibre Plate, Pipe Sleeves, Ablative Coating	OBO Bettermann / Hilti
46	ATS (Automatic Transfer Switch with Controller)	Vertiv / APC / Riello / Piller / EPI / Socomec / GE / L&T
47	Data / LAN System	Krone / Molex / AMP / Belden
48	Junction Boxes	Hensel / Spelsberg / ABB / Sintex / Fibox
49	Other Items	With Prior Approval of Client / Consultant

APPROVED MAKER / BRANDS - PLUMBING

Sl. No.	Item Description	Make
1	Sanitary wares	Hindware / Parryware / Jaquar / Kohler / Cera
2	Seats & Covers solid (W.C.)	Commander / Admiral / Supreme or equivalent
3	Sanitary Fixtures: Wash basin / Sinks / kitchen sink	Hindware / Parryware / Jaquar / Kohler / Cera
4	Bath Fittings/ CP Brass Fittings: Pillar cocks, BibCocks / Stop cock / bottle trap / heath faucet / concealed stop cock / Angle valve	Hindware / Parryware / Jaquar / Kohler / Cera
5	Bath room accessories: Towel Rack, rail, ring / soap holder, disk /	Hindware / Parryware / Jaquar / Kohler / Cera
6	PVC Soil, Waste water & Rainwater Pipes & fittings	Supreme / Finolex / Astral
7	UPVC Soil, Waste water & Rainwater Pipes & fittings	Supreme / Finolex / Astral / Ajay / Prince

8	UPVC / CPVC / PVC pressure pipes/ Low Noisedrainagepipes	Supreme / Finolex/Astral/ Ajay /Prince
9	Butterfly valves/Ball Valves/Nonreturn valves/Automatic Air releasevalves/Strainers/Pres	Leader / Zoloto / RB/ SKS/ Advance / Castle/ Sant
10	CI / DI Manholes Covers	RIF / NECO/BIC
11	G.I Clamps and Fixingaccessories	Hi-tech/ Hilti /Fixotech
12	Mirror	Modi/SaintGobain
13	Pumps	Kirloskar/ Grund Fos/ Crompton
14	Variable FrequencyDrive	Danfoss / Emerson/ ABB/ Yaskawa / Siemens/ Honeywell
15	Concealed FlushTank	Geberitt /Kohler/Grohe/Cera/Viega
16	PVC Floor Traps, GullyTraps	Supreme /Vectus
17	Electric WaterHeaters	A.OSmith/ Ariston/Racold/V-Guard
18	SS Gratings for FloorTraps	ACO /Chilly
19	Gratings for Rain WaterChannel	ACO /NECO
20	Rain water outlet	NECO / WADE/ACO
21	Water meter (Mechanical Type)	Capstan/Anand/Kranti
22	Level Controller (Water)	Minilec / KVB
23	Level indicator (Water)	Minilec / KVB
24	Flow Switch	Honeywell, Johnson, Siemens
25	Thermal Insulation	Armaflex/ K Flex/Aeroflex
26	Automatic Hand drier	Blue circle / Novatech
27	Pressure gauges	H Guru/ Waaree/ Baumer / Fiebig
28	Water purifiers	Aquaguard/ V-guard/ Blue star/ Kent / Crossfield

29	Centrifugal cast CI Pipes & Fittings	RIF / Neco or equivalent
30	G.I. Pipes (B-Class)	ITC / Tata / Jindal (Hissar) Zenith or equivalent.
31	G.I. Fittings (ISI Brand)	Unik / AMCO or equivalent.
32	Gunmetal valves (Full way, check and globe valves)	Leader / Zoloto (with ISI mark) / Sant or equivalent.
33	S.W. Pipes / Fittings & Gully traps	Perfect / Tirmurti / Bharat or equivalent.
34	Ball valves	Leader / Zoloto or equivalent.
35	Stainless steel sinks	Nirali / Neelkanth or equivalent.
36	HDPE Tanks	Sintex / Polycon / Unitank or equivalent Triple Layer White.
37	Mirrors	Modiguard or equivalent.
38	C.I. Manhole Cover	RIF / BIC / Neco or equivalent.
39	Concrete Man holes SFRC	CICO
40	Hydropneumatic Systems	Grund Fos / Crompton or equivalent.
41	Water lifting Pump	Grund Fos / Crompton or equivalent.
42	Submersible Pump	Grund Fos / Crompton or equivalent.
43	Chemical Doser	Asia Lmi / Prominent / Ion Exchange or equivalent.
44	Pressure Gauge	Baumer / Honeywell / H. Guru or equivalent.
45	Level Indicator	RM or Equivalent Approved Make
46	Air Relief Valves	RB / Zolto or equivalent.
47	Water Meter	Dasmesh / Capstain / Kaycee or equivalent.
48	PVC Encapsulated footrest.	KGM or equivalent approved make
49	C.I. Sluice valves	Kirloskar, Leader or equivalent with ISI mark on the boAsst.
50	A.C. Pipes	Everest Ramco or equivalent
51	R.C.C. Pipes	Indian Hume pipe or equivalent

52	Brass & Gun metal globe, gate valves, feet valves	Leader NETA or equivalent with ISI marking on the boAsst.
53	Sanitary Fixture	Hindware / Duravit / Cera or equivalent.
54	Storage Heaters	A.O. Smith / V-Guard / Racold / Ariston
55	Fire Hydrant	Approved by local fire Bridges Authority
56	Centrifugal Sand cast soil pipes and fittings	Adhunik/NECO sand cast / tata Metaliks / B.I.C. or equivalent.
57	Bracket supports	Hi-tech/MS brackets as per drawings
58	Towel rail / ring	Jaquar / ESS ESS or equivalent.
59	Connection pipe-PVC	Kohinoor/Viking / Astral / Supreme connection hoses or equivalent.
60	Butterfly valve	Intervalve
61	PVC Fittings (Moulded)	Clarion / Finolex / Prince or equivalent.
62	Non-return valve	Zoloto/Leader/Intervalve or equivalent
63	UV filter	Alfa-level or equivalent
64	Stainless Steel	Salem Steel or equivalent
65	Marble Mosaic Tiles	Nitco / Kajaria / Bharat / Himalayan or equivalent
66	Fire Door	RDG / Shakti / Metdor or equivalent
67	RCC pipe	Indian Hume Pipe Co. / Spun Pipe Co. or equivalent
68	Stoneware Pipe and fittings	Trimurti / Perfect Potters / Bharat

APPROVED MAKER / BRANDS - HVAC

Sl. No.	Item Description	Approved Makes
1	Water Cooled Chiller Units	Kirloskar / Bluestar / Carrier / Trane / York / Daikin / Voltas / LG
2	Air Cooled Chiller Units	Kirloskar / Bluestar / Carrier / Trane / York / Daikin / Voltas / LG
3	Cooling Towers	Advance / Bell / Paharpur / Mihir

4	Pumps	Kirloskar / Lubi / Xylem / Grundfos / KSB / Wilo / Armstrong
5	VRV / VRF / Split AC Systems	Carrier / Daikin / Hitachi / Samsung / Bluestar / Voltas / LG
6	DX Condensing Units	Daikin / Bluestar / Voltas / LG
7	Air Handling Units (AHU)	VTS / Zeco / Edgetech / Systemair / Finpower
8	Fan Coil Units (FCU)	VTS / Zeco / Edgetech / Systemair / Finpower
9	GI Sheets	TATA / Jindal / SAIL
10	Factory Fabricated Ducts	Rolastar / Seven Star / Zeco
11	Grills / Dampers / Louvers / Diffusers	Airmaster / Ravistar / Systemair / Cosmos / Dynacraft
12	Actuator for Fire Dampers	Belimo / Honeywell / Siemens
13	Nitrile Rubber Insulation	Armaflex / K-Flex / Superlon / Aeroflex
14	Acoustic Insulation	Armaflex / K-Flex / Superlon / Aeroflex
15	Fans	Systemair / Kruger / Greenheck / Astberg / Ostberg
16	Variable Frequency Drives (VFD)	Danfoss / Emerson / ABB / Yaskawa / Siemens / Honeywell
17	Control Cabling	Polycab / LAPP
18	DOL Starters	Schneider / Siemens / L&T / ABB
19	BTU Meters (Modbus Compatible)	Spire MT / Siemens / Kamstrup / Shenitech
20	HEPA Filters	Porvair / Freudenberg
21	GI / MS Pipes	TATA / Jindal / SAIL
22	Jet Fans	Nicotra / Greenheck / Systemair / Kruger
23	Air Curtains	Euronics / Dolphy
24	Plant Manager / Building Controls	Danfoss / Siemens / Honeywell
25	Anchor Fasteners	Fischer / Hilti
26	UVC Duct-Mounted Ozone Generating Lamps	UVI Aire / SPC
27	Refrigerant Pipes	Mandev / Parasmani / Jugal / Kwalitiy Tubes & Capillaries (KTC)
28	Vibration Pads	Resistoflex / Dunlop
29	Vibration Isolators	Cori / Diamond / Kanwal Industries Corporation / Resistoflex / Aeroduct
30	Power Cables	Polycab / Torrent / Finolex / Universal
31	Valves & Strainers	L&T / Advance / Zoloto / Sant / Emerald

32	Pressure Independent Balancing Cum Control Valves (PIBCV)	Danfoss / Belimo / Siemens / Honeywell
33	Fire Sealant	Birla 3M / Hilti / Promat
34	Pressure Gauges	H-Guru / Waaree / Baumer / Fiebig
35	Automatic Air Vents	Anergy
36	Thermometers	Waaree / Mars
37	Rubber Bellows	Cori Rubber / Resistoflex
38	Flow Switches	Honeywell / Johnson Controls / Siemens
39	Thermostats	Siemens / Honeywell / Johnson Controls
40	Flexible Duct Connectors (Canvas Connections)	Mapro / Kanwal Industries Corporation / Resistoflex / Aeroduct
41	Variable Air Volume Units (VAV)	Systemair / Trane / Honeywell / Siemens / Johnson Controls
42	PVC Pipes	Ajay / Supreme / Astral / Prince
43	Air Separators	Emerald
44	Sound Attenuators	Airmaster / Airtech Control
45	CO ₂ Sensors	Siemens / Honeywell / Johnson Controls
46	Cable Trays	OBO Bettermann / Profab / Indiana / Legrand
47	Motors	ABB / Bharat Bijlee / Kirloskar / Siemens

APPROVED MAKER / BRANDS - SOLAR

SINo	Item	Makes
1	PV Solar Panels	Polycab / Trina Solar / Renewsys / Goldi / Canadian Solar
2	Power Conditioning Unit	Solis/ Growwatt / ABB / Polycab
3	Surge Protection Device	OBO Betterman/CAPE
4	Outdoor enclosure	CAPE/Hensel
5	MCB / MCCB	L&T / Legrand / Schnieder / ABB / Seimens
6	Cables	Polycab / Finolex / RR Kabel / Lapp
6	Conduits	Precision/Balco/TOMS
7	Raceways	Obo Betterman/ Profab/MK/Legrand

8	Lightning protection & Earthing	OBO Betterman / Cape / AxisElectricals
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APPROVED MAKER / BRANDS - ELV (Extra Low Voltage)

Sl. No.	Item Description	Approved Makes
1	Information Outlets - CAT6 / CAT6A (Data)	Legrand / Panduit / Nexans / Schneider / Honeywell
2	Faceplates (Data)	Legrand / Panduit / Nexans / Schneider / Honeywell
3	Data Cables - CAT6 / CAT6A / OFC	Legrand / Panduit / Nexans / Belden
4	Patch Cords - CAT6 / CAT6A / OFC	Siemens / Legrand / Panduit / Nexans / Belden
5	Patch Panels - CAT6 / CAT6A / OFC	Siemens / Legrand / Panduit / Nexans / Belden
6	Racks	Rittal / Netrack
7	Information Outlets - CAT6 / RJ11 / CAT5E (Voice)	Legrand / Panduit / Nexans / Schneider / Honeywell
8	Faceplates (Voice)	Legrand / Panduit / Nexans / Schneider / Honeywell
9	Voice Cables - CAT6 / CAT5E	Legrand / Panduit / Nexans / CommScope / Belden
10	Multipair Cables - 2 / 10 / 20 / 50 / 100 Pair	Legrand / Panduit / Nexans / CommScope / Belden
11	Patch Cords - CAT6 / CAT5E (Voice)	Siemens / Legrand / Panduit / Nexans / CommScope / Belden
12	Patch Panels - CAT6 / CAT5E (Voice)	Siemens / Legrand / Panduit / Nexans / CommScope / Belden
13	IDF / MDF Termination Modules	Legrand / Panduit / Nexans / Krone / Besenet
14	Network Switches	HP / Cisco / Juniper
15	SFP Modules	HP / Cisco / Juniper
16	Wireless Access Points	HP / Cisco / Juniper / Ruckus
17	Wireless Controllers	HP / Cisco / Juniper / Ruckus
18	IP Cameras	Honeywell / Pelco / Bosch / Hikvision (Project Series)
19	NVR / Video Management System	Honeywell / Pelco / Bosch / Hikvision (Project Series)
20	Workstations	IBM / Dell / HP
21	Displays (Surveillance / Control Rooms)	Panasonic / Samsung / LG
22	Storage Systems	Seagate / HP

23	Door Controllers	HID / Honeywell / Schneider / Siemens
24	Card Readers	HID / Honeywell / Schneider / Siemens
25	Access Control Software	HID / Honeywell / Schneider / Siemens
26	EM Locks / Exit Switches / Glass Breaks / Door Loops & Accessories	Faradays / BEL / Algatec
27	Access Control Cables	Polycab / Finolex / RR Kabel
28	PA System Speakers	Honeywell / Bosch / Ahuja / Tyco
29	PA Controllers	Honeywell / Bosch / Ahuja / Tyco
30	PA Amplifiers	Honeywell / Bosch / Ahuja / Tyco
31	PA Call Stations	Honeywell / Bosch / Axis / Tyco
32	PA System Cables	Polycab / Finolex / RR Kabel
33	Telephones	Beetel / Panasonic / Avaya
34	Conduits (ELV / Telephone)	Precision / Balco / Supreme / Polycab
35	Raceways / Cable Trays	Legrand / OBO Bettermann / Profab
36	PBX	NEC / Siemens / Avaya / Alcatel
37	Nurse Call - Bedside Units	Siemens / Norris / Chiron / Honeywell / Calix / Austco / Ascom
38	Nurse Call - Toilet Pull Cords	Siemens / Norris / Chiron / Honeywell / Calix / Austco / Ascom
39	Nurse Call - Dome Lights	Siemens / Norris / Chiron / Honeywell / Calix / Austco / Ascom
40	Nurse Call - Nurse Stations	Siemens / Norris / Chiron / Honeywell / Calix / Austco / Ascom
41	Nurse Call Software	Siemens / Norris / Chiron / Honeywell / Calix / Austco / Ascom
42	Nurse Call Workstations	IBM / Dell / HP
43	IBMS Software	Schneider / Johnson Controls / Honeywell / Siemens
44	IBMS Controllers	Schneider / Johnson Controls / Honeywell / Siemens
45	Temperature Sensors	Schneider / Johnson Controls / Honeywell / Siemens
46	Pressure Sensors / Switches	Schneider / Johnson Controls / Honeywell / Siemens
47	Air Flow Switches	Schneider / Johnson Controls / Honeywell / Siemens
48	Level Sensors	Filpro / Techtrol / Omicron / Coleman

49	CO ₂ / CO Sensors	Schneider / Johnson Controls / Honeywell / Siemens
50	Humidity Sensors	Schneider / Johnson Controls / Honeywell / Siemens
51	IBMS Cables	Polycab / Finolex / Fincore
52	IBMS Conduits	Precision / Balco / Supreme / Polycab
53	IBMS Raceways / Cable Trays	Legrand / OBO Bettermann / MK
54	IBMS Workstations	IBM / Dell / HP
55	Projectors	Epson / Panasonic / Christie
56	Projector Screens	Da-Lite / Chief / Draper
57	HDMI Embedders / De-Embedders	Kramer / Extron / Crestron
58	HDMI Transmitters / Receivers	Kramer / Extron / Crestron
59	AV Speakers	JBL / Bose / QSC / Tannoy
60	AV Amplifiers	JBL / Ahuja / Crestron / Kramer / Bose
61	Microphones	Shure / Beyerdynamic / AKG
62	AV Displays	LG / Samsung / Panasonic
63	AV Controllers	Kramer / Crestron / Extron / AMX
64	Touch Screens	Kramer / Crestron / Extron / AMX
65	DSP	Biamp / Bose / BSS / Sennheiser
66	Matrix Switchers	Kramer / Crestron / Extron / AMX
67	Queue Management System	Q-matic / Qnetics

LIST OF INDIAN STANDARDS FOR CIVIL FURNISHING WORKS

- IS 4081: Safety code for blasting and related drilling operation
- IS 6313: Code of practice for anti termite measures in building
- Part 1: Constructional measures.
- Part 2 Code of practice for ant termite measures in buildings: Pre constructional chemical treatment measures
- CONCRETE
- IS 456: Code of practice for plain and reinforced concrete.
- MASONRY WORK -BRICK WORK
- IS 2185 (Part 1): Specification for solid block masonry.
- IS 2572 :Code of practice of solid block.
- IS 2250: Code of practice for preparation and use of masonry mortars.
- PLASTERING AND POINTING
- IS 412: Specification for expanded metal steel sheets for general purposes
- IS 1635: Code of practice for application of cement and cement-lime plaster finishes
- IS 2402: Code of practice for external rendered finishes.
- IS 1542 Specification for sand for plaster (Class A grading)
- FLOORING
- IS 1443: Code of practice for laying and finishing of cement concrete flooring tiles.
- IS 4457: Specification for ceramic unglazed vitreous acid resisting tiles.
- DOORS AND WINDOWS
- IS 287: Recommendation for maximum permissible moisture content for timber used for different purposes in different zones
- IS 848: Specification for synthetic resin adhesive for plywood (Phonetic and amino plastic)
- IS 1141: Code of Practice for seasoning of timber
- IS 2202: Specification for wooden flush door shutters (solid core type)
- Part I: Plywood face panels
- Part II: Particle board panels and hard board faced panels
- GLAZING
- IS 1081; Code of practice for fixing and glazing of metal, (steel and aluminium) doors, windows and ventilators.
- IS 2553: Specification for safety glass
- IS 2835: Specification for flat transparent sheet glass
- IS 3548: Code of practice for glazing in building
- PAINTING AND POLISHING
- IS 1477: Code of Practice for painting of ferrous metals in building
- Part I: Pre-treatment
- Part II: Painting
- IS 2338: Code of Practice for finishing of wood and wood based materials
- Part I: Operation and workmanship
- Part II: Schedule
- IS 2395: Code of Practice for painting, concrete, masonry and plaster surfaces

- IS 3537: Specification for ready mixed paint, finishing interior, for general purposes to IS colors
- IS 5410: Specification for cement paints colour, as required
- IS 6278: Code of Practice for white washing and colour washing

IS SPECIFICATIONS FOR ELECTRICAL INSTALLATIONS

The Electrical installation work shall confirm to the following I.S. Standards (latest additions), Local Supply Authorities Rules and Regulations, Indian Electricity Act & rules, National Building code and Fire Safety norms. All equipment including cables, wires & components thereof should be manufactured & installed as per standards specified by Bureau of Indian Standards (BIS) Where such standards do not exist, then the covered items should be approved from Architects/ Consultants /Clients prior to purchase & delivery to site.

- IS: 732 Code of Practice for Electrical wiring installation (System Voltage not exceeding 650V)
- IS: 1646 Code of Practice for fire safety of buildings (General Electrical Installation)
- IS: 9537 PART-II 1981 Rigid steel conduits for electrical wiring.
- IS: 2667 Fittings for rigid steel conduits for electrical fittings.
- IS: 2509 rigid non-metallic conduits for electrical installations.
- IS: 1293 Pin Plugs and Sockets.
- IS: 694 PVC insulated cables with copper conductors for voltages up to 1100 Volts
- IS: 9532 Specification for conduits for Electrical Installation
- IS: 3854 5A & 15A Switches.
- IS: 3043 Earthing.
- Indian Electricity Act, 1956 and Rules and Fire Insurance Regulations.
- IS: 2026 Specification for power transformer----- Not applicable.
- IS: 2099 Specification for high voltage porcelain bushings. ----- Not applicable
- IS: 355 Specification for insulating oil. ----- Not applicable
- IS: 3639 Specification for fittings and accessories for power transformer. ----- Not applicable
- IS: 2274 Electrical wiring installations (System voltage exceeding 650 volt)
- IS :7752 Guide for improvement of power factor consumer's installations
- IS: 5216 Guide for safety procedures & practices in electrical work
- IS: 3072 Installation & maintenance of Switch gear
- IS: 2551 Guide for danger notice plates
- IS: 8923 warning symbols for dangerous voltages
- IS :13947 Specification for low-voltage switchgear & Control gear
- IS :1777 Industrial luminaries with metal reflectors
- IS :1913 General & safety requirement of luminaries
- IS :116 Circuit Breakers for AC system
- IS :3427 Metal enclosed switchgear & Control gear
- IS: 3837 Accessories for rigid steel conduits.
- IS: 4047 Heavy duty Air break switches & composite switch fuse units for voltage exceeding 100 volts.

- IS :4237 General requirements for switchgears not exceeding 1000 Volts
- IS :4615 Switch socket outlets
- IS:159: Busbars & busbars connections
- IS: 415 marking & arrangement for switchgear board's main connections & auxiliary wiring.
- IS: 415 Tungsten filament lamp
- IS: 722 Three phase watt hour meter with MDI
- IS: 1248 Directing acting electrical indicating instruments
- IS: 1293 three pin plugs & sockets outlets.
- IS :1947 Floods lights
- IS: 2147 Degree of protection provided for enclosure for switchgear
- IS: 2418 Tubular fluorescent lamps for general lighting services
- IS: 2509 PVC electrical Conduits
- IS: 2075 Current Transformer
- IS: 2834 LT Capacitors
- IS: 3106 Code of practice for installation & maintenance of switchgear.
- IS: 2607 Air break isolators for voltage not exceeding 1000 Volts
- IS: 1753 aluminium Conductors for insulated conductor
- IS: 3961 Recommended current ratings for cables
- IS: 3480 Flexible steel conduits for electrical wiring
- IS: 1646 Code of fire safety of building (General Electrical installation)
- IS: 1913 General & safety requirements for electric lighting fitting.
- IS: 1239 Mild steel tubular & other wrought steel pipe fitting
- IS: 6381 Specifications for construction & testing of electrical apparatus.
- IS: 1818 Isolator & Earthing switches
- IS: 3106 Code of practice for selection
- IS: HRC Cartridge fuse unit up to 650 Volts
- IS: 10332 Part I to Part V Specification of Luminaries

ANNEXURE “A” : INTEGRITY PACT

Tender Ref. No.:.....

Whereas Union Bank of India having its registered office at Union Bank Bhavan, 239, Vidhan Bhavan Marg, Nariman Point, Mumbai, India- 400 021 and Regional office KSHB BUILDING , 1ST Floor, Vikas Nagar Chakkorathukulam , East Hill Road Kozhikode - 006 acting through its Operations, Department, represented by General Manager / Dy. General Manager hereinafter referred to as the Buyer and the first party, proposes to procure (Name or category of the Equipment, services, etc.), hereinafter referred to as Stores and / or Services.

And

M/s....., represented by....., Chief Executive Officer (which term, unless expressly indicated by the contract, shall be deemed to include its successors and its assignee), hereinafter referred to as the Bidder/ Seller and the second party, is willing to offer/ has offered the Stores and / or Services.

2. Whereas the Bidder / Seller is a private company/public company /partnership/ registered export agency, constituted in accordance with the relevant law in the matter and the Buyer is a Public Sector Undertaking and registered under Companies Act 1956. Buyer and Bidder/Seller shall hereinafter be individually referred to as “Party” or collectively as the “parties”, as the context may require.

3. Preamble

Buyer has called for tenders under laid down organizational procedures intending to enter into contract/s for supply / purchase / etc of.....and the Bidder / Seller is one amongst several bidders/Proprietary Vendor/Customer Nominated Source/Licenser who has indicated a desire to bid/supply in such tendering process. The Buyer values and takes primary responsibility for values full compliance with all relevant laws of the land, rules, regulations, economic use of resources and of fairness / transparency in its relations with its Bidder(s) and / or Seller(s).

In order to achieve these goals, the Buyer will appoint Independent External Monitor(s) (IEM) in consultation with Central Vigilance Commission, who will monitor the tender process and the execution of the contract for compliance with the principles mentioned above.

4. Commitments of the Buyer.

4.1 The Buyer commits itself to take all measures necessary to prevent corruption and fraudulent practices and to observe the following principles:-

- i) No employee of the Buyer, personally or through family members, will in connection with the tender, or the execution of a contract demand, take a

promise for or accept, for self or third person, any material or immaterial benefit which the person is not legally entitled to.

- ii) The Buyer will during the tender process treat all Bidder(s) / Seller(s) with equity and reason. The Buyer will in particular, before and during the tender process, provide to all Bidder(s) / Seller(s) the same information and will not provide to any Bidder(s)/ Seller(s) confidential / additional information through which the Bidder(s) / Seller(s) could obtain an advantage in relation to the process or the contract execution.
- iii) The Buyer will exclude from the process all known prejudiced persons.

4.2 If the Buyer obtains information on the conduct of any of its employees which is a criminal offence under the Indian legislation Prevention of Corruption Act 1988 as amended from time to time or if there be a substantive suspicion in this regard, the Buyer will inform to its Chief Vigilance Officer and in addition can initiate disciplinary action.

5. Commitments of the Bidder(s) / Seller(s).

5.1 The Bidder(s)/ Seller(s) commit himself to take necessary measures to prevent corruption. He commits himself to observe the following principles during his participation in the tender process and during the contract execution.

- i) The Bidder(s)/ Seller(s) will not, directly or through any other persons or firm, offer promise or give to any of the Buyer's employees involved in the tender process or the execution of the contract or to any third person any material or other benefit which he / she is not legally entitled to, in order to obtain in exchange any advantage during the tendering or qualification process or during the execution of the contract.
- ii) The Bidder(s)/ Seller(s) will not enter with other Bidders / Sellers into any undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.
- iii) The Bidder(s)/ Seller(s) will not commit any offence under the Indian legislation, Prevention of Corruption Act 1988 as amended from time to time. Further, the Bidder(s)/ Seller(s) will not use improperly, for purposes of competition or personal gain, or pass on to others, any information or document provided by the Buyer as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.
- iv) The Bidder(s)/Seller(s) shall ensure compliance of the provisions of this Integrity Pact by its sub-supplier(s)/ sub-contractor(s), if any. Further, the Bidder/Seller shall be held responsible for any violation/breach of the provisions by its sub-supplier(s)/sub-contractor(s).

5.2 The Bidder(s)/Seller(s) shall ensure compliance of the provisions of this Integrity Pact by its sub-supplier(s)/ sub-contractor(s), if any. Further, the Bidder/Seller shall be

held responsible for any violation/breach of the provisions by its sub-supplier(s)/sub-contractor(s).

- 5.3 The Bidder(s)/ Seller(s) will not instigate third persons to commit offences outlined above or be an accessory to such offences
- 5.4 Agents / Agency Commission:

The Seller/Bidder confirms and declares to the buyer that the Seller/Bidder is the original manufacturer or Authorized distributor / stockiest of original manufacturer or Govt. Sponsored / Designated Export Agencies (applicable in case of countries where domestic laws do not permit direct export by OEMS) of the stores and / or Services referred to in this tender/ offer / contract / Purchase order and has not engaged any individual or firm, whether Indian or Foreign whatsoever, to intercede, facilitate or in any way to recommend to Buyer or any of its functionaries, whether officially or unofficially, to the award of the tender / contract / purchase order to the Seller/Bidder; nor has any amount been paid, promised or intended to be paid to any such individual or firm in respect of any such intercession, facilitation or recommendation. The Seller/Bidder agrees that if it is established at any time to the satisfaction of the Buyer that the present declaration is in anyway incorrect or if at a later stage it is discovered by the Buyer that the Seller/Bidder has engaged any such individual / firm, and paid or intended to pay any amount, gift, reward, fees, commission or consideration to such person, party, firm or institution, whether before or after the signing of this contract / purchase order, the Seller/Bidder will be liable to refund that amount to the Buyer. The Seller will also be debarred from participating in any RFQ / Tender for new projects / program with Buyer for a minimum period of five years. The Buyer will also have a right to consider cancellation of the Contract / Purchase order either wholly or in part, without any entitlement or compensation to the Seller/Bidder who shall in such event be liable to refund agents / agency commission payments to the buyer made by the Seller/Bidder along with interest at the rate of 2% per annum above LIBOR (London Inter Bank Offer Rate) (for foreign vendors) and Base Rate of SBI (State Bank of India) plus 2% (for Indian vendors). The Buyer will also have the right to recover any such amount from any contracts / Purchase order concluded earlier or later with Buyer.

6. Previous Transgression

- 6.1 The Bidder /Seller declares that no previous transgressions have occurred in the last three years from the date of signing of this Integrity Pact with any other company in any country conforming to the anti corruption approach or with any other Public Sector Enterprise in India that could justify Bidder's/ Sellers' exclusion from the tender process.
- 6.2 If the Bidder / Seller makes incorrect statement on this subject, Bidder / Seller can be disqualified from the tender process or the contract, if already awarded, can be terminated for such reason without any liability whatsoever on the Buyer.

7. Company Code of Conduct

Bidders / Sellers are also advised to have a company code of conduct (clearly rejecting the use of bribes and other unethical behavior) and a compliance program for the implementation of the code of conduct throughout the company.

