Centre Industrial Consultancy & Sponsored Research, IIT Madras
Chennai 600 036
PURCHASE SECTION
Email: tender@imail.iitm.ac.in
Telephone:(044) 2257 9763
GSTIN: 33AAAAI3615G1Z6

The Senior Manager (Project Purchase) Date: 05.07.2023

Open Tender Reference No: PY/MSR/135/2023/LGDINTERIORS

GEM NAR ID: GEM/GARPTS/05072023/GBUQO4P0AMSV Due Date/Time:18.07.2023@ 3:00 PM

Dear Sir/ Madam,

On behalf of the IC&SR, IIT Madras, Tenders are invited in two bid system from **Class-I local suppliers and Class II local suppliers**, namely technical and financial bids for

"Development of Interior works for INCENT LGD at IIT-M Research park "

conforming to the specifications enclosed in **Annexure '1'**

Tender Documents may be downloaded from Central Public Procurement Portal https://etenders.gov.in/eprocure/app. Aspiring Bidders who have not enrolled / registered in e-procurement should enroll / register before participating through the website https://etenders.gov.in/eprocure/app. The portal enrolment is free of cost. Bidders are advised to go through instructions provided at **"Help for contractors".** [Special Instructions to the Contractors/Bidders for the e-submission of the bids online through this eProcurement Portal"

Bidders can access tender documents on the website (For searching in the NIC site, kindly go to Tender Search option and type 'IIT'. Thereafter, click on "GO" button to view all IIT Madras tenders). Select the appropriate tender and fill them with all relevant information and submit the completed tender document online on the website https://etenders.gov.in/eprocure/app as per the schedule attached.

No manual bids will be accepted. All tender documents including pre-qualification, Technical and Financial bids should be submitted in the E-procurement portal.

Relevant literature pertaining to the items quoted with full specifications (and drawing, if any) should be placed in the technical part of the bid, wherever applicable. Samples if called for, should be submitted free of charges, and collected back at the supplier's expenses.

1	**LAST DATE for receipt of Tender**	:	18.07.2023 @ 3:00 PM
	PRE-BID Meeting	:	12.07.2023, Before joining this meeting, bidders should send email with details of person who will attend this meeting and their company details along with your queries to admin@incentlgdiitm.org on or before 11.07.2023 @ 05:00 PM. Bidders will be intimated on the time schedule and venue details through email.
	Date & Time of opening of Tender	:	19.07.2023 @ 3:00 PM
GUIDELINES, TERMS AND CONDITIONS OF TENDER			

A	**Submission of Tender**	**:**	As per the directives of Department of Expenditure, this tender document has been published on the Central Public Procurement Portal URL: https://etenders.gov.in/eprocure/app The bidders are required to submit soft copies of their bids electronically on the CPP Portal, using valid Digital Signature Certificates. The instructions given below are meant to assist the bidders in registering on the CPP Portal, prepare their bids in accordance with the requirements and submitting their bids online on the CPP Portal More information useful for submitting online bids on the CPP Portal may be obtained at: https://etenders.gov.in/eprocure/app All tender documents including Technical Bid & Financial Bid should be submitted separately in online CPP portal as per the specified format only. Right is reserved to ignore any tender which fails to comply with the above instructions. **No manual bid submission will be entertained.**
B	**Instructions for online bid submission**	**:**	**REGISTRATION** • Bidders are required to enroll on the e-Procurement module of the Central Public Procurement Portal URL: https://etenders.gov.in/eprocure/app by clicking on "Online Bidder Enrollment". Enrolment on the CPP Portal is free of charge. • As part of the enrolment process, the bidders will be required to choose a unique username and assign a password for their accounts. • Bidders are advised to register their valid email address and mobile numbers as part of the registration process. These would be used for any communication from the CPP Portal. • Upon enrolment, the bidders will be required to register their valid Digital Signature Certificate (Class II or Class III Certificates with signing key usage) issued by any Certifying Authority recognized by CCA India (e.g. Sify / TCS / nCode / eMudhra etc.) https://eprocure.gov.in/eprocure/app with their profile. • Only one valid DSC should be registered by a bidder. Please note that the bidders are responsible to ensure that they do not lend their DSCs to others which may lead to misuse. Bidder then may log in to the site through the secured log-in by entering their user ID / password and the password of the DSC / eToken.
C	**Searching for tender documents**	**:**	• There are various search options built in the CPP Portal, to facilitate bidders to search active tenders by several parameters. These parameters could include Tender ID, organization name, location, date, value, etc. There is also an option of advanced search for tenders, wherein the bidders may combine a number of search parameters such as organization name, form of contract, location, date, other keywords etc. to search for a tender published on the CPP Portal. • Once the bidders have selected the tenders they are interested in, they may download the required documents / tender schedules. These tenders can be moved to the respective **"My Tender"** folder. This would enable the CPP Portal to intimate the bidders through SMS / email in case there is any corrigendum issued to the tender document. • The bidder should make a note of the **unique Tender ID** assigned to each tender; in case they want to obtain any clarification / help from the Helpdesk.

D	**Preparation of bids**	**:**	• Bidder should take into account any corrigendum published on the tender document before submitting their bids. • Please go through the tender advertisement and the tender document carefully to understand the documents required to be submitted as part of the bid. Please note the number of covers in which the bid documents have to be submitted, the number of documents including the names and content of each of the document that need to be submitted. Any deviations from these may lead to rejection of the bid. • Bidder, in advance, should prepare the bid documents to be submitted as indicated in the tender document / schedule and generally shall be in PDF / XLS formats as the case may be. Bid documents may be scanned with 100 dpi with black and white option. • To avoid the time and effort required in uploading the same set of standard documents which are required to be submitted as a part of every bid, a provision of uploading such standard documents (e.g. PAN card copy, GSTIN Details, annual reports, auditor certificates etc.) has been provided to the bidders. Bidders can use **"My Documents"** area available to them to upload such documents. These documents may be directly submitted from
E	**Submission of bids**	**:**	• Bidder should log into the site well in advance for bid submission so that he/she can upload the bid in time i.e. on or before the bid submission date and time. Bidder will be responsible for any delay due to other issues. • The bidder has to digitally sign and upload the required bid documents one by one as indicated in the tender document. • A standard BOQ format has been provided in **Annexure-3** with the tender document to be filled by all the bidders. Bidders are requested to note that they should necessarily submit their financial bids in the format provided and no other format is acceptable. Bidders are required to download the BOQ file, open it and complete the detail with their respective financial quotes and other details (such as name of the bidder). If the BOQ file is found to be modified by the bidder, the bid will be rejected. • The server time (which is displayed on the bidders' dashboard) will be considered as the standard time for referencing the deadlines for submission of the bids by the bidders, opening of bids etc. The bidders should follow this time during bid submission. • The **Tender Inviting Authority (TIA)** will not be held responsible for any sort of delay or the difficulties faced during the submission of bids online by the bidders due to local issues. • The uploaded tender documents become readable only after the tender opening by the authorized bid openers. • Upon the successful and timely submission of bids, the portal will give a successful bid submission message & a bid summary will be displayed with the bid no. and the date & time of submission of the bid with all other relevant details. • Kindly add scanned PDF of all relevant documents in a single PDF file of compliance sheet.

F	**Assistance to bidders**	**:**	• Any queries relating to the tender document and the terms and conditions contained therein should be addressed to the Tender Inviting Authority for a tender or the relevant contact person indicated in the tender. • Any queries relating to the process of online bid submission or queries relating to CPP Portal in general may be directed to the 24x7 CPP Portal Helpdesk. The contact number for the helpdesk is [0120-4200462, 0120- 4001002, 0120-4001005]
G	**General Instructions to the Bidders**	**:**	• The tenders will be received online through portal https://etenders.gov.in/eprocure/app. In the Technical Bids, the bidders are required to upload all the documents in pdf format. • Possession of a Valid Class II/III Digital Signature Certificate (DSC) in the form of smart card/e-token in the company's name is a prerequisite for registration and participating in the bid submission activities through https://etenders.gov.in/eprocure/app • Digital Signature Certificates can be obtained from the authorized certifying agencies, details of which are available in the web site https://etenders.gov.in/eprocure/app under the "Information about DSC".
2	**Marking on Technical Bid**	**:**	i. The vendor eligibility criteria, scope of work and technical Specification along with bill of materials details for this tender is given in **Annexure 1** ii. The tenderer shall go through the Annexures and submit the technical bid. iii. The Technical bid should be submitted in the proforma given as per **Annexure -2** iv. All technical bids should have the page-wise **heading as "Technical Bid" and page no.** in all pages with seal and signature of authorized signatory. The total no. of pages should be mentioned at the last page of the documents. The technical bid should consist of all technical details along with catalogue/brochure, model number and other technical, commercial terms and conditions. The technical bid should contain only technical details called for in the prescribed proforma along with the supporting documents. No other details apart from the technical details should be submitted in the technical bid. If any deviation in this regard if found in the technical bid submitted, the tender will be summarily rejected.

3	**Marking on Financial Bid**	**:**	i. Financial bid should be submitted in the prescribed proforma format as per **Annexure-3** in **xls format (BOQ)** through e-tender only. **No manual or other form of submission of Financial Bid will not be entertained**. ii. Financial bid should indicate item-wise price for all the items mentioned in the technical bid. iii. Total value in the financial bid should be indicated in figures & words clearly.

4	**EMD:** The EMD of Rs.7,00,000 to be transferred to the account details mentioned in **Annexure 8 and proof should be enclosed in the Technical Bid**. Any offer not accompanied with the EMD shall be rejected summarily as non-responsive. The EMD of the unsuccessful bidders shall be returned within 30 days of the end of the bid validity period. The same shall be forfeited, if the tenderers withdraw their offer after the opening during the bid validity period. The Institute shall not be liable for payment of any interest on EMD. EMD is exempted for Micro and Small Enterprises (MSE) as defined in MSE Procurement Policy issued by Department of Micro, Small and Medium Enterprises (MSME) and Startups as recognized by Department of Industrial Policy & Promotion (DIPP). (MSE/MSME/DIPP PROOF should be enclosed in the cover containing technical bid).
5	**Performance Security: -** The successful bidder should submit Performance Security for an amount of 3% of the value of the contract/supply. The Performance Security may be furnished in the form of an Account Payee DD, FD Receipt in the name of "The Registrar, IIT Madras" from any scheduled commercial bank or Bank Guarantee from any scheduled commercial bank in India. The performance security should be furnished within 14 days from the date of the purchase order. Performance Security in the form of Bank Guarantee: - In case the successful bidder wishes to submit Performance Security in the form of Bank Guarantee, the Bank Guarantee should be routed directly to IIT Madras from the Bank. **The Bank Guarantee should remain valid for a period of sixty days beyond the date of completion of all contractual obligations of the supplier including the warranty obligations.**
6	**Preparation of Tender**: The bidders should submit the bids in two bid system as detailed below. **Bid I Technical Bid** The technical bid should consist of Pre-Qualification Criteria (Bidder Eligibility Criteria - I & II) and technical specification compliance sheet as per Annexure 2 **Bid II Financial Bid** The financial bid should be submitted in excel format (BoQ) as per the proforma (Annexure 3) uploaded in the e-Tender web site. The Quoted price should be for supply and installation of the item and inclusive of all cost and statutory levies at IIT Madras..
7	**Prices:** **i.** The prices quoted must be Nett considering all scope of work, terms & conditions and as per the technical specification mentioned in **Annexures 1 The prices quoted by the bidders should be inclusive of GST and other statutory levies.** **ii.** **The percentage of tax etc. included in the price should be indicated in clear terms**. **If the inclusive price is not given, we will treat your offered rate as inclusive rate and comparison be made with others.** If at the time of comparison of your offer without taxes etc. is happen to be lowest, you are bound to supply as per the offered rate, i.e. without taxes etc. **iii.** Prices should be quoted in INR only. **All conditional tenders will be summarily rejected.**

8	**Signing of Tender:** The Tender is liable to be rejected if complete information is not given therein or if the particulars and date (if any) asked for in the schedule to the Tender are not fully filled in or not duly signed/authenticated. Specific attention is drawn to the delivery dates and terms and conditions enclosed herewith. **Each page of the technical bid required to be signed and bears the official seal of the tenderers.** If the application is made by a firm in partnership, it shall be signed (with seal) by all the partners of the firm above their full typewritten names and current addresses or alternatively by a partner holding power of attorney for the firm in which case a certified copy of the power of attorney shall accompany the application. A certified copy of the partnership deed along with current addresses of all the partners of the firm shall also accompany the application. If a limited company or a corporation makes the application, it shall be signed by a duly authorized person holding power of attorney for signing the application, in which case a certified copy of the power of attorney shall accompany the application. Such limited company or corporation may be required to furnish satisfactory evidence of its existence. The applicant shall also furnish a copy of the Memorandum of Articles of association duly attested by a Public notary.
9	**Period for which the offer will remain open:** The Tender shall remain open for acceptance/validity till: **120 days from the date of opening of the tender.** However, the day up to which the offer is to remain open being declared closed holiday for the Indian Institute of Technology Madras, the offer shall remain open for acceptance till the next working day.
10	For the same tender, either the OEM or the authorized dealer/service provider can only quote. But both of them cannot quote separately for the same tender.

11	**Public Procurement – Preference to Make in India:** This tender will be evaluated based on Public Procurement (Preference to Make in India) DIPP, MoCI Order No. 45021/2/2017-PP (BE II) dated 16th September 2020 and other subsequent orders issued therein. Accordingly, preference will be given to the Make in India products while evaluating the bids, however, it is the sole responsibility of the bidder(s) to specify the product quoted by them is of Make in India product along with respective documentary evidence as stipulated in the aforesaid order in the technical bid itself. Necessary self-certification about the classification of the supplier/bidder as per the above order should be submitted by the bidder in **Annexure-4.** Non-submission of self-certification will lead to rejection of bid out rightly and the bidder will be treated as non-local supplier. The bidder offering imported products will fall under the category of Non-local suppliers. They can't claim themselves as Class-I Local Suppliers/Class-II Local Suppliers by claiming services such as transportation, insurance, installation, commissioning, training and after sales service support like AMC/CAMC etc. as local value addition.