8. Sanctions for Violation

8.1 If the Bidder(s)/ Seller(s), before award or during execution has committed a transgression through a violation of Clause 5, above or in any other form such as to put his reliability or credibility in question, the Buyer is entitled to disqualify the Bidder(s)/ Seller(s) from the tender process or take action as per the procedure mentioned herein below:

- i) To disqualify the Bidder / Seller with the tender process and exclusion from future contracts.
- ii) To debar the Bidder / Seller from entering into any bid from Buyer for a period of two years.
- iii) To immediately cancel the contract, if already signed / awarded without any liability on the Buyer to compensate the Bidder /Seller for damages, if any. Subject to Clause 5, any lawful payment due to the Bidder/Seller for supplies effected till date of termination would be made in normal course.
- iv) To encash EMD / Advance Bank Guarantees/ Performance Bonds / Warranty Bonds, etc. which may have been furnished by the Bidder / Seller to the extent of the undelivered Stores and / or Services.

8.2 If the Buyer obtains knowledge of conduct of a Bidder/ Seller or of an employee or a representative or an associate of a Bidder / Seller which constitutes corruption, or if the Buyer has substantive suspicion in this regard, the Buyer will inform to its Chief Vigilance Officer.

9. Compensation for Damages

9.1 If the Buyer has disqualified the Bidder(s) / Seller(s) from the tender process prior to the award according to Clause 8, the Buyer is entitled to demand and recover the damages equivalent to Earnest Money Deposit in case of open tendering.

9.2 If the Buyer has terminated the contract according to Clause 8, or if the Buyer is entitled to terminate the contract according to Clause 8, the Buyer shall be entitled to encash the advance bank guarantee and performance bond/ warranty bond, if furnished by the Bidder / Seller, in order to recover the payments, already made by the Buyer for undelivered Stores and / or Services.

10. Price Fall Clause

The Bidder undertakes that it has not supplied/ is not supplying same or similar product/systems or subsystems at a price lower than that offered in the present Bid in respect of any other Ministry/Department of the Government of India or PSU or Coal India Ltd and its subsidiaries during the currency of the contract and if it is found at any stage that same or similar product/ Systems or Subsystems was supplied by the Bidder to any other Ministry / Department of the Government of India or a PSU or any Public Sector Bank at a lower price during the currency of the contract, then that very price will be applicable to the present case and the difference in the cost would be refunded by the Bidder to the Buyer, if the contract has already been concluded.”

11. Independent External Monitor(s)

11.1 The Buyer has appointed Independent External Monitors for this Integrity Pact in consultation with the Central Vigilance Commission (Names and Addresses of the Monitors to be given in RFQ).

11.2 As soon as the Integrity Pact is signed, the Buyer shall provide a copy thereof, along with a brief background of the case to the Independent External Monitors.

11.3 The Bidder(s) / seller (s), if they deem it necessary, may furnish any information as relevant to their bid to the Independent External Monitors.

11.4 If any complaint with regard to violation of the IP is received by the buyer in a procurement case, the buyer shall refer the complaint to the Independent External Monitors for their comments / enquiry.

11.5 If the Independent External Monitors need to peruse the records of the buyer in connection with the complaint sent to them by the buyer, the buyer shall make arrangement for such perusal of records by the Independent External Monitors.

11.6 The report of enquiry, if any, made by the Independent External Monitors shall be submitted to MD& CEO, Union Bank of India, Union Bank Bhavan, Vidhan Bhavan Marg, Nariman Point, Mumbai -21 within 2 weeks, for a final and appropriate decision in the matter keeping in view the provision of this Integrity Pact.

12. Law and Place of Jurisdiction

This Integrity pact is subject to Indian Laws, and exclusive Jurisdiction of Courts at Mumbai, India.

13. Other Legal Actions

The actions stipulated in this Integrity Pact are without prejudice to any other legal action that may follow in accordance with the provisions of the extant law in force relating to any civil or criminal proceedings.

14 Integrity Pact Duration

- 14.1 This Integrity Pact begins when both parties have legally signed it. It expires for the successful Bidder / Seller 10 months after the last payment under the contract, and for all other Bidders / Sellers within 6 months from date of placement of order / finalization of contract.
- 14.2 If any claim is made / lodged during this time, the same shall be binding and continue to be valid despite the lapse of this Integrity Pact as specified above, unless it is discharged / determined by MD & CEO, Union Bank of India.
- 14.3 Should one or several provisions of this Integrity Pact turn out to be invalid, the remainder of this Integrity Pact remains valid. In this case, the parties will strive to come to an agreement to their original intentions.

15. Other Provisions

- 15.1 Changes and supplements need to be made in writing. Side agreements have not been made.
- 15.2 The Bidder(s)/Seller(s) signing this IP shall not initiate any Legal action or approach any court of law during the examination of any allegations/complaint by IEM and until the IEM delivers its report.
- 15.3 In view of the nature of this Integrity Pact, this Integrity Pact shall not be terminated by any party and will subsist throughout its stated period.
- 15.4 Nothing contained in this Integrity Pact shall be deemed to assure the Bidder/ Seller of any success or otherwise in the tendering process.
- 16. This Integrity Pact is signed with Union Bank of India exclusively and hence shall not be treated as precedence for signing of IP with MoD or any other Organization.

17. The Parties hereby sign this Integrity Pact at _____ on _____
 (Seller/Bidder) and _____ on _____ (Buyer)

BUYER

BIDDER* / SELLER*

Signature:

Signature:

General Manager/ Dy G M,

Authorized Signatory (*)

Union Bank of India,
Division

Date:

Date:

Stamp:

Stamp:

Witness

Witness

1. _____

1. _____

2. _____

2. _____

(*) - Authorized signatory of the company who has also signed and submitted the main bid

ANNEXURE “B” - DEED OF INDEMNITY

DEED OF INDEMNITY This Deed of Indemnity executed at _____ on the _____ day of _____ by _____ (hereinafter referred to as “**the Obligor**” which expression shall unless it be repugnant to the context, subject or meaning thereof, shall be deemed to mean and include successors and permitted assigns);

IN FAVOR OF

UNION BANK OF INDIA, a banking company established under the Banking Companies (Acquisition and Transfer of Undertakings) Act, 1970 _____(address of the office)(hereinafter referred to as “**Union Bank/UBI**” which expression shall, unless it be repugnant to the subject or context or meaning thereof, be deemed to mean and include its successors and assigns)

WHEREAS Union Bank vide its Tender No [_____] dated [_____] had invited Bids from the eligible Bidders ___for _____-

WHEREAS

(1) The Obligor has

- (a) Offered to Union Bank the service(s) as stated under Scope of Work of Tender;
- (b) represented and warranted that it has all permissions, consents, approvals and license from all authorities, both regulatory /statutory and non-regulatory, for executing the services as stated in the Contract dated...../Tender;
- (c) Represented and warranted that the aforesaid services offered to UBI Bank do not violate any provisions of the applicable laws, regulations or guidelines. In case there is any violation of any law, rules or regulation, which is capable of being remedied the same will be got remedied immediately during the implementation, maintenance and contract period to the satisfaction of UBI Bank;
- (d) Represented and warranted that they are authorized and legally eligible and otherwise entitled and competent to enter into such Contract with UBI Bank;

(2) Union Bank, relying and based on the aforesaid representations and warranties of the Obligor, has agreed to avail the services from the Obligor on the terms and conditions contained in its Contract dated _____ (**the Contract**) with the Obligor;

(3) One of the conditions of the aforesaid Contract/Tender is that the Obligor is required to furnish an indemnity in favor of Union Bank indemnifying the latter against any loss, damages or claims arising out of any violations of the applicable laws, regulations, guidelines during the execution and rendering/delivery of service(s) to Union Bank and/or due to breach of terms and conditions of the Contract by the Obligor and/or on account of misconduct, omission or negligence or otherwise by the Obligor.

(4) In pursuance thereof, the Obligor has agreed to furnish an indemnity in the form and manner and to the satisfaction of Union Bank as hereinafter appearing;

NOW THIS DEED WITNESSETH AS UNDER: -

The words and expressions not specifically defined shall have the same meanings as are respectively assigned to them in the Tender/the Contract.

In consideration of UBI Bank having agreed to award the Contract to the Obligor, the Obligor hereby unconditionally, absolutely and irrevocably agree and undertake that: -

(1) the Obligor shall, at all times hereinafter, save and keep harmless and indemnified UBI Bank, including its respective directors, officers, employees, agents and representatives and keep them indemnified from and against any claim, costs, charges, damages, demand, losses, liabilities or expenses of any nature and kind whatsoever and by whomsoever made in respect of the Contract and any loss or damage caused from and against all suits and other actions that may be instituted taken or preferred against UBI Bank by whomsoever and all losses, damages, costs, charges and expenses that UBI Bank may incur by reason of any claim made by any claimant for any reason whatsoever or by anybody claiming under them or otherwise for any losses, damages or claims arising out of all kinds of accidents, destruction, deliberate or otherwise, direct or indirect, from those arising out of violation of applicable laws and also from the environmental damages, if any, which may occur or result from the terms of the Contract.

The Obligor further agrees and undertakes that the Obligor shall be liable for any third party claims, civil or criminal complaints/liabilities, site mishaps and other accidents or disputes and/or damages occurring or arising out of any mishaps at the site due to faulty work, negligence, faulty construction and/or for violating any law, rules and regulations in force, for the time being while executing/executed works by them.

(2) The Obligor further agrees and undertakes that the Obligor shall, ensure that all the permissions, authorizations, consents and licenses are obtained and renewed from the local and/or municipal and/or governmental authorities, as may be required under the applicable laws, rules, regulations, guidelines, orders framed or issued by any appropriate authorities. Obligor further agrees and undertakes that he shall be liable for any claim received from his employee or from sub contractors if any, under the Workmen's Compensation Act and Owners Liability Act, 1939 or any other law, rules and regulations in force for the time being and any Acts replacing and/or amending the same or any of the same as may be in force at the time and under any law in respect of injuries to persons or property arising out of and in the course of the execution of the contract work and/or arising out of and in the course of employment of any workman/employee.

(3) If any additional approval, consent or permission is required by the Obligor to execute and perform the Contract during the currency of the Contract, it shall procure the same and/or comply with the conditions stipulated by the concerned authorities without any delay.

(4) The obligations of the Obligor herein are irrevocable, absolute and unconditional, in each case irrespective of the value, genuineness, validity, regularity or enforceability of the aforesaid Contract or other agreement, or the insolvency, bankruptcy, reorganization, dissolution, liquidation or change in ownership of Union Bank of India or Obligor or any other

circumstance whatsoever which might otherwise constitute a discharge or defense of an indemnifier.

(5) The obligations of the Obligor under this deed shall not be affected by any act, omission, matter or thing which, would reduce, release or prejudice the Obligor from any of the indemnified obligations under this indemnity or prejudice or diminish the indemnified obligations in whole or in part, including in law, equity or contract (whether or not known to it or to UBI Bank).

(6) This indemnity shall survive the Contract.

(7) Any notice, request or other communication to be given or made under this indemnity shall be in writing addressed to either party at the address stated in the Contract and/or as stated above.

(8) This indemnity and other non-contractual obligations arising out of this indemnity, shall be governed by, and construed in accordance with, the laws of India. The Obligor irrevocably and unconditionally agrees that any legal action, suit or proceedings arising out of or relating to this indemnity may be brought in the Courts/Tribunals at Kozhikode. Final judgment against the Obligor in any such action, suit or proceeding shall be conclusive and may be enforced in any other jurisdiction, by suit on the judgment, a certified copy of which shall be conclusive evidence of the judgment, or in any other manner provided by law. By the execution of this indemnity, the Obligor irrevocably submits to the exclusive jurisdiction of such Court/Tribunal in any such action, suit or proceeding.

(9) Union Bank may assign or transfer all or any part of its interest herein to any other person. Obligor shall not assign or transfer any of its rights or obligations under this indemnity, except with the prior written consent of Union Bank.

IN WITNESS WHEREOF the Obligor has signed these presents on the day, month and year first above written.

Signed and Delivered on behalf of)

_____)

by the hand of _____,)

_____, the authorized official)

of the Obligor

1.

2.

ARTICLES OF AGREEMENT

ARTICLES OF AGREEMENT made at _____ this ____ day of 2026, Two Thousand and twenty Six.

BETWEEN

UNION BANK OF INDIA, a body corporate constituted under the Banking Companies (Transfer of Undertakings) Act, 1970 and having its Head Office at 239, Vidhan Bhavan Marg, Nariman Point, Mumbai 400 021 and Regional office at KSHB BUILDING, 1ST Floor, Vikas Nagar Chakorathkulam, East Hill Road Kozhikode - 673006, hereinafter called “the Bank” (which expression shall, unless it be repugnant to the context or meaning thereof, include its successors and assigns) of the **ONE PART**

AND

M/S _____, having its registered office at _____, hereinafter called the “Contractor” (which expression shall unless repugnant to the context or meaning thereof, include its successors and permitted assigns) of the **OTHER PART**.

WHEREAS

- i. The Bank is desirous of _____ (Works) on its _____ at _____.
- ii. The Bank has already appointed and retained Architects M/S P C Rasheed and Associates having their Office at Rarichan Road, Nadakkavu, Eranhipalam PO, Kozhikode-673006 as Architect/ Consultant for the Works of the Project.
- iii. The Bank has caused the drawings and bills of quantities showing and describing the Works to be done to be prepared by or under the direction of the Consultants/ Architect;
- iv. The Bank had invited tenders for Civil, Electrical & PH works in accordance with the general conditions of contract, special conditions of contract, technical specifications, bills of quantities and working drawings, as prepared by the Interior Consultants/ Architect and furnished to the Contractor.
- v. Having examined the general conditions of contract, special conditions of contract, technical specifications, bills of quantities and working drawings as prepared by the Consultants/ Architect, the Contractor offered to execute, complete and maintain the whole of the Works relating to the Project in conformity with the said general conditions of contract, special conditions of contract, technical specifications, bills of quantities and working drawings and in accordance with instructions issued by the Consultants/ Architect and the Contractor submitted its tender for the contract sum of Rs. _____ towards the said work.
- vi. The tender submitted by the Contractor was, after negotiations, modified/ altered upon the Contractor agreeing to revise the rates of certain items and further offering

a rebate for execution and completion of the Project thereby reducing the tender amount to Rs. _____ as confirmed by its letters dated _____.

- vii. Towards the implementation of the Project, the Contractor has supplied the Bank with a fully priced copy of the said bills of quantities (which copy is hereinafter referred to as “the Contract Bills”) and the drawings numbered as mentioned in the Annexure 11 of the Tender document inclusive (hereinafter referred to as “the Contract Drawings”) and the Contract Bills and the contract Drawings have been signed by or on behalf of the parties hereto:
- viii. The Contractor has already agreed with the Bank to implement and execute the Project in full on the basis of the contract documents as hereinafter defined on the terms and conditions therein contained;
- ix. The parties are now executing this Agreement setting out the basic terms of the agreement between them for smooth implementation and execution of the Project without any unnecessary difference or dispute.

NOW IT IS HEREBY AGREED as follows:

1. The Contract Document is comprising of
 - i. Tender document including technical bid (Vol.-I) and price-bid (Vol.-II).
 - ii. Notice Inviting Tender issued vide letter _____
 - iii. Subsequent letters issued by the Bank vide _____
 - iv. Clarifications submitted by the contractor vide letter dt. _____.
 - v. Minutes of Meeting held on _____
 - vi. Rebate / Discount offered by the contractor vide letter _____
 - vii. Work Order issued by the Bank vide letter _____
 - viii. Acceptance letter _____ from the contractor
 - ix. Drawings numbering as mentioned in the Annexure 11 of the Tender document enclosed along with the tender document.
 - 1.1. Unless the context otherwise requires the contract documents above mentioned shall be harmoniously construed and in the chronological order.
 - 1.2. Unless otherwise expressly provided under these presents, contract documents (iii) to (ix) above shall be construed as modifying only those general and special terms and conditions in tender document in so far and to the extent referable to the clauses in the said tender document.
 - 1.3. Unless otherwise stated expressly hereunder, all the general and special terms and conditions shall apply and binding on the contractor.
2. The Contract Document is complimentary. What is called for in any one shall be as binding as called for by all. The aforesaid shall form integral part of contract and in the event of any inconsistency between any provisions herein the provisions of the Contract Documents shall prevail. When any of the General and Special Conditions are at variance,

the condition stipulated in the Special Conditions of Contract shall super cede relevant provisions in General Conditions. For all matters not specifically provided for herein the provisions of General and Special Conditions in the Tender Documents shall apply and the rights and liabilities of the parties shall be decided accordingly. The decision of the Bank in this regard shall be final and binding.

3. All time limits stated in the Contract Document are of the essence of the contract where the work has to be completed within 18 months failing which liquidated damages will be recovered @ 0.5% of contract amount for per week of delay subject to maximum recovery of 7.5% of the contract amount.

4. For the consideration hereinafter mentioned, the Contractor shall carry out and complete the Works in conformity with the contract documents and in accordance with the instructions issued by the consultant from time to time including all modifications extra and additional works and obligations to be carried out either on the Site or at any factory or work shop or any other place for subsequent incorporation as required for the due performance of the contract.

5. The general character and the scope of the Works is illustrated and defined by the specifications and the bills of quantities herewith attached and by the signed drawings. The scope includes furnishing all materials, labor, tools, equipment and management necessary for and incidental to the construction and completion of the Works. If the Contractor shall find any discrepancy in or divergence between the contract drawings and/or the contract bills he shall immediately give to the Consultant a written notice specifying the discrepancy or divergence and the Consultant shall issue instructions in regard thereto which shall be complied with by the Contractor.

6. INTENT

The intention of arrangement is to secure the performance of the Contractor's obligations to the satisfaction of the Bank / Architect / Consultant. All labor, material, equipment, constructional plant and transportation necessary for the proper execution of the Project is to be provided by the Contractor and should only be of the approved manufacturer/agencies respective kinds as described in the Contract Documents which is to be subjected from time to time to such tests as the Engineer/ Consultant's representative may direct. In case the required material/services of approved manufacturers/agencies are not available or are not up to the mark the Contractor shall procure material/ services from such other manufacturer/agencies as may be approved by the Consultant / Bank and the Contractor shall submit rate analysis for such material.

7. EXTENT OF WORKS

The Contractor shall carry out and complete the Works in every respect in accordance with this contract and with the directions of and to the reasonable satisfaction of the Consultant. The Consultant may in their absolute discretion and from time to time issue further drawings, details and/or written instructions and written explanations whole of which are collectively referred to as Consultants' instructions. All such drawings and instructions shall be consistent with the Contract Document true developments thereof as reasonably inferable therefrom.

8. TYPE OF CONTRACT

The Contract is an Item Rate contract. The Contractor shall be paid for the actual quantity of Work done, as measured at Site, at the Items rate quoted by him in the Contract Bills. The contractors have

8.1. Been informed that the schedule of approximate quantities is liable to alteration by omission, deduction, substitution or additions at the discretion of the Consultant/Bank without affecting the terms of the contract and no compensation to Contractor.

8.2. Fully and correctly understood the meaning of all the tender documents, the General Conditions of Contract, Special Condition of Contract, Technical Specifications, Bill of Quantities and working drawings or part thereof.

9. CONTRACTORS COVENANTS

9.1. The Tender form conditions, priced schedule of quantities, contract drawings and General and Special Conditions of Contract, specifications, Drawings, priced Bill of Quantities, Schedule of Rates and Prices, if any, Tender, pre-contract correspondence, Letter of Intent/Acceptance, Work order, shall be read and construed as forming part of this agreement and the Contractor shall abide by and submit themselves to all the conditions and stipulations contained therein; which are not specifically incorporated herein;

9.2. The Contractor shall obtain necessary permissions/ certificates/ order from the Competent Authority in respect of workmen employed by them for the Project and shall keep the Bank safe, harmless and reimburse all amounts/expenses incurred or suffered by the Bank in connection with any such claim;

9.3. The Contractors shall not make any claim as regards want of information of any particular point or any change in the rate or conditions save and except as provided herein;

9.4. The Contractors shall have a duly authorized agent at the place of Work to accept services of notice and to agree to extras, omissions, additions and substituted items of Works and rates from the commencement of the Work until it is virtually completed.

9.5. In the event of any discrepancy between the details and/or description given in the Bill of Quantities, the Drawings and the Technical Specifications, such items shall be deemed to have been priced in accordance with the details and/or description confirming to the most superior provisions contained in any of the following :-

- a) Bill of Quantities
- b) Drawings
- c) Technical Specifications

9.6. It shall be understood that the details and/or description not specifically mentioned in the Bill of Quantities and/or the drawing shall be the same as those mentioned in the Technical Specification. Any further interpretation of above Clause shall be at the discretion of the Consultants, whose decision shall be final and binding on the parties to the contract.

9.7. The Contractors shall not make any claim for increase in the contract consideration on the basis of incorrectness and insufficiency of the information available at the time of submitting the Tender and/ or incorrectness and insufficiency of the rates and prices stated in the price bill of quantity and schedule of rates and prices or otherwise alleging insufficiency of the tender amount to cover their obligation under the contract or matters concerning the execution of the Project.

9.8. The Contractor shall be fully responsible for the adequacy, stability and safety of all site operations and methods of construction, provided that the Contractor shall not be responsible, except as may be expressly provided in the Contract, for the design or specification of the Permanent Works, or for the design or specification of any Temporary Works prepared by the Consultant.

9.9. The Contractor shall promptly inform the Consultant of any error, omission, fault and other defects in design, drawing or specifications for the Works, which are discovered while reviewing the Contract Documents or in the process of execution of the Works.

9.10. The Contractor shall arrange for the permits and licenses for release of materials, which are under Government control subject to the Bank giving all the necessary assistance and upon being advised by the Consultant signing any forms or applications that may be necessary.

9.11. The Contractor shall comply with the provisions of legislation prevailing during the currency of contract.

9.12. The Contractor shall keep the Bank saved harmless and indemnified against claims if any of the workmen and all costs and expenses as may be incurred by the Bank in connection with any claim that may be made by any workmen.

10. GENERAL CONDITIONS

10.1. The schedule of Quantities given in the Contract Bill is provisional and is meant to indicate the intent of the Work and to provide a uniform basis for tendering. The Bank reserves the right to increase or decrease any of the quantities or to totally omit any item of Work and the Contractor shall not claim any extras or damages on these grounds.

10.2. Any error in description or in quantity or omission of items from the Contract Bill shall not vitiate this Contract but shall be treated as a variation.

10.3. The rates quoted by the Contractor in the priced bill of quantities (Contract Bills) shall be treated as firm and the contract sum shall be deemed to have been calculated with reference to the cost of execution of Works as set out in Contract Documents and shall not be adjusted or altered for any reason.

10.4. Anything contained elsewhere in any of the clauses of the tender, the prices/rates quoted for each item/Work in the Bills of Quantities shall be deemed to be inclusive of all direct and indirect costs, duties, taxes, GST, consignment tax, octroi/local tax, Works contract tax etc. on any of inputs, royalty on quarried items etc. that may be involved in completing the item/Work as required in the fulfillment of all obligations under the contract and to the satisfaction of the Architect. Additional

Taxes/ Levies by Central/ State Government legislations after opening of tender shall be reimbursed to the contractors as per actuals.

10.5. All the interim payments shall be regarded as payments by way of advance against the final payment only and not as payments for Work actually done and completed, and shall not preclude the repairing of bad, unsound, and imperfect or unskilled Work to be removed and taken away and reconstructed, or re-erected or be considered as an admission of the due performance of the contract, or any part thereof in any respect or the accruing of any claim, nor shall, it conclude, determine or affect in anyway the power of the Bank under these conditions or any of them as to the final settlement and adjustment of the accounts or otherwise or in any other way vary or affect the contract. The final bill shall be submitted by the Contractor within one month of the date fixed for completion of the Work or of the date of certificate of completion furnished by the Consultant and payment shall be made within eight (8) weeks from the date of receipt of final Certificate from the Consultant.

11. INSURANCE

11.1. Without limiting the obligations and responsibilities under Contract Clause for Care of Work the Contractor shall effect third party insurance with an insurer and in terms approved by the Bank in the joint names of the Bank and the Contractor-

11.2. against all loss or damage from whatever cause arising, other than the excepted risks stated in contract clause of the General Conditions for which the Contractor is to be held responsible under the terms of the Contract so as to cover the Bank and the Contractor during the period beginning with commencement of the Works until the date stated in the Certificate of Completion for the whole of the Works.

11.3. against any loss or damage occasioned by the Contractor in the course of any operations carried out by him for the purposes of completing the outstanding Work during the Defects Liability period pursuant to the Undertaking given at the time of applying for the issue of Certificate of Completion.

11.4. against any loss or damage occasioned by the Contractor in the course of any operations carried out by him for rectifying any defect in perfection or fault appearing during the progress of the Work or during the Defects Liability Period.

11.5. against any loss or damage occasioned by the Contractor in the course of any operations carried out by him for searching the cause of any defect, imperfection or fault appearing during the progress of the Works or during the Defects Liability Period.

11.6. against any liability for or in respect of any damages or compensation payable at law in respect of or in consequence of any accident or injury to any workmen or other person in the employment of the sub-Contractor provided the sub-contractors shall not have insured against such contingency. (Insurance against accident etc. to workman)

11.7. Unless otherwise instructed the Contractor shall insure the Works and keep them insured until the virtual completion of the contract against loss or damage by fire and/or earthquake, flood.

11.8. The Contractor shall maintain Contractors' all risks insurance policy covering loss, damage, theft, burglary etc. of all materials and equipment's, temporary Works and the Work shall be insured for a total sum equal to the value of all such items plus 10% of such value.

11.9. Provided always that all the insurance under the contract documents shall be arranged by the Contractor from a first class insurance company having a branch near the site who can deal with all matters pertaining to the subject, the insurance must be placed with a company approved by the Bank, in the joint names of the Bank and the Contractor for such amount and for any further sum if called to do so by the Bank, the premium of such further sum being allowed to the Contractor as an extra.

11.10. The Contractor shall deposit the policy and receipt for premiums paid with the Bank within 21 (twenty-one) days from the date of issue of Work order unless otherwise instructed. In default of the Contractor insuring as provided above, the Bank on his behalf may so insure and may deduct the premiums paid from any money due, or which may become due to the Contractor. The Contractor shall as soon as the claim under the policy is settled or the Work reinstated by the Insurance Company should they elect to do so, proceed with due diligence with the completion of the Works in the same manner as though the insured risk/contingency has not occurred and in all respects under the conditions of the contract. The Contractor in case of rebinding or reinstatement after the occurrence of the insured risk/contingency shall be entitled to such extension of time for completion as the Bank may deem fit.

11.11. Such insurance shall continue during the whole of the time of continuance of Work and/or during such time that any persons are employed by him on the Works and shall when required produce before the Bank or the consultant, such policy of insurance and the receipt for payment of the earlier premium and the current premium.

11.12. The insurance shall be effective in such manner that the Bank is indemnified under the policy. In the event of the sub-contractor having affected an insurance against accident etc. to the workmen the Contractor shall require such sub-contractor to produce to the Bank/ consultant when required, such policy of insurance and the receipt for the payment of the current premium, then in that event insurance under clause (vii) hereof by the Contractor shall not be necessary.

11.13. The Contractor shall provide for adequate cover to the Bank as per the provisions of Workmen Compensation Act.

11.14. The Contractor shall make available the insurance cover note before the commencement of the Work and shall notify any change in the nature or extent of the Work and also make available additional insurance of Works if required in special circumstances.

12. DEFECTS LIABILITY

12.1. Defect Liability Period (DLP) shall be for a period of 12 months from the date of handing over of completed site. This period commences only after all works are completed in every respect and formally certified by the Project Consultant. During the DLP, the contractor is responsible for rectifying, at their own cost, any defects arising from workmanship, materials, shrinkage, settlement, or any other deficiencies identified during the period.

12.2. Any defects, shrinkages or other faults which shall appear within the Defects Liability Period of 12 months from the date of handing over the works and which are due to materials or workmanship not in accordance with this contract or on account of failure on the part of the Contractor to comply with any of his obligations expressed or implied shall be specified by the consultant in a schedule of defects which he shall deliver to the Contractor not later than 14 days after the expiration of the Defects Liability Period, and within a reasonable time after receipt of such schedule the defects, shrinkages and other faults therein specified shall be made good by the Contractor and (unless the consultant shall otherwise instruct, in which case the contract sum shall be adjusted accordingly) entirely at his own cost.

12.3. The Contractor shall make good at his own costs and to the satisfaction of the consultant, all defects, shrinkages or small faults arising in the opinion of the consultant/ engineer from Work or materials not being in accordance with the drawings or specifications or schedule of quantities or the instructions of the Engineer/ consultant, which may appear within the "Defects Liability Period of 12 months from the date of handing over completed site" referred to in the Appendix to General Conditions. All defects, shrinkages or small faults arising from any other cause not attributable to the Contractor shall be rectified by the Contractor as an additional work.

12.4. In the event of failure of the Contractor to carry out any such work to the satisfaction of the Engineer / consultant, the Bank shall be entitled to carry out the same at the Contractor's costs and all expenses consequential and incidental thereto shall be deducted by the Bank from any monies due or to become due to the Contractor.

12.5. When in the opinion of the Architect/ consultant any defects, shrinkages or other faults which he may have required to be made good under sub-clause (1) and (2) of this condition shall have been made good he shall issue a certificate to that effect, and completion of making good defects shall be deemed for all the purposes of this contract to have taken place on the day named in such certificate.

13. SPECIAL RISK

The Contractor shall not be liable for or in respect of any consequences arising out of any special risks as enumerated in relevant clause of the General Conditions. The responsibilities, rights and liabilities of the parties in such case shall be determined with respect to Clause 65 of the General Conditions.

14. STATUTORY OBLIGATIONS, NOTICES, FEES AND CHARGES

14.1. The Contractor shall comply with and give all notices required by any Act of Parliament, any instrument rule or order made under any Act of Parliament, or any regulation or byelaw of any local authority or of any statutory undertaker which has any jurisdiction with regard to the Works or with whose systems the same are or will be connected. The Contractor before making any variation from the contract drawings or the contract bills necessitated by such compliance shall give to the Engineer/consultant a written notice specifying and giving the reason for such variation and the Engineer/consultant may issue instructions in regard thereto. If within 7 days of having given the said written notice the Contractor does not receive any instructions in regard to the matters therein specified, he shall proceed with the Work confirming to the Act of Parliament, instrument, rule, order, regulation or byelaw in question and any variation thereby necessitated shall be deemed to be a variation required by the Engineer/consultant.

14.2. There shall be no employer -Employee relationship whatsoever between the bank and the successful bidder/his sub-contractors/agents/labourers /employees/staff/representatives. The bidder shall be liable for compliance of all labor laws applicable in connection with the contract and shall be responsible for payment of wages/arrears of wages under the applicable laws.

15. MATERIALS, WORKMANSHIP, SAMPLES, TESTING OF MATERIALS

15.1. All the Works specified and provided for in the specifications or which may be required to be done in order to perform and complete any part thereof shall be executed in the best and most workmanlike manner with materials of the best and approved quality of the respective kinds in accordance with the particulars contained in and implied by the specifications and as represented by the drawings or according to such other additional particulars and instructions as may from time to time be given by the consultant /Engineer during the execution of the Work, and to his entire satisfaction.

15.2. If required by the consultant /Engineer the Contractor shall have to carry out tests on materials and workmanship in approved materials testing laboratories or as prescribed by the consultant /Engineer at his own cost to prove that the materials etc., under test conform to the relevant I.S. Standards or as specified in the specifications. The necessary charges for preparation of mould (in case of concrete cube) transporting, testing etc., shall have to be borne by the Contractor. No extra payment on this account should in any case be entertained.

15.3. In case contractor is delaying or refusing or avoiding testing of material, the consultant/engineer shall arrange for carrying out testing of material and the necessary expenditure in carrying out the testing, transportation and incidental expenses shall be recovered from the contractor.

15.4. All the materials (except where otherwise described) stores and equipment required for the full performance of the Work under the contract must be provided through normal channels and must include charge for import duties, sales tax, octroi and other charges and must be the best of their kind available and the Contractor/s must be entirely responsible for the proper and efficient carrying out of the Work. The Work must be done in the best workmanlike manner. Samples of all materials to be

used must be submitted to the Consultant/Engineer when so directed by the Consultant/Engineer and written approval from Consultant/Engineer must be obtained prior to placement of order.

15.5. During the inclement weather the Contractor shall suspend concreting and plastering for such time as the Consultant /Engineer may direct and shall protect from injury all Work when in course of execution. Any damage (during constructions) to any part of the Work for any reason due to rain, storm or neglect of Contractor shall be rectified by the Contractor in an approved manner at no extra cost.

15.6. If the Work be suspended by reason of rain, strike, lock-outs or any other cause, the Contractor shall take all precautions necessary for the protection of Work and at his own expenses shall make good any damage arising from any of these causes.

15.7. The Contractor shall cover up and protect from damage from any cause, all new Work and supply all temporary doors, protection to windows, and any other requisite protection for the execution of the Work whether by himself or special tradesmen or sub-contractor and any damage caused must be made good by the Contractor at his own expenses.

16. SUBSTITUTION

Should the Contractor desire to substitute any materials and workmanship, he/they must obtain the approval of the Bank / Consultant in writing for any such substitution well in advance. Materials designated in this specification indefinitely by such term as “Equal” or “Other approved” etc. specific approval of the Bank/Consultant has to be obtained in writing. The term equivalent means, if material specified is not available, then after satisfying to the fact, the consultant / engineer may give other material to be used which will be subject to adjustment in purchase prices.

17. INSPECTION OF WORKS

17.1. All materials and workmanship shall be subject to inspection, examination and test at any and all times during manufacture and/or construction. The Consultant may issue instructions requiring the Contractor to open up for inspection any Work covered up or to arrange for or carry out any test at any and all times.

17.2. The Consultant / Engineer shall have the right to reject the defective material and workmanship or require its correction.

17.3. The test of any materials or goods (whether or not already incorporated in the Works) or of any executed Work, and the cost of such opening up or testing (together with the cost of making good in consequence thereof) shall be added to the contract sum unless provided for in the contract bills or unless the inspection or test shows that the Work, materials or goods are not in accordance with this contract.

17.4. The Consultant / Engineer may issue instructions in regard to the removal from the site of any Work, materials or goods, which are not in accordance with this contract.

17.5. The Engineer may (but not reasonably or vexatiously) issue instructions requiring the dismissal from the Works of any person employed thereon.

17.6. On the failure of the Contractor to comply with any of the Engineer's instructions the Engineer may proceed to replace or correct such material/workmanship entirely at the cost of the Contractor.

18. REMOVAL OF IMPROPER WORK

18.1. The Bank shall during the progress of the Work have power to order in writing from time to time the removal from the Work within such reasonable time or times as may be specified in the order of any materials which in the opinion of the Consultant / Engineer are not in accordance with specification or instructions, the substitution or proper re-execution of any Work executed with materials or workmanships not in accordance with the drawings and specifications or instructions.

18.2. The contractor shall promptly remove, rectify, or replace any work, materials, or workmanship found to be substandard, defective, non-compliant with specifications, or executed contrary to the instructions of the Project Architect/Engineer-in-Charge. The contractor shall undertake such corrective action at their own cost and without entitlement to additional payment. Failure to comply within the stipulated time will empower the employer to get the defective work rectified through alternate agencies at the contractor's risk and cost, without prejudice to any other contractual rights of the employer.

18.3. In case the Contractor refuses to comply with the order the Bank shall have the power to employ and pay other agencies to carry out the Work and all expenses consequent thereon or incidental thereto as certified by the Consultant / Engineer shall be borne by the Contractor or may be deducted from any money due to or that may become due to the Contractor. No certificate which may be given by the Engineer shall relieve the Contractor from his liability in respect of unsound Work or bad materials.

19. PROTECTIVE MEASURES

19.1. The Contractor from the time of being placed in possession of the site must make suitable arrangements for watching, lighting and protecting the work, the site and surrounding property by day, by night, on Sundays and other holidays.

19.2. Contractor shall indemnify the Bank against any possible damage to the building, roads, or members of the public in course of execution of the work.

19.3. The contractor shall provide necessary temporary enclosures etc. for the protection of the work and materials and for altering and adopting the same as may be required and removing on completion of the works and making good all works disturbed.

20. NOTICE AND PATENTS OF APPROPRIATE AUTHORITY AND OWNERS.

20.1. The Contractor shall conform to the provisions of any Acts of the Legislature relating to the Work, and to the Regulations and Bye-laws of authorities, and/or any water, lighting and other companies, and/or authorities with whose systems the structures were proposed to have connection and shall before making any variations from the drawings or specification that maybe associated to so conform, give the Consultant / Engineer written notices, specifying the variations proposed to be made

and the reasons for have making them and apply for instruction thereon. The Consultant / Engineer on receipt of such intimation shall give a decision within a reasonable time.

20.2. The Contractor/s shall arrange to give all notices required for by the said Acts, Regulations or Bye-laws to be given to any authority, and to pay to such authority or to any public officer all fees that may be properly chargeable in respect of the Work and lodge the receipts due with the Bank.

21. ASSIGNMENT AND SUB-LETTING

21.1. The whole of the Works included in the contract shall be executed by the Contractor and the Contractor shall not directly or indirectly transfer, assign or underlet the contract or any part, share or interest therein nor, shall take a new partner, without written consent of the Bank and no subletting shall relieve the Contractor from the full and entire responsibility of the contract or from active superintendence of the Work during their progress.

21.2. The Contractor shall not assign the Contract or any benefit or interest therein or thereunder, otherwise than by a charge in favor of the Contractor's bankers of any monies due or to become due under this Contract, without the prior written consent of the Bank.

21.3. The Contractor shall not sub-let the whole of the Works except where otherwise provided by the contract, the Contractor shall not sublet any part of the Works without the prior written consent of the Engineer, which shall not be unreasonably withheld, and such consent, if given shall not relive the Contractor from any liability or obligation under the contract and he shall be responsible for the acts, defaults and neglects of any sub-contractor, his agents, servants or workmen as fully as if they were the acts, defaults or neglects of the Contractor, his agents, servants or workmen. Provided always that the provision of labor on a piecework basis shall not be deemed to be a subletting under this clause. The Contractor shall co-ordinate and shall be responsible for all aspects of his sub-contractor(s) without being relieved of any of his obligation under the contract.

21.4. If, the contracting agencies are violating the tender terms and sub-let the work without bank's consent and the same is brought to the notice of the Bank, the Bank will be entitled to recover 10% of such work as penalty besides initiating measures as provided in contract.

21.5. If, at any time during the execution of the Works, the Consultant / Engineer shall require the Contractor to make boreholes or to carry out exploratory excavation, such requirement shall be ordered in writing and shall be deemed to be an addition ordered under the provisions of the General Conditions unless a provisional sum in respect of such anticipated Work shall have been included in the Bill of Quantities.

21.6. The Contractor shall in connection with the Works provide and maintain at his own costs all lights, guards, fencing and watching when and where necessary or required by the Consultant / Engineer or the Bank, or by any duly constituted authority, for the execution and for the protection of the Works, and/or for the safety and convenience of the public / others.

21.7. The Contractor shall, in accordance with the requirements of the Consultant / Engineer, afford all responsible opportunities for carrying out their Work to any other Contractors employed by the Bank and their workmen and to the workmen of the Bank and of any other duly constituted authorities who may be employed in the execution on or near the Site of any Work not included in the contract or of any contract with the Bank may enter into in connection with or ancillary to the Works. The Contractor will not be paid any compensation on this account.

21.8. Shall keep the Site reasonably free from unnecessary store of constructional plant and machinery, wreckage and rubbish during progress of Works and on completion leave the whole site clean and in a workmanlike condition to the satisfaction of the Consultant / Engineer.

22. DEFAULT OF CONTRACTOR

22.1. If the Contractor

- i. being a company presents a petition for winding up and/or goes into liquidation (other than a voluntary liquidation for the purposes of amalgamation or reconstruction) or
- ii. shall make an assignment or a composition for the benefit of the greater part, in number of amount of his creditors or shall enter into a Deed or arrangement with his creditors, or
- iii. if a Receiver of the Contractor's firm appointed by the court shall be unable, within fourteen days after notice to him requiring him to do so, to show to the reasonable satisfaction of the Bank that he is able to carry out and fulfill the contract, and if so required by the Bank to give reasonable security therefor, or
- iv. if the Contractor shall suffer execution to be issued, or
- v. shall suffer any payment under this contract to be attached by or on behalf of and of the creditors of the Contractor, or
- vi. shall assign, charge or encumber this contract or any payments due or which may become due to the Contractor without the consent in writing of the Bank first obtained, thereunder, or
- vii. shall agree to carry out the contract under a committee of inspections of his creditors, or
- viii. shall have an execution levied on his goods, or
- ix. shall use improper materials or workmanship in carrying on the Works, or
- x. shall in the opinion of the Bank not exercise such due diligence and make such due progress as would enable the Work to be completed within due time agreed upon, and
- xi. the Consultant / Engineer certifies in writing that the Contractor has failed to commence the Works or failed to proceed with the Works after the suspension order when so called upon by the Consultant / Engineer, or
- xii. shall abandon the contract, or

- xiii. without reasonable excuse has failed to commence the Works or have suspended the progress of Works for 28 days after receiving from the Consultant / Engineer written notice to proceed or
- xiv. has failed to remove materials from the site or to pull down or replace for 28 days after receiving from the Consultant / Engineer written notice that the said materials or Work has been condemned and rejected by the Consultant / Engineer under these conditions or
- xv. despite previous writings by the Consultant / Engineer in writing has failed to execute Works in accordance with the contract, or is persistently or flagrantly neglecting to carry out his obligations under the contract or as to the detriment of good workmanship or in defiance of the Consultant / Engineer's instructions to the contrary, sublet any part of the contract then and in any of the said cases the Bank may notwithstanding previous waiver
 - a) *determine the contract by after giving 14 days notice in writing to the effect as hereinafter mentioned, but without thereby affecting the powers of the Bank or the obligations and liabilities of the Contractor the whole of which shall continue in force as fully as if the contract, had not been so determined and as if the Works subsequently executed had been executed by or on behalf of the Contractor (without thereby creating any trust in favor of the Contractor)*
 - b) *further the Bank or his agent, or servants, may enter upon the Site and take possession of the Work and all Constructional Plant, amenities, unused materials, tools, scaffolding, sheds, machinery, steam and other power, utensils and materials lying upon premises or the adjoining lands or roads reserved for the execution of the Works and*
 - i. sell the same as his own property or
 - ii. may employ the same by means of his own servants and workmen in carrying on and completing the Works or
 - iii. by employing any other Contractors or other persons or person to complete the Works, and the Contractor shall not in any way interrupt or do any act, matter of thing to prevent or hinder such other Contractors or other persons or person employed from completing and finishing or using the materials and plants for the Works when the Works shall be completed, or as soon thereafter as conveniently may be, the Bank shall give notice in writing to the Contractor to remove his surplus materials and plants and should the Contractor fail to do so within a period of 14 days after receipt by him the Bank may sell the same by Public Auction and shall give credit to the Contractor for the amount so realized.

22.2. Any expenses or losses incurred by the Bank in getting the Works carried out by other Contractors shall be adjusted against the amount payable to the Contractor by way of selling his tools and plants or due on account of Work carried out by the Contractor prior to engaging other Contractors or against the Security Deposit.

22.3. Upon such entry and expulsion by the Bank the Consultant / Engineer may adopt an appropriate mode at his discretion and certify the amounts, if any, that had at the time of such entry and expulsion reasonably been earned in respect of the work actually done by him and the value of any unused or partially used materials, any Constructional Plant and any amenities brought into existence exclusively for execution of the Works.

22.4. If the Bank shall enter and expel [the Contractor] under this Clause, he shall not be liable to pay to the Contractor any money on account of the Contract, until the expiration of the Defects Liability Period and thereafter until the costs of execution, damages for delay in completion, if any, and all other expenses incurred by the Bank have been ascertained and the amount thereof certified by the Consultant / Engineer. The Contractor shall then be entitled to receive only such sum or sums, if any, as the Consultant / Engineer may certify would have been payable to him upon due completion by him after deducting the said amount. If such amount shall exceed the sum which would have been payable to the Contractor on due completion by him, then the Contractor shall, upon demand, pay to the Bank the amount of such excess and it shall be deemed a “debt due” by the contractor to the Bank and shall be recoverable accordingly.

23. DEFAULT OF THE BANK

23.1. The Contractor may, if -

- a) The Bank does not pay to the Contractor the amount due on any certificate within six weeks from the receipt of Certificate from the Consultant honoring certificates named in the appendix to these conditions and continues such default for 7 days after receipt by registered post or recorded delivery of a notice from the Contractor stating that notice of determination under this condition will be served if payment is not made within 7 days from receipt thereof; or
- b) The Bank interferes with or obstructs the issue of any certificate due under this contract; or
- c) The carrying out of the whole or substantially the whole of the uncompleted Works is suspended by the Bank for a continuous period of 90 days;
- d) The Bank becomes bankrupt or makes a composition or arrangement with his creditors or has a winding up order or (except for the purposes of reconstruction) a resolution for voluntary winding up passed or a receiver or manager of his business or undertaking is duly appointed, or possession is taken by or on behalf of the holders of any debentures secured by a floating charge, of any property comprised in or subject to the floating charge,
- e) if the Bank gives a formal notice of his inability to meet his contractual obligations after giving 14 days prior written notice by registered post or recorded delivery to the Bank with a copy to the Consultant / Engineer terminate the employment of the Contractor PROVIDED that such notice shall not be given unreasonably or vexatiously.

23.2. Upon the expiry of 14 days notice referred to herein, the Contractor shall with all reasonable dispatch remove from the site all constructional plant brought by him thereon.

23.3. Upon such determination, without prejudice to the accrued rights or remedies of either party or to any liability which may accrue either before the Contractor or any sub-contractors shall have removed his temporary buildings, plant, tools, equipment, goods or materials or by reason of his or their so removing the same, the respective rights and liabilities of the Contractor and the Bank shall be as follows, that is to say:

a) The Contractor shall with all reasonable dispatch and in such manner and with such precautions as will prevent injury, death or damage of the classes in respect of which before the date of determination he was liable to indemnify the Bank remove from the site all his temporary buildings, plant, tools, equipment, goods and materials and shall give facilities for his sub-contractors to do the same;

b) After taking into account amounts previously paid under this contract the Contractor shall be paid by the Bank for;

- The total value of Work completed at the date of determination;
- The total value of Work begun and executed but not completed at the date of determination, the value being ascertained if such Work were a variation required by the Consultant / Engineer;
- The cost of materials or goods properly ordered for the Works for which the Contractor shall have paid or for which the Contractor is legally bound to pay, and on such payment by the Bank any materials or goods so paid for shall become property of the Bank;
- The reasonable cost of removal under paragraph (a) of this sub-clause.
- And in addition the amounts payable in respect of any preliminary item, so far as the work or service comprised therein has been carried out or performed and a proper proportion as certified by the Consultant / Engineer of any such item, work or service comprised in which has been partially carried out or performed.
- A sum certified by the Bank being the amount of any expenditure reasonably incurred by the Contractor in the expectation of completing the whole of the Works in so far as such expenditure shall not have been covered by the payments made under this clause.
- The reasonable costs of repatriation of all the Contractor's staff and workmen, employed on or in connection with the Works at the time of such termination.

c) Provided always that against any payment due from the Bank under this sub-clause, the Bank shall be entitled to be credited with any outstanding balances due from the Contractor for advances in respect of constructional plant and materials and any other sums which at the date of termination were recoverable by the Bank from the Contractor under the terms of the Contract. The Bank shall also return all Bank Guarantees and Retention after proper

accounts have been settled between the Contractor and the Bank.

d) Provided that in addition to all other remedies the Contractor upon such determination take possession of and shall have a lien upon all unfixed goods and materials, which may have become the property of the Bank until payment of all monies due to the Contractor from the Bank.

23.4. If a war or other circumstances outside the control of both the parties, arises after the Contract is made, so that either party is prevented from fulfilling his contractual obligations, or under the law governing the Contract, the parties are released from further performance, then the sum payable by the Bank to the Contractor in respect of the Work executed shall be the same as that which would have been payable under Clause 32 hereof as if the Contract had been terminated under the provisions of Clause 32 hereof. Performance of obligations becoming more onerous shall not be considered as a cause for “Frustration”.

24. NOTICES

24.1. All certificates, notices or written orders to be given by the Bank or by the Consultant/ Engineer to the Contractor under the terms of the Contract shall be served by sending by registered post or by Courier or delivering the same to the Contractor’s principal place of business, or such other address as the Contractor shall nominate for this purpose.

24.2. All notices to be given to the Bank or to the Consultant / Engineer under the terms of the Contract shall be served by sending by registered post or by Courier or delivering the same to the respective addresses nominated for that purpose in Part II of these conditions.

24.3. Either party may change a nominated address to another address in the country where the Works are being executed by prior written notice to the other party and the Consultant / Engineer may do so by prior written notice to both parties.

24.4. The work should be executed is time bound and Bank has the right to exit/cancel /terminate the contract with immediate effect and engage another contractor, in case the bidder defaults or commit breach of any Tender terms. In such an event, bank shall recover from the bidder the cost, expenses for loss, damage caused due to the bidder, by various means not limited to forfeiture of security deposit and unpaid bills.

25. ARBITRATION

25.1. Wherever, in any of the documents forming part of the Contract, the Bank’s Asst. General Manager, RO Kozhikode, KERALA has been vested with the final powers, his decision, opinion, certificate or any other discretion shall be final conclusive and binding on the parties and shall be without appeal. All other matters shall be subject to the right of arbitration.

25.2. All disputes or differences of any kind whatsoever save and except matters referred to in clause 1) arising out of or in connection with the Contract, whether during the progress of Work or after Completion and shall after written notice by either party to the contract to the other of them and to the Bank hereinafter mentioned be

referred for adjudication to two Arbitrator, one each to be nominated by the Contractor and the Bank, who shall thereafter appoint an Umpire. The provisions of Indian Arbitration and Conciliation Act 1996 shall apply for the purposes.

25.3. The Work under the Contract shall, however, continue during the arbitration proceedings and no payment due or payable to the Contractor shall be withheld on account of such proceedings.

25.4. The Arbitrator shall be deemed to have entered on the reference on the date he issued notice to both the parties fixing the date of the first hearing.

25.5. The Arbitrator may from time to time, with the consent of the parties, enlarge the time for making and publishing the award.

25.6. The Arbitrator shall give a separate award in respect of each dispute or difference referred to him. The Arbitrator shall decide each dispute in accordance with the terms of the contract and give a reasoned award. The venue of arbitration shall be such place as may be fixed by the Arbitrator in his sole discretion.

25.7. The fees, if any, of the Arbitrator shall, if required to be paid before the award is made and published, be paid half and half by each of the parties. The cost of the reference and of the award including the fees, if any, of the Arbitrator who may direct to and by whom and in what manner, such costs or any part thereof shall be paid and may fix or settle and amount of costs to be so paid.

25.8. The award of the Arbitrator shall be final and binding on both the parties.

25.9. Subject to aforesaid the provisions of the Arbitration & Conciliation Act 1996 or any statutory modification or re-enactment thereof and the rules made there under, and for the time being in force, shall apply to the arbitration proceeding under this clause.

25.10. The Bank and the Contractor hereby also agree that arbitration under clause shall be a condition precedent to any right to action under the contract with regard to the matters hereby expressly agreed to be so referred to arbitration.

AS WITNESS the hands of the said Parties.

Signed by the said
In the presence of

Bank

Witness
Name:
Address

Signed by the said
In the presence of

Contractor

Witness
Name:

Address

DOCUMENTS ATTACHED TO THE AGREEMENT FORMING PART & PARCEL OF THE AGREEMENT

- Tender document & tender drawings.
- NIT vide .
- Addendum issued vide
- Contractor's letter dated
- Work order vide.

CERTIFICATE (TO BE ISSUED BY THE CONSULTANT / ENGINEER)

It is certified that various items of works claimed in the RA Bill by Contractor has been completed to the extent claimed and at appropriate rates and that the items are in accordance with and fully confirming to the standard and/or prescribed specifications and drawings. Quality and rates verified. The material supplied and work done conform tender specifications. We further certify that we have checked the measurement to the extent of 100 per cent of each item claimed in this bill. As net amount of Rs..... (Rupees) is recommended to be paid to the contractor making the total up to date payment of Rs.....

(Rs.)

Quality and rates verified. The material supplied and work done confirm with the tender specifications.

DATE : SITE ENGINEER / CONSULTANT

The above certification shall be endorsed in the relevant Measurement Books also by the Consultant.

FORMAT FOR RUNNING BILL

On letter head of contractor

Running Bill No.		
Tender Amount		Rs.
Value of work done		Rs.
Less rebate	(-)	Rs.

Net Value of work done		Rs.
Extra variation items after settlement @100%		Rs.
Extra variation items without settlement @75%		Rs.

Total		
Add : Cost of material on site @ 75%		Rs.

	Total payable Rs.	
Deductions		
1. Retention money		Rs.
2. Recovery of advance if any		Rs.
3. Income-tax		Rs.
4. Any other		Rs.
5. Total bill paid till last bill		Rs.
Total deductions	Rs.	Rs.

	Net payable	Rs.
	Amount certified for payment	Rs.

Note : This page shall be signed and stamped by the Site Engineer, Contractor and Project Architect.

FORMAT FOR SECURED ADVANCE

ACCOUNT OF SECURED ADVANCE IF ADMISSIBLE ON MATERIALS HELD AT SITE BY THE CONTRACTOR

Sno.	Name of the supplier	Quantity	Unit	Amount	Remarks
1	2	3	4	5	6
Face value of Materials at site					
Secured Advance % of above value.					

Date

.....
 Signature of Site Engineer
 Preparing the bill.

Date

Signature of Bank's
 Consultants

Date

Signature of the Contractor

FORMAT FOR RUNNING BILL (To be submitted by the contractor)

I	Name of the Contractor / Agency	:	
II	Name of the Work	:	
III	Sr. No. of the Bill	:	
IV	Sr. No. of the Previous Bill	:	
V	Reference to Agreement No.	:	
VI	Date of written order to commence	:	
VII	Date of Completion as per Agreement	:	
VIII	Date of Measurements	:	
XI	Present status of work	:	

Sno.	Items Description	Unit	Rate	Qty. as per measurement	Tender Amount Rs.
1	2	3	4	5	6

Up to previous RA Bill		Up to date gross		Present bill		remark
qty	Amt.	Qty.	Amt.	Qty.	Amt.	
7	8	9	10	11	12	13

Note :

1. If part rate is allowed for any item, it should be indicated with reasons for the allowing such a rate.
2. If adhoc payment is made, it should be mentioned specially.
3. Consumption of Cement/Steel statement to be submitted along with each R.A. Bills.