12	**PRE-QUALIFICATION CRITERIA** **Bidder Eligibility Criteria I:** 1. Only 'Class-I local suppliers' and 'Class-II local suppliers', as defined under DIPP, MoCI Order No. P-45021/2/2017-PP (BE II) dated 16th September 2020 and other subsequent orders issued therein, shall be eligible to bid in this tender. Declaration for Class-I and Class-II local suppliers should be submitted in the prescribed proforma format as per **Annexure-4.** 2. Bidder should confirm their acceptance that they comply with the provisions with report to "Guidelines for eligibility of a bidder from a country which shares a land border with India as detailed at **Annexure-5**. The bidder should submit Certificate for "Bidder from/ Not from Country sharing Land border with India & Registration of Bidder with Competent Authority" as per Order of DoE F.No.6/18/2019-PPD dated 23.07.2020 as mentioned. **Bidder Eligibility Criteria II:** 1. The firm should not have been blacklisted / debarred by any Government/ regulatory bodies of India In last 3 Years . A self-declaration format given in **Annexure – 6** 2. The Bidder Firms shall be of National reputation having past experience of executing "similar works" (Civil, Interior finishes, Furniture, Furnishings and Electrical & Mechanical Works, HVAC etc. for Multi-storeyed Institutional Buildings / Corporate Offices / Hotels / Super Speciality Hospitals) during the last three years ending 31st December 2022. IIT Madras reserves its right to verify the claims at its own discretion and may seek opinion of the customer, based on which the vendor's offer may be accepted or rejected. Should submit satisfactorily completed work details as per following during the last three years ending 31st December 2022: Three similar works as prime Interior Contractor each costing Rs 60,00,000/- or Two similar works as prime Interior Contractor each costing Rs 80,00,000/- or One similar work as prime Interior Contractor each costing Rs 1,00,00,000/- And The Contractor should have executed at least 1 similar work costing Rs. 60,00,000/- with central government department /Autonomous Bodies/ Central Public Sector Undertakings. Note: The word similar completed works means Civil & Interior finishes, including Electrical & Mechanical Works for Multi-storeyed Institutional Buildings / Corporate Offices / Hotels / Super Speciality Hospitals (Individually / aggregate of number of works mentioned in each criteria) and should consist of Civil, structural, Interior Finishing / furnishings, including E&M Systems, etc. incorporating advanced Architectural & E&M design concepts with all modern services / amenities including acoustic performance, etc. (Proof of similar works executed shall be furnished along with photographs / views, duly certified by the client). 4. The bidder Should have had an average annual turnover of Rs 1,00,00,000/- on construction works during the last three years ending 31st March 2023. (**Financial statements / certificates issued by Chartered Accountant should be submitted as proof).**

13	Terms of Delivery: Supplier will be fully responsible for the safe carriage, Installation/Commissioning of goods up to the Research Park, IITM or named place as per PO, Insurance coverage will be in the scope of the supplier. The tenderer should indicate clearly the time required for delivery of the item (subject to the approval of the Executive Committee-IIT-Madras). In case there is any deviation in the delivery schedule, liquidated damages clause will be enforced or penalty for the delayed supply period will be levied. In the event of delay or non-supply of materials/execution of Contract beyond the date of delivery/completion of job. The penalty will be levied @1% per week of delay subject to a max of 10% of the value of purchase order and if the delay is more than accepted time frame by IIT M, the PO would be partially or fully cancelled and liquidated damages will be enforced accordingly.
14	**Evaluation of Bids:** **Bid evaluation will take place in two stages.** **Stage I: Technical Bid evaluation** 1. Bidder Eligibility Criteria-I will be evaluated first and those bidders who have complied with this criteria alone be evaluated for the Bidder Eligibility Criteria-II and technical Specification evaluation. 2. In the 2nd stage, the Bidder Eligibility Criteria-II and the technical specification offered by the bidders will be evaluated by the technical committee for compliance. The proposed technical specification offered by the bidder should be equivalent or higher to the specifications mentioned in the technical bid. 3. All bidders who have fully complied with Bidder Eligibility Criteria I, II and technical evaluation will only be considered for opening of financial bid. **Stage II: Financial Bid Evaluation** The financial bid evaluation will be based on price quoted by the bidder (BoQ). The tender will be awarded to the overall L1 bidder for the total work (Comprising all items).
15	**Selection of successful bidder and Award of Order** The order will be directly awarded to the technically qualified bidder as per the condition in para 3A of DIPP, MoCI Order No. 45021/2/2017-PP (BE II) dated 16th September 2020.
16	**Completion of work :** Three months from the date of order.
17	**Payment:** • **No Advance Payment will be made for Indigenous purchase.** • Payment will be made only after supply and satisfactory installation.
18	**Warranty and Support:** • All items must have a comprehensive warranty for 3 years • The vendor is responsible for 3 years' service support.
19	**Terms and conditions:** Failure to comply with any of the instructions stated in this document or offering unsatisfactory explanations for non-compliance will likely to lead to rejection of offers.
20	**Right of Acceptance:** IIT MADRAS reserves the right to reject the whole or any part of the Tender without assigning any reason or to accept them in part or full.
21	**Transit Insurance:** The Purchaser will not pay separately for Transit Insurance.
22	In terms of Rule 173 (iv) of General Financial Rules, 2017 the bidder shall be at liberty to question the bidding conditions, bidding process and/or rejection of its bid.
23	**Conditions of contract:** A formal Contract / Agreement shall be entered into with successful service provider as per **Annexure 10.** Tenderer should quote on the basis of the conditions referred to in Para of the invitation to tender and tender papers. In case these terms and conditions are not acceptable to the tenderer, he should specifically state the deviation(s) there from in the body of the tender.
24	**Tenderer shall submit along with this Tender:** Name and full address of the Banker and their swift code and PAN No. and GSTIN number.

25	**Disputes and Jurisdiction:** **Settlement of Disputes:** Any dispute, controversy or claim arising out of or in connection with this PO including any question regarding its existence, validity, breach or termination, shall in the first instance be attempted to be resolved amicably by both the Parties. If attempts for such amicable resolution fails or no decision is reached within 30 days whichever is earlier, then such disputes shall be settled by arbitration in accordance with the Arbitration and Conciliation Act, 1996. Unless the Parties agree on a sole arbitrator, within 30 days from the receipt of a written request by one Party from the other Party to so agree, the arbitral panel shall comprise of three arbitrators. In that event, the supplier will nominate one arbitrator and the Project Coordinator of IITM shall nominate on arbitrator. The Dean IC&SR will nominate the Presiding Arbitrator of the arbitral tribunal. The arbitration proceeding shall be carried out in English language. The cost of arbitration and fees of the arbitrator(s) shall be shared equally by the Parties. The seat of arbitration shall be at IC&SR IIT Madras, Chennai. a. **The Applicable Law:** The Purchase Order shall be construed, interpreted and governed by the Laws of India. Court at Chennai shall have exclusive jurisdiction subject to the arbitration clause. Any legal disputes arising out of any breach of contact pertaining to this tender shall be settled in the court of competent jurisdiction located within the city of Chennai in Tamil Nadu.

26	**Force Majeure:** The Supplier shall not be liable for forfeiture of its performance security, liquidated damages or termination for default, if and to the extent that, it's delay in performance or other failure to perform its obligations under the Contract is the result of an event of Force Majeure. For purposes of this Clause, "Force Majeure" means an event beyond the control of the Supplier and not involving the Supplier's fault or negligence and not foreseeable. Such events may include, but are not limited to, acts of the Purchaser either in its sovereign or contractual capacity, wars or revolutions, fires, floods, epidemics, quarantine restrictions and freight embargoes. If a Force Majeure situation arises, the Supplier shall promptly notify the Purchaser in writing of such conditions and the cause thereof. Unless otherwise directed by the Purchaser in writing, the Supplier shall continue to perform its obligations under the Contract as far as is reasonably practical, and shall seek all reasonable alternative means for performance not prevented by the Force Majeure event.
27	**Risk Purchase Clause:** In event of failure of supply of the item/equipment within the stipulated delivery schedule, the purchaser has all the right to purchase the item/equipment from the other source on the total risk of the supplier under risk purchase clause
28	All information including selection and rejection of technical or financial bids of the prospective bidders will be communicated through e-Tender portal. In terms of Rule 173(iv) of General Financial Rule 2017, the bidder shall be at liberty to question the bidding conditions, bidding process and/or rejection of bids.
29	The tenderer shall certify that the tender document submitted by him / her are of the same replica of the tender document as published by IIT Madras and no corrections, additions and alterations made to the same. If any deviation found in the same at any stage and date, the bid / contract will be rejected / terminated and actions will be initiated as per the terms and conditions of the contract.
30	Due to Covid-19 pandemic the bidders will not be entertained to participate in opening of Bids. Since the tender is e-tender, the opening of the bids may be checked using the respective logins of the bidders.

ACKNOWLEDGEMENT

It is hereby acknowledged that I/We have gone through all the points listed under “Specification, Guidelines, Terms and Conditions” of tender document. I/We totally understand the terms and conditions and agree to abide by the same.

SIGNATURE OF TENDERER ALONG WITH SEAL OF THE COMPANY WITH DATE

ANNEXURE – 1

Development of Interior works for INCENT LGD at IIT-M Research park
Tender Ref No : PY/MSR/135/2023/LGDINTERIORS

(A) PRE-QUALIFICATION CRITERIA

1. Bidder Eligibility Criteria I:

1.1 Only 'Class-I local suppliers' and 'Class-II local suppliers', as defined under DIPP, MoCI Order No. P-45021/2/2017-PP (BE II) dated 16th September 2020 and other subsequent orders issued therein, shall be eligible to bid in this tender. Declaration for Class-I and Class-II local suppliers should be submitted in the prescribed proforma format as per Annexure-4

1.2 Bidder should confirm their acceptance that they comply with the provisions with report to "Guidelines for eligibility of a bidder from a country which shares a land border with India as detailed at Annexure-5. The bidder should submit Certificate for "Bidder from/ Not from Country sharing Land border with India & Registration of Bidder with Competent Authority" as per Order of DoE F.No.6/18/2019-PPD dated 23.07.2020 as mentioned.

2. Bidder Eligibility Criteria II:

The firm should not have been blacklisted / debarred by any Government/ regulatory bodies of India In last 3 Years . A self-declaration format given in Annexure – 6
The Bidder Firms shall be of National reputation having past experience of executing "similar works" (Civil, Interior finishes, Furniture, Furnishings and Electrical & Mechanical Works, HVAC etc. for Multi-storeyed Institutional Buildings / Corporate Offices / Hotels / Super Speciality Hospitals) during the last three years ending 31st December 2022. IIT Madras reserves its right to verify the claims at its own discretion and may seek opinion of the customer, based on which the vendor's offer may be accepted or rejected.

Should submit satisfactorily completed work details as per following during the last three years ending 31st December 2022:
Three similar works as prime Interior Contractor each costing Rs 60,00,000/- or

Two similar works as prime Interior Contractor each costing Rs 80,00,000/- or

One similar work as prime Interior Contractor each costing Rs 1,00,00,000/-
And
The Contractor should have executed at least 1 similar work costing Rs. 60,00,000/- with central government department /Autonomous Bodies/ Central Public Sector Undertakings.

Note: The word similar completed works means Civil & Interior finishes, including Electrical & Mechanical Works for Multi-storeyed Institutional Buildings / Corporate Offices / Hotels / Super Speciality Hospitals (Individually / aggregate of number of works mentioned in each criteria) and should consist of Civil, structural, Interior Finishing / furnishings, including E&M Systems, etc. incorporating advanced Architectural & E&M design concepts with all modern services / amenities including acoustic performance, etc. (Proof of similar works executed shall be furnished along with photographs / views, duly certified by the client).
4. The bidder Should have had an average annual turnover of Rs 1,00,00,000/- on construction works during the last three years ending 31st March 2023. (Financial statements / certificates issued by Chartered Accountant should be submitted as proof).

5. For Electrical Works, the contractor should have valid ESB license.

B) SCOPE OF WORK

1. The tender is called for Development of Interior works for INCENT LGD at IIT-M Research park

2. The bidder is required to execute the work as per the drawings (Annexure 9) and specification given below:

- General
  The Scope of work shall comprise of but not limited to Supply of materials, construction, erection, installation, setting to work, integration with services, testing, pre-commissioning, commissioning, trial runs, completion, operations and maintenance of the work specified in the Bill of Quantities, Technical Specifications and drawing. The scope of work includes but not limited to the following:

2) Preliminary and Enabling Works

i) Preparation of samples, mock-ups, and prototypes.

ii) Procurement, manufacture, assembling, installation, and construction.

iii) Integrated testing and commissioning of Works and Equipment.

iv) Supply of all Spare Parts and special tools.

v) Preparation of Operation and Maintenance Manuals and training of Employer's personnel in the operation and maintenance of systems, integrated systems, and installed equipment.

vi) Safety signs to safeguard / caution the workers and other Site related personnel from any accident or mishap during Construction Phase.

vii) Protection of existing utilities and services

a) Civil Works

Supply, erection/installation, testing of all civil works including flooring, masonry, partitions, doors, finishes, ceiling and acoustic installation, signage etc.

b) Electrical Works

Supply, erection / installation, testing and commissioning of Electrification works including Earthing, Cables & Trays, Distribution Boards & Breakers, Wiring & Conduiting, Lighting Fixtures, UPS, Tap off box etc.

c) Networking and Telephone conduits:

Supply, erection/installation, testing and commissioning of Networking & Telephone conduiting including sockets, outlets, conduits junction boxes, modules, cables, racks, speakers, microphone, camera, recorders, monitors, power supply units, intercom systems etc.

d) HVAC

Supply, erection / installation, testing and commissioning of Air Distribution System, piping, valves, gauges, meters, ducting, grills, diffusers, dampers, actuators, acoustic lining, foils& attus.

e) Fire Fighting and Fire Alarm.

Supply, erection / installation, testing and commissioning of Firefighting and Fire Alarm Systems.

3. Any change in the above design is not permitted

4. The bidder can be an OEM or an authorized dealer (format is given in Annexure-7)

5. The bidder should use the Quantity mentioned in the Bill of Material for designing and should choose any of one of the mentioned brands/make of items as per BOM.

6. Any other brand other than what mentioned in BOM will not be accepted.

7. All materials which are in the BoQ must be submitted for approval by IITM prior to the work/installation. Samples of each material and table setup are required for review and must meet the necessary standards.

8. The Contractor will not be entitled, to any compensation for any increase/reduction in the quantities of work but will be paid only for the actual amount of work done and for approved materials supplied against a specific order. The accepted variation in quantity of each individual item of the contract would be upto 100% of the quantity originally contracted. The Contractor shall be bound to carry out the work at the agreed rates and shall not be entitled to any claim or any compensation whatsoever up to the limit of 100% variation in quantity of individual item of works.

9. The Selected bidder need to follow the norms of IITM Research Park for carrying out works as per this tender.

BILL OF MATERIAL

TECHNICAL SPECIFICATION

INTERIOR WORKS

GENERAL PREAMBLE TO THE BILL OF QUANTITIES

1. The Bill of Quantities must be read with the Drawings, and the Specification and the tenderer shall be deemed to have examined the Drawings, Specifications, and to have acquainted himself with the Works to be done and the way in which they are to be carried out.

2. Not withstanding that the work has been sectionalized, every part of it shall be deemed to be supplementary to and complementary of every other part and shall be read with it or into it so far as it may be practicable to do so.

3. The detailed description of work and materials, given in the Specification are not necessarily repeated in the Bill of Quantities.

4. Each individual item in the Bill of Quantities is to be priced or if any items are not priced it is to be indicated under which item or items the value of the work has been included. If the tenderer omits to price an item the cost of the work of such item shall be held to be spread over and included in the prices given for other items. He is not to mark items "included" when the rate is asked for. Exactly similar items in different sections shall be priced similarly.

5. For the sake of convenience the Bill of Quantities is sectionalized to cover one structure or a group of structures.

6. The quantities in Sections of the Bill of Quantities are for the official designs. In case the tenderer quotes for the official designs, payment will be made according to the actual quantities of works ordered and carried out, as measured and valued at the rates and prices quoted in the Bill of Quantities.

7. Unit Rates will be used as basis of payment for schedules and variation orders.

8. Rates and prices set against items are to be the full inclusive value of the finished work shown on the Drawings and/or described in the specification or which can reasonably be inferred there from and are to cover the cost of marking layout of buildings, fixing permanent grid points, establishing bench mark, provision of plant, labour, supervisions, materials, erection, insurance, maintenance, overheads and profits and every incidental and contingent cost and charges whatsoever including all taxes such as turnover tax, Excise duty, customs duty, sales tax, sales tax on works contract and general tax, if any and every kind of temporary work executed or used in connection therewith and all the Sub Contractor's obligations under the sub contract and all matters and things necessary for the proper completion and maintenance of the Works.

9. The specification is intended to cover the supply of material and the execution of all works necessary to complete the Works. Should there be any details of construction or materials which have not been referred to in the Specification or in the Bill of Quantities and Drawings, but the necessity for which may reasonably be implied or inferred there from or which are usual or essential to the completion of all works in all trades, the same shall be deemed to be included in the rates and prices named by the tenderer in the Bill

of Quantities. If there is inconsistency between the Bill of Quantities, Specification or Drawings, the description in the Bill of Quantities shall prevail.