CEMENT CONSUMPTION STATEMENT

Code No.	Description of item of work	Unit	Quantity of cement to be used per unit quantity of work (Bags)
1	2	3	4
<i>Cement Concrete (Cast-in-Situ)</i>			
1.	1:1.5:3 (1 Cement : 1.5 sand : 3 graded aggregate)	Cu.M.	8.00
2.	1:2:4 (1 Cement : 2 sand : 4 graded aggregate)	Cu.M.	6.40
3.	1:3:6 (1 Cement : 3 sand : 6 graded aggregate)	Cu.M.	4.40
4.	1:4:8 (1 Cement : 4 sand : 8 graded aggregate)	Cu.M.	3.40
<i>Burnt Brick Masonry</i>			
5.	In CM 1:3 (1 Cement : 3 mortar)	Cu.M.	2.56
6.	In CM 1:4 (1 Cement : 4 mortar)	Cu.M.	1.90
7.	In CM 1:6 (1 Cement : 6 mortar)	Cu.M.	1.06
<i>Half Brick Masonry</i>			
8.	In CM 1:3 (1 Cement : 3 mortar)	100Sq.M.	28.56
9.	In CM 1:4 (1 Cement : 4 mortar)	100Sq.M.	21.28
<i>Random Rubble Masonry</i>			
10.	In CM 1:6 (1 Cement : 6 mortar)	Cu.M.	1.70
<i>Course Rubble Masonry</i>			
11.	In CM 1:6 (1 Cement : 6 mortar)	Cu.M.	1.50
<i>Flooring</i>			
12.	40 mm thick in PCC (1:4:8)	Sq.M.	0.34
13.	18 mm thick in Skirting	Sq.M.	0.32
<i>Cement Plaster</i>			
14.	12 mm thick in CM (1:3)	100Sq.M.	14.68
15.	12 mm thick in CM (1:4)	100Sq.M.	10.94
16.	15 mm thick in CM (1:4)	100Sq.M.	13.08
17.	15 mm thick in CM (1:6)	100Sq.M.	8.60
18.	20 mm thick in CM (1:4)	100Sq.M.	17.02
19.	20 mm thick in CM (1:6)	100Sq.M.	11.20
20.	6 mm thick in CM (1:3)	100Sq.M.	7.34
21.	6 mm thick in CM (1:4)	100Sq.M.	5.48

PROFORMA FOR APPLICATION FOR EXTENSION OF TIME PERIOD

1.	Name of Contractor	:	
2.	Name of the work as given in the Agreement	:	
3.	Agreement No.	:	
4.	Estimated tender amount	:	
5.	Date of Commencement of work as per Agreement	:	
6.	Period allowed for completion of work as per Agreement.	:	
7.	Date of Completion stipulated in Agreement.	:	
8.	Period for which extension of time has been give previously	:	
a)	1st extension vide Architect's /Bank's letter	:	
	No. Dated Month Days		
b)	2 nd extension vide Architect's /Bank's letter	:	
	No. Dated Month Days		
c)	3 rd extension vide Architect's /Bank's letter	:	
	No. Dated Month Days		
d)	4 th extension vide Architect's /Bank's letter	:	
	No. Dated Month Days		
	Total extension previously given	:	
9.	Reason's for which extensions have been previously given (Copies of the previous applications should be attached)	:	
10.	Period for which extension is applied for	:	
11.	Hindrances on account of which extension is applied for with dates on which hindrances occurred and the period for which these are likely to last.	:	

a)	Serial No.		
b)	Nature of Hindrance		
c)	Date of occurrence		
d)	Period for which it is likely to last.		
e)	Period for which extension required for this particular hindrance		
f)	Over lapping period if any, with reference to item (e) above		
g)	Net extension applied for		
h)	Remarks, if any		
12.	Extension of time required for extra work	:	
13.	Details of extra work and the amount involved	:	
a)	Total value of extra work		
b)	Proportionate period of extension of time on estimated amount put to tender.		
14.	Total extension of time required for 11 & 12	:	

Submitted to the Architect/Bank

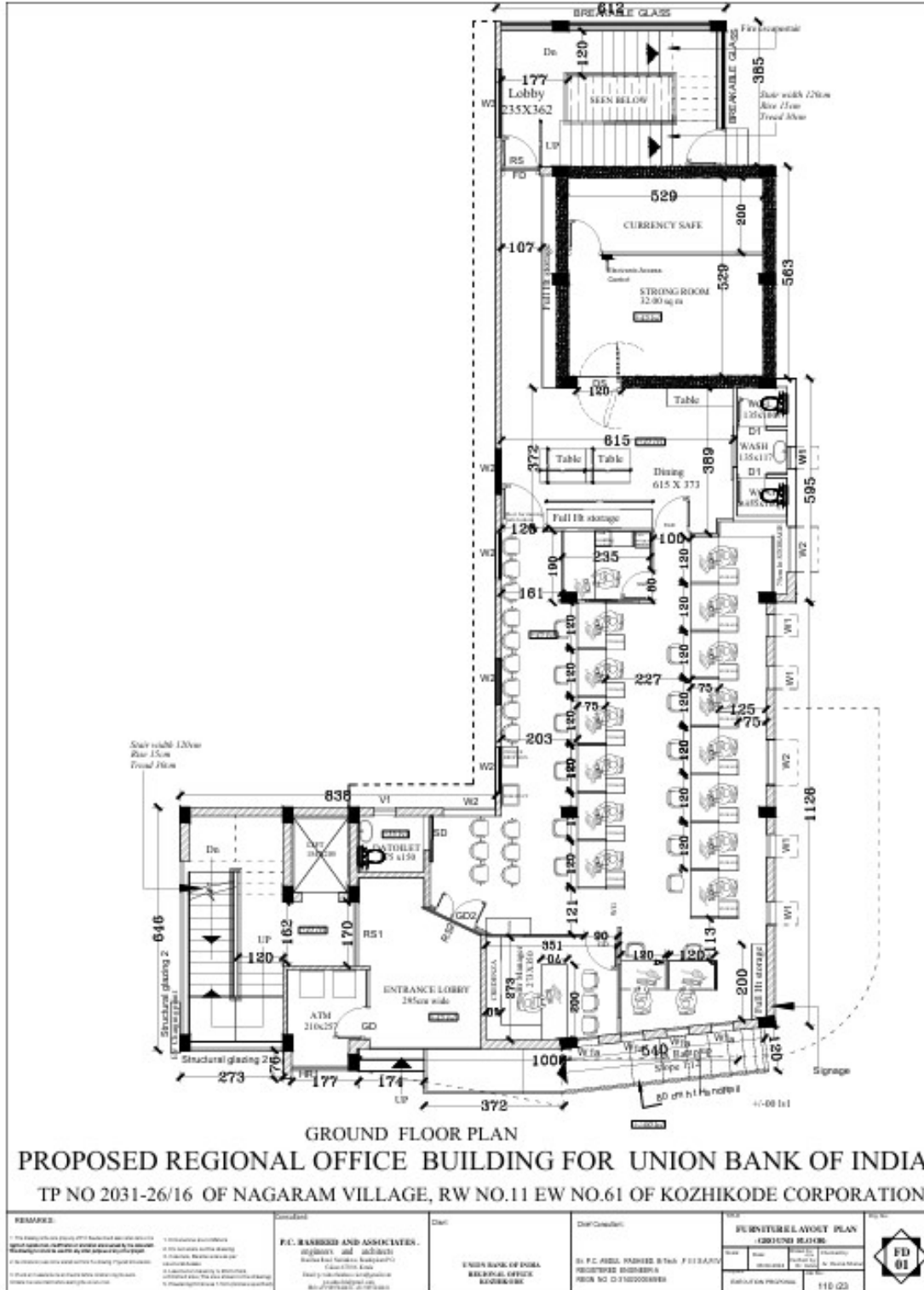
Date:

Signature of Contractor

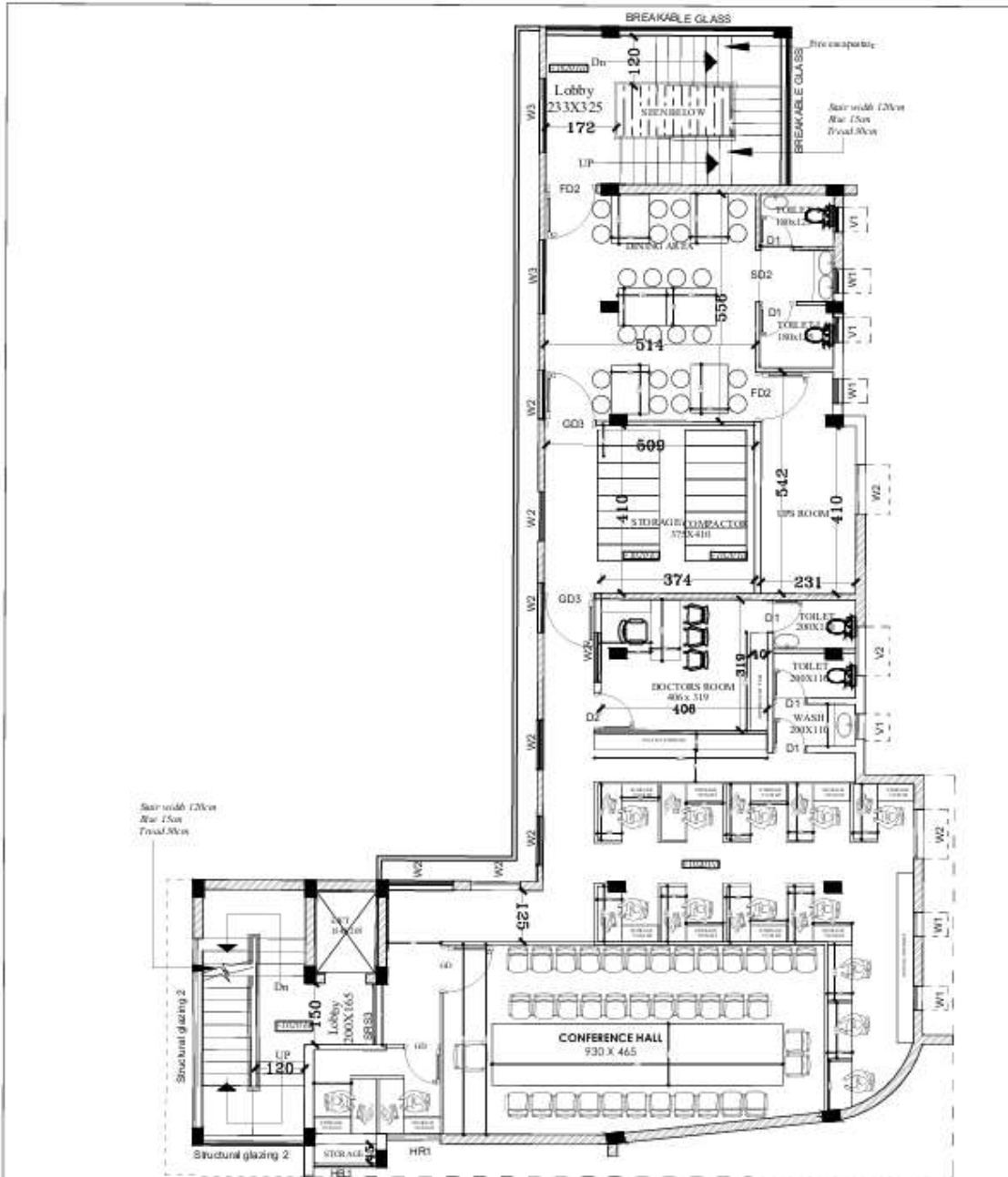
DRAWINGS

(Detailed drawings can be obtained from, Union Bank of India, Regional Office, Kozhikode)

GROUND FLOOR PLAN



THIRD FLOOR PLAN

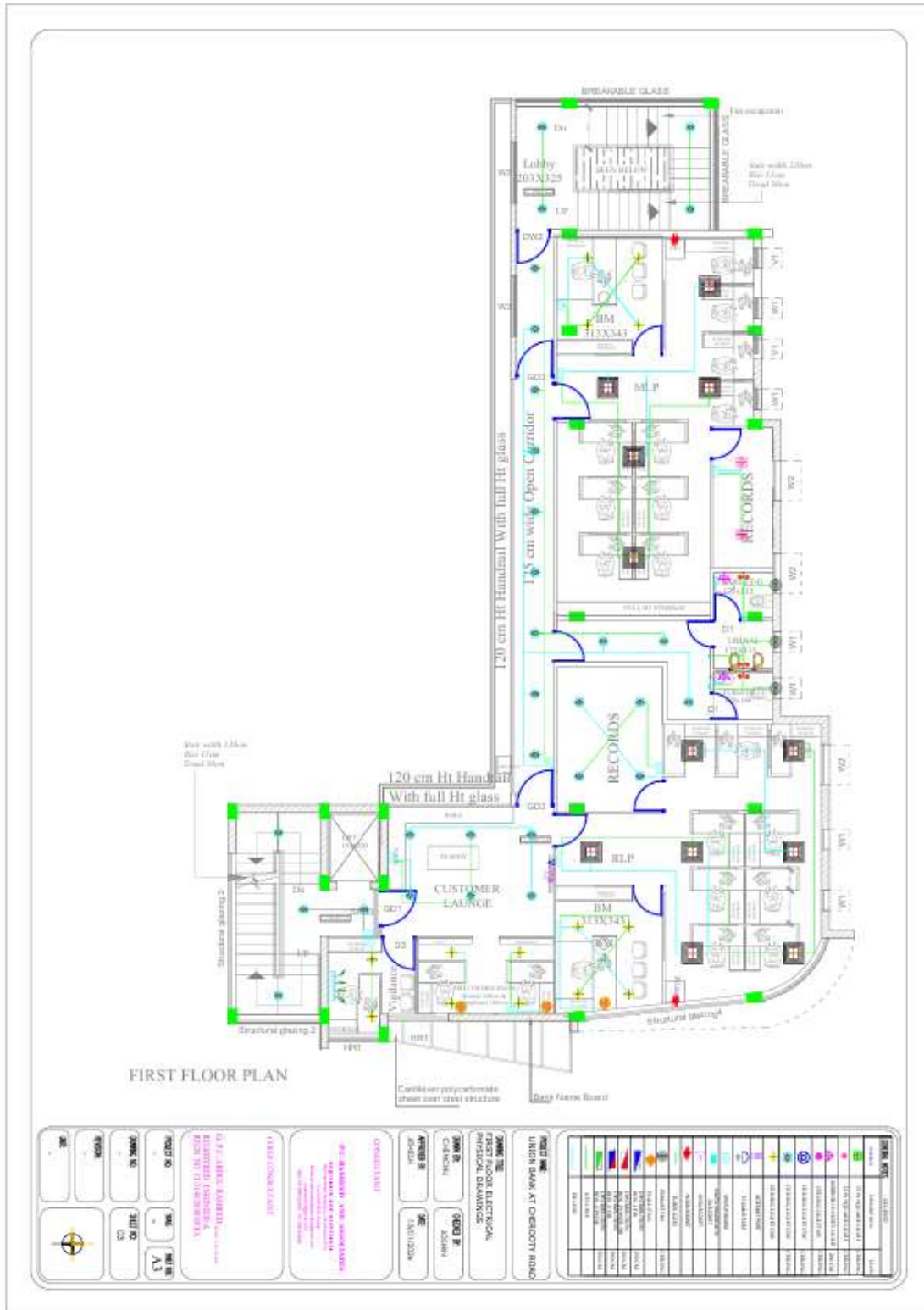


THIRD FLOOR PLAN

**PROPOSED REGIONAL OFFICE BUILDING FOR UNION BANK OF INDIA
 TP NO 2031-26/16 OF NAGARAM VILLAGE, RW NO.11 EW NO.61 OF KOZHIKODE CORPORATION**

<p>REMARKS:</p> <ul style="list-style-type: none"> 1. For details refer to drawings of all structural members and connections. 2. All structural members shall be designed as per IS 456:2000 and IS 800:2008. 3. All structural members shall be designed as per IS 456:2000 and IS 800:2008. 4. All structural members shall be designed as per IS 456:2000 and IS 800:2008. 5. All structural members shall be designed as per IS 456:2000 and IS 800:2008. 	<p>DATE: 10/11/2021</p> <p>P.C. RASHEED AND ASSOCIATES ARCHITECTS</p> <p>Plot No. 10/11, 10/12, 10/13, 10/14, 10/15, 10/16, 10/17, 10/18, 10/19, 10/20, 10/21, 10/22, 10/23, 10/24, 10/25, 10/26, 10/27, 10/28, 10/29, 10/30, 10/31, 10/32, 10/33, 10/34, 10/35, 10/36, 10/37, 10/38, 10/39, 10/40, 10/41, 10/42, 10/43, 10/44, 10/45, 10/46, 10/47, 10/48, 10/49, 10/50, 10/51, 10/52, 10/53, 10/54, 10/55, 10/56, 10/57, 10/58, 10/59, 10/60, 10/61, 10/62, 10/63, 10/64, 10/65, 10/66, 10/67, 10/68, 10/69, 10/70, 10/71, 10/72, 10/73, 10/74, 10/75, 10/76, 10/77, 10/78, 10/79, 10/80, 10/81, 10/82, 10/83, 10/84, 10/85, 10/86, 10/87, 10/88, 10/89, 10/90, 10/91, 10/92, 10/93, 10/94, 10/95, 10/96, 10/97, 10/98, 10/99, 10/100, 10/101, 10/102, 10/103, 10/104, 10/105, 10/106, 10/107, 10/108, 10/109, 10/110, 10/111, 10/112, 10/113, 10/114, 10/115, 10/116, 10/117, 10/118, 10/119, 10/120, 10/121, 10/122, 10/123, 10/124, 10/125, 10/126, 10/127, 10/128, 10/129, 10/130, 10/131, 10/132, 10/133, 10/134, 10/135, 10/136, 10/137, 10/138, 10/139, 10/140, 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C. ABUL KALAM S. TAJI, F.I.T.E., R.E. REGISTERED ENGINEER REG. NO. CHN 8288 BREA</p>	<p>SCALE: 1/10 (2/3)</p> <p>FURNITURE LAYOUT PLAN - THIRD FLOOR</p> <p>Date: 10/11/2021 Prepared by: P. C. RASHEED Checked by: P. C. ABUL KALAM S. TAJI</p>	<p>FD 04</p>
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ELECTRICAL PLAN - FIRST FLOOR



Regional Office-Kozhikode

KSHB Building, 1ST Floor, Vikas Nagar Chakkorathukulam, East Hill Road Kozhikode - 006

TENDER FOR

Construction of New G+3 Floor Commercial building along with Interior Furnishing work and Demolition of Existing Structure at Cherooty Road, Kozhikode, Kerala.

PART-II

TENDER SPECIFICATION AND BILL OF QUANTITIES

PRICE BID

<p>Owner:</p> <p>Regional Office , Kozhikode</p> <p>KSHB BUILDING, 1ST Floor, Vikas Nagar Chakkorathukulam, East Hill Road Kozhikode - 006</p> <p>Tel: 0495 2772325, 8848039042, 8547634848</p> <p>Email:</p> <p>rh.kozhikode@unionbankofindia.bank.in, smpdrokoz@unionbankofindia.bank.in</p>	<p>Consultant:</p> <p>M/S P.C. Rasheed and Associates</p> <p>Engineers and Architects</p> <p>64/1355,Rarichan Road, Nadakkavu</p> <p>Eranhipalam P O,</p> <p>Calicut-673006- Kerala</p> <p>Tel: 9895444441,9497444441</p> <p>Email:</p> <p>pcrasheedclt@gmail.com, pcrasheedandassociates@gmail.com 9895444441,9497444441</p>
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ABSTRACT OF COST

Subject: Construction of New G+3 Floor Commercial building along with Interior Furnishing work and Demolition of Existing Structure at Cherooty Road, Kozhikode, Kerala.

Details of tender amount quoted by the contractor:

PART NO.	PARTICULARS OF WORKS	AMOUNT IN FIGURES	AMOUNT IN WORDS
1	CIVIL CONSTRUCTION WORK	Rs.	
2	INTERIOR FURNISHING WORKS	Rs.	
3	PLUMBING & SANITARY WORK	Rs.	
4	ELECTRICAL WORKS	Rs.	
5	FIRE FIGHTING WORK	Rs.	
6	HVAC WORKS	Rs.	
7	PA SYSTEM	Rs.	
8	INSTALLATION OF 8 PASSENGER AUTOMATIC ELEVATOR	Rs.	
9	INSTALLATION OF SOLAR POWER STATION	Rs.	
10	INSTALLATION OF MECHANICAL PARKING SYSTEM	Rs.	
11	DEMOLISHING OF EXISTING BUILDING	Rs.	
	TOTAL AMOUNT	Rs.	

(Total Quoted Amount in Words) =

Rate inclusive of all Material charges, Transportation, Local levies as applicable, Loading, Unloading, Lifting- Shifting, Erection, Testing, Commissioning, Scaffolding, VAT, Sales tax, GST any additional/ special duties, excise, custom duty etc. as applicable.

INDEX

SI NO	TITLE
01	INSTRUCTIONS
02	SUMMARY
03	BILL OF QUANTITIES

INSTRUCTIONS

1. The Bill of Quantities shall be read in conjunction with the Drawings, Conditioners of Contract and Specifications, as these documents are jointly explanatory and descriptive of the works included in the Contract.
2. General directions and descriptions of work and materials given elsewhere in the Contract documents are not necessarily repeated in the Bill of Quantities. Reference is to be made to the other documents for information.
3. The Contractor shall be deemed to have visited the site before preparing his Tender and to have examined for himself the conditions under which the work will be priced and all other factors affecting the execution of the work and the cost thereof.
4. The Quantities of work and material in the Bill of Quantities are not to be considered as limiting or extending the scope of work to be done and materials to be supplied by the Contractor. The quantities in the Bill of Quantities are an estimate of the amount work but the work will be measured on complete and the contractor will be paid on the actual measurement of work approved by the Architect.
5. Any special methods of measurements used are stated at the head of or in text of the Bills of Quantities for the items affected. All other items are measured net in accordance with the drawings and no allowance has been made for wastage. Unless otherwise specified measurements shall be as per relevant Indian Standard.
6. A price or rate in figures is to be entered against the item in the Bill of Quantities, whether quantities are stated or not. Item against which no price is entered will be considered as covered by other prices or rates in the Bills.
7. The prices and rates interested are to be the full inclusive value of the works described under the various items, including all costs and expenses which may be required for the completion of the work described, together with all cost and obligations set forth or implied in the conditions of Contract, Specifications and the Drawings.
8. Some finishing items may be quantity wise completely altered (either added or omitted) and the same shall not affect any rates quotes.
9. Where prices have been entered against Lump sum items, payment for such affected items shall be made in proportion to the extent of which works have been done at the time of billing and the same is at discretion of the Architect.
10. “Providing and Fixing” shall mean that the Contractor has to provide such materials not being procured and borne by the Bank, but which are required for the item and if no materials need be provided by the Contractor, the rate shall be only for fixing of the component covered in the item.

SUMMARY

Subject: Construction of New G+3 Floor Commercial building along with Interior Furnishing work and Demolition of Existing Structure at Cherooty Road, Kozhikode, Kerala.

PART 1

ABSTRACT OF CIVIL WORKS

S NO	DESCRIPTION	AMOUNT - Rs.
1	SITE DEVELOPMENT	
2	DEWATERING	
3	EARTH WORK	
4	PILING WORKS	
5	R.C.C AND STEEL REINFORCEMENT	
6	CENTERING AND SHUTTERING	
7	PCC WORKS	
8	MASONRY WORKS	
9	PLASTERING	
10	PAINTING	
11	WATER PROOFING	
12	UPVC DOORS AND WINDOWS	
13	WOOD WORKS - DOORS	
14	FIRE DOORS	
15	STRONG ROOM DOOR	
16	ALUMINUM AND GLASS WORKS (STRUCTURAL GLAZING) & WINDOW GRILLS	
17	ROLLING SHUTTERS	
18	GRANITE WORKS	
19	FLOORING AND WALL TILES	
20	HANDRAILS	
21	ROOF WORKS WITH POLYCARBONATE SHEET	

22	LETTERING	
23	SCAFFOLDING SYSTEM	
24	ROAD & PAVER BLOCK WORK	
25	SHEET PILING	
26	CORE CUTTING	
27	ANTI-TERMITE TREATMENT	
	TOTAL FOR CIVIL WORKS	
	ADD GST@18%	
	GRAND TOTAL	

PART II

ABSTRACT OF INTERIOR FURNISHING WORKS

S NO	DESCRIPTION	AMOUNT - Rs.
1	GENERAL FALSE CEILING	
2	PARTITIONS /RELATED WORKS	
3	DOORS	
4	FURNITURE AND COUNTER RELATED ITEMS	
5	STORAGE UNIT AND RELATED ITEMS	
6	WALL PANELLING	
7	GENERAL ITEMS	
8	ATM WORKS	
	TOTAL FOR INTERIOR FURNISHING WORKS	
	ADD GST@18%	
	GRAND TOTAL	

PART III

ABSTRACT OF PLUMBING & SANITARY WORK

S NO	DESCRIPTION	AMOUNT - Rs.
1	SANITARY FIXTURES & ACCESSORIES	
2	CP FITTINGS, VALVES & ACCESSORIES	
3	SOIL, WASTE AND RAIN WATER PIPING	
4	WATER SUPPLY PIPING	
5	INSPECTION CHAMBER/ MANHOLE/ GULLY TRAP	
6	PIPE SUPPORTS AND STRUCTURAL	
7	ACCESSORIES	
	TOTAL FOR PLUMBING & SANITARY WORK	
	ADD GST@18%	
	GRAND TOTAL	

PART IV

ABSTRACT OF ELECTRICAL WORKS

S NO	DESCRIPTION	AMOUNT - Rs.
1	H T INSTALLATION	
2	PANEL BOARD	
3	CABLING & END TERMINATION	
4	DIESEL GENERATOR	
5	UPS	
6	WIRING,	
7	LIGHT FIXTURES AND FANS	
8	CABLE TRAYS	
9	DISTRIBUTION BOARD	
10	NETWORK CABLING	
11	T V CABLING	
12	TELEPHONE CABLING	
13	MISELLANEAOUS	
14	DOCUMENTS/APPROVALS	
	TOTAL FOR ELECTRICALWORK	
	ADD GST@18%	
	GRAND TOTAL	

**PART V
ABSTRACT OF FIRE FIGHTING WORK**

S NO	DESCRIPTION	AMOUNT - Rs.
1	FIRE PUMPS & ACCESSORIES	
2	FIRE HYDRANT & SPRINKLER SYSTEM	
3	FIRE DETECTION & ALARM SYSTEM	
4	PUBLIC ADDRESS TALK BACK SYSTEM	
5	FIRE EXTINGUISHERS	
	TOTAL FOR FIRE FIGHTING WORK	
	ADD GST@18%	
	GRAND TOTAL	

PART VI

ABSTRACT OF HVAC WORKS

S NO	DESCRIPTION	AMOUNT - Rs.
1	VRF OUTDOOR UNIT	
2	CASSETTE TYPE INDOOR UNIT - VRF SYSTEM	
3	COPPER REFRIGERANT PIPING WITH 18G HD COPPER PIPES	
4	REFRIGERANT GAS CHARGING	
5	REFNET JOINTS	
6	COMMUNICATION CABLE BETWEEN INDOOR AND OUTDOOR UNITS	
7	CONDENSATE PIPING	
8	OUTDOOR STAND	
9	SUPPLY ACCESSORIES	
	TOTAL FOR HVAC WORK	
	ADD GST@18%	
	GRAND TOTAL	

PART VII

ABSTRACT OF PUBLIC ADDRESSING SYSTEM

Sl.No	Item Description	Amount.)
1	PUBLIC ADDRESS SYSTEM MAIN CONTROL PANEL	
2	MUSIC PLAYER	
3	P A SPEAKER WITHOUT VOLUME CONTROL	
4	P A SPEAKER WITHOUT VOLUME CONTROL	
5	WIRED TYPE MICROPHONE SYSTEM.	
6	WIRELESS TYPE MICROPHONE ALL ACCESSORIES.	
	TOTAL FOR PA SYSTEM	
	ADD GST@18%	
	GRAND TOTAL	

PART VIII, IX, X, XI

ABSTRACT OF OTHER ITEMS

PART No.	Item Description	Amount.)
VIII	PASSENGER AUTOMATIC ELEVATOR	
IX	SOLAR POWER STATION	
X	MECHANICAL PARKING SYSTEM	
XI	DEMOLISHING OF EXISTING BUILDING	
	ADD GST@18%	
	GRAND TOTAL	

BILL OF QUANTITIES

Subject: Construction of New G+3 Floor Commercial building along with Interior Furnishing work and Demolition of Existing Structure at Cherooty Road, Kozhikode, Kerala.

PART I - BOQ FOR CIVIL WORKS

No	Quantity	Code	Description of works	Unit	Rate	Amount
1-SITE DEVELOPMENT						
1	695.73	2.32	Clearing grass and removal of the rubbish up to a distance of 50 m outside the periphery of the area cleared.	1 sqm		
2	347.87	2.31	Clearing jungle including uprooting of rank vegetation, grass, brush wood, trees and saplings of girth up to 30 cm measured at a height of 1 m above ground level and removal of rubbish up to a distance of 50 m outside the periphery of the area cleared	1 sqm		
3	695.73	2.28.1	Surface dressing of the ground including removing vegetation and in-equalities not exceeding 15 cm deep and disposal of rubbish, lead up to 50 m and lift up to 1.5 m. All kinds of soil	1 sqm		
TOTAL						
2-DEWATERING						
1	360.00	60.2.6	BAILING OUT WATER USING PUMP ABOVE 30HP AND UP TO 40HP - Bailing out water with engine and pump set above 30HP and up to 40HP, including conveyance to site and erection, cost of fuel, lubrication oil and other stores, pay of staff etc complete	1 hrs		
TOTAL						

3-EARTH WORK						
1	674.75	2.8.1	Earth work in excavation by mechanical means (Hydraulic excavator) /manual means in foundation trenches or drains (not exceeding 1.5 m in width or 10 sqm on plan), including dressing of sides and ramming of bottoms, lift up to 1.5 m, including getting out the excavated soil and disposal of surplus excavated soil as directed, within a lead of 50 m. All kinds of soil	1 cum		
TOTAL						
4- PILING						
1	396.80	20.2.2	Boring, providing and installing bored cast-in-situ reinforced cement concrete piles of grade M-25 of specified diameter and length below the pile cap to carry a safe working load not less than specified, excluding the cost of steel reinforcement but including the cost of boring, with bentonite solution and temporary casing of appropriate length for setting out and removal of same and the length of the pile to be embedded in the pile cap etc. all complete, including removal of excavated earth with all lifts and leads (Length of pile for payment shall be measured upto bottom of pile cap). 500 mm dia piles	1 m		
2	396.80	20.2.3	Boring, providing and installing bored cast-in-situ reinforced cement concrete piles of grade M-25 of specified diameter and length below the pile cap to carry a safe working load not less than specified, excluding the cost of steel reinforcement but including the cost of boring, with bentonite solution and temporary casing of appropriate length for setting out and removal of same and the length of the pile to be embedded in the pile cap etc. all complete, including removal of excavated earth with all lifts and leads (Length of pile for payment shall be measured upto bottom of pile cap). 600 mm dia piles	1 m		
3	12.51	15.3	Demolishing R.C.C. work manually / by mechanical means including stacking of steel bars and disposal of unserviceable material with in 50	1 cum		

			metres lead as per direction of Engineer -in-Charge.			
4	21374.45	5.22.6	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth level. Thermo - Mechanically Treated bars of grade Fe-500D or more	1 kg		
5	2.00	20.6.3.1	Vertical load testing of piles in accordance with IS 2911(Part IV) including installation of loading platform and preparation of pile head or construction of test cap and dismantling of test cap after test etc. complete as per specification & the direction of engineer -in-Charge. Group of two or more piles upto 50 tonne capacity Initial test	1 per test		
6	2.00	20.6.3.2	20.6.3.2. Vertical load testing of piles in accordance with IS 2911(Part IV) including installation of loading platform and preparation of pile head or construction of test cap and dismantling of test cap after test etc. complete as per specification & the direction of engineer -in-Charge. Group of two or more piles upto 50 tonne capacity Routine test	1 per test		
TOTAL						
5- R.C.C AND STEEL REINFORCEMENT						
1	307.11	5.33.1.2	Providing and laying in position ready mixed or site batched design mix cement concrete for reinforced cement concrete work; using coarse aggregate and fine aggregate derived from natural sources, Portland Pozzolana / Ordinary Portland /Portland Slag cement, admixtures in recommended proportions as per IS: 9103 to accelerate / retard setting of concrete, to improve durability and workability without impairing strength; including pumping of concrete to site of laying, curing, carriage for all leads; but excluding the cost of centering, shuttering, finishing and reinforcement as per direction of the engineer-in-charge; for the following grades of concrete. Note: Extra cement up to 10% of the minimum specified cement content in design mix shall be payable separately. In case the cement content in design mix is more than 110% of the specified minimum	1 cum		

			cement content, the contractor shall have discretion to either re-design the mix or bear the cost of extra cement. All work upto plinth level Concrete of M30 grade with minimum cement content of 350 kg /cum			
2	327.66	5.33.2.2.	Providing and laying in position ready mixed or site batched design mix cement concrete for reinforced cement concrete work; using coarse aggregate and fine aggregate derived from natural sources, Portland Pozzolana / Ordinary Portland /Portland Slag cement, admixtures in recommended proportions as per IS: 9103 to accelerate / retard setting of concrete, to improve durability and workability without impairing strength; including pumping of concrete to site of laying, curing, carriage for all leads; but excluding the cost of centering, shuttering, finishing and reinforcement as per direction of the engineer-in-charge; for the following grades of concrete. Note: Extra cement up to 10% of the minimum specified cement content in design mix shall be payable separately. In case the cement content in design mix is more than 110% of the specified minimum cement content, the contractor shall have discretion to either re-design the mix or bear the cost of extra cement. All work above plinth level upto floor V level Concrete of M30 grade with minimum cement content of 330 kg /cum	1 cum		
3	45798.08	5.22.6	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete upto plinth level. Thermo - Mechanically Treated bars of grade Fe-500D or more	1 kg		
4	55863.57	5.22A.6	Steel reinforcement for R.C.C work including straightening, cutting, bending, placing in position and binding all complete above plinth level. Thermo - Mechanically Treated bars of grade Fe-500D or more	1 kg		
TOTAL						

6- CENTERING AND SHUTTERING						
1	232.44	5.9.1	Centering and shuttering including strutting, etc. and removal of form for: Foundations, footings, bases of columns, etc for mass concrete	1 sqm		
2	884.90	5.9.2	Centering and shuttering including strutting, etc. and removal of form for: Walls (any thickness) including attached pilasters, buttresses, plinth and string courses etc.	1 sqm		
3	1344.48	5.9.3	Centering and shuttering including strutting, etc. and removal of form for: Suspended floors, roofs, landings, balconies and access platform	1 sqm		
4	1691.08	5.9.5	Centering and shuttering including strutting, etc. and removal of form for: Lintels, beams, plinth beams, girders bressumers and cantilevers	1 sqm		
5	809.41	5.9.6	Centering and shuttering including strutting, etc. and removal of form for: Columns, Pillars, Piers, Abutments, Posts and Struts	1 sqm		
6	198.83	5.9.7	Centering and shuttering including strutting, etc. and removal of form for: Stairs, (excluding landings) except spiral - staircases)	sqm		
7	185.41	5.9.16.1	Centering and shuttering including strutting, etc. and removal of form for: Edges of slabs and breaks in floors and walls Under 20 cm wide	1 m		
TOTAL						
7 - PCC WORKS						
1	37.22	4.1.8	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level: 1:4:8 (1 cement : 4 coarse sand : 8 graded stone aggregate 40 nominal size)	1 cum		
TOTAL						

8- MASONRY WORKS						
1	20.67	60.7.1	DRY RUBBLE MASONRY _ Dry rubble without concrete levelling course masonry with good quality blasted rubble including packing to compactness to lines and levels cost and conveyance of all materials labour charges etc. complete as per direction of Consultant Architect.	1 cum		
2	18.74	50.6.7.2	Laterate masonry with neatly dressed laterate stone of size 40x20x15cm or nearest size in cement mortar 1:6 for super structure above plinth level up to floor two level including all cost of materials, labour charges etc.	1 cum		
3	2.81	50.6.1.4	Solid block masonry using pre cast solid blocks (Factory made) of size 30x20x20cm or nearest available size confirming to IS 2185 part I of 1979 for foundation and plinth with thickness 20cm and above in: CM 1:6 (1 cement : 6 coarse sand) etc complete	1 cum		
3	69.99	50.6.1.5	Solid block masonry using pre cast solid blocks (Factory made) of size 30x20x20cm or nearest available size confirming to IS 2185 Part I of 1979 for super structure up to floor two level thickness 20cm and above in: CM 1:6 (1 cement : 6 coarse sand) etc complete	1 cum		
4	33.55	50.6.1.6	Solid block masonry using pre cast solid blocks (Factory made) of size 30x20x20cm or nearest available size confirming to IS 2185 part I of 1979 for super structure above floor two level upto floor five level thickness 20cm and above in : CM 1:6 (1 cement : 6 coarse sand sand) etc complete	1 cum		
5	26.66	50.6.1.8	Solid block masonry using pre cast solid blocks (Factory made) of size 40x20x15cm or nearest available size confirming to IS 2185 part I of 1979 for super structure up to floor two level with thickness 15cm in: CM 1:6 (1 cement : 6 coarse sand etc complete	1 cum		
6	19.34	50.6.1.9	Solid block masonry using pre cast solid blocks(Factory made) of size 40x20x15 cm or nearest available size confirming to IS 2185 part I of 1979 for super structure above floor two level upto floor five level with thickness 15cm in: CM 1:6 (1 cement : 6 coarse sand) etc complete	1 cum		

7	19.62	50.6.3.2	Solid block masonry using pre cast solid blocks (Factory made) of size 40x20x10 cm or nearest available size confirming to IS 2185 part I of 1979 for super structure up to floor two level for 10 cm thick wall in : CM 1:6 (1 cement : 6 coarse sand) including cost of scaffolding complete	1 cum		
TOTAL						
9- PLASTERING						
1	338.32	13.1.1	12 mm cement plaster of mix: 1:4 (1 cement : 4 fine sand)	1 sqm		
2	4329.80	13.16.1	6 mm cement plaster of mix: 1:3 (1 cement : 3 fine sand)	1 sqm		
3	798.80	13.73.1	Forming groove of uniform size in the top layer of washed stone grit plaster as per approved pattern using wooden battens, nailed to the under layer, including removal of wooden battens, repair to the edges of panels and finishing the groove complete as per specifications and directions of the Engineer-in-Charge: 15 mm wide and 15 mm deep groove	1 metre		
TOTAL						
10- PAINTING						
1	6313.78	13.43.1	Primer: Applying one coat of water thinnable cement primer of approved brand and manufacture on wall surface: Water thinnable cement primer	1 Sqm		
2	5100.04	13.80	Putty : Providing and applying white cement based putty of average thickness 1 mm, of approved brand and manufacturer, over the plastered wall surface to prepare the surface even and smooth complete	1 Sqm		
3	5100.04	13.60.1	Internal - Emulsion painting Wall painting with acrylic emulsion paint of approved brand and manufacture to give an even shade: Two or more coats on new work	1 Sqm		
4	136.14	13.62.1	Painting on joineries Painting with synthetic enamel paint of approved brand and manufacture to give an even shade: Two or more coats on new work	1 sqm		
5	1401.11	13.46.1	External - weatherproof painting Finishing walls with Acrylic Smooth exterior paint (weatherproof) of required shade: New work (Two or more coat applied @	1 sqm		

			1.67 ltr/10 sqm over and including priming coat of exterior primer applied @ 2.20 kg/10 sqm)			
6	38.96	13.48.3	Painting on steel works Finishing with Deluxe Multi surface paint system for interiors and exteriors using primer as per manufacturers specifications: Painting Steel work with Deluxe Multi Surface Paint to give an even shade. Two or more coat applied @ 0.90 ltr/10 sqm over an under coat of primer applied @ 0.80 ltr/10 sqm of approved brand and manufacture	1 sqm		
7	39.36	16.47.1	Painting on parking marks Painting runway/ taxi track /apron making with adequate nos of coats to give uniform finish with road marking paint of superior make as approved by the Engineer-in-Charge, i/c cleaning the surface of all dirt, scales, oil grease and other foreign material etc. and lining out complete. New work (Two or more coats)	1 sqm		
TOTAL						
11- WATER PROOFING						
1	377.70	22.23.1	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservoir, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the Consultant Architect. The product performance shall carry guarantee for	1 sqm		

			10 years against any leakage. For vertical surface two coats @0.70 kg per sqm			
2	69.97	22.23.2	Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures like retaining walls of the basement, water tanks, roof slabs, podiums, reservoir, sewage & water treatment plant, tunnels / subway and bridge deck etc., prepared by mixing in the ratio of 5 : 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3 : 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineerin- charge. The product performance shall carry guarantee for 10 years against any leakage. For horizontal surface one coat @1.10 kg per sqm.	1	sqm	
3	277.96	22.3	Providing and laying water proofing treatment to vertical and horizontal surfaces of depressed portions of W.C. kitchen and the like consisting of : i) I course of applying cement slurry @ 4.4 Kg/ sqm mixed with water proofing compound conforming to IS: 2645 in recommended proportions including rounding off junction of vertical and horizontal surface. ii) II course of 20 mm cement plaster 1:3 (1 cement : 3 coarse sand) mixed with water proofing compound in recommended proportion including rounding off junction of vertical and horizontal surface. iii) III course of applying blown or residual bitumen applied hot at 1.7 kg per sqm of area. iv) IV course of 400 micron thick PVC sheet. (Overlaps at joints of PVC sheet should be 100 mm wide and pasted to each other with bitumen @ 1.7 Kg/ sqm.	1	sqm	

4	296.10	22.6	<p>Providing and laying water proofing treatment on roofs of slabs by applying cement slurry mixed with water proofing cement compound consisting of applying : a) after surface preparation, first layer of slurry of cement @ 0.488 kg/ sqm mixed with water proofing cement compound @ 0.253 kg/ sqm. laying second layer of fibre glass cloth when the first layer is still green. Overlaps of joints of fibre cloth should not be less than 10 cm. c) third layer of 1.5 mm thickness consisting of slurry of cement @ 1.289 kg/ sqm mixed with water proofing cement compound @ 0.670 kg/sqm and coarse sand @ 1.289 kg/sqm. This will be allowed to air cure for 4 hours followed by water curing for 48 hours. The entire treatment will be taken upto 30 cm on parapet wall and tucked into groove in parapet all around. d) fourth and final layer of brick tilling with cement mortar (which will be paid for separately. For the purpose of measurement the entire treated surface will be measured)</p>	1	sqm		
TOTAL							
12 - UPVC DOORS AND WINDOWS							
1	27.28	9.118.1	<p>Providing and fixing to existing door frames 24 mm thick factory made PVC door shutters made of styles and rails of a uPVC hollow section of size 59x24 mm and wall thickness 2 mm (± 0.2 mm) with inbuilt edging on both sides. The styles and rails mitred and joint at the corners by means of M.S. galvanised/plastic brackets of size 75x220 mm having wall thickness 1.0 mm and stainless steel screws. The styles of the shutter reinforced by inserting galvanised M.S. tube of size 20x20 mm and 1 mm (± 0.1 mm) wall thickness. The lock rail made up of 'H' section, a uPVC hollow section of size 100x24 mm and 2 mm (± 0.2 mm) wall thickness, fixed to the shutter styles by means of plastic/galvanised M.S. 'U' cleats. The shutter frame filled with a uPVC multi-chambered single panel of size not less than 620 mm, having over all thickness of 20 mm and 1 mm (± 0.1 mm) wall thickness. The panels filled vertically and tie bar at two places by inserting horizontally 6 mm galvanised M.S. rod and fastened with nuts and</p>	1	sqm		

			washers, complete as per manufacturer's specification and direction of Engineer-in-charge(For W.C. and bathroom door shutter).			
2	189.20	9.117.1	Providing and fixing factory made uPVC door frame made of uPVC extruded sections having an overall dimension as below (tolerance ± 1 mm), with wall thickness 2.0mm (± 0.2 mm), corners of the door frame to be jointed with galvanized brackets and stainless steel screws, joints mitred and plastic welded. The hinge side vertical of the frames reinforced by galvanized M.S. tube of size 19 x 19 mm and 1 mm (± 0.1 mm) wall thickness and 3 nos. stainless steel hinges fixed to the frame complete as per manufacturer's specification and direction of Engineer-in-charge Extruded section profile size 48x40 mm	1	m	
TOTAL						
13- WOOD WORKS - DOORS						
1	0.41	50.9.1.1	Providing wood work in frames of doors, windows, clerestory windows and other frames, wrought framed and fixed in position with hold fast lugs or with dash fasteners of required dia & length (hold fast lugs or dash fastener shall be paid for separately), using good quality Anjili wood /jack wood	1	cum	
2	7.09	50.9.2.1	Providing and fixing paneled and glazed shutters for doors, windows and clerestory windows, 35 mm thick shutters including ISI marked M.S. pressed butt hinges bright finished of required size with necessary screws, excluding panelling which will be paid for separately, all complete as per	1	sqm	

			direction of Engineerin - charge. using Anjili/ Jack wood			
3	10.77	50.9.4.1	Providing and fixing paneling or paneling and glazing in paneled or paneled and glazed shutters for doors, windows and clerestory windows (Area of opening for panel inserts excluding portion inside grooves or rebates to be measured) paneling for paneled or paneled and glazed shutters 25 mm to 40 mm thick using good quality Anjili/ Jack wood	1	sqm	
TOTAL						
14 - FIRE DOORS						
1	9.35	od	Providing & Fixing of 46 mm thick Steel Fire Check Door (Double/Single leaf) of 240 minutes Fire Rating confirming to BS:476 Part-22 and IS:3614 PartII. Door shutter are fabricated with 1 mm (20 Gauge) thick Galvanized Steel Sheet Pressed formed to provide a 46 mm fully flush double skin panel lock with seam joint. The internal construction of panel specially design with Honey comb structure along with reinforcement at all around. The door frames Single / Double Rebated made from 1.6 mm (16 Gauge) thick Galvanized Steel Sheet pressed form of size 143 mm x 57 mm and including of SS Ball Bearing Hinges of 4" x 3" x 3mm complete with SS Screws (100 x 75 x 3 mm), 120 Mints Fire Rated Clear Glass Size of 200 X 300 mm X 6 mm Thick Vision Panel/ Louvers., 10 X 150 mm Long Fastners with PVC Cap., Flush Bolt 300 mm Long.	1	sqm	
15- STRONG ROOM DOORS						

2	1.00	od	Providing and fixing BIS labelled Class 'B' Strong Room (Vault) Door conforming to IS:11188 (Part-1):2014, of heavy-duty composite steel construction with torch and tool resisting barrier material, complete with two dual-control unpickable locks (min. 8 levers) operating shooting bolts (6 each side, 38 mm dia), ventilating grill gate with dual-control lock, Class-B air ventilator with exhaust fan and cage (IS:14387:2005), provision for time lock, BIS metallic label, and complete installation with grouting, fasteners and accessories, as directed by the Engineer-in-Charge.	1	no		
16- ALUMINUM AND GLASS WORKS (STRUCTURAL GLAZING) & WINDOW GRILLS							
1	455.53	21.1.1.2	Providing and fixing aluminum work for doors, windows, ventilators and partitions with extruded built up standard tubular sections/ appropriate Z sections and other sections of approved make conforming to IS : 733 and IS: 1285, fixing with dash fasteners of required dia and size, including necessary filling up the gaps at junctions, i.e. at top, bottom and sides with required EPDM rubber/ neoprene gasket etc. Aluminum sections shall be smooth, rust free, straight, mitred and jointed mechanically wherever required including cleat angle, Aluminium snap beading for glazing /paneling, C.P. brass/ stainless steel screws, all complete as per architectural drawings and the directions of Engineer-in-charge.(Glazing, paneling and dash fasteners to be paid for separately): For fixed portion Powder coated aluminum (minimum thickness of powder coating 50 micron)	1	kg		
2	266.06	21.1.2.2	For shutters of doors, windows & ventilators including providing and fixing hinges / pivots and making provision for fixing of fittings wherever required including the cost of EPDM rubber/ neoprene gasket required (Fittings shall be paid for separately) Powder coated aluminum (minimum thickness of powder coating 50 micron)	1	kg		

3	365.70	21.19.1	Filling the gap in between aluminum/ stone/ wood frame and adjacent RCC/ Brick/ Stone/ wood/ Ceramic/ Gypsum work by providing weather/structural non sag elastomeric PU sealant over backer rod of approved quality as per architectural drawings and direction of Engineer-in-charge complete, complying to ASTM C920, DIN 18540-F & ISO 11600 Upto 5 mm depth and 5 mm width	1	metre		
4	113.04	21.3.3	Providing and fixing glazing in aluminum door, window, ventilator shutters and partitions etc. with EPDM rubber / neoprene gasket etc. complete as per the architectural drawings and the directions of Engineer - in -Charge. (Cost of aluminum snap beading shall be paid in basic item): With float glass panes of 5.50 mm thickness	1	sqm		
5	978.29	9.48.1	Providing and fixing M.S. Grills of required pattern in frames of windows etc. with M.S. flats, square or round bars etc. including priming coat with approved steel primer all complete. Fixed to steel windows by welding	1	kg		
6	3779.82	25.1	Providing and supplying aluminum extruded tubular and other aluminum sections as per the architectural drawings and approved shop drawings , the aluminum quality as per grade 6063 T5 or T6 as per BS 1474,including super durable powder coating of 60-80 microns conforming to AAMA 2604 of required colour and shade as approved by the Engineer-in-Charge. (The item includes cost of material such as cleats, sleeves, screws etc. necessary for fabrication of extruded aluminum frame work. Nothing extra shall be paid on this account).	1	kg		
7	279.69	od from 9.138	Providing and fixing glazing in with 9 mm toughened glass door shutters, fixed panels & partitions etc., with G.I. beading made out of 1.6 mm thick G.I. sheet (zinc coating not less than 120 gm/m ² ;) of size 20 x 33 mm screwed with M4 x 38 mm SS screws at distance 75 mm from the edges and 150 mm c/c , including applying a coat of approved fire resistant primer/powder coating of not less than 30 micron on G.I. beading,	1	sqm		

			& special ceramic tape of 5 x 20 mm size etc complete in all respect as per NBC 2016, IS 16231 (Part 3):2016 and as per direction of Engineer-in-charge			
8	141.90	od from 9.138	Providing and fixing glazing in with Float glass sheet of nomina thickness 5 mm (weight not less than 13.50 Kg/sqm) door shutters, fixed panels & partitions etc., with G.I. beading made out of 1.6 mm thick G.I. sheet (zinc coating not less than 120 gm/m ² ;) of size 20 x 33 mm screwed with M4 x 38 mm SS screws at distance 75 mm from the edges and 150 mm c/c , including applying a coat of approved fire resistant primer/powder coating of not less than 30 micron on G.I. beading, & special ceramic tape of 5 x 20 mm size etc complete in all respect as per NBC 2016, IS 16231 (Part 3):2016 and as per direction of Engineer-in-charge	1	sqm	
TOTAL						
17- ROLLING SHUTTERS						
1	35.48	10.6.1	Supplying and fixing rolling shutters of approved make, made of required size M.S. laths, interlocked together through their entire length and jointed together at the end by end locks, mounted on specially designed pipe shaft with brackets, side guides and arrangements for inside and outside locking with push and pull operation complete, including the cost of providing and fixing necessary 27.5 cm long wire springs manufactured from high tensile steel wire of adequate strength conforming to IS: 4454 - part 1 and M.S. top cover of required thickness for rolling shutters. 80x1.25 mm M.S. laths with 1.25 mm thick top cover	1	sqm	
TOTAL						

18 - GRANITE WORKS							
1	263.43	8.2.2.2	Providing and fixing 20 mm thick gang saw cut, mirror, polished, premoulded and prepolished, machine cut for kitchen platforms, vanity counters, window sills, facias and similar locations, of required size, approved shade, colour and texture laid over 20 mm thick base cement mortar 1:4 (1 cement : 4 coarse sand), joints treated with white cement, mixed with matching pigment, epoxy touch ups, including rubbing, curing, moulding and polishing to edges to give high gloss finish etc. complete at all levels.GRANITE- Lakha Red or Ruby Red Area of slab over 0.50 sqm Tolerance of ±2 mm shall be allowed for the thickness.The slabs shall be of selected quality, hard, sound, dense and homogeneous in texture free from cracks, decay, weathering and flaws.The slabs shall have the top (exposed) face polished before being brought to site, unless otherwise specified. Before starting the work the contractor shall get the samples of slabs approved by the Engineer-in-Charge.	1	sqm		
2	232.80	8.3.2	Providing edge moulding to 18 mm thick granite stone counters, vanities etc., including machine polishing to edge to give high gloss finish etc. complete as per design approved by Engineer -in-Charge. Granite work	1	metre		
TOTAL							
19- FLOORING AND WALL TILES							
1	654.30	OD from 11.41.2	Providing and fixing vitrified tiles of size 1200 × 600 mm, of approved make and shade, minimum 9-10 mm thick, conforming to IS: 15622, in flooring, laid over prepared base using polymer-modified tile adhesive, including cutting, levelling, alignment, and grouting with matching epoxy/cementitious grout, complete as per pattern, line and level, including all materials, labour, tools and accessories, as directed by the Engineer-in-Charge.	1	sqm		

2	338.88	OD from 11.46.2	Providing and fixing vitrified wall tiles of size 1200 × 600 mm, of approved make and shade, thickness 9 mm, conforming to IS:15622, in dado over prepared wall surface, fixed with polymer-modified tile adhesive of approved brand, including cutting, edge finishing, true to plumb and alignment, and grouting the joints with white cement / cementitious grout matching the shade of tiles, complete with all materials, labour, scaffolding and accessories, as per specifications and directions of the Engineer-in-Charge.	1	sqm		
3	274.96	OD from 11.41.2	Providing and fixing matt finish vitrified floor tiles of size 1200 × 600 mm, of approved make and shade, thickness 9 mm,, conforming to IS:15622, with anti-skid surface (minimum R9 rating), laid over prepared base using polymer-modified tile adhesive, including cutting, alignment, true to line and level, and grouting with matching epoxy/cementitious grout, complete with all materials and accessories, as directed by the Engineer-in-Charge.	1	sqm		
4	83.92	OD from 11.41.2	Providing and fixing vitrified tiles of size 1800 × 1200 mm, minimum 10 mm thick, for flooring including matching skirting, of approved make, shade and thickness, conforming to IS:15622, laid over prepared base using polymer-modified tile adhesive, including cutting, alignment, true to line and level, and grouting with matching epoxy/cementitious grout, complete with all materials, labour and accessories, as directed by the Engineer-in-Charge.	1	sqm		
5	40.13	11.26.1	Kota stone slab flooring over 20 mm (average) thick base laid over and jointed with grey cement slurry mixed with pigment to match the shade of the slab, including rubbing and polishing complete with base of cement mortar 1:4 (1 cement : 4 coarse sand) 25 mm thick	1	sqm		
6	8.34	11.27	Kota stone slab 20 mm thick in risers of steps, skirting, dado and pillars laid on 12 mm (average) thick cement mortar 1:3 (1 cement : 3 coarse sand) and jointed with grey cement slurry mixed with pigment to match the shade of the slabs, including rubbing and polishing complete.	1	sqm		

7	23.64	od from 7.38	Clay tile cladding work for wall lining upto 10 m height with special adhesive over 12mm thick bed of cement mortar 1:3 (1 cement :3 coarse sand), including pointing in white cement with an admixture of pigment to match the stone shade.	1	sqm		
TOTAL							
20 - HANDRAILS							
1	1891.92	10.28	Providing and fixing stainless steel (Grade 304) railing made of Hollow tubes, channels, plates etc., including welding, grinding, buffing, polishing and making curvature (wherever required) and fitting the same with necessary stainless steel nuts and bolts complete, i/c fixing the railing with necessary accessories & stainless steel dash fasteners, stainless steel bolts etc., of required size on the top of the floor or the side of waist slab with suitable arrangement as per approval of Engineer-in-charge, (for payment purpose only weight of stainless steel members shall be considered excluding fixing accessories such as nuts, bolts, fasteners etc.)	1	kg		
TOTAL							
21 - ROOF WORKS WITH POLYCARBONATE SHEET							
1	87.28	10.16.1	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	1	kg		
2	60.35	10.1	Structural steel work in single section, fixed with or without connecting plate, including cutting, hoisting, fixing in position and applying a priming coat of approved steel primer all complete.	1	kg		
3	4.94	10.19	Providing and fixing mild steel round holding down bolts with nuts and washer plates complete.	1	kg		

4	5.75	50.12.2 .3	Providing & fixing poly carbonate multi wall plain sheet 5 mm thick as approved by the Consultant Architect and should be supplied in a single length of 12 M or as decide by the Consultant Architect. The sheets shall be fixed using self drilling/ self tapping screw of size (5.5x55 mm) with EPDM seal complete upto any pitch in horizontal/ vertical/ curved surfaces, but excluding the cost of purlins, rafters, trusses, and including cutting to size and shapes where ever required.	1	sqm		
TOTAL							
22- LETTERING							
1	16.00	od	Lettering with stainless steel letters of 1 foot height of approved brand and manufacture	1	each		
2	13.00	od	Lettering with stainless steel letters of 20 cm height of approved brand and manufacture	1	each		
TOTAL							
23 - SCAFFOLDING SYSTEM							
1	1629.60	24.2	Providing and fixing double scaffolding system (Cup lock type) on the exterior side of building/structure, upto 25 metre height, above ground level, including additional rows of scaffolding in stepped manner as per requirement of site, made with 40 mm dia M.S. tube, placed 1.5 metre centre to centre, horizontal & vertical tubes joint with cup & lock system with M.S. Tubes, M.S. tube chakkus, M.S. clamps and staircase system in the scaffolding for working platform etc. and maintaining it in a serviceable condition for execution of work of cleaning and /or pointing and / or applying chemical and removing it thereafter. The scaffolding system shall be stiffened with bracings, runners, connecting with the building etc, wherever required, if feasible, for inspection of work at required locations with essential safety features for the workmen etc., complete as per directions and approval of Engineer-in-Charge. Note: - (1) The evaluational area of the scaffolding shall be measured for payment purpose, (2) The payment will be made once only for execution of all items of such works	1	sqm		

TOTAL					
24- ROAD & PAVER BLOCK WORK					
1	384.43	16.91.2	Providing and laying factory made chamfered edge Cement Concrete paver blocks in footpath, parks, lawns, drive ways or light traffic parking etc, of required strength, thickness & size/ shape, made by table vibratory method using PU mould, laid in required colour & pattern over 50mm thick compacted bed of sand, compacting and proper embedding/laying of inter locking paver blocks into the sand bedding layer through vibratory compaction by using plate vibrator, filling the joints with sand and cutting of paver blocks as per required size and pattern, finishing and sweeping extra sand. complete all as per direction of Engineer-in-Charge. 80 mm thick C.C. paver block of M-30 grade with approved color design and pattern.	1 sqm	
TOTAL					
25 - SHEET PILING					
1	306.18	60.65	Providing Z steel sheet pile of size 400x185x7.5/8.5 driving down vertically in lines and levels interlocking with adjacent piles with suitable pile driving unit and all accessories including all labour hire charges etc. complete and as per the directions of Consultant Architect.	1 sqm	
2	306.18	100.6.5 .6	Driving down the sheet pile and shoring.	1 sqm	
3	306.18	100.6.5 .7	Dismantling the sheet pile after use, cleaning and stacking properly	1 sqm	
TOTAL					
26 - CORE CUTTING					
1	40.00	100.41. 32	Boring RCC slab above 12cm and up to 15cm thick for providing pipes or fittings of size 120mm to 150mm and rectifying slab with cement concrete 1:2:4 using 20mm broken stone and finishing the top and bottom with cement mortar after placing the pipe or fittings	1 no	
27- ANTI-TERMITE TREATMENT					

1	368.28	2.34 + 2.35.3. 1	<p>Providing and applying pre-construction anti-termite treatment using approved chemical emulsion (Chlorpyriphos/ Lindane emulsifiable concentrate of 20%) to soil below foundations, plinth filling, column pits, trenches, and around the building perimeter as half litre per sqm.</p> <p>The treatment shall include uniform spraying/injection of chemical solution at specified dosage, creating a continuous chemical barrier against termite infestation, complete with all materials, labor, equipment, and safety measures, as per relevant IS standards and directions of the Engineer-in-Charge.</p>	1 SQM		
TOTAL						
TOTAL AMOUNT IN FIGURES						
TOTAL AMOUNT IN WORDS						

PART II - BOQ FOR INTERIOR FURNISHING WORKS

	SPECIFICATION	UNIT	QNTY	RATE	AMOUNT
SECTION -1					
GENERAL FALSE CEILING					
1	Gypboard plain ceiling including painting over putty				
	<p>Supply and fixing of M/S suspended ceiling as per levels marked in the mirror plan. Ceiling to have Aluminum perimeter channels of size. 0.55mm thick (Having one flange of 20mm and another flange of 30mm and web of 27mm)along the perimeter of ceiling screw fixed to brick wall/partition with the help of nylon sleeves and screws at 610mm C/C. Ceiling to have suspended GI intermediate channels of size 45mm (0.9mm thick with 2 flange of 15mm each) at a spacing at 1220mm c/c suspended using ceiling angle of width 25mm x 10mm x 0.55mmfixed to soffit with GI cleat and steel expansion fasteners. Ceiling sections of 0.55mm thickness having knuckled web of 51.5mm and 2 flanges of 26mm each with lips at 457mm c/c. 12.5mm tapered edge gypboard to be screw fixed to ceiling section with 25mm dry wall screws at 230mmc/c. Boards to be jointed and finished so as to have a flush look which includes filling and finishing the tapered and square edges of the boards with jointing compound after applying Joint paper tape and two coats of dry wall top coat suitable for gypboard. Rates to be inclusive of providing cutout for electrical fittings, grills, diffusers including providing / edge bead to be provided on edges Rate to be inclusive of all related labour, wastage, cost of materials transportation etc complete. Rates to be inclusive of finishing including two coats of emulsion over putty base .</p>	Sqm	647.70		
2	PVC CEILING				

	Supply and fixing of a PVC Panel Suspended Ceiling System at the marked levels. This includes erecting a fully specified Galvanized Iron (GI) framework, comprising perimeter channels 0.55 mm thick, suspended intermediate channels 0.9 mm thick, and ceiling angle supports, all fixed securely to the walls and soffit. The ceiling panels shall be 7 mm to 8 mm thick, waterproof PVC panels fixed to the grid using their tongue-and-groove system to achieve a flush, continuous finish. The rate is fully inclusive of all framework components, the PVC panels, perimeter trims, all necessary cutting and provision of cutouts for services (lights, grills), labour, and transportation.	Sqm	47.00		
3	WPC LOUVERS FOR CEILING				
	Supply and installation of a WPC (Wood-Plastic Composite) Louver ceiling system, fixed in the approved pattern (linear, grid, etc.). The louvers shall be high-density, Wood-Plastic Composite sections of width 50 mm x 50 mm tube made from a blend of wood fibre and thermoplastic (PVC/PE), ensuring they are 100% waterproof, termite-proof, fire-retardant, and highly resistant to fading and warping. Installation requires first constructing a rigid, levelled supporting framework of GI channels secured to the soffit. The WPC louvers shall then be mechanically fixed to this framework using manufacturer-approved concealed fasteners or clips, ensuring the specified gap or spacing between the louvers is maintained for the aesthetic design. The rate is inclusive of the WPC louvers, all framework materials, fixing hardware, cutting wastage, and the provision of neat perimeter edge finishing/lipping.	Sqm	47.95		
	TOTAL 1				
SECTION -2					
PARTITIONS /RELATED WORKS					
1	GENERAL DOUBLE SKIN PARTITIONS				
	Double skin partitions to be of various heights /finish as stated but of the following general specifications .Partitions to be 7.5 cm thick with inside base frame in 19mm Mply @45cm c/c (vertical & horizontal) .Bothsides of frame to be in laminated 9mm Mply fixed on base frame. Bottom sections to be screwed to floor base frame using suitable anchor bolts .Rates also to be inclusive of all related materials costs,labour,wastage etc complete.				