10. The abbreviations used in the Specification and Bill of Quantities shall be read as follows:

IS		Indian Standard
BS		British Standard
A.S.T.M.		American Society for Testing and Materials
A.W.S		American Welding Society
mm		Millimetre /s
cm		centimetre /s
km.		kilometre /s
l.m.		linear metre /s
r.m		running metre /s
gm.		gram
kg.		kilogramme
N.B.		Nominal Bore
Tonne/t/MT		metric ton/s (1000 Kilogrammes)
n.e.		not exceeding
dia.		diameter
wt.	-	Weight
sq.cm.		square centimetre
incl		including
sq.m.		square metre
cu.cm.		cubic centimetre
cum		cubic metre
YST	-	yeild stress

no.		number
Drg.No.		drawing number
Qty.		quantity
E.O.		Extra Over
P.C.C.		Plain Cement Concrete
R.C.C.		Reinforced cement concrete
Rs.		rupees
P.	-	paise
L.S.		lump sum
P.S.	-	provisional sum
H.T	-	High tensile
M.S.	-	Mild Steel

General

These specification are for work to be done, items to be supplied, materials, to be used in the work shown and defined on the drawing and described herein, to the satisfaction of the Employer / Architect

1.1 The workmanship is to be the best possible and of a high standard. The Contractor shall take all steps immediately to make deficiencies if any noticed by the Client / Architect. Use must be made of special tradesman in all aspects of the work and allowances must be made in the rates for the same.

1.2 The materials to be provided by the contractor shall be accordance with the samples already got approved from the Client / Architect by the contractor and in conformity with specification and approved; list of manufactures and brand The contractor shall produce all invoices, vouchers or receipts for any materials if called upon to do so by The Client / Architect.

1.3 Samples of all materials are to be submitted to the Client/Architect for the approval before the contractor orders or deliver the materials to the site. Samples together with their packing are to be provided free of charge by. The contractor and should any materials to be rejected, they will be removed from the site at the contractor's expenses. All samples will be retained by the Client / Architect for comparison with materials which will be delivered at site. Also the contractor will be required to submit the specimen finishes of colours, fabrics etc., for the approval of the Client / Architect before proceeding with the work.

1.4 The contractor shall be responsible for providing and maintaining temporary coverage required for the protection of finished work. He is also to clean out all wood· shaving, cut ends and other waste from all parts of the work before covering or in filling is constructed.

1.5 Contractor shall maintain uniform quality and consistency in workmanship throughout the execution of the work.

1.6 Site order Books / reports for the purpose of quick communication between the Architect / Architect's representative and the contractor or his agent or representative, site instruction books shall be maintained at site in the manner as described below.

1.7Any communication, relating to the works may be conveyed through records in the site instruction book. Such communication from the Architect / Architect's representative to the contractor shall be deemed to have been adequately served in terms of the contract. Each site instruction book shall have machine number pages in triplicate and shall be carefully maintained and preserved by the contractor at site. Any instruction or others which the Architect / his representative may like to issue to the contractor may be recorded by him in the site instruction book and one copy thereof issued to the contractor.

1.8 The contractor shall check and verify all site levels and measurements whenever requested by the other specified contractors to enable them to prepare there own shop drawings and pass on the information with sufficient promptness. A copy of all such information passed on shall be given to the consultants.

1.9 Templates, boxes and moulds shall be accurately set out rigidly constructed so as to remain accurate during the time they are in use.

All unexposed surface of timber eg: - partition/paneling frames, false ceiling, backing, fillets, backs of door frames, cupboards framing, grounds etc are to be treated with two coats of approved timber preservative and anti termite paints before fixing or converging.
All concealed surface of MDF/Plywood with 0.80mm thick Laminate.
All Exposed edges to be finished with 2mm thick PVC Edge banding with suitable adhesive to the satisfaction of the Client/Architect.

2. Joinery in woodwork
2.1 The contact surface between internal frame and skinning shall be glued with approved adhesive in addition to fixing with necessary screws etc.

2.2 After preparing proper surface of skinning by sand preparing etc., the laminate or veneers shall be fixed on it with the help of approved adhesive.

2.3 Frame work for full height partition shall be rigidly fixed to the floor, walls and ceiling soffit. The partition height shall be measured up to bottom of false ceiling and framing members / ply going above will not be measured.

2.4 Any portion that are warped or found with other defects are to be replac0d. The whole of the work is to be framed and finished in a workman- like manner in accordance with detailed drawings and the direction of Client / Architect and whenever required, fitted with all necessary metals ties, straps, screws, adhesive etc. Joinery work generally to be finished with fine sand/glass paper.

2.5 All joins shall be standard mortise and tenon, dowel, or cross-halved. Screws, nails, etc. will be of standard iron or wire. Tenon should fit the mortises exactly.

2.6 Nailed or glued butt joints will not be permitted.

2.7 Whenever screw heads are on finished surfaces those will be sunk and the hole plugged with a wood plug of the same wood and grain to match the colour.

2.8 The contact surfaces of dowels, tenons, wedges etc., shall be glued with approved adhesives. Were glued, joinery and carpentry works is likely to come into contact with moisture, the glue should be water proof.

3. Timber

3.1 All the Sal wood, Steam, Beach wood, CP teak, BTC to be used shall be properly seasoned, of natural growth and shall be free from worm holes, loose or dead knots or other defects, sawn square and shall not suffer from warping, spitting or other defects.

3.2 The moisture content shall not exceed 12%

3.3 All internal frameworks shall be treated with approved wood preservative, anti termite and with fire retardant treatment/paint.

3.4 All wood brought to site to be clean; it shall not have any preservatives or other coating / covering.

3.5 All rejected, decayed, bad quality wood shall be immediately removed from site.

3.6 All the dimensions mentioned for T.W. members are finished sizes.
All wood brought to site should be stacked, stored properly as per instructions.

4. Plywood

Plywood should be accordant as per the specification stipulated in bills of quantities.
Commercial Ply wood should generally confirm to IS :303, bonded with Phenol formaldehyde, BWR grade treated with wood preservative.
Particle boards should be phenol formaldehyde bonded and generally confirm to 15:3087 - 1965
Only 3mm to 4mm thick straight grain group matching approved veneers should be used.
MDF if used in places as per specification should be confirming to 15:12406 - 1988

5. Hardware and Metals

5.1 The hardware throughout shall be of approved manufacture or supplier well made and equal to in every respect to the sample to be deposited with architect. The contractor may be required to produce and provide samples from many different sources before the Client/Architect to take decisions and he should allow his rates for doing so.

5.2 All the screw/bolts with nuts to be used shall have oxidized finish (unless required otherwise) of approved shapes, size and quality.

5.3 Fittings shall be of brass oxidized heavy duty unless specified otherwise.

5.4 Samples of all hardware are required to be got approved in advance from Architects/Client.

5.5 The agency should cover up and protect the brass surface by thick grease or other suitable material veneer as necessary and subsequently clean it away at the same time of handing over.

5.6 All hardware shall be fitted with good workmanship without the surrounding edges being damaged.

Aluminum and stainless steel shall be of approved manufacture and suitable for its particular application. Generally the surface of aluminum shall have an anodized finish and both shall comply with samples approved by Client/Architects.

6. Laminate

6.1 All laminate shall be specified in Bill of Quantity and of approved make.

6.2 The contractor shall get the sample showing the surface texture, pattern and colour approved by Client / Architect.

6.3 All edges, beading, etc shall also be finished in Lip pings

7. Fabrication in Metal

7.1 All brazing and welds are to be executed in a clean and smooth manner, rubber down and finished in flat and tidiest way, particularly where exposed.

8. Glass Works

8.1 All glass is to be of approved manufacture, complying with 1.5. 3548-1960, or as per approved quality and sample, to be of the qualities specified and free from bubbles, air holes, waviness and other defects.

8.2 In cutting glass, proper allowances shall be made for expansion. Each square or rectangle of glazing to be in one whole sheet.

8.3 Glass for mirror shall be silvering quality (5.Q.) conforming to 1.5.3458-1958 or as approved sample and quality.

8.4 On completion, all glass surfaces shall be cleaned inside and out. All cracked, scratched glass/ mirror shall be replaced.

8.5 Sun control film shall be non-reflective type, of approved make and shade. The fixing shall be without any defects such as air bubbles/ creases / adhesive marks, etc.

9. Paint and Polishes

9.1 All material required for the work shall be specified ands approved manufacture, delivered to the site in the manufacture's containers with the seals, etc. unbroken and after use empty containers shall be stored till finally cleared by the Employer.

9.2 All iron or steel/metal surfaces shall be thoroughly scraped and rubbed down with wire brushes and shall be entirely free from rust, mill scale etc. before applying the primer coat.

Melamine polish finishes shall be properly finished, without any flow marks, spots, roughness etc.
Painting work shall be of high standard, without any brush marks on the finished surfaces and no spots on adjacent furniture, glass, etc.

Spray painting with approved machines will be permitted only if written approval has been obtained from the Client/Architect prior to painting. Neither spraying will be permitted in the case of priming coat nor where the soiling of adjacent surfaces is likely to occur. The buzzle and pressure to be so operated has to give and even coating throughout to the satisfaction of the Client/Architect. The paint used for spraying is to comply generally with the specification concerned and is to be specially prepared by the manufacture for spraying. Thinning of paint made for brushing will not be allowed.

All brushes, tools, pots, kettles etc. used in carrying out the painting works shall be clean and free from foreign matter and to be thoroughly cleaned out before use with a different type of class of material.

Prior to painting, the surface preparation should be done as per IS code i 4177 1994 para 4.2.1, 5.2.1.1, 5.2.2.1, 5.2.3. In the case of maintenance operation, the surface preparation should be done as per para 7.00 of IS 14177:1994

For primer and finist1ing coat, the painting work should be carried out strictly as per 5.2.1.2, 5.2.1.3, 5.2.2.2 and 5.2.2.3 of IS Code.

Painting should be done invariably using airless spray equipment as per IS : 141771994 wherever recommended.

Proper care should be taken for deciding the compatibility of primer paint with paints used for finishing coats, including thinner on the basis of manufacturer's recommendation.

Enamel paint should confirm to IS 133 - 2004

Wood filler, transparent liquid should confirm to IS: 345 - 1952 (with amendment Nos. 1 and 2 reaffirmed 1986).

French Polish if to be done as per specific requirement should confirm to IS 348 1968 (First revision, with amendment No's 1, reaffirmed 2001)

Painting on concrete, masonry and plastered surfaces should confirm to IS : 2395 (. pt - I) - 1994 (Operations workmanship re affirmed 2005)
Plastic emulsion painting for interior use should confirm to IS 5411 (Pt.I) - 1974 (with amendment No: 1, reaffirmed 1993)

10. Civil Work

10.1 The Contractor shall use cement of approved make only.

10.2 Only first quality ceramic tiles / vitrified tiles of approved make shall be used. All tiles joints shall be filled up properly using cement slurry mixed with matching pigments.

10.3 Only best quality granite and marbles of the basic rate specified and of approved shade shall be used. (Basic rates wherever mentioned are ex-go down and excluding taxes). The granite/marble shall be from the same lot and without colour / shade variations or any other defects.

10.4 All edge chamfers / cutting of granite / marble shall be mirror polished and no extra shall be paid for the same. In the case of Urinal partitions / sink partitions, the granite slab used for partition should be polished on both sides.

11. Upholstery
This will be of first call standard workmanship with webbing, no sag spring, coiled springs, padding and filling as specified on drawing. Covering fabrics will be seen tufted and corded as shown on the drawing and as approved by the Client/Architect.
Cushion Vents- Brass Cushion vents should be installed at the back or under side of seat cushions (especially those covered in leather vinyl plastics or very tightly woven fabrics) to allow air to escape easily and to prevent tearing.

Materials- Finished timber shall be of the type specified. Furnishing fabrics, colour, pattern, substance to be as specified and manufacture, or supplied by the company specified, no variations of this will be permitted unless with prior approval of the consultants. The sample of the upholstery should be got certified from the Client! Architect, before placing orders.

12. Polish

12.1 French Polish

The basic material shall be shellac dissolved non methylated spirit
The timber must be well sanded and clean and the grain filler. Any staining must be done before applying the polish.

By pad of cotton with soft white linen or cotton fabric, apply evenly over the surface with a slow figure of eight motion until the timber is coated with a thin layer of polish. Allow the work to stand for at least 8 hours, and the fresh rubber with double thickness of cover material and charges it with methylated spirit.

12.2 Wax Polish

Wax polish shall contain silicon's and driers. A good silicon wax is to be used not a creamy or sprays. Timber shall be sealed first with another finish such as Ron seal, before applying wax.

Apply a light coat of the sealer by brush or cloth direct to the unfilled timber, working it well in and finishing evenly with the grain. Allow to dry thoroughly then sand lightly with fine paper. Apply a heavy coat of wax by cloth or on flat surfaces with a stiff brush. Work it well into the timber and finish of by stroking with grain before leaving to harden. Leave for several hours before rubbing up with a soft brush. Finally buff the grain with a soft cloth.

12.3 Transparent colored Polyurethane (Melamine)

This shall be applied where natural grain of the wood is required to show.
Polyurethane gives tough surface which resist chipping, scratching and boiling water .
Clean off all grease and wax with an abrasive and white spirit, this should not be applied in humid conditions. Apply the first coat, preferably of clear hard glaze with a cloth pad. Leave this to dry for at least six hOlJi s, and then apply further coats with a paintbrush. If you wait for longer than 24 hours between coats, rub down the previous coat with fine glass paper or a medium grade steel wool. Obtain a matt finish, if required, by giving a final coat of clear Ron seal Matt Coat.

VIII. MODE OF MEASUREMENTS

The measurements will be made in terms of relevant IS codes and will be made in meters and will be as per I.S code. The method of measurements for each item is as given under:

1. DOORS, WINDOWS, ROLLING SHUTTERS AND GRILLS
Clear area over one face inclusive of frame shall be measured. Hold fasts and portions embedded in masonry or flooring shall not be measured.

2 PARTITIONS IN WOODWORK
The partition height shall be measured up to bottom of false ceiling finished level and framing members / ply going above shall not be measured.

3 DECORATIVE PANELING OVER WALL OR OVER PARTITIONS
The area of cladding shall be measured in square meter, or square feet. The gross area cladded will be measured. No deductions will be made for gaps up to one centimeter between the panels
CARPETS
The actual area covered by the carpet shall be measured. No extra shall be allowed for wastage.

5. PAVING AND TILE WORK

The work mentioned in this section (shall be measured in Sq.ft or Sq.m. and shall be priced per unit of Sq. mt. In all paving work, the slabs shall be touching the walls and go well under the plaster, but the measurements shall be the clear measurements of the rooms or areas when finished. No allowance shall be made for portions going under the plaster. The wall dado will also be measured as per the clear measurements of the visible area only.

6.ALUMINIUM SLIDING WINDOWS

The measurement of aluminum sliding windows shall be taken only after the frame along with the shutter is fixed in its final finished position in line level and plumb. Width and height shall be measured net between the out of the aluminum window frames.

7. SHUTTERS, STORAGE UNITS, BOXING FOR ROLLING SHUTTERS etc.
The area will be measured in Sq.m on the actual facing size. No allowance shall me made for portions not visible.

8. TELLER COUNTER / UTILITY COUNTER, WALL MOUNTED WRITING LEDGE, PANTRY PLAT FORM, LUNCH PLATFORM SKIRTING etc

Will be measured in Rm on the actual length through the centre of the item if in curved profile.

9. FALSE CEILING

For false ceiling work, the measurement shall be for the actual area covered. The vertical faces will be measured as per the actual visible area. No deduction shall, be made for the cutouts, for light fittings, speakers, column up to 1.5 Sqm.

10. PAINTING

The rates include all scaffolding, ladders, paints, cans, brushes and other appliances required for the efficient execution of the work. The rates also include conveyance, delivery, handling, unloading, storing, wastage, protective cover and cleaning stains from floors and walls, glass panes etc and also preparatory works such as knotting, priming stopping and rubbing down, burning off or stripping etc.
The rates for special conditions of works not mentioned in the tender will be finalized by Client / Architect considering tile site conditions and nature of specialty required, which will be final and binding on the contractor.
Measurements

No deduction will be made for openings not exceeding 0.5 Sq.m each and no addition will be made for painting to beading, mouldings, edges, jambs, soffits, sill etc. of such openings.

Corrugated sheet surfaces will be included with plain surfaces after increasing their areas by the following percentages :-

(i) Corrugated sheets 14%
(ii) Asbestos cement sheets corrugated 20%
(iii) Asbestos cement sheets semi corrugated:- 10%

Areas of uneven surfaces will be converted into equivalent plain areas in accordance with table given below:

Table of Equivalent Plain Ares of uneven Surfaces

Sl.No.	Description of work	How measured	Multiplying factor
1	Panelled or framed and brazed or ledged and battened or ledged, battened and brazed joinery	(not 11.30 (for Measured flat (not girthed) including frame. Edges, chocks, cleats etc. should be deemed to be included in this item	1.30 (for each side)
2	Flush joinery	Do	1.20 (for each side)
3	Fully glazed or gauged joinery	Do	0.80 (for each side)
4	Partly paneled and partly glazed or gauged joinery	Do	1.00 (for each side)
5	Fully Venetianed or lovered joinery	Do	1.80 (for each side)
6	Weather boards	Measured flat (Not girthed) supporting frame work shall not be measured separately.	1.20 (for each side)
7	Guard Bars, Balustades gales, gratings, grills, expanded metal and railings, gates and open for open palisade fencing including standard braces, rails stays etc .	Measured flat overall. No deduction shall be made for open spaces. Supporting members will not be measured separately.	1.00 (for painting all over)
8	Carved or enriched work	Measured flat	2.00 (for each side)
9	Steel rolling shutters	Measured flat (size of opening) overall, jamb guides, bottom rails and locking arrangement, etc., shall be included in the item (top cover will be measured separately)	1.10 (for each side)
10	Plain sheet steel doors and windows	Measured flat (not girthed) including frame, edges etc.	1.10 (for each side)
11	Fully glazed or gauged steel	Do	0.50 (for each side)
12	Partly Paneled and partly glazed steel doors.	Do	0.80 (for each side)
13	Collapsible gate	Measured flat (size of opening)	1.50 (for each side)

PREAMBLE TO THE BILL OF QUANTITIES : IRON AND STEEL WORKS

Unless otherwise specified the rates quoted shall include for the following :

Work at all heights and at all levels.

The steel casement windows and ventilators, including all its fittings, shall be manufactured to conform to IS 1038 and I.S. 7452.

Appropriate sections having the specified Weight characteristics only shall be used.

Shutters of all windows and ventilators shall be as per drawing.

Projecting type stainless steel hinges / pivot hinges must be provided for all side hung shutters.

All the members should be finished with one coat of Anti corrosive primer after through cleaning of the surface to remove rust/scale, oil etc., in accordance with I.S. 1038.

The fittings supplied shall be sturdy and samples of all fittings shall be got approved before fabrication.

The workmanship and finish of the windows, ventilators and fittings should be of first class and shall be got approved.

All hardware fittings such as Peg stays with screws, Standard Handles, Spring, catches, lugs with suitable screws, Glazing clips, Transomes, Mullions, Coupling bars, Weathering bars, where necessary Cast aluminium alloy or pressed steel stove enameled wrinkle finish.

Supply of hardware fittings like coupling, mullions, and additional fixing like clamps, bolts, nuts, washers etc., for continuous fastening of windows / structural steel members.

All reinforcement steel shall be of Fe-500 or Fe-415 or Mild steel conforming to IS 432 or HYSD bar conforming to IS 1786.

Cutting and waste, straightening, bending, hoisting, fixing, supporting in position with precast spacer blocks or chairs / spacer rods and tying with GI annealed wire, welding with electrodes wherever required, including allowance for laps.

Submission of reinforcement for testing and submission of test reports for approval, prior to use.

All materials supplied shall be free from manufacturing defects and defective workmanship and guaranteed. Any defects noticed shall be made good by the Contractor at his own cost, without claim for any extra.

PREAMBLE TO THE BILL OF QUANTITIES : ALUMINIUM WORK

Unless otherwise specified, the rates quoted shall include for the following :

1) Providing all aluminium doors, windows, ventilators, glazings, railings, stainless glazing, curtain wall and aluminium composite panel of approved make and sample shall be got approved before fabrication.

2) Providing necessary couplings, transoms and mullions.

3) Providing a protective thick layer of clear transparent lacquer based on methacrylates or cellulose butyrate, for protection of surfaces of various units during transportation and installation and removal of the same after installation is complete.

4) Each shutter of sliding window shall have Nylon sleeved rollers both at top and bottom. Lock and handle shall be provided in Nylon / PVC / Aluminium, sample of which shall be got approved. Providing single row continuous neoprene or PVC weather strip to prevent air infiltration to openable shutters with stainless steel ball bearing.

5) Sealing the junction of windows or glazing frame with openings and / or wooden base lining around the opening with special silicon sealant from the approved manufacturers of Dowcorning, General Electric or equivalent to make the junction as water tight.

6) Fixing of aluminium units in the openings with lugs 15 mm x 3.15 mm x 100 mm long in cement concrete blocks of 150 mm x 100 mm x 100 mm size 1:3:6 (1 cement : 3 coarse sand : 6 coarse graded aggregate 20 mm and down size) or with wooden plugs and screws or with rawl plugs and coach screws or with bolts and nuts or with anchor fasteners as required.

7) Door shutters shall have heavy duty single / double action hydraulic floor springs of approved make pivoted at top and bottom including grouting in the floor with CC 1:2:4.

8) Necessary locking arrangements of approved design shall be provided to door shutters including flush type tower bolts for each shutter as directed.

9) The Contractor shall furnish detailed fabrication drawings to suit site installation for approval before taking up the work. The size and details of door, windows and ventilators etc. shall generally be as per Architects drawing. The contractor shall take exact dimensions of openings as verified at site for all the items before fabrication to avoid any discrepancies.

10) Hoisting and working at any height including required scaffolding etc., and protecting the aluminium sections and glass from any damage, scratches etc., till being taken over and shall include for final cleaning of all items.

11) The manufacture of the aluminium framed glazed doors and windows etc., shall sconform to IS.

12) Aluminium Sections for aluminium doors, windows and ventilators shall be of standard extrusion and shall conform to IS 733. Aluminium sections for structural glazing and curtain windows shall be of extruded sections – 6063 Alloy or BSH9 conforming to IS - 63400.

13) All Aluminium Sections shall be finished in electrolytic colour anodizing of approved shade and colour for an anodic coating of minimum 15 microns / 20 microns thickness or as specified in the BOQ conforming to IS. A piece of anodised materials shall be got approved before fabrication.

14) All doors, windows, etc., shall be factory finished and the frame joints shall be absolutely water tight. All frames and shutters shall be properly jointed ensuring adequate mechanical strength and absolute right angleness.

15) All doors shall be provided with matching colour anodized aluminium push plates as per approved design and shape.

16) All glazing shall be depending upon the size of panes / panels and of approved quality with the following thickness of different areas as given below :

a) Single glazing - 4.0 mm, 5.5 mm & 6 mm thick – Approved shade and colour tinted or clear glass.

b) Double glazing - As specified in the BOQ.

17) The glasses for doors, windows fixed glazing shall be fixed with matching aluminium colour anodized snapfit glazing clips and gasket rubber, PVC weather strip shall be provided.

18) Matching Sections shall be perfectly aligned for compactness.

19) Samples of Sections for outer frame, shutter frame, hardware etc., shall be produced for prior approval.

20) Packing and all other incidental charges such as protecting the surface of aluminium sections and glass using peelable PVC tape or any other equivalent approved material etc.

21) Structural glazing / Curtain windows / aluminium composite panel works shall be carried out by on approved specialised agency on prior approval. The work shall be guaranteed for a period of 15 (fifteen) years in an approved proforma acceptable to the Employer on a stamped paper.

22) All joinery hardware fittings like floor spring, mortice lock, cylindrical lock, door closer, handles, hinges of approved make and ISI mark as per the list attached below.

PREAMBLE TO THE BILL OF QUANTITIES FLOORING WORKS

Unless otherwise specified rates quoted shall include for the following :

1. Work at all heights and at all levels.

2. Work at any floor, any height and in any position or shape as directed with necessary scaffolding with all leads and lifts, cost and conveyance of all required materials to site of work, royalty charges, required tools and plant etc.

3. Final preparation of base subgrade or subfloor by cleaning of all dust/dirt, loose particles, caked mortar dropping by scrubbing with coir or steel wire brushes, haul king etc. Roughening surface if so directed, cleaning with water and keeping surface wet for 12 hours and removing surplus water by mopping before topping is laid and minor trimming of the base to remove undulations.

4. Cleaning and watering immediately before laying the floor as directed.

5. Providing bedding layer of mortar as specified in the case of slabs, tiles, etc. to correct levels gradients or steps as called for.

6. Cutting, rubbing and polishing where applicable (both machine and hand) including grinding, rubbing, acid cleaning, wax and tinoxide polishing etc.

7. Keeping the surface wet for a minimum period of one week.

8. For all Marble flooring, skirting, dadooing to be done with neat white cement slurry coat to the required thickness over bed mortar before laying the marble slab. All cladding works in marble slab, granite, etc., shall be arranged with requisite brass / gun metal clamps / stainless steel clamps and keys in required sizes and pattern as directed.

9. All ceramic / glazed tile flooring shall have bedding layer of mortar as specified in the bill of quantities and skirting shall have bedding layer of "ROFF TILE" Water proof Tile Adhesive for fixing and pointing shall have 'Roff Tile – Joint Fillers' of approved shade and colour as per Manufacturer's Specification.

10. All ceramic / glazed tile dadoing shall have final light acid cleaning and pointing with "ROFF TILE" Joint Fillers compound of approved shade and colour as per manufacturer's specification.

12. Work in jambs soffits and sills of openings for lifts entrance in marble shall be arranged to match with the surroundings and as directed.

13. Formation of vertical grooves on vertical surfaces and provision of mortar bed of required thickness to achieve proper level/slope.

14. Provision in small quantities, narrow width, mitered and returned ends, sinking, risers, set back and any other sundry items for cutting, fixing, making good upto and which may be required for forming base.
PREAMBLE TO THE BILL OF QUANTITIES: PAINTING AND FINISHING WORKS

Unless otherwise specified rate quoted for all items shall include for the following:

1. Work at all heights and depths and also internally and externally.

2. Erection of necessary double scaffolding and removal of the same and other equipments etc.

3. Providing all materials like paints, brushes and other materials and application of paint as per Manufacturers specification conforming to relevant item in bill of quantities.

4. Cleaning of plastered surface of walls, all surfaces of wooden / steel / aluminium joinery etc., removal of dirt, dust by sand paper, chemical removal of rust etc. filling in crevices at any level and puttying the surface complete and leaving the work neat as directed.

5. Eventhough the number of coats have been specified against each item of work, any additional coat is required shall be given without any extra cost to bring the surface to the desired finish, before handing over the site.

Neat finishing of junctions of plaster, skirting, dadoing and cladding.

All the junctions of Painting surface and joinery works should be protected with peel off foil or protective tape.

6. All paints should be of best quality of approved make and colour.

1. TECHNICAL SPECIFICATION FOR CONCRETE WORKS

This specification covers the general requirements for plain and reinforced cement concrete of different grades.

The requirements for concrete shall be materials, storage of materials, design of concrete mix, sampling and testing, form and formwork, construction joints, preparation and placement of concrete including batching,

mixing, conveying, depositing and curing, finishing, grouting, inspection, cleanup etc. The concrete shall generally comply with the requirements of latest IS : 456.

Unless otherwise specified, the rates for all RCC will be exclusive of reinforcements. Reinforcements will be paid for separately. Unless otherwise specifically mentioned, the rates for all plain and RCC works shall be inclusive of formwork, centering and shuttering.

MATERIALS :

1. Cement :

Unless otherwise specified, ordinary Portland cement of 43 grade conforming to latest IS : 8112 shall be used for all concrete works. Test certificates from the manufacturers to show that the cement brought by the contractor to site for use in the works fully complies with the relevant IS Specification shall be submitted to the Engineer at the Contractor's own cost. In addition, field test shall be conducted for every consignment of cement for the purpose of concrete design mix. Cement shall be stored and neatly packed in piles not exceeding 10 bags high in weather proof sheds with raised wooden plank flooring to prevent deterioration by dampness or intrusion of foreign matter. It shall be stored in such a way as to allow the removal and use of cement in chronological order of receipt, i.e. the first received being first used. Cement deteriorated and/or clotted shall not be used on work but shall be removed at once from the site. Daily record of cement received and consumed shall be maintained by the contractor in an approved form and a copy submitted to the Engineer once a week. Not withstanding the above, the Engineer, for any reasons whatsoever, may at his discretion order to retest, the cement brought to site in an approved testing laboratory and fresh certificate of its soundness shall be produced at the Contractor's own cost. Cement ordered for retesting shall not be used for any work pending results of retest.

2. Aggregates :

Fine and coarse aggregates shall conform to IS 383. If required, the aggregates shall be washed and screened. Sampling and testing shall be as per IS : 2386.

Each size of aggregate shall be stored on a separate platform and shall avoid mixing and contamination with foreign material. Segregated aggregates shall be rejected.

Cost of stacking, washing, screening and cost of all tests, sampling etc. shall be borne by Contractor.

a) Fine Aggregate :

Sand shall conform to IS: 383. It shall pass through I.S sieve 4.75 mm (3/16 B.S) test seive, leaving a residue not more than 5%. It shall be from a natural source approved by the Engineer. It shall be washed if directed to reduce the percentage of deleterious substances to acceptable limits at Contractors own cost. Sand shall not contain any trace of salt and sand containing any trace of salt shall be rejected.

The fine aggregate for concrete shall be graded within limits as specified in IS : 383 and the fineness modules shall range between 2.60 to 3.20.The fine aggregate shall be stacked carefully on a clean hard dry surface so that it will not get mixed up with deleterious foreign materials. If such a surface is not available a platform of planks or corrugated sheets or brick floor or concrete floor shall be prepared.

IS Sieve	Percentage Passing		
Designation	Grading Zone I	Grading Zone II	Grading Zone III
10 mm	100	100	100

4.75	90 - 100	90 - 100	90 - 100
2.36	60 - 95	75 - 100	85 - 100
1.18	30 - 70	55 - 90	75 - 100
600 Micron	15 - 34	35 - 59	60 - 79
300 Micron	5 - 20	8 - 30	12 - 40
150 Micron	0 - 10	0 - 10	0 - 10

c) Coarse Aggregate :

Coarse aggregate shall conform to IS : 383. It shall consist of crushed or broken stone, 95% of which shall be retained on 4.75 mm IS test sieve. It shall be obtained from crushed granite, trap, besalt or similar approved stones from approved quarry. Coarse aggregate shall be chemically inert when mixed with cement & shall be angular in shape and free from soft friable thin porous laminated or flaky pieces. It shall be free from dust and other foreign matter. Gravel/shingle of desired grading may be permitted as a substitute in part or full in plain cement concrete if the Engineer is otherwise satisfied about the quality of aggregate.