	Details of height/finish of various Dskin partitions				
1.1	Dwarf/full height partitions/partition above glass	Sqm	424.13		
2	Glass partitions (TOUGHENED 12MM GLASS)				
2.1	Providing and fixing of 12mm glass as per design for the Manager cabin/ front .Edge polished glass to be fixed using patch fittings . Rates also to be inclusive of all related materials costs,labour,wastage etc complete.	Sqm	45.31		
2.2	Providing and fixing of 12mm glass as per design for the cash cabin / single window front sides.Glass to be fixed using patch fittings as per detailed dwg enclosed. All glass edges to be polished. Rates also to be inclusive of all related materials costs,labour,wastage etc complete.	Sqm	24.21		
2.3	Providing and fixing sticker for etching on glass with necessary fixing arrangement and gums etc. complete. DAR 9.158	Sqm	20.92		
3	Aluminum partition in strong room				
	Supply and fixing of Aluminum partition with sliding door inside strongroom. Partition to be in powder coated Al frames with Laminated ply insertion (9mm ply with both sides laminate)	Sqm	18.29		
	TOTAL 2				
SECTION -3					
DOORS					
1	ENTRY DOOR /CABIN DOORS				
	Providing and fixing toughened glass door to Bank Entry/Manager Cabin . Door to be in toughened 12mm glass fixed on floor springs of good quality make.Doors to be hung using patch fittings. Rates to be inclusive of all hardware including SS handle 120 long on either side of door , locks etc complete. Rates to be inclusive of cost of materials, labor, transportation,scaffoldingetc complete	Sqm	51.84		
2	FLUSH DOORS (FD)				

	Providing and fixing general flush doors . Flush doors to be 2.5 cm thick with both side Mply . Front face of doors to be in laminated finish with inside also in laminate finish. Rates to include door opening panelling in 8 cm x 1.5 cm beechwood /Teakwood . Rates to further include cost of door closer ,handles , lock etc complete . All exposed wood to be melamine finished. Rates also to be inclusive materials costs, labour, transportation etc complete				
2.1	Door size 100/120X210	Nos	2.00		
3	CASH CABIN DOORS / SINGLE WINDOW DOOR				
	Providing and fixing of Cash cabin door.door to be 75 wide with 210 height. Door to be in 2.5 cm thick beech wood/Teakwood frame with top in Al grill insertion and bottom in laminated Mply insertion . Rates to include cost of hinges, locks (night latch) and SS handles etc. All exposed wood to be melamine polished. Rates to be inclusive of materials costs, labour, transportation including automatic door closure etc.	Nos	1.00		
4	Wicket door				
	Supply and fixing wicket door 90x105cms(laminate finish)	Nos	1.00		
	TOTAL 3				

SECTION -4					
FURNITURE AND COUNTER RELATED ITEMS					
1	Supply and positioning of Tables with side unit. Table and side unit to have edge banded laminated top. Tables to have one side draw unit (with three draws) and key board tray. Table front to be as per design with middle portion in white laminate with top and bottom bands in colour laminate border. Tables to have provision for CPU stand. All exposed ply edges to be lipped/edge banded. Adequate footrest to be provided below. Tables to have external laminated finish with inside also in laminate finish. All exposed wood to be melamine polished. Rates to include cost of hinges, locks and handles. Rates to be inclusive of materials costs, labour, transportation etc including 10mm edge polished glass over laminated top. All dimensions are in Centimetres				
a	Regional Manager Table - 200 X 100, Side unit - 100 X 40	Nos	1.00		
b	DY RH1 Table - 160 X 70	Nos	1.00		
c	DY RH2 Table - 170 X 70, Side unit - 100 X 40	Nos	1.00		
d	Chief Manager Table - 160 X 75, Side unit - 90X40	Nos	4.00		
e	Manager (MLP, Main Branch) Table - 200 X 70, Side unit -110 X 40	Nos	2.00		
f	Manager (RLP) Table - 215 X 70, Side unit -110 X 45	Nos	1.00		
g	Vigilance Officer Table - 170X60, Side unit - 80X40	Nos	1.00		
h	HR Head Table - 155 X 75, Side unit - 90 X 40	Nos	1.00		
i	Officer Table Table - 150x60, Side unit - 70x40	Nos	4.00		

j	Officer Table Table - 150x60, Side unit - 100x40	Nos	12.00		
k	Officer Table Table - 150x60, Side unit - 60x40	Nos	16.00		
l	Officer Table Table - 135x60, Side unit - 90x40	Nos	15.00		
m	Officer Table Table - 135x60, Side unit - 140x40	Nos	1.00		
n	Officer Table Table - 130x60, Side unit - 90x40	Nos	1.00		
o	Officer Table Table - 135x60, Side unit - 60x40	Nos	5.00		
p	Officer Table Table - 120x75, Side unit - 50x40	Nos	14.00		
q	Back-office table - 120x75	Nos	3.00		
r	PA TO RH Table - 150 x 60	Nos	1.00		
s	Back-office table - 135x60	Nos	2.00		
t	Head cashier Table 180 X 80, Side unit- 100X40	Nos	1.00		
2	Cash Cabin				
a	Providing and fixing of counter of above specification with staff top @75 lvl and customer top @105 lvl Provision for cash tray to be provided. (shutter door to be provided for pigeon hole)	Rm	1.80		
b	Aluminum grill for cash cabin top Officer table similar to Manager table with size -120x65 & side unit 50x45 (Top edge banded Laminate including 10mm edge polished glass over laminated top.)	Sqm	2.16		
c	Note bundling table	Nos	1.00		

	Supply and fixing of note bundling table				
3	Writing table				
	Supply and fixing of writing table of size 150x40 cms. Table to be made using 19mm ply with top in laminate finish. 5mm back painted glass to be laid over top. Top height to be at 100 lvl. Intermediate glass shelf in 12mm glass to be provided 15cms below top. Glass shelf to have edge polished finish. All exposed faces of table to have laminate finish. Rate to include cost towards cheque drop box, suggestion box (on either side of writing table below writing table) and pin up board of size 150x 120 cms above writing table. (external and internal faces has to be laminated)	Nos	1.00		
4	SOFA				
	Supplying and laying fully upholstered sofa with red colour upholstery. Frame is made with plywood and filling is with foam.	Rm	11.30		
5	3-SEATER STAINLESS STEEL SOFA				
	Supplying and laying three-seater Stainless Steel sofa with red colour upholstery and cushion.	no	5.00		
6	BIFMA CERTIFIED CHAIRS				
a	MID BACK REVOLVING CHAIR - BIFMA Certified				
	Supplying and laying medium back chairs with M.S. Stand with castors, P.U. Arms, revolving / tilting, Suspa / MDI Gas Lipped, molded foam seat (60 density 2.5" molded foam) and back (50 density 2" molded foam). Tapestry cloth shall be Red casmet.	no	79.00		
b	HIGH BACK REVOLVING CHAIR- BIFMA Certified				
	Supplying and laying high back chairs with M.S. Stand with castors, P.U. Arms, revolving / tilting, Suspa / MDI Gas Lipped, molded foam seat (60 density 2.5" molded foam) and back (50 density 2" molded foam). Tapestry cloth shall be Red casmet.	no	10.00		
c	VISITOR CHAIR - MID BACK- BIFMA Certified				
	Supplying and laying medium back chairs with M.S. Stand without castors, P.U. Arms, molded foam seat (60 density 2.5" molded foam) and back (50 density 2" molded foam). Tapestry cloth shall be Red casmet.	no	48.00		

7	CONFERENCE TABLE -710 X 150				
	Supply and positioning of CONFERENCE TABLE to have edge banded laminated top. Table to be of size 710X150 cm. Table to be made using 19mm ply with top in corian slab finish. Top height to be at 100 lvl. All exposed faces of table to have laminate finish. Support of table to be made using 19 mm ply as per drawing. There shall be point for micro phones and wedge and pop up box for electrical cables	no	1.00		
8	WOOD DINING TABLE AND CHAIRS				
	Supplying and laying Wood Glass Top Six Seater Dining table for pantry with 6 chairs. Size of each table 120 X 90 Each table should be supplied with 6 chairs made of polypropylene with metal legs.	no	8.00		
9	WOOD COFFEE TABLE - 150x70x46 cm				
	Supplying and laying Wood Coffee Table with Glass Top of size 150x70x46 cm	no	1.00		
10	WOOD COFFEE TABLE - 120x50x46 cm				
	Supplying and laying Wood Coffee Table with Glass Top of size 120x50x46 cm	no	2.00		
11	NOTICE BOARD				
	Providing and fixing notice board of size 90x60x10 cm made of 12 mm thick BWR 303 plywood back, 19 mm BWR 303 plywood sides, 6 mm thick glass front with locking arrangements. Providing Surge cloth, internal painting and finishing with 1 mm thick laminate (shade and colour as per the instruction by the Architect) etc complete.	no	1.00		
	TOTAL 4				

SECTION -5					
STORAGE UNIT AND RELATED ITEMS					
1	General Storage units in manager cabin/general areas				
1.1	Providing and fixing low height /full height storage units inside manager cabin/general areas, Storage units to be in base 19mm ply. Top of units to be of edge banded finish. Shutters to be in 19mm Mply with edge banded finish. Locks to be provided for each storage unit. Shutters to be fixed using 110 overlay autoclosing hinges. All shutters to have 4” SS handle and inside of storage unit to be in laminate finish. Storage to have 2 nos 19mm Ply intermediate inside shelves on each shutter bay. FINISH - inside laminated, top & shutters -edge banded. Rates also to be inclusive of all related materials costs, labour, transportation etc complete	Sqm	89.99		
2	Storage unit inside in dining room				
	Providing and fixing storage units in inside dining room, Storage units to be in base multiwood. Top of units to be of granite finish. Shutters to be in multiwood. Locks to be provided for each storage unit. Shutters to be fixed using 110 overlay autoclosing hinges. All shutters to have 4” SS handle and inside of storage unit to be in laminate finish. Storage to have 2 nos 19mm multiwood intermediate inside shelves on each shutter bay. Rates also to be inclusive of all related materials costs, labour, transportation etc complete including sink & basin with reload plumbing				
2.1	Base units with granite top	Sqm	0.88		
2.2	cabinets	Sqm	5.94		
2.3	Supply & fixing of sink SS (single bowl) with all accessories including tap & trap	Nos	1.00		
	TOTAL 5				
SECTION -6					
WALL PANELLING					
1	Pillar panelling in laminate over 9mm ply	Sqm	134.16		
2	Acoustic Panelling				

	Supply and installation of an acoustic fluted panel system on the conference hall surfaces. This includes erecting the necessary structural framework and high-density acoustic infill material behind the panels, ensuring the specified air gap is maintained for performance. All exposed edges are completed with necessary trims and finishings complete	Sqm	31.52		
3	Wooden Panelling				
	Supply and installation of a wooden panelling system on the conference hall surfaces. This includes erecting the necessary structural framework. All exposed edges are completed with necessary trims and finishings complete	Sqm	11.82		
4	Matt finished laminate				
	Supply and fixing of High-Pressure Decorative Laminate (HPDL) with a Matte (Non-Reflective) Finish in white colour, adhering to the IS: 2046 standard. The laminate shall be 1.0 mm thick (minimum) of approved make and shade, using quality synthetic resin adhesive. The rate includes the provision of matching edge-banding or lipping to all exposed edges, ensuring a non-glare, scratch-resistant, and seamlessly finished surface.	Sqm	137.97		
5	Decorative Wallpaper				
	Supply and fixing of Vinyl decorative Wall paper of approved pattern and color, meeting relevant Fire Rating standards. The rate includes all surface preparation (putty/sanding), application with mold-resistant adhesive, and guaranteed perfect pattern matching and flush seams, delivering a durable and seamless finish.	Sqm	86.53		
	TOTAL 6				
SECTION -7					
GENERAL ITEMS					
1	Vertical Blinds				
	Providing Vertical Blinds of branded make controlled using high quality mechanism - as per approved colour scheme	Sqm	99.00		
2	Dining counter				
	Providing granite slab topped dining counter (175X75 cm) in WPC/PVC board base fixed on MS frame work	Sqm	0.88		

3	Wash counter				
	Providing granite slab topped wash counter with bottom unit in WPC/PVC board with shutter for wash basin	Sqm	1.20		
4	Wash basin				
	Supply & fixing of wash basin with all accessories including tap & trap	Nos	11.00		
5	Etching sticker work				
	Providing and sticking etching sticker on glass	Sqm	28.81		
6	Storage compactor				
	<p>Mechanically Operated Mobile Storage Compactor System</p> <p>Providing, fabricating, supplying, transporting, loading, unloading, installing, aligning, testing and commissioning a mechanically operated mobile storage compactor system made of CRCA steel, mounted on floor-mounted MS rails, complete in all respects as per approved drawings and directions of the Engineer-in-Charge.</p> <p>Configuration and Dimensions</p> <p>The compactor system shall consist of six (6) racks, out of which two (2) single racks shall be fixed at both end sides, and four (4) mobile racks arranged as two double-sided racks accessible from both sides. The mobile racks shall operate on floor-mounted rails and shall be actuated through mechanical hand wheels.</p> <p>Each rack shall have a length of 270 cm and a width of 45 cm. The overall dimensions of the complete compactor system shall be 270 cm (L) × 270 cm (B) × 210 cm (H).</p> <p>Construction and Materials</p> <p>The base frame shall be fabricated from CRCA steel sheet of minimum 2.5 mm thickness, suitably welded and reinforced to withstand operational and static loads. The vertical uprights, as well as side and end panels, shall be made from CRCA steel of minimum 1.2 mm thickness, properly stiffened to ensure rigidity and long-term stability.</p> <p>The shelves shall be of adjustable box-type construction, fabricated from CRCA steel sheet</p>	No	1.00		

	<p>of minimum 0.9 mm thickness, with folded edges on all sides for strength. Shelf spacing shall be adjustable, and each shelf shall be capable of carrying a minimum uniformly distributed load of 80 kg without deformation.</p> <p>Rail and Movement System</p> <p>The compactor shall be mounted on MS floor rails, which shall be properly aligned, firmly fixed and grouted into the floor, flush with the finished floor level. The rack movement shall be smooth and stable, supported on wheels fitted with appropriate bearings.</p> <p>Drive and Operating Mechanism</p> <p>Rack movement shall be achieved through a mechanically operated hand wheel system, connected to a chain and gear drive mechanism of robust construction. The system shall ensure controlled, smooth and synchronized movement of mobile racks along the rails.</p> <p>Safety Arrangements</p> <p>The system shall be provided with a central locking arrangement, along with anti-tilt and anti-derailment safety devices, to prevent accidental movement, tipping or derailment during operation and access.</p> <p>Finish and Coating</p> <p>All steel components shall be properly cleaned, de-greased and treated before finishing. The entire unit shall be finished with epoxy polyester powder coating of minimum 50 microns thickness, in an approved shade. The coating shall be uniform, corrosion-resistant and durable.</p> <p>Installation and Commissioning</p> <p>Installation shall include complete fixing in position, alignment of rails and racks, operational checks, load testing of shelves, trial movement and final commissioning. The system shall be handed over in perfect working condition after demonstration and approval by the Consultant Architect</p>				
7	Soft board				

	supply and installation of a 12 mm thick Low-Density Fibreboard (Soft Board) used for notice or acoustic applications. This work includes providing and fixing a wooden or aluminum framework, a stable 6 mm plywood backing, and securing the soft board onto this structure. The exposed surface must be finished with an approved fire-retardant fabric, and all perimeter edges must be neatly finished with approved wooden or aluminum lipping/beading	No	1.00		
8	Glass Shelves for keeping Idols/ Trophies				
	Supply and installation of a shelves shall be fabricated from minimum 8 mm to 10 mm thick Clear Toughened (Tempered) Glass, as required to support the weight of the idols. The edges of the glass shall be finished with a high-quality Mirror Polish (or Flat Polished) finish on all visible sides. The fixing system must comprise approved, heavy-duty, corrosion-resistant Stainless Steel (SS 304 grade) brackets or supports, securely fastened to the wall using non-corrosive fasteners and appropriate wall plugs.	No	1.00		
9	Planter box				
	Providing and placing high grade terracotta clay planter box of size 1200 mm × 1200 mm × 600 mm high, made of dense fired natural clay (terracotta) with minimum wall thickness 25 mm, finished with natural unglazed surface, including supply, handling and placing in position, complete as per directions of Engineer-in-Charge.	No	6.00		
	Providing and placing high grade terracotta clay planter box of size 600 mm × 1200 mm × 600 mm high, made of dense fired natural clay (terracotta) with minimum wall thickness 25 mm, finished with natural unglazed surface, including supply, handling and placing in position, complete as per directions of Engineer-in-Charge	No	4.00		
	TOTAL 6				

SECTION -8					
ATM WORKS					
1	Gypboard plain ceiling including painting over putty				
	<p>Supply and fixing of M/S suspended ceiling as per levels marked in the mirror plan. Ceiling to have Al. perimeter channels of size. 0.55mm thick (Having one flange of 20mm and another flange of 30mm and web of 27mm) along the perimeter of ceiling screw fixed to brick wall/partition with the help of nylon sleeves and screws at 610mm C/C. Ceiling to have suspended GI intermediate channels of size 45mm (0.9mm thick with 2 flange of 15mm each) at a spacing at 1220mm c/c suspended using ceiling angle of width 25mm x 10mm x 0.55mm fixed to soffit with GI cleat and steel expansion fastners. Ceiling sections of 0.55mm thickness having knuckled web of 51.5mm and 2 flanges of 26mm each with lips at 457mm c/c. 12.5mm tapered edge gypboard to be screw fixed to ceiling section with 25mm dry wall screws at 230mm c/c. Boards to be jointed and finished so as to have a flush look which includes filling and finishing the tapered and square edges of the boards with jointing compound after applying Joint paper tape and two coats of dry wall top coat suitable for gypboard. Rates to be inclusive of providing cutout for electrical fittings, grills, diffusers including providing / edge bead to be provided on edges Rate to be inclusive of all related labour, wastage, cost of materials transportation etc complete. Rates to be inclusive of finishing including two coats of emulsion over putty base .</p>	Sqm	5.40		
2	Main Entrance Door				
	Fully glazed Ivory coloured powder coated Aluminum Shutter, pivoted and mounted on floor spring of ISI make, with opaque film over Glass Door.	Sqm	1.89		
3	Fixed Glass				
	Fully glazed Ivory coloured powder coated Aluminum fixed glazing with opaque film over Glass Door.	Sqm	6.66		
4	Internal wall paneling				

	Al tubular frame 50 x 38 x 1.2 mm at 600 mm c/c horizontally & vertically, anchored to the floor & the slab on top with skin on both sides of 9 mm thick BWR IS 303 grade plywood. The exterior surface to be finished with Laminate as specified in drawing enclosed.	Sqm	17.05		
5	Provision of Standard display Board and Information Panel.				
	3 Nos Display Board of size 1'-6" X2' 1 Nos information panel of size 2'-6"X2'	nos	1.00		
6	Etching sticker work				
	Providing and sticking etching sticker on glass	Sqm	7.18		
7	Rolling shutter cover				
	Providing and fixing rolling shutter cover with ACP finish as per bank color specification including enamel painting of shutter rails	Sqm	3.80		
8	Providing box covering to conceal network power points in ATM	Nos	3.00		
9	Enamel painting of window grill and rolling shutter	Sqm	3.80		
	TOTAL 7				
TOTAL AMOUNT IN FIGURES					
TOTAL AMOUNT IN WORDS					

PART III - BOQ FOR PLUMBING AND SANITARY WORKS

Sl.No	Description	Unit	Qty	Unit Rate	Amount
SECTION 1					
Sanitary Fixtures & Accessories					
1	Supply and Labour for Installation of white vitreous china pedestal type water closet (European type) with seat and lid, 10 litre low level white vitreous china flushing cistern & C.P. flush bend with fittings & C.I. brackets, 40 mm flush bend, overflow arrangement with specials of standard make and mosquito proof coupling of approved municipal design complete, including painting of fittings and brackets, cutting and making good the walls and floors wherever required (DSR v2 2021 - 17.3.1)				
i	W.C. Pan With ISI Marked White Solid Plastic Seat and Lid	Set	13		
ii	Angle Cock - 2 Nos	Set	13		
iii	Health Faucet	Set	13		
iv	Stainless Steel Wall Mounted Foldable Grab Bar W/nylon Sleeve For Disabled Toilet. (Make: KosmoCare)	Set	2		
2	Supply and Labour for Installation wash basin with C.I. brackets, 15 mm C.P. brass pillar taps, 32 mm C.P. brass waste of standard pattern, including painting of fittings and brackets, cutting and making good the walls wherever require (DSR v2 2021 - 17.7.1)				
i	White Vitreous China Wash basin size 630x450 mm with a pair of 15 mm C.P. brass Pillar taps	Set	15		
ii	Bottle trap	Set	15		
iii	Angle cock with wall flange	Set	15		

3	Supply and Labour for white vitreous china flat back or wall corner type lipped front urinal basin of 430x260x350 mm and 340x410x265 mm sizes respectively with automatic flushing cistern with standard flush pipe and C.P. brass spreaders with brass unions and G.I clamps complete, including painting of fittings and brackets, cutting and making good the walls and floors wherever required (DSR v2 2021 - 17.4.1)				
i	Urinal Basin with 5 litre white P.V.C. Automatic Flushing Cistern	Set	7		
ii	Angle cock	Set	7		
iii	Health Faucet	Set	7		
	TOTAL				
SECTION 2					
CP Fittings, valves & Accessories					
4	Supply and Labour for Installation of site respective dia C.P brass Concealed and Exposed part of Stop Cock [inside bathroom] including cutting and making good the wall wherever required (for drinking water/ cooler/water-filtering units) and Angle Valves				
i	20mm Stop Cock	Nos	15		
ii	25mm Stop Cock	Nos	3		
iii	20mm dia Angle Valve including cutting and making good the wall wherever required	Nos	5		
5	Labour for Installation of site 15mm dia C.P brass Bib tap/horse connector with wall flange including cutting and making good the wall wherever required	Nos	8		
6	Supply and Labour for Installation, testing and commission of brass valves with test pressure of Shell 25kg/cm ² g and seat 16kg/cm ² g stated as follows with all supports, fixing and fitting all as specified and shown on drawings and complying to relevant standards				

i	25mm dia section Brass Valve	Nos	4		
ii	32mm dia section Brass Valve	Nos	3		
iii	40mm dia section Brass Valves	Nos	3		
iv	50mm dia Brass Ball Valves	Nos	4		
v	50mm dia NR Valves	Nos	2		
vi	20mm ARV	Nos	2		
	TOTAL				
SECTION 3					
Soil, Waste and Rain Water Piping					
CHASING THE FLOOR, CONCRETE					
7	Supply and Labour for Installation of Lead free PVC-U pasted pipe using Solvent Cement ISI Marked [As per IS 4985] with Heavy duty ISI Marked PVC fittings through floor, concrete etc. as required. It should be well replastered and refinished using cement plaster 1:3 mix (cement : coarse sand). Testing of the system for leakage and Air tightness should be done appropriately. (Supreme/Astral or equivalent) (4kg/cm ²)				
i	40mm OD Waste Piping	Mtrs	60		
ii	50mm OD Waste Piping	Mtrs	25		
iii	75mm OD Waste Piping	Mtrs	60		
iv	110mm OD Soil Piping	Mtrs	100		
THROUGH OPEN WALL / DUCT					

8	<p>Providing and fixing Chlorinated Polyvinyl Chloride (CPVC) pipes through open Walls / Ducts etc, having thermal stability for hot & cold water supply, including all CPVC plain & brass threaded fittings, including fixing the pipe with clamps at 1.00 m spacing. This includes jointing of pipes & fittings with one step CPVC solvent cement and testing of joints complete as per direction of Consultant Architect. including fixing the pipe with with suitable Ts, Elbows, Bends, Y's etc and Adapters, Air vents, Clamping with GI U Clamps /supports, as required for firmly installing the pipes adjacent to the building walls, concrete etc. as required. It should be well replastered and refinished using cement plaster 1:3 mix (cement : coarse sand). Testing of the system for leakage and Air tightness should be done appropriately.</p>				
i	75mm OD Waste Piping	Mtrs	35		
ii	110mm OD Waste Piping	Mtrs	20		
iii	110mm OD Soil Piping	Mtrs	50		
iv	110mm OD Rain Water Piping	Mtrs	75		
v	75mm Vent Pipe	Mtrs	80		
THROUGH TRENCH, CELING OR GROUND					
9	<p>Providing and fixing Chlorinated Polyvinyl Chloride (CPVC) pipes through trench having up to a depth of 1mtr /as per site condition and to make corresponding slope , having thermal stability for hot & cold-water supply, including all CPVC plain & brass threaded fittings, including fixing the pipe with clamps at 1.00 m spacing. This includes jointing of pipes & fittings with one step CPVC solvent cement and testing of joints complete as per direction of Consultant Architect. [Excavation will be in the scope of contractor]. Testing of the system for leakage and Air tightness should be done appropriately.</p>				
i	110mmOD Rain water piping	Mtrs	50		
ii	75mm OD Waste Piping	Mtrs	20		

iii	110mm OD Soil Piping	Mtrs	20		
iv	110mm OD Waste Piping	Mtrs	45		
v	160mm OD Soil Piping	Mtrs	45		
10	Supply and Labour for Installing at site CPVC multi inlet traps and outlet connections to pipes using solvent cement complete as required for floor drains.				
i	Multi Inlet floor trap 110x75x50/40mm.	Nos	20		
ii	125x125mm CP Stainless Steel Gratings with Cockroach Protection for multi inlet floor trap.	Nos	16		
ii	Multi Inlet Stainless Steel Lockable Grating 110x75x50/40mm	Nos	4		
	TOTAL				
SECTION 4					
Water Supply Piping					
ABOVE THE OPEN TERRACE FLOOR					
11	Providing and fixing Chlorinated Polyvinyl Chloride (CPVC) pipes, having thermal stability for hot & cold water supply, including all CPVC plain & brass threaded fittings, including fixing the pipe with clamps at 1.00 m spacing. This includes jointing of pipes & fittings with one step CPVC solvent cement and testing of joints complete as per direction of Consultant Architect.				
i	40mm Nominal Dia	Mtrs	55		
ii	50mm Nominal Dia	Mtrs	15		
CHASING OF THE INSIDE WALLS, CELING, CONCREATE [CPVC, CFP PIPES]					
12	Supply and Labour for Installing at site <u>Concealed/open CPVC Pipe</u> of Equivalent Standard Size with all accessories like bends, y's etc. for Water supply Joined using Solvent Cement fittings with metal inserts suitable for the working pressure. Inside walls, ceiling, concrete... etc. using existing rails/supports or GI				

	clamps/supports as required. Hydrostatic Testing of the Pipes using 10kg/cm ² test pressure for specified time period (Supreme/Astral or equivalent).				
i	20mm Nominal Dia	Mtrs	270		
ii	25mm Nominal Dia	Mtrs	70		
iii	32mm Nominal Dia	Mtrs	15		
CHASING OF THROUGH OPEN THE WALL / DUCT [ASTMCPVC, CFP PIPES]					
13	Supply and Labour for Installation at site <u>Concealed/open</u> CPVC Pipes of Equivalent Standard Size with all accessories like bends, y's etc for Water supply Joined using Solvent Cement fittings with metal inserts suitable for the working pressure. Supporting exposed pipes using rails at 60 cm intervals through open walls /duct , concrete etc. as required, replastering and refinishing using Cement Plaster 1:3 mix [Cement : Coarse sand]. Hydrostatic Testing of the Pipes using 10kg/cm ² test pressure for specified time period (Supreme/Finolex/Astral or equivalent)				
i	32mm Nominal Dia	Mtrs	60		
ii	40mm Nominal Dia	Mtrs	12		
14	Supply and Labour for laying of 50mm nominal dia scheduled 80 astm from well to OH Tank through Trench and Duct/ Wall using existing rails/supports or GI clamps/supports as required, rails at 60 cm intervals through through duct, concrete etc.	Mtrs	50		
TOTAL					
SECTION 5					
INSPECTION CHAMBER/ MANHOLE/ GULLY TRAP					
15	Gully Trap				