IS Sieve	A						B		
Designation	% Passing for single sized aggregate of nominal size						% Passing of graded aggregate of nominal size		
	63 mm	40 mm	20 mm	16 mm	12.5 mm	10 mm	40 mm	20 mm	16 mm
80 mm	100	-	-	-	-	-	100	-	-
63 mm	85 - 100	100	-	-	-	-	-	-	-
40 mm	0 - 30	85 - 100	100	-	-	-	95 - 100	100	-
20 mm	0 - 5	0-20	85 - 100	100	-	-	30 - 70	95 - 100	100
16 mm	-	-	-	85 - 100	100	-	-	-	90 - 100
12.5 mm	-	-	-	-	85 - 100	100	-	-	-
10 mm	0-5	0-5	0-20	0-30	0-45	85 - 100	10-35	25-55	30-70
4.75 mm	-	-	0-5	0-5	0-10	0-20	0-5	0-10	0-10
2.36 mm	-	-	-	-	-	0-5	-	-	-

Unless otherwise specifically stated for all RCC works, the size of coarse aggregate shall be 20 mm and down size.

3. Water :

Water used for mixing concrete and curing shall be potable quality, fresh, clean, free from oil, salts, acids, alkali and shall be in accordance with the clause 4.3 of IS 456. The contractor shall produce test results of water proposed to be used on the job for approval by the Engineer for the mixing before casting any concrete.

4. Reinforcement :

Refer separate specification given elsewhere.

5. Admixtures :

The use of admixtures may be allowed only if approved by the Engineer and his decision in this regard shall be final.

Concrete :

Concrete shall be specified in various graded designations as M10, M15, M20 & M45 etc. The letter 'M' refers to the mix and the number to the minimum compressive strength in N/Sq.mm to be established by 28 day of 15 cms works cube tests with the probability of not more than 1 test out of 10 falling below that minimum.

The proportions of ingredients for concrete shall be such that in addition to complying with the strength requirement, the concrete shall have adequate workability and proper consistency to permit it to be worked readily into the forms and around reinforcement, under the conditions of placement to be employed without excessive segregation or bleeding.

All ingredients shall be proportioned and measured by Weight using approved weighbatching equipment. There shall be full field control of (1) predetermined grading of all aggregates that go into concrete (2) predetermined proportion of course aggregate, fine aggregate, cement and water for the required strength.

Design Mix :

The Contractor is responsible for the design of the concrete mix. The Contractor shall design the mix and submit for the approval of the Engineer. No concreting works shall be commenced without the approval of the design mix of concrete.

The Contractor shall make trial mixes using coarse aggregates, sand, water and cement actually available at site to be used for making concrete. Before making trial mixes all the ingredients shall be tested in the field laboratory and should conform to the relevant IS Specifications. Suitable proportions of sand and the several sizes of coarse aggregates for each grade of concrete shall be selected to give as nearly as practicable the maximum density, this is to be determined by mathematical means, laboratory tests, field trials or other means.

The minimum cement contents for design mix concrete of various grades shall be as under :

Grade of concrete	Cement per cum of concrete
M10	220 Kgs
M20	320 Kgs

M25 330 Kgs

The mix required to produce, place and compact the specified grade of concrete shall be designed by the Contractor. He shall carry out preliminary tests of specimen at his own cost at field laboratory as per IS : 456 and IS : 516 and he shall furnish to the Engineer a statement of proportions proposed to be used for various concrete mixes and grades of concrete for approval.

The minimum strength requirements shall be as follows :

Minimum compressive strength of 15 cm cubes at 7 days and 28 days after mixing, conducted in accordance with IS : 516.

Grade of Concrete	Preliminary Test N/Sqmm		Work Test N/Sqmm	
	At 7 days	At 28 days	At 7 days	
M - 10	9.0	13.5	7.0	
M - 20	17.5	26	13.5	
M - 25	22.0	32	17.0	

Once a mix including water cement ratio has been determined and specified for use by the Engineer, that W/C ratio shall be maintained.

Details of design mix concrete approved by the Engineer shall be submitted to the Engineer for record along with the results of sieve analysis and such other tests on cement, aggregates and water etc. The approved design mix shall then be followed for subsequent concreting operations at site till a variation in some characteristics of any ingredient is observed or till a variation in the degree of quality control necessitates a change in the mix.

Batching and Mixing of Concrete :

All materials for controlled concrete shall be batched as per approved design mix in suitable weigh batcher of adequate capacity and of approved design. Mixers for concrete may be stationary mixers of either the tilting or nontilting type, or truck mixers of approved design. Thorough mixing of the concrete is essential and mixers shall be capable of combining the materials into a uniform mixture, uniform colour and of discharging this mixture without segregation. The mixers should always be operated at the speed and time recommended by the makers. The mixers shall be maintained in sati's operating condition, and mixer drums shall be kept free of hardened concrete. The consistency of the concrete produced from the mixers should have sufficient workability to enable it to be well consolidated, to be worked into the corners of the shuttering and around the reinforcements.

The slump for concrete as determined by slump tests as per Indian Standard 1199 latest edition, shall not exceed the maximum slumps indicated below for each type of construction using high frequency vibration unless otherwise approved or directed by the Engineer.

Workability	Slump in mm		Type of construction
	Min.	Max.	
Medium	40	80	All RCC works

The contractor shall not place concrete having a slump outside the limits specified without the approval of the Engineer.

Atleast one slump test shall be made for every compressive strength test carried out. More frequent tests shall be made if there is a distinct change in job conditions, or if required by the Engineer.

Transporting :

Concrete shall be conveyed from the place of mixing to the place of final deposit as rapidly as practicable by methods which will prevent segregation or loss of any of the ingredients. If segregation does occur during transport, the concrete shall be remixed before being placed. Normally not more than 30 minutes shall lapse between mixing and consolidation in position. All means of conveyance shall be adopted to deliver concrete of the required consistency and plasticity without segregation or loss of slump.

Concrete should be transported only by transit mixers

Placing :

Method of placing shall be such as to preclude segregation and as far as practicable the placing shall be continuous. Special care shall be taken in accordance with latest IS : 456 while laying concrete under extreme weather.

Concrete shall be transported by transit mixers and placed in position without segregation. It is important that the concrete be placed in its final position before the cement reaches its initial set. The concrete should normally be compacted in its final position within 30 min. of leaving the mixer, and once compacted, it should not be disturbed. Before the concrete is actually placed in position, the insides of the forms should be inspected to see that they have been cleaned and oiled, care being taken to see that the reinforcements do not get contaminated. Temporary openings should be provided to facilitate inspection, especially at the bottom of columns, to permit the removal of all sawdust, wood shavings etc. Openings should be placed so that the water used to flush the forms will drain away. No water should be left in the forms. The concrete should be spread evenly in the form to avoid segregation and should completely fill all corners of the form work and the space between the reinforcement. Vibrator should not be used for

spreading the concrete. Concreting should be carried on without interruption between predetermined construction joints.

Compacting :

The object of compacting concreting is to achieve maximum density. The concrete should therefor, be placed a little in excess of its specified depth so that after proper compaction its final desired depth is obtained. Manually Roding and tapping the concrete and tapping the form work on its external face shall be continuously carried out at the actual pouring head, while compacting the concrete with mechanical vibrators shall be done sufficient distance away from the pouring head, so that the vibrator is utilised only to compact the concrete and not to spread it. The Engineer may, however, at his absolute discretion, permit concreting by increasing the slump and correspondingly increasing the cement contents at contractor's cost. Except for shallow or inaccessible concrete the vibrator shall be penetrated vertically and at regular distance intervals, not at an angle and not at haphazard intervals. At corners, obstructions, embedded fixtures and congested reinforcement areas, the vibrators shall be manipulated with the utmost care and handled only by the most experienced workmen.

The number and type of vibrator to be used shall be subject to the approval of the Engineer and in general immersion type vibrators shall be used. Consolidation by using immersion vibrator will be in accordance with IS Code : 3558. Sufficient number of reserve vibrators in good working condition shall be kept on hand at all times, so as to ensure that there is no slacking of interruption in compacting.

Protection of Concrete :

All freshly placed concrete surfaces shall be protected from damages by workmen equipment or any other cause. The surface shall be protected from dry wind and direct sun rays. The Contractor shall provide and use, where directed by the Engineer enough tarpaulins or other suitable materials to cover completely or enclose all freshly finished concrete.

Curing :

As soon as the concrete is hardened sufficiently, it shall be cured by maintaining the concrete in a damp condition by application of wet sacking or other approved moisture retaining covering for a period of 28 days after placing the concrete. In floors curing should be carried out by ponding and covering with polythene sheets to reduce evaporation losses. Extreme care should be taken to ensure that all surfaces are kept in a moist condition and no local area shall be allowed to dry out intermittently. Curing shall be done with potable water free from sediments of any kind.

Construction Joints :

Construction joints in exposed concrete work shall be made only where shown on the drawings or directed by the Engineer and shall be in accordance with the details shown or approved by the Engineer. The procedure given in clause 20.1.4.2 of IS : 456 shall be followed for general guidance. All foreign matters shall be removed from the concrete before it is allowed to fully harden. The removal shall be effected by scrubbing the concrete surface with wire and with bristle brushes and washing down to expose clearly the aggregate. However care shall be taken to avoid dislodgment of particles of aggregate. If concrete has been allowed to harden excessively the surface shall be chipped over its whole surface and thereafter thoroughly washed. Before fresh concrete is added on the construction joints, the surface of the old concrete shall be thoroughly wetted and covered with a thin layer of cement mortar 1:1.

Construction joints in concrete floors and walls of basement, water tanks or any other structures in contact with water or earth, shall be provided with PVC water stops of approved make coated on either side

with hot asphalt. The longitudinal joints, in water stops, shall preferably be not welded or overlapped atleast 200 mm.

Sampling and strength test of concrete :

Sampling and testing of concrete shall be conducted in accordance with the latest issue of Indian Standard 1199, 516 and 456.

During the progress of construction compression tests shall be made to determine whether the concrete being produced complies with the strength requirements specified. The test will be made in accordance with Indian Standard 516 latest edition.

The minimum frequency of sampling of concrete of each grade shall be in accordance with the following :

Quantity of concrete in the work, Cum	Number of Samples
1 - 5 6 - 15 16 - 30 31 - 50 51 and above	Plus one additional sample for each additional 50 Cum or part thereof

NOTE :

At least one sample shall be taken from each shift

A set of six specimens from random mixer batches, shall constitute a test, three being tested for 7 days and three being tested for 28 days strength.

The strength test result shall be the average strength of the three companion test specimens, tested at 28 days, except that, if one specimen in a test shows manifest evidence of improper sampling, molding or testing the result shall be discarded and the remaining two strengths averaged. Separate procedures shall be established when cements other than Portland cement are used.

Normally, 7 day and 28 day tests shall be made on specimens. For any mix, a correlation between 7 day and 28 day strengths may be made in the laboratory. Soon after a job starts, a similar correlation will evolve for samples of concrete taken from the mixer. After that correlation has been established, the results of the 7 day tests may be used as an indicator of the compressive strengths which should be expected at 28 days, provided such results are consistent. If 7 day tests show compressive strengths that are too low, measures shall be taken at once, at the Engineer's direction, without waiting for the results of the 28 day tests.

A. The concrete shall be deemed to comply with the strength requirements if:

a) every sample has a test strength not less than the characteristic value ; or

b) the strength of one or more samples though less than the characteristic value, is in each case not less than the greater of ;

i) the characteristic strength minus 1.35 times the standard deviation; and

ii) 0.80 times the characteristic strength and the average strength of all the samples is not less than the characteristic strength plus

$$\left|1.65 - \frac{1.65}{\sqrt{\text{number of samples}}}\right| \text{ times the standard deviation}$$

B. The concrete shall be deemed not to comply with the strength requirements if :

a) The strength of any samples is less than the greater of:

i. the characteristic strength minus 1.35 times the standard deviation and;

ii. 0.80 times the characteristic strength; or

b) the average strength of all the samples is less than the characteristic strength plus

$$\left|1.65 - \frac{3}{\sqrt{\text{number of samples}}}\right| \text{ times the standard deviation}$$

C. Concrete which does not meet the strength requirements as specified in Para (A) but has a strength greater than that required by Para (B) may be accepted as being structurally adequate without further testing by the Engineer in consultation with designer.

In the event that concrete tested in accordance with the requirements of the above clause, fails to meet the specification, the Engineer shall have the right to require any one or all the following :

a) Changes in the concrete mix proportions for the remainder of the work

b) Coring and testing of the concrete represented by the tests which failed as per IS : 456.

c) Load tests on part of structures as per IS : 456.

d) Removal and replacement of any such portions of the structure.

e) Extended curing of the concrete represented by the specimen.

The Contractor shall carryout all such measures as directed at his own expense, if the concrete cannot be accepted due to reasons attributable to the Contractor.

The unit rate of concrete shall be inclusive of all tests and remedial measures.

FORM WORK :

The formwork shall conform to the shapes, lines and dimensions for all the elements as shown on the drawing. The formwork shall be designed and constructed so that the concrete can be properly placed and thoroughly compacted to obtain the required shape, position and level subject to specified tolerances. The designed formwork arrangement shall be got approved by the Engineer. Approval of the proposed formwork by the Engineer will not diminish the Contractor's responsibility for the satis performance of the formwork, nor for the safety and coordination of all operations.

Formwork for architectural shapes for columns, ring, beams, circular or spherical walls, shell roofs or bottoms in the case of water reservoirs or any other structure shall be made from approved wrought and put up timber or steel plates and frames.

The formwork to be used shall be of an approved system type

Erection of Formwork :

The following shall apply to all formwork.

1. The contractor shall obtain the approval of the Engineer for the design of forms and the type of material used before fabricating the forms.

2. All shutter planks and plates shall be adequately backed to the satisfaction of the Engineer by a sufficient number and size of walers or framework to ensure rigidity during concreting. All shutters shall be adequately strutted, braced and propped to the satisfaction of the Engineer to prevent deflection under dead weight of concrete and superimposed live load of workmen, materials and plant, and to withstand vibration and wind. No joints in props shall be allowed.

3. Vertical props shall be supported on wedges or other measures shall be taken where the props can be gently lowered vertically during removal of the formwork. Props for an upper storey shall be placed directly over those in the storey immediately below and the lowest props shall bear on a sufficiently strong area.

4. Care shall be taken that all formwork is set plumb and true to line and level or camber or batter where required and as specified by the Engineer.

5. If formwork is held together by bolts or wires, these shall be so fixed that no iron will be exposed on surface against which concrete is to be laid. In any case wires shall not be used with exposed concrete formwork. The Engineer may at his discretion allow the Contractor to use tiebolts running through the concrete and the Contractor shall decide the location and size of such tiebolts in consultation with the Engineer. Holes left in the concrete by these tiebolts shall be filled as specified by the Engineer at no extra cost. No through tie will be permitted in all cases where water is likely to be retained and gas tightness of the structure is to be ensured.

6. Provision shall be made in the shuttering for beams, columns and walls for a port hole of convenient size so that all extraneous materials that may be collected could be removed just prior to concreting.

7. Formwork shall be arranged as to permit removal of forms without jarring the concrete Wedges, clamps and bolts shall be used wherever practicable instead of nails.

An approved mould oil or other material shall be applied to faces of formwork in contact with the wet concrete to prevent adherence of concrete. The use of oil which darkens the surface of the concrete shall not be allowed. Oiling shall be done before reinforcement has been placed and care shall be taken that no oil comes in contact with the reinforcement while it is being placed in position. The formwork shall be kept thoroughly wet during concreting and the whole time that it is left in place.

9. Formwork for beams and slabs shall be so erected that the shuttering on the side of the beams and soffits of slabs can be removed without disturbing the beam bottoms.

Immediately before concreting is commenced, the formwork shall be carefully examined to ensure the following :

a) Removal of all dirt, shavings, sawdust and other refuse by brushing and washing.

b) The tightness of joints between panels of sheathing and between these and any hardened core.

c) The correct location of tie bars, bracing and spacers, and especially connections of bracing.

d) That all wedges are secured and firm in position.

e) That provision is made for traffic on formwork not to bear directly on reinforcing steel.

The Contractor shall obtain the Engineer's approval for dimensional accuracies of the work and for the general arrangement of propping and bracing. It is imperative that for scaffolding heights of 3.6 M and above, timber posts or steel scaffolding be used with adequate bracings in horizontal and vertical planes. The Contractor shall be entirely responsible for the adequacy of propping and for keeping the wedges and other locking arrangements undisturbed through the decentering period.

Formwork shall be continuously watched during the process of concreting. If during concreting any weakness develops and formwork shows any distress the work shall be stopped and remedial action taken.

Exposed Concrete Work :

Exposed concrete surfaces shall be smooth and even, originally as stripped without any finishing or rendering. Where directed by the Engineer, the surface shall be rubbed with carborundum stone immediately on striking the forms. The Contractor shall exercise special care and supervision of formwork and concreting to ensure that the cast members are made true to their sizes, shapes and positions and to produce the surface patterns desired. No honeycombing shall be allowed. Honeycombed parts of the concrete shall be removed by the Contractor as directed by the Engineer and fresh concrete placed without extra cost, as instructed by the Engineer.

All materials, sizes and layouts of formwork including the locations for their joints shall have the prior approval of the Engineer.

Camber :

Forms and false work shall be generally cambered as indicated in the drawings or as instructed by the Engineer. However, for beams upto 5 M span and slabs upto 4 M span camber is not normally required to be provided.

Age of Concrete at removal of formwork :

Unless otherwise permitted in writing by the Engineer, the minimum period of keeping formwork in position after concreting the members in normal circumstances and where ordinary portland is used shall conform to the Indian Standard Specifications and shall be as follows :

a)	Walls, columns and vertical faces of all structural members	24 to 48 hours as may be decided by the Engineer.
b)	Slabs (props left under)	3 days
c)	Beam soffits (props left under)	7 days
d)	Removal of props under slabs :	
	i. Spanning up to 4.5 m	7 days
	ii. Spanning over 4.5 m	14 days
e)	Removal of props under beams and arches	
	i. Spanning up to 6 m	14 days
	ii. Spanning over 6 m	21 days

For other cements, the stripping time recommended for ordinary Portland cement may be suitably modified.

The Engineer may vary the above period if he considers it necessary. Immediately after the forms are removed, they shall be cleaned with a jet of water and a soft brush.

Stripping of Formwork :

Formwork shall be removed carefully without jarring the concrete, and shall be eased off carefully in order to allow the structure to take up its load gradually and curing of the concrete shall be commenced immediately. Immediately after the shuttering is removed, all the defective areas such as honeycombed surfaces, rough patches, holes left by form bolts etc. shall be brought to the notice of Engineer who may permit patching of the defective areas or reject the concrete work. Rejected concrete shall be removed then replaced by Contractor at his own cost. After removing loose materials, the surface shall be prepared and saturated with water for 24 hours before patching is done with 1:1.5 CM. The use of epoxy for bonding fresh concrete shall be carried out as directed by Engineer. Concrete surfaces to be exposed shall, where required by the Engineer, be rubbed down with carborundum stone to obtain a smooth and even finish. Where the concrete requires plastering or other finish later the concrete surface shall be immediately hacked lightly all over as directed by the Engineer. No extra charge will be allowed to the Contractor for such work on concrete surfaces after removal of forms.
In the case of folded plates and shell roofs the contractors should take approval for the pattern of centering and shuttering along with programme for deshuttering.

Repropping :

For multistoried buildings the floors may need repropping to support the loads of the upper floors under construction. The extent of such repropping shall be as directed by the Engineer. Such repropping shall not

be paid for separately and the cost of such repropping shall be deemed to have been included in the Contractor's rates.

Reuse of Forms :

The Contractor shall obtain permission for reusing of timber forms. The Engineer may in his absolute discretion order rejection of any forms he considers unfit for use for a particular item, and order removal from the site of any forms he considers unfit for use in the works.

Hackingout :

1. Immediately after removal of forms, the concrete surfaces to be plastered shall be roughened with a brushhammer or with chisel and hammer as directed by the Engineer to make the surfaces sufficiently coarse and rough to provide a key for plaster.

This shall not be paid for separately and shall be deemed to have been included in the Contractor's rates.

2. No payment shall be made for temporary formwork used in concreting, nor for formwork required for joints or bulkheads, in floors, or elsewhere, whether such joints are to be covered later with concrete or mastic or other material.

Inspection :

All materials, workmanship and finished construction shall be subject to the continuous inspection and approval of Engineer. Materials rejected shall be replaced by Contractor immediately at his own cost.

Cleanup :

Upon the completion of concrete work, all forms, equipment, construction tools, protective coverings and any debris, scraps of wood etc. resulting from the work shall be removed and the premises left clean.

PRECAST CONCRETE :

All precast concrete shall be cast over vibrating tables or by using form vibrators. Exposed surfaces of precast members shall be finished as called for on the drawings. All jointing surfaces shall be wire brushed and hosed down until the aggregate is free from cement slurry. Constellations shall be provided wherever called for. Leave grouting holes, grooves, inserts, projections, reinforcements, lifting hooks, etc., to conform to the erection procedure. All edges and delicate projections likely to be damaged during handling and erection shall be protected by means of wooden cover fillets, until placed in position.

1. MATERIALS :

The materials used for the construction shall conform to IS 456 latest.

2. MOULD :

The mould used for manufacturing precast components normally consist of two parts, (a) bottom mould, and (b) side moulds. The bottom mould can be made out of timber, masonry, concrete, steel, FRP, plastic or any other material acceptable to the Engineer. The side moulds similarly can be of timber, steel, FRP, or plastic. When using masonry or concrete moulds, the top surface shall be finished to the required accuracy and made smooth.

In case of masonry moulds, the use of chicken mesh or fibre reinforcements in the top surface will help in making the mould last longer for higher efficiency.

In the case of cored units the voids can be created either by an extrusion process, by inflated tubes, Mild steel tubes, timber, cardboard / hard paper or any other materials.

The castellations / depressions / roughening of required depth shall be provided in the sides of the precast units. Suitable provisions in the side shutters of the mould may create better keying between in situ concrete and precast concrete units at the joints.

3. REINFORCEMENT COVER :

Minimum cover for the reinforcement for precast units shall be as follows ;

a) For reinforcement in the flange, 12 mm clear in all directions. This shall be increased to 15 mm when surfaces of precast members are exposed to corrosive atmosphere and

b) For main reinforcement in the rib, 20 mm or diameter of bar whichever is greater. In case of corrosive atmosphere, this shall be increased to 25 mm, or diameter of bar, whichever is greater.

It shall be ensured that the reinforcement cages are not in any way distorted during storage, handling, placement and casting. In the case of mass production in large precasting factories, the use of reinforcement ladders and mesh made by using a resistant welding machine will be advantageous for improving production.

4. CONCRETE :

The concrete mix used shall be minimum of M15 grade in accordance with IS: 456 latest but M 20 and above grade of concrete is preferred for reinforced concrete units. The concrete mix as specified in the drawings shall be used for respective units in accordance with IS: 456 latest.

5. CASTING & CURING OF UNITS :

Mechanical vibration either through mould/table vibrators or screed vibrators is essential to ensure good compaction. Needle vibrators can be used for compacting concrete in the ribs and screed vibrators for compacting concrete in the flange. For larger factories, concrete placing machine, which level, vibrate and finish the concrete units can be advantageously utilized for this purpose.

Curing shall be done as per IS 456 latest. If necessary, low pressure steam curing may be provided to get early stripping / release strength.

6. SAMPLING AND TESTING OF UNITS

Sampling :

Sampling shall be done in accordance with latest load test : Load tests shall be carried out in accordance with IS 456 latest. All the units passing the load test can be used in the constructions.

7. TRANSPORTATION AND ERECTION OF PRECAST ELEMENTS :

Lifting Hooks

Wherever lifting hooks / holes are used these shall be provided at structurally advantageous points (for example, 1/5 of the length from the end of the element) to facilitate demoulding and erection of the precast unit. The lifting hooks can be formed out of normal Mild steel reinforcing bars with adequate carrying capacity to carry the self Weight during demoulding, handling and erection. After erection, the hooks can either be cut or bent down inside the screed or joint concrete that will be laid subsequently.

Lifting and removal of precast units shall be undertaken without causing shock, vibration or undue bending stress to or in the units. Lifting and handling positions should conform to the Engineers directions.

Stacking of Units

After removal from moulds the precast units shall be stacked over supports placed at about 1/6 of span from ends. Care shall be taken to see that no support is placed at the centre of span. Care also shall be taken to see that the main reinforcement is always at the bottom of stacked units.

TRANSPORTATION :

The units shall be transported always with the main reinforcement at the bottom. For transporting and erecting the units, rope slings shall be tied near the ends at 1/5 of the length from either end of the unit. In case the units are transported in trolleys, the overhang of the units from the trolley shall not be more than 1/5 of the length. The unit shall be lifted manually or with the help of chain pulley blocks or mechanically with a hoist or a crane.

8. PLACING AND ALIGNING :

The units shall be placed and aligned side by side across the span to be covered. While placing the units, care shall be taken to see that they have the specified bearing on supporting wall / beam. Placing of units shall be started from one end of the building.

9. BEARING :

The precast units shall have a minimum bearing of 75 mm on the beams and 100 mm on the conventional masonry wall.

10. CURING OF IN SITU CONCRETE IN JOINTS :

The in situ concrete in the joint shall be cured for at least 7 days in accordance with IS 456 latest. The concrete shall then be allowed to dry for at least a week. A coat of cement slurry may be applied to the joints to fill the hairline cracks that might have developed. Joints shall be finished as specified in the drawings.

11. FIXTURES :

Designers shall indicate provisions for fixtures like fan hooks / inserts / electric conduits, etc., to be incorporated within the precast units or the in situ joints / screed concrete.

In case of concealed wiring, conduits may be placed within the joints along the length or within the screed before concreting. If adequate thickness is available this may be concealed within the floor / roof finish.

Holes, openings and fixtures required to be provided within the precast units shall be fixed accurately with adequate embedment at the precasting stage. Drilling of holes / cutting of edges shall not be made unless permitted by the Engineer.

DEFECTS IN CONCRETE :

Immediately on removal of form work, the surface of the concrete shall be examined by the contractor and any honeycombs or other imperfections shall be brought to the notice of the Engineer. The acceptability or otherwise of such defective concrete shall be at the sole discretion of the Engineer who may direct the contractor to repair the defective work or ask for demolition and replacement of such defective work at the risk and cost of the contractor.

PROTECTION OF CONCRETE :

All concrete shall be protected from damage by workmen, equipment, overload or any ther cause. All edges, corners and projections of concrete members likely to be damaged shall be protected by means of cover fillets or as directed by the Engineer.

EQUIPMENT FOUNDATION :

The contractor shall provide concrete foundations for the various equipments in accordance with the drawings. All concrete for equipment foundations shall be of specified grade as per drawing. Bolts, inserts and other anchoring features shall be left in their correctly assigned position to templates prepared for this purpose at the time of casting. Where it is not possible to leave bolts, etc., in position, pockets of suitable sizes shall be left in the concrete foundations to receive the bolts. Pockets shall be formed by suitable form work as directed by the Engineer. Bolts shall be grouted by expanding cement mortar, nonshrink grouting compound and finished neat.

It is essential that the Engineer who is incharge of the construction of all concrete work, whether plain or reinforced shall be well experienced in this class of work and shall superintend personally the whole construction and pay special attention to:

a) Quality Control in respect of selection of materials, proportioning and mixing, etc.

b) Placing and consolidation of concrete.

c) Accuracy in cutting, bending, placing and binding of reinforcement.

d) Accuracy in fabrication, assembly and erection of form work.

e) Casting, handling, transportation and erection of precast members.

MODE OF MEASUREMENT :

The method of measurement for various items in the tender shall be generally in accordance with the IS : 1200 subject to the following :

Cement Concrete in P.C.C. & R.C.C. items shall be measured exclusive of reinforcement and plaster thickness but shall include necessary costs of shuttering, centering, hire charges of all equipment, curing, hacking and fair finish. Reinforcement and plaster shall be measured and paid separately.

Items like R.C.C.precast Jalli, R.C.C.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.

No deductions will be made for openings upto 0.1 Sqm. and no extra labour for forming such opening or voids shall be paid.

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.

Beams shall be measured from face to face of columns/beams and shall include haunches, if any. The depth of the beams (other than raft foundation beams) shall be measured from the top of the slab to bottom of the beam.

In case of combined footings and raft foundation, the exposed portion of beam rib shall be measured as beam and the remaining portion measured in footing/raft slab.

Slabs (other than in raft foundation) shall be measured in bays (clear of beams) with deductions for column portion.

The Kerb shall be of precast of size 125 x 300 x 600mm with chamfered edge. The kerb shall be fixed by leaving a clear gap of 300mm. (The measurement shall be taken through out the length without any gap and the rate shall be quoted accordingly)

Chajja : Only projected portion shall be measured in square metre.

Staircase : Measurements shall be in Cum. Staircase comprising of step, soffit slab, landing slab shall be measured and paid under this item. Side parapet walls, railings, finishing of risers and treads M.S. reinforcement and plastering etc. shall be paid separately under respective items.

4. TECHNICAL SPECIFICATION FOR STEEL REINFORCEMENT

This specification covers the general requirements of steel reinforcement.

Steel reinforcement shall be either mild steel of tested quality high yield strength deformed bars of grade Fe500 conforming to IS:1786 or as called for on the drawings. Fabric reinforcement where called for shall be of hard drawn mild steel wire mesh conforming to IS:1566. Bars shall be free from deleterious materials, mill scale, loose rust, oil or paint.

The contractor shall submit bar bending schedules for approval of the Engineer prior to commencement of fabrication. These shall indicate the accurate dimensions and bending of bars as called for on the structural drawings. Fabrication shall be accurately done to the dimensions, spacing and ensuring minimum cover as called for on structural drawings.

All reinforcing steel within the limit of a day's pour shall be in place and firmly wired atleast one day prior to the date of pour to permit inspection. The contractor shall also ensure that all conduits embedments and inserts are in position before placing concrete.

Bending :

All reinforcement bars shall be made straight before bending. Bars shall be bent cold gradually by machine or other approved means without the use of heat. Bars having cracks or splits on the bends shall rejected. Bars incorrectly bent once shall not be used without the approval of the Engineer.

The Contractor shall prepare bar bending schedules as per details given in IS 2502 and get them approved before proceeding with cutting and bending of bars.

All bars shall be carefully and accurately bent by the Contractor in accordance with the drawings and special care shall be taken such that :

a) the depth of the crank is correct as per the drawing or the Bar Cutting and Bending Schedule.

b) the rods are placed in exact positions. The bars should not be bent or straightened in any manner that will injure the material

c) hooks where indicated shall be either a complete semi circular turn with a radius of not less than four and not more than six bars diameters, plus an extension of atleast four bar diameters at the free end, or a 90 degree bend having a radius of not less than 4 bar diameters plus an extension of 12 bar diameters, as shown or implied on the drawings.