	Supply and Labour for installation of Gully Trap of respective sizes provided below with suitable masonry around it with fit and finish including excavation, backfilling, disposal, concrete waterproofing etc all in accordance with the drawing ,specification and relevant standards. (All civil Works are under Contractors Scope)				
iii	Size 160 IN and 200 OUT	Nos	2		
16	MANHOLE Supply and Labour for Installation,testing and commissioning of Manholes, valve chamber, sandtrap etc.. including excavation, backfilling, disposal, concrete waterproofing etc upto 1 mtr depth all in accordance with the drawing, specification and relevant standards. (All civil Works are under Contractors Scope)				
ii	Size (as per the site condition) : 45 cm x 45 cm	Nos	27		
17	MANHOLE COVER Supply and Labour for Installation, testing & commissioning of ISI marked FRP manhole cover and frame of (25 ton withstanding capacity) conforming to the latest relevant IS specifications. Make:Thermodrain/Fibrocast				
i	Size: 60cm x 60cm	Nos	4		
ii	Size: 45 cm x 45 cm	Nos	30		
	TOTAL				
SECTION 6					
PIPE SUPPORTS AND STRUCTURALS					
18	Supply and Labour for Installing and Leveling Pipe Supports Fabricated from GI Slotted Rails/Channels of corresponding as per the site condition with suitable for carrying the operating weight of pipe and the fluids, 12mm Dia GI Adjustable Threaded Rods and Anchor Fasteners on wall, U clamps etc. as appropriate.				
i	50cm width with 60cm interval	Nos	70		

ii	100cm width with 60cm interval	Nos	420		
iii	40cm width with 60cm interval	Nos	100		
19	Labour charges for core cutting of slabs/beam for pipes of following sizes and include filling the gap with waterproof material and hence complete.				
i	160 mm dia	Nos	12		
i	110 mm dia	Nos	40		
ii	75mm dia	Nos	20		
iii	50mm dia	Nos	10		
	TOTAL				
SECTION 7					
ACCESSORIES					
20	Supply and Labour for Installation of Robe Hook	Nos	15		
21	Supply and Labour for Installation of Soap Dish	Nos	15		
22	Supply and Labour for Installation of water level float switch system for water level controlling (Brand: SONTAY/VIDION)	Nos	2		
23	Supply and Labour for Installation, testing and commissioning of sewage submersible pumps having minimum of 120 LPM discharge at 10m head including all required accessories like clamps and etc. (Brand: KIRLOSKAR/LUBI)	Nos	1		
24	Supply Labour for Installation, testing and commissioning of openwell submersible pumps having minimum of 150 LPM discharge at 30m head including all required accessories like foot valve, clamps, etc. (Brand: KIRLOSKAR/LUBI)	Nos	2		
	TOTAL				

TOTAL AMOUNT IN FIGURES	
TOTAL AMOUNT IN WORDS	

PART IV - BOQ FOR ELECTRICAL WORKS

SL. NO.	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
SECTION 1	HT INSTALLATION				
1.1	SOIL TESTING				
1.1.1	Taking soil resistance directly from the site for calculating soil resistivity from Electrical Inspectorate including all sundries except statutory charges. (statutory shall be reimbursed after the production of valid proof)	LS	1		
1.2	RMU				
1.2.1	Supply, Erection, testing and Commissioning of 11KV,630A,30KA, Electrical & Manual operated, compact, Outdoor, Extendable RMU (2 Nos Load Break Switch incomer and 1No. Fixed type manual & Electrical operated VCB outgoing). The rate shall include charges for testing, commissioning and obtaining statutory approvals from Electrical inspectorate and KSEB. All civil works including construction of foundation, fencing, jelly filling etc. shall be in the scope of contractor. [statutory charges shall be borne by the clients on production of valid proof]	No	1		
1.3	ROD EARTHING				
1.3.1	Supply, Installation, testing and Commissioning of Rod Earthing using 20mm dia 3 mtr long copper coated steel earth electrode with all required accessories and adding earth conductivity enhancing mineral compound, construction of earth pit inspection chamber with Heavy duty Cast Iron cover.	Nos	2		
1.3.2	Supply & laying / fixing of 25mm x 3mm copper strip for RMU earthing & pit interconnection and to premises grid.	M	25		
1.4	HT Cabling				

1.4.1	Supply, laying, testing and commissioning of following 11 kV XLPE. armoured Aluminum UG cable through built up trenches / D cable trays and using necessary fixing accessories etc. complete and conforming to IS CEA regulations. All civil works including construction of Trench and Cover Slab shall be in the scope of the contractor.				
a)	3Cx240sq mm	M	80		
b)	3Cx300sq mm	M	15		
1.4.2	Laying of one number PVC insulated and PVC sheathed /XLPE power cable of 11 Kv grade of following size direct in ground including excavation, sand cushioning, protective covering and refilling the trench etc as requires				
a)	Above 120 sq.mm and upto 400 sq.mm	Mtr	15		
1.4.3	Laying of one number PVC insulated and PVC sheathed /XLPE power cable of 11 Kv grade of following size direct in the existing RCC/HUME/METAL pipe as required				
a)	Above 120 sq.mm and upto 400 sq.mm	Mtr	15		
1.4.3	Supply, laying and commissioning of following 11KV XLPE armoured Aluminum UG cable in suitable depth through HDPE duct in Horizontal Direct Drilling method across & alongside Road . The rate shall include charges for getting all approval from Road Authorities, Communication & Other agencies, rectification of damages for other services met with during HDD work etc. Complete				
a)	3Cx300sq mm	M	65		
1.5	HT Termination Supply and carrying out cable end termination using push on/heat shrinkable cable termination kit, Aluminum crimping lugs, gland earthing of adequate size etc. for the following,				
1.5.1	Indoor & Outdoor Termination				
a)	3Cx240sq mm	M	2		
b)	3Cx300sq mm	M	4		
1.6	200 KVA USS				

REFER CORRIGENDUM 1

1.6.1	<p>Supply, Installation, Testing and Commissioning of Unitised substation - 200 kVA capacity 11000 / 433V, 3 Phase, AN cooled Vector Dyn11 cast resin outdoor transformer (LVS) with off-circuit tapplings of +/- 5% in steps of 2.5%, changeable by tap links provided with LV terminals suitable for 2 runs of armoured PVC cable & HV terminals connected to 11 kV, 26.3 kA, 630 Amps.</p> <p>Load Break Switch with incoming suitable for XLPE cable with HRC fuses, 3 Nos. suitably rated HT CTs having class 0.2S sensitivity, 1 No. 11kV/110V PT(Class 0.2), superior quality TTB and provision for fixing HT NET metering with all standard accessories and output connected to 11 kV Seal Off Bushings to the transformer including all control wiring etc. All the work shall be done as per IS/EI/EB standards [statutory charges shall be borne by the clients on production of valid proof]</p> <p>All civil works including construction of foundation, fencing, jelly filling etc. shall be in the scope of contractor</p> <p>200kVA cast resin dry-type transformer's specifications include: 200kVA capacity, air-cooled (OA/AF) cooling, copper windings insulated with materials like Nomex, Class F or H insulation, and standard high-voltage (11kV) and low-voltage (433V / 400V) ratings, with an "SCB" (Solid Cast Resin) series designation.</p> <p>Key features include fire retardancy, self-extinguishing properties, strong overload capacity, environmental friendliness (no oil), compact size, and suitability for indoor use in humid or polluted environments.</p>	Set	1		
1.6.2	<p>Supply & Installation of 11kV Net meter, 0.2s accuracy class, 3 phase 4 wire DLMS compatible meters with 3 CT connection, with all accessories, conforming to KSEB requirements.</p>	Set	1		

1.6.3	Charges for Transporting and testing of HT NET TOD meter and CT PT unit from authorised testing centres.	Set	1		
1.6.4	Supply, Installation, testing (from authorities) & commissioning of DTR meter with 4sets 300/5A, Class 0.5s CTs, conforming to KSEB requirements	Set	1		
1.6.5	NEUTRAL CT Supply, Installation, testing (from authorities) & commissioning of 110/5A, Class 5p10,15VA neutral CT in in suitable fabricated and powder coated enclosure, for connecting low set earth fault relay.	Set	1		
1.6.6	EMERGENCY PUSH BUTTON Supply & Fixing of Emergency Push Button with breakable glass in suitable enclosure as per statutory requirements	NO.	1		
	TOTAL				
SECTION 2	PANEL BOARDS				
2.1	MSB Supply and Labour for installation, testing and commissioning 320A MV Cubicle panel. Fabricated out of 16 swg CR CA sheet, powder coated, dust and vermin tight proof, front opening type , cable bottom entry type, flush and wall mounted free standing on 4” MS channel directly bolted to wall using nuts and bolts stencilling all identification etc., confirming to IS1863,IE rules . INCOMER 320A 4P 36kA Microprocessor based MCCB inbuilt E/F releases with all isolation duty - 1Nos 320A 4P ISO-1 No 320A 4P ATS-1 No Meters & Relays: (a) Multifunction energy meter with communication port display of Voltage, Current, Power, Frequency, Power Factor, THD and Maximum Demand Controller with necessary CT's(eq.to Schneider-EM 6400 NG+ WITH RS 485) - 1 Set for EB side (b)Multifunction Energy meter with display Voltage & Current with suitable CT's (eq. to EM-6436 with RS-485 port) for DG side- 1 set (c) RYB indication lamp with 2A MCBs - 2 Sets. (d) Low set earth fault protection relay- 1	No	1		

	<p>No. (e) 250/5A; CL 1; 10VA CT for APFC relay - 1 No. (f) class-B&C type 1 and type 2 surge protector- 1 No (g) RPR -1 No Busbar:- 1 Set TPN AL bus bars suitably rated for 320A OUTGOING 160A TPN 25kA thermomagnetic type MCCB with variable setting - 2 Nos 125A TPN 25kA microprocessor based type MCCB with variable setting -3 Nos 160A TPN ISO-1 Nos 80A TPN 25kA thermomagnetic type MCCB with variable setting - 1 Nos 125A TPN 25kA microprocessor based type MCCB with variable setting with 125/5A CT Meter for Solar-1 Set All MCCBs must be rotary operated Electrical and mechanical interlocking shall be done All MCCBs are Rotary Operated</p>				
2.2	<p>SSB-1 Supply and Labour for Installation, Testing and commissioning of 160A MV Cubicle panel. Fabricated out of 16 swg CR CA sheet, powder coated dust and vermin tight proof, front opening type, flush and floor mounted free standing on 3” MS channel directly bolted to floor using nuts and bolts stencilling all identification etc., confirming to IS1863, IE rules. Incomer 80A TPN Isolator - 1 Nos Outgoing 63A TPN 18kA thermomagnetic type MCCB with variable settings - 1 No 40A TPN 18kA thermomagnetic type MCCB with variable setting - 5Nos Busbar : Corresponding to 160A All MCCBs are Rotary Operated</p>	No	1		

2.3	<p>COMMON PANEL - SSB 02 Supply and Labour for Installation, Testing and commissioning of 125A MV Cubicle panel. Fabricated out of 16 swg CR CA sheet, powder coated dust and vermin tight proof, front opening type, flush and floor mounted free standing on 3" MS channel directly bolted to floor using nuts and bolts stencilling all identification etc., confirming to IS1863, IE rules.</p> <p>Incomer 125A TPN Isolator - 1 Nos RYB indication lamps with 2A MCB - 1 set</p> <p>Outgoing 25A DP MCB - 1 No 32A TPN MCB - 3 Nos 40A DP MCB - 3 Nos 40A TPN MCB - 4Nos 63A TPN MCB - 1Nos Busbar :125A TPN Al busbar</p>	No	1		
2.4	<p>APFC PANEL Supply, Installation, Testing and commissioning of 160 MV APFC panel Fabricated out of 16 swg CR CA sheet, powder coated dust and vermin tight proof, front opening type ,cable bottom entry type, flush and floor mounted free standing on 3" MS channel directly bolted to floor using nuts and bolts, stencilling all identifications etc conforming to IS 8623, IE rules, made of 16g CR sheet steel with the following.</p> <p>INCOMER 160A 4P ISOLATOR- 1 Nos RYB indication lamps with 2A MCB - 1 set Multifunction Digital Meter - 1 set 8 Stage APFC relay, microprocessor based intelligent automatic power factor control relay field setting type with stage identifier etc., lockable 2-stage auto/manual selector switch, auxiliary contactor, capacitors including all control wiring & accessories etc.</p> <p>OUTGOINGS 32A TP MCB WITH MOC 10 contactor for 5kVAR cylindrical type heavy duty capacitor (MPP)- 1 set 32A TP MCB WITH MOC 10 contactor for 10kVAR cylindrical type heavy duty capacitor (MPP)- 5 set 32A TP MCB for 10kVAR cylindrical type heavy duty capacitor (MPP)- 1 set Busbar: Corresponding to 160A</p>	No	1		

2.5	<p>LCP(Lift common panel) Supply and Labour for Installation, Testing and commissioning of 40A MV Cubical panel board fabricated out of 16g CR CA sheet, powder coated, dust and vermin tight proof, front opening type, cable bottom entry type, flush and wall mounted bolted to wall using nuts and bolts stencilling all identification etc., confirming to IS1863, IE rules.</p> <p>INCOMER 40A 4P ISO- 1 No. 1 set RYB indication LED type lamps with 2A MCBs</p> <p>OUTGOINGS 32A 4P 300ma RCBO - 1No 25A DP 30ma RCBO - 1No with 6A SP MCB - 4 Nos Cu busbar rated for 40A and double earthing as per IS3043. Double door fabrication for RCBOs and MCBs. Busbar: 40A TPN Al Busbar</p>	No	1		
2.6	<p>Pump Panel Supply and Labour for installation, testing and commissioning 40A MV Cubicle panel. Fabricated out of 16 swg CR CA sheet, powder coated, dust and vermin tight proof, front opening type, cable bottom entry type, flush and wall mounted free standing on 4” MS channel directly bolted to wall using nuts and bolts stencilling all identification etc., confirming to IS1863,IE rules .</p> <p>INCOMER 40A 4P ISO - 1Nos</p> <p>OUTGOING 32A TPN MCB with DOL Starter for 3hP motor with cam operating mechanism having ON/OFF Push button and suitable capacitors - 2Nos 32A TPN MCB with DOL Starter for 2hP motor with cam operating mechanism having ON/OFF Push button and suitable capacitors - 2Nos Rotary switch 32 A -2 Nos Busbar : Corresponding to 40A</p>	No	1		

2.7	<p>SSB -3 (HVAC PANEL) Supply, installation, testing and commissioning of 125A MV Cubicle Panel. Fabricated out of 16 swg CR CA sheet, powder coated, dust and vermin tight proof, front opening type , cable bottom entry type, flush and wall mounted free standing on 3” MS channel directly bolted to wall using nuts and bolts stencilling all identification etc.. confirming to IS1863,IE rules .</p> <p>INCOMER 125A TPN Isolator - 1Nos RYB Indication Lamp - 1Set Multi-function meter - 1 No.</p> <p>OUTGOINGS 63A TPN 18kA Thermomagnetic Type MCCB with Variable settings- 6 Nos Busbar : Corresponding to 125A All MCCBs must be rotary operated</p>	No	1		
	TOTAL				
SECTION 3	CABLING & TERMINATION				
3.1	Supply of XLPE insulated 1.1kV grade cables of the following type and sizes. The cable shall be laid in existing built up trenches, excavated trench, racks, risers, truss, walls, pulling through pipes including all minor civil works such as fixing of brackets, chipping of floor, chasing of walls etc. using necessary fixing accessories and identification tags.				
a)	3.5C x 300Sq.mm Aluminum Armoured U.G. cable	M	45		
b)	3.5C x 120 Sq.mm Aluminum Armoured U.G. cable	M	90		
c)	3.5C x 95 Sq.mm Aluminum Armoured U.G. cable	M	30		
d)	3.5C x 70 Sq.mm Aluminum Armoured U.G. cable	M	15		
e)	3.5C x 35 Sq.mm Aluminum Armoured U.G. cable	M	20		

f)	4C x 25 Sq.mm Aluminum Armoured U.G. cable	M	140		
g)	4C x 16 Sq.mm Aluminum Armoured U.G. cable	M	50		
h)	4C x 10 Sq.mm Aluminum Armoured U.G. cable	M	500		
i)	3C x 16 Sq.mm Aluminum Armoured U.G. cable	M	70		
j)	3C x 4 Sq.mm Copper Armoured U.G. cable	M	150		
k)	3C x 1.5 Sq.mm Copper Armoured U.G. cable	M	250		
l)	9C x 1.5 Sq.mm Copper Armoured U.G. cable (Control cable)	M	45		
3.2	Laying, Testing & commissioning of XLPE insulated 1.1kV grade cables of the following type and sizes. The cable shall be laid in existing built up trenches, excavated trench, racks, risers, truss, walls, pulling through pipes including all minor civil works such as fixing of brackets, chipping of floor, chasing of walls etc. using necessary fixing accessories and identification tags.				
a)	3.5C x 300Sq.mm Aluminum Armoured U.G. cable	M	45		
b)	3.5C x 120 Sq.mm Aluminum Armoured U.G. cable	M	90		
c)	3.5C x 95 Sq.mm Aluminum Armoured U.G. cable	M	30		
d)	3.5C x 70 Sq.mm Aluminum Armoured U.G. cable	M	15		
e)	3.5C x 35 Sq.mm Aluminum Armoured U.G. cable	M	20		
f)	4C x 25 Sq.mm Aluminum Armoured U.G. cable	M	140		
g)	4C x 16 Sq.mm Aluminum Armoured U.G. cable	M	50		
h)	4C x 10 Sq.mm Aluminum Armoured U.G. cable	M	500		
i)	3C x 16 Sq.mm Aluminum Armoured U.G. cable	M	70		

j)	3C x 4 Sq.mm Copper Armoured U.G. cable	M	150		
k)	3C x 1.5 Sq.mm Copper Armoured U.G. cable	M	250		
l)	9C x 1.5 Sq.mm Copper Armoured U.G. cable (Control cable)	M	45		
3.3	Termination Supply, Installation and commissioning charges for carrying out cable end termination for the following cables using brass cable gland, compression type Cu/Al crimping lugs, gland earthing of adequate size etc., complete.				
a)	3.5C x 300Sq.mm Aluminum Armoured U.G. cable	M	2		
b)	3.5C x 120 Sq.mm Aluminum Armoured U.G. cable	M	4		
c)	3.5C x 95 Sq.mm Aluminum Armoured U.G. cable	M	4		
d)	3.5C x 70 Sq.mm Aluminum Armoured U.G. cable	M	2		
e)	3.5C x 35 Sq.mm Aluminum Armoured U.G. cable	M	8		
f)	4C x 25 Sq.mm Aluminum Armoured U.G. cable	M	4		
g)	4C x 16 Sq.mm Aluminum Armoured U.G. cable	M	6		
h)	4C x 10 Sq.mm Aluminum Armoured U.G. cable	M	34		
i)	3C x 16 Sq.mm Aluminum Armoured U.G. cable	M	6		
j)	3C x 4 Sq.mm Copper Armoured U.G. cable	M	12		
k)	3C x 1.5 Sq.mm Copper Armoured U.G. cable	M	24		
l)	9C x 1.5 Sq.mm Copper Armoured U.G. cable (Control cable)	M	2		
3.4	EARTHING				

	Supply and earthing of 600 mm x 600 mm x 3 mm electrolytic copper plate connected to a 40 mm x 3000 mm 'B' class GI pipe by means of 4 nos. suitable shaped clamps with stainless steel bolts, nuts and washers buried under the ground with two runs of 25 mm x 3 mm copper flat connected to the copper plate by means of 2 nos. stainless bolts, nuts and washers to the earth pipe at every meter length. The earth pipe should have 10 mm holes at 150 mm apart along the length all-round and as per the required standards and confirming to IS 3084 / 1987 as amended to-date. The earthing station shall have a neat chamber with concrete slab having provision for watering as cover for protection.	Nos	8		
3.5	EARTHING CONDUCTORS				
3.5.1	Supply, installation & connecting of Cu. strip/wire being clamped to walls, cable trays, ladders, run in pipes, laid underground etc., as required including interconnection between the earth stations etc., all complete as required.				
a)	Copper Strip 25x3	M	490		
b)	Copper wire No. 8 SWG	M	50		
c)	Copper wire No. 10 SWG	M	300		
	TOTAL				

SECTION 4	DIESEL GENERATOR				
4.1	<p>Supply & Installation, testing & commissioning of 3 phase 200 KVA Diesel generator with AMF Panel for Kerala State Electrical Inspectorate Standards , including required earthing, power/control cabling, terminations including getting the necessary clearance/ approval of generator from electrical inspectorate, testing of neutral CT, relays, meters etc.. as required [statutory charges shall be borne by the clients on production of valid proof] All civil works including construction of foundation ,fencing, jelly filling etc. shall be in the scope of Contractor.</p> <p>A 200 KVA DG set Typically features a rated power output of 200 kVA (160 kW) at 50 Hz and 0.8 power factor, using a liquid-cooled, 3-phase, 6-cylinder engine with a 1500 RPM rating. Key features include a canopy for noise reduction, a microprocessor-based AMF control panel, a 460-liter fuel tank, and overall dimensions around 4340 x 1740 x 1970 mm with a weight of approximately 4300 kg (wet).</p> <p>General Specifications: Power Output: 200 kVA (160 kW),Frequency: 50 Hz, Power Factor: 0.8 lagging Voltage: 415V, 3-phase ,Governing Class: G3 (as per ISO 8528-1)</p> <p>Engine & Alternator: Aspiration: Typically Turbocharged and Aftercooled (TA). Rated Speed: 1500 RPM Alternator Insulation Class: Class H</p> <p>AMF PANEL Supply, Installation and Commissioning of 200 KVA Diesel Generator set with Automatic Mains Failure (AMF) Panel. As per CPCB -IV, Voltmeter, Ammeter, Frequency meter, Power factor meter or Multifunctional Digital Display meter (Displaying Voltage, Current, Frequency, Power Factor)</p> <p>Required switches and cut-out, Contactor, Circuit breaker, Battery charger. All essential indicators such as Engine speed, Lube oil pressure, Coolant / cylinder head Temperature, Engine running hours, Engine battery voltage, Engine running status, Generator voltage (Ph-Ph), Generator voltage (Ph-N), Generator current (R,Y,B), Generator apparent power (KVA),Generator active power (KW), Power Factor, Frequency,</p>	Nos	1		

	Fuel Level ,Event log , control supply voltage control supply voltage				
4.2	Supply and providing DG exhaust pipe with following B Class medium M.S. Pipe with necessary accessories like flanges etc.as required, and with necessary painting using heat resistant Aluminum paint for the following,				
a)	4"	M	5		
b)	6"	M	10		
c)	8"	M	0		
d)	10"	M	0		
e)	12"	M	0		
4.3	Supply and providing proper heat insulation to exhaust pipe with necessary Aluminum Cladding heat insulation to following exhaust pipe sections& including residential silencer with all necessary accessories complete.				
a)	4"	M	5		
b)	6"	M	10		
c)	8"	M	0		
d)	10"	M	0		
e)	12"	M	0		
	TOTAL				

SECTION 5	UPS				
	Supply and Labour for installation of 10 kVA three phase in and three phase out	Nos	3		

REFER CORRIGENDUM 1

REFER CORRIGENDUM 1					
	online parallel redundant UPS with battery bank having 30minutes back up.				
	Supply and Labour for installation of 3 kVA Three phase in and Single phase out online parallel redundant UPS with battery bank having 30minutes back up.	Nos	1		
	TOTAL				
SECTION 6	WIRING				
6.1	Point Wiring Supply and carrying out wiring for lights, fan and plug points including testing and commissioning in concealed/open conduit system from control board to luminaries / Fans / Plug points using single core PVC insulated(FRLSH Class 2) stranded1.1kV grade copper wire of size 1.5 sq.mm along with same size wire as earth continuity conductor through rigid PVC ISI grade conduit with necessary bends, junction boxes and 6A modular type switches on metal boxes complete with ceiling roses, plugs etc. The rate shall include chasing walls, chipping concrete floors, beams etc. and making good the chase with cement mortar after laying of conduits etc complete.(Light points up to 6 mtr length and point to point looping 3 mtr)				
a)	One light controlled by 1 nos.6A switch.	No.	200		
b)	One light controlled by 1 nos.6A switch.(For Lift Well)	No.	8		
c)	Two light controlled by 1 nos.6A switch.	No.	35		
d)	Three light controlled by 1 nos.6A switch.	No.	10		
e)	Four light controlled by 1 nos.6A switch.	No.	6		
f)	Five light controlled by 1 nos.6A switch.	No.	1		
g)	Six light controlled by 1 nos.6A switch.	No.	1		
h)	Seven light controlled by 1 nos.6A switch.	No.	1		
i)	1 fan controlled by 6A switch with step type regulator	No.	5		
j)	6 A plug points in combined position.	No.	25		
k)	6 A plug points in independant position.	No.	25		

6.2	<p><u>Circuit Mains/Passage,BF Car Park, Terra ce light points & external display lighting</u> Supply and wiring from DBs to switch boards/passage lights/Display boards using following runs of single core PVC insulated 1.1kV grade copper wire along with same size copper wire as earth conductor through 20/25 mm medium grade ISI rigid PVC Conduit in concealed/open conduit system.</p>				
a)	3 run 1.5 Sq. mm	M	2000		
b)	3 run 2.5 Sq. mm	M	2510		
c)	3 run 4 Sq. mm	M	3100		
d)	3 run 6.0 Sq. mm	M	500		
6.3	<p><u>Switches & Sockets</u> Supply & Fixing of following modular type Power switches& sockets in standard metal boxes concealed on wall and giving connections complete.</p>				
a)	3 Nos 6A Socket	No.	176		
b)	16A Switch with Indicator Only	No.	176		
c)	6A socket	No.	53		
d)	6A Switch	No.	53		
e)	16A switch socket with indicator	No.	22		
f)	20A switch Socket with indicator	No.	22		
g)	1 No. 6A Switch Socket in Combine Position(For Lift Well)	No.	8		
h)	1 No. 16A Switch Socket(For Lift Well)	No.	7		
i)	RJ 45 Socket (information outlet)	No	87		
j)	TV Socket	No	1		
k)	Telephone Jack	No	35		
l)	IP-65 junction box suitable for 3c x 2.5 sqmm Cu Cable	Nos	10		
m)	32A 4P ISOLATOR	Nos	5		
n)	32A SPN INDUSTRIAL SOCKET	Nos	25		
o)	32A DP SWITCH	Nos	17		

p)	Supply and fixing of DOL starter for 1HP motor with ON OFF switch button with suitable capacitor in open enclosure for Water pump	Nos	2		
q)	Supply and fixing of DOL starter for 3HP motor with ON OFF switch button with suitable capacitor in open enclosure for submersible Pump	Nos	2		
TOTAL					
SECTION 7 LIGHT FIXTURES & FANS					
7.1	Supply & Labour for fixing, testing and commissioning of following fixtures with all necessary accessories including cutting of false ceiling etc.				
a)	600 X 600 LED Light Fitting - 36 Wall - Philips / Wipro (RC380B LED-36S 6500 PSE WH 220-240V and frame Cat no. ZBS 565P MFP3328 LED)	Nos	37		
c)	25W square Ceiling light -Philips / Wipro(Approved Category Number)	Nos	15		
d)	15W Recessed Ceiling Lights-Philips / Wipro (LD80-530-XXX-60-XX 1x15w)	Nos	10		
e)	12W Recessed Ceiling Lights-Philips / Wipro (LD80-530-XXX-60-XX 1x12w)	Nos	80		
f)	12W surface mount Lights-Philips / Wipro (Approved Category Number)	Nos	45		
g)	10W Recessed Ceiling Lights-Philips / Wipro(Approved Category Number)	Nos	18		
h)	6W Recessed Ceiling Lights-Philips / Wipro(Approved Category Number)	Nos	25		
i)	Decorative Wall Lights(11W)-Philips / Wipro(Approved Category Number)	Nos	10		
l)	Wall washer light-Philips / Wipro(Approved Category Number)	Nos	10		
n)	Decorative Hanging/Pendant Lights-Philips / Wipro(Approved Category Number)	Nos	5		
o)	wall light-Philips / Wipro(Approved Category Number)(Approved Category Number)	Nos	21		

p)	Mirror Lights-Philips / Wipro(Approved Category Number)(Approved Category Number)	Nos	13		
q)	Foot Lamps/Skirting Lights-Philips / Wipro(Philips Anthracite Step light Product SKU : 919215850651)	Nos	10		
r)	Ceiling Mount Exhaust Fan - Crompton / Almonard / Bajaj(Approved Category Number)	Nos	17		
s)	20W LED Tube Light -Philips / Wipro(Approved Category Number)	Nos	40		
t)	Wall Fan- Crompton / Almonard / Bajaj(Approved Category Number)	Nos	70		
u)	Bulk Head Lights-Philips / Wipro(Approved Category Number)	Nos	5		
v)	LED Strip Lights including driver-Philips / Wipro / Luker(Approved Category Number)	Mtr	300		
w)	Bollards-Philips / Wipro(Approved Category Number)	Nos	5		
x)	Spike Lights-Philips / Wipro(Approved Category Number)	Nos	4		
y)	Post Top Lights 4Mtr-Philips / Wipro (Make - Philips City Star BRP330 LED24 CW R5N PC PSU S1 SPD)	Nos	5		
TOTAL					
SECTION 8	CABLE TRAYS				
8.1	Supply & labour for Fabrication and fixing of Vertical/Horizontal type M.S. Angle Cable Trays of size 25 x 6sqmm and MS flat of size 25 x 3sqmm for supporting cable /pipes using suitable accessories. The same shall be fixed on ceiling/wall. The cable trays and supports shall be painted with 2coats of Zinc chromate primer and 2coats of enamel paint. (Tray size as per the drawings)	Kg	500		
8.2	Supplying and installing following size of perforated painted with powder coating M.S cable tray with perforation not more than 17.5% , in convenient sections ,joined with connectors, suspended from the ceiling with M S suspenders including bolts & nuts painting suspenders etc as required.				