No reinforcement shall be bent when in position in the works without approval whether or not it is partially embedded in hardened concrete.

Lapping :

As far as possible bars of maximum length available shall be used.

Unless otherwise specified or shown on the drawings, all laps shall be 50 times the diameter of bar. Not more than 33% (Thirty Three Percent) of the bars shall have lapped joints at the same location.

Welding :

Only where specifically shown on the drawings, reinforcement shall have welded joints.

All welding shall be carried in accordance with IS : 2751. Only qualified welders shall be permitted to carry out such welding.

The welding procedure shall be approved by the Engineer and tests shall be made to prove the soundness of the welded connection.

Rate quoted for steel reinforcement work shall be deemed to include the cost of such welding wherever specified.

Cleaning, Placing and Fastening :

All reinforcement shall be cleaned to remove loose mill scale, loose rust, oil and grease or any other harmful matter immediately before placing the concrete. Dowel bars will be provided where shown on drawing or where required.

All steel reinforcement shall be accurately placed in position shown on the drawing tied with 18 gauge GI annealed steel wire and firmly held during the placing and setting of concrete.

The vertical distance required between successive layers of bars shall be maintained by providing space bars, inserted at such intervals that main bars do not perceptibly sag between adjacent space bars.

COVER FOR REINFORCEMENT :

Reinforcement shall have cover as shown on the structural drawings and where not specified the thickness of cover shall be as follows.

a) At each end of reinforcing bar not less than 25 mm. nor less than twice the diameter of such bar.

b) For a longitudinal reinforcing bar in a column not less than 40 mm nor less than the diameter of such bar. In the case of columns of minimum dimension of 20 cm. or under whose reinforcing bars do not exceed 13 mm., the cover 25 mm shall be used.

c) For longitudinal reinforcing bar in a beam not less than 25 mm., nor less than the diameter of such bar.

d) For tensile, compressive, shear or other reinforcement in a slab not less than 13 mm., nor less than the diameter of such reinforcement.

e) For any other reinforcement not less than 13 mm., nor less than diameter of such reinforcement. For giving the necessary covers, concrete cover blocks of same strength of concrete proposed for the structure shall be used. All cover blocks shall be secured firmly so that they are not disturbed during compaction.

MODE OF MEASUREMENT :

The method of measurement for various items in the tender shall be generally in accordance with the IS : 1200 subject to the following :

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. Authorised overlaps and splices shall only be measured.

2. TECHNICAL SPECIFICATION FOR FLOORING WORKS

FLOORING :

This specification covers the general requirements for different types of flooring and dadoing works.

GENERAL :

All works shall be carried out as per relevant Indian Standard Specifications and as directed by Engineer. The rates shall include preparation of base, including chipping extra concrete roughening of surface and skin removed, cleaning, screeding, leveling etc.

Before the operation for laying any floor is started, the surface of base concrete, structural slab shall be thoroughly cleaned of all dirt, loose particles, caked mortar roppings etc. by scrubbing with coir or steel wire brushes. If so directed by the Engineer the surface shall be roughened by chipping or hacking at close intervals. The surface shall then be cleaned with water and kept wet for 12 hours and surplus water shall be removed by mopping before the topping is laid. The tiles / slab should be laid over cement mortar 1:4 20mm thick, unless otherwise specified.

Cement :Ordinary Portland cement of 43 Grade conforming to IS: 8112 shall be used and as specified under concrete work.

Coarse Aggregates :As specified under concrete works and conforming to IS : 383

Fine Aggregates :As specified under concrete works and conforming to IS : 383

Water : As specified under concrete works.

BASE CONCRETE :

The base concrete may be deposited in the whole area at a stretch. Before placing the concrete the subbase shall be properly wetted and well rammed. The concrete shall then be deposited between the forms where necessary, thoroughly tamped and the surface finished level with the top edges of the forms. The surface of base concrete shall be left rough to provide adequate bond for the topping. Two or three hours after the concrete has been laid in position, the surface shall be brushed with a hard brush to remove any scum or laitance and swept clean so that coarse aggregate is exposed.

GRANOLITHIC FLOORING :

GENERAL :

The work shall be carried out in accordance with Indian standard specification 5491 latest.

The flooring shall be of specified thickness and shall consist of C.C. 1:1.5:3 granolithic flooring. Floor finish shall be divided into suitable panels so as to reduce and avoid the risk of cracking. The granolithic flooring shall be laid in alternate panels. The size of panels shall be as decided by the Engineer. The screed strips shall be fixed on the base concrete dividing it into suitable panels. The intermediate panels shall be filled in after one or two days. If glass or aluminium or other metal strips are provided for effective separation of panels, the topping may be laid in all the panels simultaneously.

LAYING OF GRANOLITHIC CONCRETE FLOORING WITH 1:2:4 CONCRETE :

Before the operation of laying the topping is started the surface of base concrete shall be prepared as described earlier screed strips shall be fixed over the base as divided.

The flooring concrete shall be of PCC 1:2:4 mix (1 part of cement, 2 parts of sand and 4 parts of coarse aggregate) using 6 to 10 mm graded crushed granite stone. The ingredients shall be thoroughly mixed with

sufficient water to obtain the required plasticity. The free water on the surface of the base shall be removed and a coat of cement slurry of the consistency of thick cream shall be brushed on the surface.

The prepared 1:2:4 concrete shall be laid immediately after mixing on the fresh grouted base. The concrete shall be spread evenly and levelled carefully and compacted. Then the surface shall be tested with the straight edge and mason's spirit level to detect any inequalities in the surface. Low places shall be filled, humps removed and the whole surface again levelled. The layer shall be thoroughly compacted to the finished thickness by ramming and power toweled and allowed to set. Just sufficient toweling shall be made to give a level surface.

The surface should not be over toweled as excessive toweling will bring the cement to the surface which shall be strictly avoided. When the initial set takes place further compaction by power toweling shall be done and final toweling shall be done well before the topping becomes too hard.

The surface shall be toweled three times at intervals so as to produce a uniform, hard and smooth surface. No mortar or cement will be allowed to be added in this process.

The screed strips should be removed the next day after the concrete has been deposited in the panels and the edges of panels shall be examined for any honeycombing or undulation which, if found, shall be repaired straight and smooth by cement mortar; if the intermediate panels are not to be filled the next day, the screed strips shall then be cleared and put back against the edge of panels till the concrete in the alternate panels is to be deposited. When the concrete is being deposited in the alternate panels the screed strips shall be removed. When the concrete is being compacted in new panels, care shall be taken to avoid damage to the panels already laid.

When ironate or equivalent hardonate is to be added the same shall be mixed and laid as per the manufacturers instructions and specifications.

CURING :

As soon as the surface is hard enough, it shall be covered with sacking or sand and kept continuously wet for a period of atleast one week.

GLAZED OR CERAMIC TILES FLOORING, DADO & SKIRTING :

Glazed or ceramic tiles from an approved manufacturer conforming to IS 777 shall be of specified size and thickness and colour. The top surface of the tiles shall be of uniform colour and texture and free from flaws, cracks, chips, craze, specks, crawing or other imperfections. These shall be sound, true to shape with true and straight edges, nonabsorbing and nonfading. All specials viz. coves, internal and external angles, corners, beads etc. shall be used wherever directed. Under layer of 20 mm average thickness for flooring and 12 mm thickness for dadoing of cement mortar 1:6 proportion or as specified in item specification shall be laid evenly over the surface, tamped and corrected to desired levels. The bedding mortar shall be roughened with wire brushes or by scratching diagonal lines 1.5 mm deep at 7.5 cm centre to centre both ways. Tiles shall be well soaked in water washed clean before set in cement grout. The back of tiles shall be buttered with grey cement slurry and edges with white cement slurry and set in bedding mortar with chemical adhesive and each tile being gently tapped with a wooden mallet till it is properly bedded and in level with the adjoining tiles. The joints shall be kept as thin as possible and in straight lines or to suit the required pattern. When grouting the tiles special care shall be taken to prevent scratch. After the tiles have been laid, surplus cement grout shall be cleaned off. The joints shall be cleaned off the grey cement grout with a wire brush or trowel to a depth of 5 mm and all dust and loose mortar removed. Joints shall then be flush pointed with "ROFF RAINBOW TILE MATT" matching shade as per manufacturer's

specification. The floor / dado shall then be kept wet for 14 days. After curing, the surface shall be washed with mild hydrochloric acid and clean water. The finished floor/dado shall not sound hollow when tapped with a wooden mallet. The rate will include the cost of under layer of cement mortar.

VINYL FLOORING :
Vinyl floor tiles shall be homogeneous flexible quartz reinforced vinyl tile composed of 100% vinyl from face to back with alkaline resisting colour pigments and other plastic compounds. The colour shall be nonfading and uniform in appearance, as approved by the Engineer.

The tiles shall be of square shape or sheets in rolls and thickness as specified in drawing, finish schedule, schedule of items or as directed by Engineer. The face of these tiles shall be free from porosity, blisters, cracks, embedded foreign mattter, or other physical defects, which affect the appearance or impair the service ability of the tiles. All edges shall be out true and square.
Cove base shall be extruded PVC (100% putty) with moulded top set cove colour and the height of the base shall be as indicated on the drawings, scheduling and / or as approved by Engineer.

Samples of tile and cove base shall be submitted to the Engineer for approval along with test certificate before commencing the work.

Tiles shall lie flat for atleast one hour before being adhered. The method of laying must be clearly stated by Contractor during the offer itself. The method should be such that long life and good binding of the sheet should be ensured. The floor and joints should be stable against the usual cleaning method using a polisher and cleaner and must not be affected by spill of water, as water may be profusely used to clean the floor. Adhesives and other materials used must have resistance against the corrosive chemicals. Any defective surface must be capable of easy replacement. Joints shall be finished smooth and will not be a source of accumulation of dust, pool of liquid etc.

The hard concrete surface in which the flooring has to be laid to pattern as shown should be made smooth and the tiles have to be fixed after applying the chemical adhesive as per manufacturer's specifications and instructions and conforming to IS 3462 and BS 3261 Part 1 : Type B.

The subfloor shall be machine polished to remove all undulation thoroughly dry, and free of paint, wax, grease or oil, cracks and expansion joints in concrete subfloors shall be filled with crack filler.

Adhesive shall be applied at the rate recommended by the manufacturer. Any adhesive contaminating the face of the tiles shall be removed immediately after laying. In order to remove the adhesive which had hardened a solvent shall be used which shall not cause any harm to the tiles.

Tile shall be laid true, level and even with water tight joints. After it has adhered, vinyl tiles shall be rolled in two directions with a roller weighing 45 Kg. or more. Tile shall be fitted to and around all permanent fixtures. Borders shall be fitted accurately. Exposed edges or tile at door sills etc. shall be protected with metal moulding.

Cove base shall be firmly cemented to the walls and accurately scribed to trim and plinth.

All flooring shall be thoroughly cleaned of surplus adhesive. All scraps packing materials and debris shall be removed.

MODE OF MEASUREMENT :

The method of measurement for various items in the tender shall be generally in accordance with the IS : 1200 subject to the following :

Flooring shall be measured in square metre 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.

TECHNICAL SPECIFICATION FOR STEEL DOORS

This specification covers the general requirements for manufacture and erection of steel doors, steel sliding doors and steel rolling shutters and other miscellaneous steel works.

GENERAL :

The contractor shall furnish all materials, labour, operations, equipments, tools & plant and incidentals necessary and required for the completion of all metal work in connection with steel doors, windows and other glazings, railings, flashings, inserts, hangers and other items of metal works as called for in the drawings, specifications and bill of quantities cover the major requirements only. Anything called for in the tender documents shall be considered as applicable to the items of work concerned. The supply and installation of additional fastenings, accessory features and other items not specifically mentioned, but which are necessary to make a complete functioning installation shall form a part of this contract.

All metal work shall be free from defects, imparing strength, durability and appearance and shall be of the best quality for purposes specified made with structural properties to withstand safely, strains, stresses to which they shall normally be subjected.

All fittings shall be high quality brass chromium plated or as specified and as per approval of Engineer.

SHOP DRAWINGS :

The contractor shall submit shop drawings and / or samples of each type of doors, windows, railings and other items of metal work called for to the Engineer for his approval atleast thirty days ahead of their use at site and to conform to the C.P.M. Chart. The shop drawings shall show full size sections of doors, windows and other components, thickness of metal, details of construction, hardware as well as connection of doors, windows and other metal work to adjacent work/supports. Samples of all joints and methods of fastening and joining shall be submitted to the Engineer for approval well in advance atleast thirty days before commencing the work.

SAMPLES :

Samples of all typical metal work such as, doors, windows, railings and other metal components as called for shall be fabricated, assembled and erected or submitted to the Engineer as directed by him, for his approval atleast thirty days in advance of their use at site.

APPROVED MANUFACTURER :

All doors, windows, railings & other metal works as called for shall be manufactured by a manufacturer/fabricator approved by the Engineer. The entire work shall be carried out by workmen skilled in the kind of work as called for in a shop fully equipped to carry out all phases of fabrication in accordance with the best accepted practices and as approved by the Engineer.

INTERNAL DOORS :

Internal door frames where called for shall be of pressed mild steel sections as per IS:4351 of the size and details as shown on drawings or other documents. The sections shall be pressed from 18 gauge mild steel

sheet unless otherwise specified to the profile shown, by means of a mechanical press of adequate capacity. The pressed section shall be true to profile and also true to dimensions called for.

The frame members shall be of one piece and the corners of the frames shall be mitred, electrically welded and ground smooth. Mechanical jointing of members may be accepted subject to approval of the jointing arrangement by the Engineer.

Necessary provisions shall be made in the frames for fixing silencers, tower bolts, door closers and other hardwares. Slots for receiving lock and latch shall be shop punched and not made at site. The size and the location of the slots shall match the type of lock specified and at the height shown on the drawings / documents, hinges of specified type, make and size shall be fixed to the frames in the fabrication shop. The hinges shall be so fixed that the hinge flap is flush with the face of the frame. A reinforcing metal plate of 16 mm thickness with holes drilled and threaded to receive machine screws from the hinges shall be welded to the frames at hinge locations as shown on the drawings. Holdfasts where called for shall be of mild steel flats of shapes and sizes as shown on the drawings/documents and shall be welded to frames.

The frames shall be phosphated and then given a coat of redoxide zinc chromate primer. The surfaces shall be as specified under 'PAINTING' as approved by the Engineer. Base ties of mild steel angles shall be provided for all door frames to retain the size and shapes of the frames during transportation, handling, storage at site and erection.

FITTINGS :

Hinges, locks, tower bolts, rubber buffers, door closers and other fittings shall be provided as given in Bill of Quantities.

UNLOADING AND STACKING :

The fabricated frames shall be transported, bundled, unloaded and stacked in a careful manner. They shall be stacked on edge on level bearers and supported evenly. All precautions shall be taken to ensure that the frames are not damaged or distorted in any manner.

FIXING :

The door frames shall be fixed at the top & bottom through M.S. cleats as shown on the drawings. M.S. cleats of size and detail as shown or called for shall be anchored to the floor and roof slab concrete at the time of casting the concrete. The frame shall be securely fixed to the outstanding leg after erecting in true and correct position. When the frames are to be fixed to column/wall faces, they shall be fixed with rawl bolts/expansion bolts of approved make. The frames shall be fixed into position true to line and level using adequate number of expansion machine bolts (RAWL BOLTS) of approved size and manufactured in an approved manner. The holes in concrete / masonry members for housing anchor bolts shall be drilled with an electric drill.

The doors assembled as shown on drawings/documents shall be placed in correct final position in the openings and marks made on concrete members at jambs, sills, and heads against holes provided in the frames for anchoring. The frames shall then be removed from the openings and laid aside. Neat holes with parallel sides of appropriate size shall then be drilled in the concrete members to house the expansion bolts. The expansion bolts shall then be inserted in the holes, struck with a light hammer till the nut is forced into anchor shell. The frames shall then be placed in final position in the openings and

anchored to the supports through cadmium plated machine screws of required size threaded to expansion bolts. The entire operation shall be subject to the approval of the Engineer.

The frames shall be set in the openings by using wooden wedges at supports and be plumbed in position. The wedges shall invariably be placed at the meeting points of glazing bars and frames.

The contractor shall be responsible for the doors being set straight, plumb, level and for their satis AUDITORIU Moperation after fixing is complete.

In case of brick wall, precast cement concrete (1:2:4 mix) blocks shall be provided at locations where the frames are to be anchored, at the time of building the wall. The rawl bolts shall then be anchored to these blocks.

Hollow of frames abutting concrete/masonry shall be filled with cement grout (1 cement : 3 coarse sand) densely packed and finished neat.

All steel frames and other steel members shall be enamel painted as provided under "PAINTING" or as specified after the installation of the shutters, glazing, etc.

DOOR SHUTTERS :

Pivoted shutters shall have "EVERITE" floor springs at the bottom suitably fixed to the floor and pivots fixed at the top as shown in drawings or as called for in the specifications. The shutters shall be fabricated with M.S. light gauge roll formed sections conforming to I.S. specification including welding all the joints and panels made out of 18 gauge M.S. sheets cut to size and shape as shown in the drawings and fixed to the shutter frame by means of brass screws and cup washers as called for in the drawings. The contractor shall however get the shop drawings and the sample approved by the Engineer before executing.

All the steel surfaces shall be thoroughly cleaned free of rust, scale or dirt and millscale by picking or phosphate and before erection painted with one coat of approved primer and after erection painted with two finishing coats of synthetic enamel paint of approved shade and quality.

PAINTING :

All exposed glazing, frames shall be treated with solignum stained to the tint approved by the Engineer. Door shutters, shall be enamel painted to approved finish. All painting, shall be carried out as specified under 'PAINTING' or as specified.

PROTECTION OF WORK :

The contractor shall be responsible for the temporary doors and closing in openings necessary for the protection of work during progress. He shall also provide & maintain any other temporary covering required for the protection of finished wood work that may be damaged during the progress of work if left unprotected.

MAKE GOOD DEFECTIVE WORK :

The contractor shall be responsible for any shrinkages or warping or any other defects which may appear in any joinery work. All defective or damaged work shall be taken down and renewed or repaired to the entire satisfaction of the Engineer.

RAILING :

Railing to stairs and other locations where called for shall have hand rail of steel pipe or other material as called for of size as shown, supported by mild steel balusters anchored to concrete railing as shown on drawings. The mild steel verticals shall be 25 dia tube and as shown on drawings and shall be embedded & anchored in the concrete members in their correct assigned positions at the time of casting the concrete members. No breaking or disturbing of any completed concrete members shall be allowed. The hand rail shall be fixed to the baluster verticals by means of Tee joints as detailed on the drawing. The drilling of holes, counter sunking, etc., shall be carried out by skilled fitters in a precise,neat and workman like manner,as called for on the drawings and as directed by the Engineer. The finished railing shall be true to plumb, line and levels as called for. The mild steel balusters and other exposed mild steel members shall be painted as specified under 'PAINTING' or as specified.

ROLLING SHUTTERS :

The rolling shutters shall be fabricated from 18 gauge steel sheets and machine rolled with 75 mm rolling centres with effective bridge depth of 12 mm lathe sections, interlocked with each other and ends locked with malleable cast iron clips conforming to IS : 2108. The guides shall be either rolled or pressed deep channel sections, 75 mm and 25 mm wide, fitted with necessary fittings and fixtures. The suspension shaft of the roller shall be made of steel pipe to heavy duty of IS 1161 and of sufficient diameter so as to resist deflection due to the Weight of the rolling shutter. The deflection shall not exceed 5 mm per metre width. The shaft shall be provided with CI pulleys and helical spring for counter balancing this Weight of the shutter adequately. The spring shall be made of high tensile spring wire conforming to grade 2 of IS 4454. For large size rolling shutter the roller shall be provided with double row, selfaligning ball bearings. For wide openings, the roller shall be of fabricated cage type, the roller assembly shall be designed so as to be capable of producing sufficient torque to ensure easy operation of the rolling shutter in any position. the spring tension shall be adjusted by means of suitable adjustment holes on the rim of the pulleys. The hood cover shall be made of 20 gauge galvanised sheets with necessary stiffeners and frame work to prevent sag. The bottom lock plate shall be made of 5 mm thick MS plate and 95 mm wide reinforced with angle as T section, of suitable section with 6 mm dia. MS rivets interlocked with last strike of curtain. The locking arrangement shall consist of hasp and staple on the bottom plate lockable from both sides. The rolling shutters shall be of specified grade and approved make.

Brackets shall be rigidly fixed to the lintel, wall or at any position as required to take the full load of the shutter. The shaft along with springs shall be fixed to the brackets. The shutter shall be laid on ground and the guide channels shall be bound with it, with ties. The shutter shall then be placed in position and the top fixed with suspension shaft. The side guide channels and cover frame shall then be fixed to the wall. Pockets shall be cut to fix the brackets, clamps, guide channels, etc. and shall be grouted with cement concrete, proportion 1:2:4, or these shall be fixed by any other method as directed by the Engineer or as specified by the Manufacturer, at the contractor's own cost. Fixing shall be done true to plumb and level such that the operation of the shutter is easy and smooth.

SLIDING DOOR :

The large size sliding doors shall be manufactured with M.S channels, angles, MS sheets etc. All the materials to be used for the manufacture of sliding doors shall conform to Indian Standard Specification. The sliding door may be of single leaf or double leaf construction. Each leaf will have two wheels with double ball bearings at the bottom and guide rollers at the top. At the bottom the wheel shall slide over the rails fixed on the floor and at the top the guide roller shall move on the guide rails supported on the structural member.

In the floor the rails shall be embedded in the concrete and the top of rail should be flush or slightly below the finished level of the floor but should not be projected above the floor level. The guide roller at the top of door shall have a hood cover in 18 G M.S sheet with necessary bracket supports. Bottom rail and top guide rail and hood cover shall extend 200 mm more on either side beyond the door in open position in the case of two leaf construction and in the case of single leaf one side shall be extended. The size of door to be manufactured shall be more than the size of structural opening of the door according to the site condition. But the payment shall be for the door opening only. The door shall be of manually operated or electrically operated. The door shall be sand blasted and painted with two coats of approved quality synthetic enamel paint over a coat of zinc chromate primer.

The large size door construction shall generally consist of frame work with main members alround stiffened by horizontal and vertical members using M.S channel, angle sections and sheeting welded on both sides of frame using MS sheet with folded construction and sliding arrangements at bottom and top using wheel and guide roller with necessary supporting arrangement on the main frame. Necessary corner pieces and additional stiffners wherever necessary shall be provided to ensure structural stability of the door. Fabrication, welding, erection and painting shall be in accordance with relevant Indian Standard Specifications. The Contractor shall submit shop drawings from the manufacturer showing full details and wheel & guide roller arrangements to the Engineer for approval. The entire work shall be executed as per approved drawings and as directed by the Engineer.

Necessary fittings shall be provided as specified.

MODE OF MEASUREMENT :
The method of measurement for various items in the tender shall be generally in accordance with the IS : 1200 subject to the following :

Steel doors :

Clear area over one face inclusive of exposed frame shall be measured. Holdfasts or portions embedded in masonry or flooring shall not be measured.

Steel rolling shutters :

Clear width between sides 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.

Steel Sliding Door :

Measurement for payment shall be in square metre for the actual structural opening of the door. The rate shall be inclusive of Hood, Sliding arrangement, wheel, guide roller, hardware fittings etc. required for the door.

10. TECHNICAL SPECIFICATION FOR ALUMINIUM WORKS

1. GENERAL :

This specification covers the general requirements for aluminium doors, windows and ventilators manufactured from extruded aluminium alloy sections of standard sizes and designs complete with fittings including supply, fabrication and installation in accordance with the drawings and specifications.

The supply, fabrication and erection will include all parts such as but not restricted to frames, tracks, guides, mullions, styles, rails, couplers, transoms, plates, glazing bars, weather bars, glass, hinges, handles, pegstays, bolts, locks, latches, locking arrangements, spring catches, cord and pulley

arrangements, door closers, floor springs etc., required for the whole work whether the parts/items are individually and specifically referred to in the schedule/specifications/drawings or not, provided that the supply and installation of such parts can be inferred therefrom and are necessary to make the work complete, unless separate provision is made in the bills of quantities for supply to such parts/items.

2. Materials :

a) Aluminium Sections :

i. The members shall be made out of aluminium alloy corresponding to IS 733 (latest) and will consist of extruded sections and of other shapes, and to sizes and gauges as shown in the drawings/described in accordance with the relevant IS Codes. The members shall be chosen to provide strength/stability and maximum resistance to wear and tear.

ii. The sections shall be of INDAL, JINDAL, or equivalent extruded sections. As indicated in the drawings the tenderer should specifically mention which sections he is going to use.

iii. The Weight of sections and the corresponding catalogue numbers are mentioned. The IS specifications are to be strictly adhered.

iv. The various tests of aluminium section shall be conducted in accordance with relevant IS Codes.

v. The following sections shall be used for the fabrication of doors, windows and ventilators etc.

INDAL/JINDAL Section No.	Minimum Weight Kg/RM
9200	1.974
9201	1.299
9202	1.202
9203	1.319
9807	1.757
4420	0.136
9771	1.054
8650	0.485
8732	1.055
8758	0.659
8765	0.558
8766	0.424
6358	0.617
6410	0.885

3. Finishing :

i. The extruded aluminium section shall be mechanically finished to remove all scratches, extrusion marks etc and subsequently thoroughly cleaned in an alkali bath prior to anodising.

ii. For anodising IS 1868 shall be strictly followed.

iii. The anodising shall be in natural finish by electro chemical process as per IS Specification 7088 (latest) and thickness shall be 15 microns. Film thickness test for anodic coating shall be done in authorised test house and test results shall be submitted to the Engineer.

iv. The anodised material shall be sealed properly and it should be wrapped in gummed tape before fabrication to avoid scratches during fabrication and erection and shall be kept protected till handing over.

4. Fabrication :

Before commencing the fabrication the contractor shall submit to the Engineer for his approval detailed fabrication drawings, based on the Engineer's drawings and specifications and corresponding to the finished openings left at site where the doors, windows, ventilators, partitions are to be fixed, junctions, fittings, accessories etc. such as hinges, flush bolts, locks, latches, latching arrangements, pegstays, rotor arms, centre pivots, gaskets, rubber packings, door felts, mastic, sealant, etc., fixing and sealing arrangements, etc. and the type and method of scaffolding he intends to use, incorporating therein what he has offered and what has been accepted, and specified in the order. Fabrication shall be taken up only on approval of and in accordance with the approved drawings. Should there be any necessity, the Engineer may revise the sections of any door/ window / ventilator etc. and the same shall be followed for execution. However the rate quoted for the relevant finished item shall be adjusted only for the difference in Weight of Aluminium sections in KG. between that specified by the tenderer at the time of tendering and that modified by the Engineer. All other elements of cost variation due to such modifications in the sections shall be deemed to have been included in the quoted rates.

Fabrication shall be done true to the drawings to correspond to the finished openings at the site, the sections cut to lengths to suit, mitred at the corners, to true right angles with joints made neatly to hair lines, with concealed fasteners, wherever possible joints shall be made in concealed locations.

All fabricated items shall be packed and carted properly before despatch to site to prevent damage in transit. On receipt at site they shall be carefully stacked in protected storage to avoid distortion/damage. Such items shall also be in the safe custody of the contractor.

5. Construction :

The units shall be built to precision, alignment, dimensional accuracy and strength.

The outer frame shall be interfitted together by mechanical means of best fabrication technique.

The interlocking members shall be accurately manufactured to close tolerances to ensure tight fit of the mating interlock profiles.

There shall be minimum gap between shutter and frame to facilitate easy and smooth movement of the shutter.

Field connections may be made with concealed screws, self tapping or other approved fasteners or may be made with weld due precautions being taken to avoid altogether distortion / discoloration of the finish.

Details of construction of the doors, windows, ventilators partitions shall be as specified in the relevant I.S codes and in the absence of such details in any I.S. code, will correspond to the best engineering practice.

Faces / Parts coming into contact with masonry in the construction shall before shipment to the site be given a heavy coat of an alkali resistance bitumen paint. Aluminium coming in contact with other incompatible metals shall be given similarly a thick coat of Zinc Chromate primer.

The sliding shutters are to be fixed with nylon rollers with stainless steel ball bearings and stainless steel pin. The Stainless steel mosquito netting of approved quality with necessary fasteners are fixed in window frames at location as indicated in the drawings and complete in all respects. The frames to be fitted with wool pole as directed by the Engineer.

The doors, windows, ventilators and partitions shall be supplied in natural colour (matt finish) anodising in the item specifications. Anodising shall be matt finish under electrically controlled conditions conforming to IS 6057, and to be minimum thickness as may be specified in the item specifications or if not so specified to a minimum thickness of 15 microns excepting on the fittings, hinges and such other moving parts where it shall be to a minimum thickness of 20 microns. Any frames found short of microns film thickness of anodising shall be rejected.

For installation a thick layer of clear transparent lacquer based or methacrylates or cellulose butyrate shall be applied by the supplier on the aluminium doors, windows ventilators and partitions to protect the surface. The coating shall be removed after installation is done. They shall be cleaned thoroughly with warm water to restore the finish.

Scaffolding is the responsibility of the contractor and shall be done without causing any damage to the structure and the finishes therein.

6. Glazing :

Glazing shall be done with flawless sheet glass of best approved quality without waviness, distortion, coloration/discoloration, of specified thickness, in sizes as shown in the drawings, fixed as required with special glazing clips, putty, neoprene/PVC gaskets. The gasket shall be extruded EPDM synthetic rubber wrap around U channel type with bevelled edges to run continuously around the perimeter of the glass. All glass shall be cleaned thoroughly before they are fixed in position.

The thickness of glass shall be as specified in the item specification under B.O.Q. and Drawings. The following types of glasses shall be used.

1. Building Clear glass or tinted glass or as specified in the Schedule of Quantities.

Toilets & Kitchen Clear glass or frosted or tinted glass or as specified in schedule of quantities.

Partitions Clear or tinted or frosted float glass.

Sky light roofing Frosted Glass

7. Fitting :

The handles shall be of cast aluminium anodised two point handles of high quality and of approved design and shape. Peg stays shall be of anodised wrought aluminium. All fittings shall be of high quality to design and / or type approved by the Engineer.

8. Sealing :

Sealing shall be done using a nonhardening silicon sealant single part gun applied to provide water tight seal between the window and the surrounding construction.

9. Protection and Cleaning :

The Contractor shall be responsible for the protection of all aluminium works during the course of construction of the building and for cleaning all aluminium works after painting and finishing of building is completed.

The aluminium manufacturers shall give specific performance guarantee against defects in materials or workmanship for a period of one year from the date of installation.

The rates quoted shall include :

a) Providing all aluminium doors, windows, ventilators, glazings, railings etc. of the best manufacture and as per prior approval of the Engineer.

b) Providing necessary couplings, transoms and mullions.

c) Providing a protective thick layer of clear transparent lacquer based on methaorylates or cellulose butyrate, for protection of surfaces of various units during transportation and installation and removal of the same after installation is complete.

d) Each shutter of sliding window shall have 2 Nos. Nylon sleeved rollers. Lock and handle