a)	450 mm width X 50 mm depth X 2.0 mm thickness	Mtr	150		
8.3	Supplying and installing following size of perforated painted with powder coating M.S cable tray with perforation not more than 17.5% , in convenient sections ,joined with connectors, suspended from the ceiling with M S suspenders including bolts & nuts painting suspenders etc as required.				
a)	450 mm width X 50 mm depth X 2.0 mm thickness	each	8		
TOTAL					
SECTION 9	DISTRIBUTION BOARD				
9.1	Supplying and fixing following way , horizontal type three pole and neutral, sheet steel, MCB distribution board ,240 V ,on surface /recess ,complete with tinned copper bus bar, neutral bus bar, earth bar , din bar, interconnections , powder painted including earthing etc. as required .(But without MCB/RCCB/Isolator)				
a)	6way ,Double door	each	1		
9.2	Supplying and fixing following way , horizontal type three pole and neutral, sheet steel ,MCB distribution board, 415 V, on surface /recess ,complete with tinned copper bus bar, neutral bus bar, earth bar , din bar, interconnections , powder painted including earthing etc. as required. (But without MCB/RCCB/Isolator)				
a)	4 way (4+ 12) ,Double door	each	9		
b)	6 way (4+ 18) ,Double door	each	5		
9.3	Supplying and fixing following way surface /recess mounting .vertical type 415V ,TPN MCB distribution board of sheet steel ,dust protected ,duly powder painted ,inclusive of 200A tinned copper bus bar, common neutral link, earth bar, din bar for mounting MCB s(but without MCBs AND INCOMER) as required.(Note :Vertical type MCB TPDB is normally used where 3 phase outlets are required.				

a)	4 way (4+ 12) ,Double door	each	4		
b)	6 way (4+ 18) ,Double door	each	1		
c)	8 way (4+ 24) ,Double door	each	1		
9.4	Supplying and fixing following rating, four pole, 415V , Isolator in the existing MCB DB complete with connections ,testing and commissioning etc.as required.				
a)	40A	each	4		
b)	63A	each	1		
c)	100A	each	4		
9.5	Supplying and fixing following rating ,four pole ,(three phase and neutral) 415 Volts ,residual current circuit breaker (rccb)having a sensitivity current 30mA in existing MCB DB complete with connections ,testing and commissioning etc. as required				
a)	40A	each	26		
b)	63A	each	1		
c)	10A SP MCB	each	218		
d)	16A SP MCB	each	94		
TOTAL					
SECTION 10	Network Cabling				
a)	Supply and labour charges for Wiring of CAT-6 cable through 20mm medium pvc conduit with all accessories in open wall/concealed(Approved make from bank)	Mtr	4000		
b)	Supply, Installation of RJ-45 Information Outlet(Approved make from bank)	Nos	89		
c)	Supply, Installation of RJ-45 jack(Approved make from bank)	Nos	89		
d)	Supply, Installation of Cat-6 Patch Cord - 1 Mtr (Approved make from bank)	Nos	89		
e)	Supply, Installation of Cat-6 Patch Cord - 2 Mtr(Approved make from bank)	Nos	89		
f)	Supply and installation of Switch for DATA - 24 Port Gigabyte L2 Manageable PoE	Nos	2		

	Switch - With 1/4 Fiber SFP Link Ports (Approved make from bank)				
g)	Supply and installation of Switch for IP DATA- 16 Port Gigabyte POE Switch - (Approved make from bank)	Nos.	3		
h)	Supply and fixing of wall mount 12U rack 500mm deep with cable managers- 4 nos ,Power strip with 5/15A combined-2 Nos, cooling fan- 2 nos,Hardware pack of 10 - 2 packet (size-9U) , acrylic cover stationery shelf etc complete.(D-link)	Nos.	5		
	TOTAL				
SECTION 11	TV Cabling				
a)	Supply and laying of RG6 co-axial cable through 20mm conduit	Mtr	35		
b)	Supply, fixing and connecting modular type TV co-axial socket in suitable MS box concealed on wall and complete with giving connections	Nos.	1		
	TOTAL				
SECTION 12	Telephone Cabling				
1	Supply and installation of 4 Trunk lines and 36 Extentions EPBAX(Aproved make from bank)	Nos.	1		
2	Supply and installation of Telephone instrument(Aproved make from bank)	Nos.	35		
3	Supply and providing telephone 20 pair connector (Krone) on suitable stands and providing termination with ferrule identification mark	Nos.	5		
4	Supply, fixing and connecting modular type RJ 11 Telephone socket in suitable MS box concealed on wall and complete with giving connections	Nos.	35		
5	Supply and labour charges for Wiring of 1 run of 2 pair telephone 0.5 sqmm cable through 20mm medium pvc conduit with all accessories in open wall/concealed	Mtr	1500		
6	Supply & Laying of following sizes of PVC Pipes with required bends after chipping the wall/ concrete/ floor/ beams replastering and restoring to the original condition, laying in ground in excavated				

	trench etc complete. (For pulling the cables/ wires).				
a)	25 mm PVC Pipe.	M	30		
b)	32 mm PVC Pipe.	M	30		
c)	40 mm PVC Pipe.	M	50		
d)	50 mm PVC Pipe.	M	10		
7	Supply & Laying of following sizes medium grade PVC conduits of ISI in recessed concrete, floors etc. with all necessary PVC accessories and rough plastering as reqd. (For pulling cable/wires)				
a)	20 mm	M	50		
b)	25 mm	M	50		
	TOTAL				
SECTION 13	MISCELLANEOUS				
a)	Supply and fixing of LT danger boards	Nos	1		
b)	Supply and installation of emergency push button	Nos	1		
c)	Supply and fixing of 11KV grade synthetic insulated mat 2 meter x 1 meter x 3mm conforming to IS:15652:2006	Nos	2		
d)	Supply and fixing of 440KV grade synthetic insulated mat 2 meter x 1 meter x 2.5mm conforming to IS:15652:2007	Nos	3		
e)	Supply and Labour charges for 2 Nos, 9 litres Red colour Fire bucket on stands	Nos	1		
f)	Supply and Labour for Fixing of 5kg dry powder fire extinguishers on clamp.	Nos	2		
g)	Supply and Labour for Fixing of laminated schematic drawings	Nos	1		
h)	Supply and Labour charges for Laying 6 mm chequered plate for covering cable trenches as per required sizes	Sqm	5		
i)	Supply and providing fire sealant mortar with 15cm thickness for fire proof partition between floors in the electrical ducts.	Sq. Mtr.	5		

j)	Supply and providing of LT/HT cable route marker	No.	2		
TOTAL					
SECTION 14	<u>DOCUMENTS/APPROVAL</u> Preparation of drawings and necessary documents and submitting to the Electrical Inspectorate/ KSEB, obtaining preliminary approvals & energisation sanction, and obtaining service connections from KSEB with all necessary followup works and related expenses complete(Only Statutory fees will be reimbursed by the Client on production of Chalan receipts).	LS	1		
TOTAL AMOUNT IN FIGURES					
TOTAL AMOUNT IN WORDS					

PART V - BOQ FOR FIRE FIGHTING WORKS

Sl. No.	Description	Unit	Qty	Rate	Amount
	SECTION 1				
	Fire Pumps & Accessories				
1	Supplying, installation, testing and commissioning of Horizontal mounted end suction Electric motor driven Main Pump suitable for automatic operation rated for 1620 LPM at 50 M head , high efficiency, volute type with cast iron casing, cast iron impeller pump coupled to a squirrel cage induction motor of 30 HP , SPDP. The operating voltage is 415v 3 phase 50 Hz. The pump set is of foot mounted type including all accessories such as standard coupling, coupling guard, common base frame, foundation bolts, etc. complete. Make: LHP/LUBI	Nos	1		
2	Supply, installation, testing & commissioning of single stage and single outlet Diesel Engine driven common stand by pump of Horizontal end suction back pull out type and capable to deliver 1680 LPM at 50M head . The pump shall coupled to suitable HP of Diesel engine radiator water cooled type and mounted on common base frame with sign boards two sets of Batteries & battery leads with stand, Fuel tank (For 8 Hrs. running and filled fully) with stand & gauge glass & Fuel piping with valves etc. The quoted rate shall includes coupling guard, and Starter panel, other standard accessories and foundation bolts, etc. complete. Make: LHP/LUBI	Nos	1		
3	Supply, Installation, Testing and Commissioning Electrically driven Monoblock Jockey pump of capacity 180 LPM at 50 M head with all the necessary accessories operating on 3 Ph. 50 Hz. 415 V AC supply including foundation, bolts etc. complete, The Pump set shall be of 7.5 HP . Make: LHP/LUBI	Nos	1		
4	Supply, Installation, Testing and Commissioning Electrically driven Monoblock Terrace pump of capacity 900 LPM at 50 M head with all the necessary accessories operating on 3 Ph. 50 Hz. 415 V AC supply including foundation, bolts etc. complete, The Pump set shall be of 5 HP . Make: LHP/LUBI	Nos	1		

5	Supply, erection, testing and Commissioning of Motor control panel for Fire pumps incorporating automatic direct online starter for fire pumps switch gear rated for the motor HP. The control panel mounting shall include necessary indication lamps for the RYB phase showing the power supply conditions ammeter with clear indications or motor full load current, voltmeter with selector switch etc. The panel shall dully painted with proper anti-corrosive lacquer and is of foot mounted type with all accessories as required etc. complete. Make: Fabricated with L&T components	Nos	1		
6	Supply, installing, testing and commissioning of Air cushion vessel made of mild steel of 200mm dia with automatic air release cock, 25mm dia drain valve and shutt off. The vessel shall be 100cm in height etc. Complete. Make: Fabricated	Nos	1		
7	Supply, installation, testing and commissioning of Pressure Gauge with required range/capacity. Make: H-Guru	Nos	2		
8	Supply, installation, testing and commissioning of Pressure Switch for automatic operation. Make: Indfoss	Nos	4		
9	Above Ground Piping: Supply, erection, testing and commissioning of M.S 'B' class Pipes confirming to IS :1239 part - I with malleable specials confirming to IS:1239 part - II, such as elbows, reducers, flanges etc. Including cutting, Welding, fixing in / on walls, ceiling by using suitable supports, The pipe shall be painted with one coat of primer and two coats of synthetic enamel paint of approved colour / shade.				
	a) 150 mm Dia	Mtrs	6		
	b) 100 mm Dia	Mtrs	24		
	c) 80 mm Dia	Mtrs	3		
	Make: Tata/Jindal				
10	Supplying, Installing, testing and commissioning CI Butterfly valve slim seal standared lever operated type confirming to IS 13035 with required flanges, nuts, bolts etc. complete.				
	a) 150 mm Dia	Nos	1		
	b) 100 mm Dia	Nos	7		
	c) 80 mm Dia	Nos	1		
	Make: Kartar				

11	Supply, installation, testing and commissioning of C.I. Non-Return Valve slim seal type with required flanges, nuts & bolts, gasket etc. complete				
	a) 150 mm Dia	Nos	1		
	b) 100 mm Dia	Nos	4		
	c) 80 mm Dia	Nos	1		
	Make: Kartar				
	SECTION 2				
	Fire Hydrant & Sprinkler System				
1	Above Ground Piping: Supply, erection, testing and commissioning of M.S 'B' class Pipes confirming to IS :1239 part - I with malleable specials confirming to IS:1239 part - II, such as elbows, reducers, flanges etc. Including cutting, Welding, fixing in / on walls, ceiling by using suitable supports, The pipe shall be painted with one coat of primer and two coats of synthetic enamel paint of approved colour / shade.				
	Make: Jindal				
	a) 100 mm Dia	Mtrs	60		
	b) 80 mm Dia	Mtrs	5		
	c) 65 mm Dia	Mtrs	20		
	d) 32 mm Dia	Mtrs	6		
	e) 25 mm Dia	Mtrs	66		
2	Supply, installation, testing and commissioning of instantaneous pattern SS Single Headed Hydrant valve of 63mm Dia, oblique type, instantaneous hose coupling adaptor complete with PVC blank cap etc. Make: Kartar/Monsher	Nos	5		
3	Supply and placed in position of AL Branch Pipe , 63mm female instantaneous inlet, male threaded outlet, complete with hexagonal base nozzle. Make: Kartar/Monsher	Nos	5		
4	Supply and placed in position of Controlled Percolated Hose conforming to IS: 636, 63mm dia, 15 Mtrs length with SS 63 mm pair of male and female couplings etc. Make: Kartar/CRC	Nos	5		

5	Supply, installation, testing and commissioning of Hydraulic Hose Reel drum completed with swinging type drum with 19mm dia thermoplast braided hose of 30M. length and Shut off nozzle, with necessary fittings etc. complete. Make: Monsher/Newage	Nos	5		
6	Supplying, installing, testing and commissioning of Cast iron Ball valves with fittings of screwed end type.				
	a) 25 mm Dia	Nos	5		
	Make: Karthar				
7	Supply, installation, testing and commissioning of Single Door Hose Cabinet to accommodate one piece of hose pipe along with one pair of male and female coupling and one branch pipe. The cabinet is made of 20swg M.S Sheet, glass fronted with hinged door and lock. The cabinet is spray painted to scarlet red color. Make: Friends	Nos	5		
8	Supply, installation, testing and commissioning of single acting Air Release Valve with screwed inlet 20mm dia etc. Make: Atam	Nos	2		
9	Supply, installation, testing and commissioning of Fire Brigade Inlet connection with 4 nos of 63 mm dia. built - in Gun metal Non- return valves instantaneous coupling type arranged on 100 mm dia.etc. Pipe manifold shall be connected to wet riser main. Make: Fabricated	Nos	1		
10	Supplying, installing, testing and commissioning of fire brigade draw off connection of 2 way with 2 Nos 63 mm dia. built - in Gun metal Non- return valves instantaneous coupling type arranged on 100 mm dia. Pipe manifold and connected to wet riser main as well as to Fire water tank. Quoted rate shall be included with C.I. Butterfly valve, C.I. Non-return valve and M.S. cabinet of suitable size with mounting supports etc. complete.	Nos	1.00		
11	Supplying, installing, testing and commissioning of hydraulically operated Sprinkler control valve (Alarm check valve and Isolation valve with tamper switch) with water motor gong bell and trims as required, pressure gauges, drain valves, ball valves, check valves, strainers etc. complete. Alarm valve (Installation Control Valve) shall be UL Listed & FM approved.				
	100 mm dia.	Nos	1.00		

12	Supply, installation, testing and commissioning of approved make 15mm brass Sprinkler heads designed to operate at 68 deg. Celcius etc. with necessary fittings etc, complete.				
	a) Pendent Type	Nos	31		
13	Supplying and installing of in position the following type of sign boards made out of 3mm thick "Opaque" PVC foam board with computer cut, PVC Non-reflective self adhesive vinyle painted foam board, complete with mirror fasteners.				
	FIRE DUCT	Nos	5		
	FIRE EXIT	Nos	5		
	EXIT	Nos	5		
14	Supply & fixing of indoor type Exit board with LED Lamps, reflector, indicating arrow with exit recess mounted type.	Nos	10		
	SECTION 3 Fire Detection & Alarm System				
1	Supply, installing, testing and commissioning of Micro processor based Main Fire alarm control panel of 12 zones capacity , with visual LED indications for fire / fault alarms, signals and should have stage alarm facility with maintenance free battery backup for 24 hours normal operation and 15 minutes alarm operation. The panel shall be fabricated by M.S. sheet and powder coated both inside & outside, door shall be glass fronted type with locking arrangement, as per specification. Make: Ravel	Nos	1		
2	Supply, Installation, testing and commissioning of Manual Call Point break glass type as per standard specification. Make: Ravel / Agni	Nos	10		
3	Supply, installation, testing and commissioning of Electronic dual tone Hooter (Sounder) as per standard specification. Make: Ravel/Agni	Nos	6		
4	Supply, installation, testing and commissioning of Optical type Smoke detectors with solid state design, indicating lamp, mounting base etc., Make: Apollo / System sensor/ Ravel	Nos	114		

5	Supply, installation, testing and commissioning of Heat detectors with solid state design, indicating lamp, mounting base etc., <i>Make: Apollo / System sensor/ Ravel</i>	Nos	4		
6	Supply, installation, testing and commissioning of flame detectors with solid state design, indicating lamp, mounting base etc., <i>Make: Apollo / System sensor/ Ravel</i>	Nos	4		
7	Supply, installation, testing and commissioning of LPG Leak detectors <i>Make: Apollo / System sensor/ Ravel</i>	Nos	2		
8	Supply, installation, testing and commissioning of Response Indicators (RI) with LED indicators. Response indicators are to be provided for detectors to indicate activation of a detector installed inside rooms / cabins and above false ceiling or generally hidden <i>Make: Apollo / System sensor/ Ravel</i>	Nos	16		
9	Supply, installation, testing and commissioning of PSTN Auto-dialer with LCD display. PSTN Auto-dialer should have facility to dial at least 10 telephone mobile no's and transmit voice message of at least 20 seconds. <i>Make: Texecom</i>	Nos	1		
10	Supplying and laying of P.V.C conduit with all necessary fittings. Etc.				
	a) 20mm dia	Mtrs	1000		
	<i>Make: ISI marked</i>				
11	Supplying and laying of 1.5 sq.mm cross section copper armored cable laid in ISI marked conduit pipes <i>Make: Finolex / Havells</i>	Mtrs	1000		
	SECTION 4 Public Address Talk back System				
1	Supply, Installation, testing and commissioning of P A Talk back Speaker 6W <i>Make: ASES / AGNI</i>	Nos	5		

2	Supply, installing, testing and commissioning of P A Selector panel with 250W Amplifier , Microphone etc Make: Seculite / Innovice	Nos	1		
3	Supplying and laying of P.V.C conduit with all necessary fittings. Etc.				
	a) 20 mm dia	Mtrs	400		
	Make:Geoplast/Equivalent				
4	Supplying and laying of 1 Sq.mm cross section PVC insulated copper speaker wires .	Mtrs	800		
	Make: Finolex/Havells/Equivalent				
	SECTION 5				
	Fire Extinguishers				
1	Supplying, and fixing of ABC type fire extinguisher of 4Kgs. Capacity, with initial filling in brand new cylinder with powder coated finish, fitted with Gun metal union, discharge hose, wall mounting bracket etc. complete.	Nos	10		
	Make: Safex/Kanex				
2	Carbon-di-oxide type fire extinguisher of 4.5 Kgs. capacity , with CO2 gas filled in brand new seamless cylinder with powder coated finish, made out of manganese steel fitted with wheel type valve,stored pressure type, discharge hose, bend & horn wall mounting bracket etc complete.The Extinguisher will be Manufactured Strictly as per BIS: 15683:2006 bearing ISI. mark EN3 615 Approved Powder. ABC 87% MAP. (For Electrical & AHU Rooms)	Nos	5		
	Make: Safex/Kanex				
TOTAL AMOUNT IN FIGURES					
TOTAL AMOUNT IN WORDS					

PART VI - BOQ FOR HVAC WORKS

Sl.No	Description	Unit	Qty	Unit Rate	Total
Note 1	Unless specified all works are for supply, installation, loading, unloading, testing, commissioning and balancing to be considered.				
Note 2	All bill of quantities items are to be read in conjunction with drawings and technical specifications whether specified or not.				
Note 3	Vendors shall submit the technical data sheet duly filled.				
	SECTION 1 - VRF OUTDOOR UNIT				
	The system shall be suitable for variable refrigerant volume / flow air conditioner consisting of one outdoor unit and multiple indoor units. The outdoor units shall be of Inverter/digital scroll type capable of changing the rotating speed to follow variations in cooling load and shall be suitable for connecting multiple indoor units of different capacities & types as per the drawing and project requirements. The unit shall be with non-ozone depleting refrigerant R410A. The refrigerant piping length between farthest indoor units and outdoor unit shall be possible to extend up to 175m with maximum 50m level difference. The system shall be provisioned such that, even if the power supply to any Indoor unit is cut-off, the rest of the system shall be able to continue to function normally. The vendor shall select all the units suitable for nominal capacity suitable for maximum outdoor temperature of 36 degC and suitable for indoor temperature of 22±1deg C. The selected equipments shall meet the minimum TR and CFM (as per the BOQ). For the VRF SYSTEM (COP shall be more than 3.6 at AHRI-1230 condition of 35 deg C air over condenser coil)				
a)	16 HP	Nos	2		
b)	18 HP	Nos	2		
	TOTAL				
	SECTION 2 CASSETTE TYPE INDOOR UNIT - VRF SYSTEM				
	Note: The capacities prescribed below are nominal capacities and vendor shall refer the equipment schedule for actual cooling capacities and air flow requirements.				

	Design, Supply, Installation, testing and Commissioning of VRF indoor air conditioning units with direct driven fan, high efficient filter, Inbuilt micro controller thermostat, electronic expansion valve, Remote controller including cables, necessary supports and vibration isolators, Refrigerant charging, refnet joints for both liquid and gas lines branch kits, control wiring, power cables form nearest socket including plug, drain connections etc.. Capacities as mentioned below				
a)	ROUND FLOW SENSING 4 WAY CASSETTE				
i)	Cooling capacity- 3TR	Nos	6		
ii)	Cooling capacity- 2.5TR	Nos	1		
iii)	Cooling capacity- 2TR	Nos	6		
iv)	Cooling capacity- 1.6TR	Nos	5		
b)	HIGH WALL MOUNTED SPLIT IDU (VRF)				
i)	Cooling capacity- 2.0TR	Nos	2		
ii)	Cooling capacity- 1.5TR	Nos	1		
iii)	Cooling capacity- 1TR	Nos	7		
iv)	Cooling capacity- 0.8TR	Nos	5		
	TOTAL				
SECTION 3	Supply, Installation, Testing & Commissioning of Copper Refrigerant piping with 18G HD Copper pipes , insulated with specified thickness nitrile rubber tubings and joints sealed with black cotton tape.	Metre	450		
SECTION 4	REFRIGERANT GAS CHARGING				
i)	R 410A gas	Kg	45		
SECTION 5	REFNET JOINTS as per manufacturer recommendation.	Nos	35		
SECTION 6	COMMUNICATION CABLE BETWEEN INDOOR AND OUTDOOR UNITS of 2Cx1.5 Sqmm Cu. Cable placed in a 3/4" conduit.	Metre	230		

SECTION 7	Condensate Piping Supply and erection of the condensate UPVC pipes with all joints, reducers, necessary elbows and tees, supporting arrangements etc. Rate shall inclusive of thermal insulation with 13mm thickness FM approved closed cell nitrile rubber insulation covering with fire resistant fibre cloth fabric as a resistant to scratch and mechanical impacts				
	25mm Dia UPVC	RMT	200		
SECTION 8	OUTDOOR STAND Supply and installation of AC outdoor unit MS stand with suitable accessories				
i)	18HP ODU Stand	Nos	2		
ii)	16HP ODU Stand	Nos	2		
	TOTAL				
SECTION 9	SUPPLY ACCESSORIES				
i)	Wired or wireless remote controller	Nos	33		
ii)	Separation Tube	Nos	33		
iii)	Twinning kit	Nos	4		
	TOTAL				
TOTAL AMOUNT IN FIGURES					
TOTAL AMOUNT IN WORDS					

PART VII - BOQ FOR PA SYSTEM

Sl.No	Item Description	Qty	Rate	Amount
1	<u>PUBLIC ADDRESS SYSTEM MAIN CONTROL PANEL</u> Supply and installation of public address system control panel which includes panel, amplifier of 350 W with 16 zone selector switch-16 M with all call power ON/OFF with DC Battery. Main control panel should have facility for connecting wireless type microphone. Make: Any reputed make	1 No		
2	Supplying and laying of 1 Sq.mm cross section PVC insulated copper speaker wires in ISI marked PVC conduits.	800 Mtrs		
3	<u>Music Player</u> Supply & Installation of music player which have facility of USB, SD, MMC Card & Bluetooth. Make: Any reputed make	1 No		
4	<u>P A Speaker without volume control</u> Supply & Installation of concealed type speaker of 6 watt.	32 Nos		
5	<u>P A Speaker without volume control</u> Supply & Installation of wall mount type speaker of 6 watt with volume control.	10 Nos		
6	<u>Wired Type Microphone</u> Supply & Installation of wired type microphone with 10 meters cable, 6.35 mm Jack Mono Connector Lead ideal for public address system.	5 Nos		
7	<u>Wireless type microphone</u> Supply & Installation of wireless type ideal for public address system with all accessories.	10 Nos		
TOTAL AMOUNT IN FIGURES				
TOTAL AMOUNT IN WORDS				

PART VIII - BOQ FOR AUTOMATIC ELEVATOR

Sl	Description	Qty	Rate	Amount
8	<p>Supply, installation, testing & commissioning of 6 passenger automatic elevator including the following specification other details are as per the lift manufactures standard specifications</p> <ol style="list-style-type: none"> 1. Rated capacity: 6 persons with a load capacity of 408 kgs, passenger class (P). 2. Number of stops/openings: 6 stops with all landing openings on the same side. 3. Power supply: 400/415 volts, 3-phase AC supply. 4. Machine location/type: Machine-room-less (MRL) gearless traction system. 5. Lift car dimensions: Car width 1000 mm × depth 1100 mm with clear height of 2200 mm. 6. Car door type: Power-operated side opening sliding door. 7. Number of door panels: Two-panel configuration. 8. Car door size: 800 mm (width) × 2000 mm (height). 9. Lift cabin material: Stainless steel grade 304. 10. Lift cabin finish: Stainless steel 304 hairline finish. 11. Car door material: Stainless steel grade 304. 12. Car door finish: Stainless steel 304 with glass in hairline finish. 13. □ Ceiling finish: Stainless steel 304 hairline finish. 14. Ventilation: Regular circular fan provided in cabin. 15. Lighting: Three numbers of LED lights provided. 16. Handrail type/location: SS 304 round handrail fixed on rear side of the cabin. 17. Over speed governor: Provided as per safety requirements. 	1 NOS		

	<p>18. Door protection: Infrared door screen provided.</p> <p>19. Counterweight screen: Inbuilt counterweight safety screen provided.</p> <p>20. Overload indicator: Overload detection and indication provided.</p> <p>21. Fireman switch: Fireman emergency control switch provided.</p> <p>22. Automatic rescue device: Automatic rescue device provided for power failure.</p> <p>23. Emergency alarm and light: Battery-operated emergency alarm and light provided.</p> <p>24. Intercom system: Two-way intercom with press-and-speak facility provided in COP.</p> <p>25. SCHINDLER/ OTIS/ KONE/JOHNSON</p>			
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PART IX - BOQ FOR SOLAR POWER STATION

SI	Item Description	Unit	Qty	Rate	Amount
	Supply, installation, testing, commissioning and documentation etc. of 30 Kw Roof Top Solar Power Station as per the specification in the technical bid, with following, but not limited to following				
1	Site survey, shadow analysis, system design & engineering	LS	1		
2	Preparation & submission of drawings, approvals, documentation & manuals	LS	1		
3	Project management & DISCOM coordination	LS	1		
4	585 Wp Monocrystalline PV Modules with RFID (PERC/TopCon)	Nos	51		
5	Power Optimizers / Module Level Devices	Nos	51		
6	Hot Dip Galvanized / Aluminium Module Mounting Structure	Lumpsum	1		
7	Solar DC Cables (XLPO, UV resistant) (To be quoted after site inspection for the entire length of estimated length of cables)	Lumpsum	As Req.		
8	MC4 compatible connectors & couplers	Set	1		
9	DC String / Array Junction Boxes with SPD	Nos	2		
10	DC Distribution Board with MCB/MCCB & SPD	Nos	1		
11	30 kVA Grid Tied Inverter with MPPT & Protections	Nos	1		
12	AC Distribution Board with MCCB/MCB & SPD	Nos	1		
13	AC Power & Control Cables (To be quoted after site inspection for the entire length of estimated length of cables)	Mtrs	As Req.		
14	DC, AC & Lightning Earthing System (Separate Pits)	Lumpsum	1		
15	Lightning Arrestor with Down Conductor	Nos	1		
16	Plant Monitoring System with DAS & RMS	Lumpsum	1		
17	Solar Radiation & Temperature Sensors	Set	1		
18	Bi-directional Net Meter & Grid Synchronization	Lumpsum	1		
19	Danger Boards, Safety Signage & Display Board	Lumpsum	1		
20	Installation, Testing & Commissioning	Lumpsum	1		
21	Factory inspection & third-party testing of modules	Lumpsum	1		
22	Tools, tackles & essential electrical spares	Lumpsum	1		
23	Comprehensive insurance of plant	Lumpsum	1		

	Warranty Period: Minimum 10 Years from the date of Commissioning of the Solar Power Station.				
	TOTAL AMOUNT IN FIGURES				
TOTAL AMOUNT IN WORDS					

PART X - BOQ FOR MECHANICAL/STACK PARKING SYSTEM

Sl	Item Description	Unit	Qty	Rate
10	<p>Supply and installation of Electro-Mechanical SDP-2G (Semi-Dependent Parking system, Two-Grid / Two-Level (Ground + One level)</p> <p>System Dimensions: The car parking system shall be designed with overall dimensions not less than the following. The minimum overall system length shall be 5300 mm, and the minimum overall system width shall be 2600 mm. The overall system height shall be configurable between 3600 mm and 4100 mm to suit site conditions and vehicle height requirements. The pallet or parking platform width shall not be less than 2250 mm. The system layout shall ensure sufficient clearance for safe vehicle entry, parking, lifting, and retrieval operations without risk of damage to the vehicle or the system components.</p> <p>Warranty Period: Minimum 5 Years from the date of Commissioning of the mechanical/ stack car parking.</p>	NOS	2	

PART XI - BOQ FOR DEMOLISHING OF EXISTING BUILDING

Sl	Item Description	Unit	Qty	Rate
01	Demolishing of existing building (G+1) and removal of waste materials from the project site	LS		

Name and address of the bidder

Place:

Date: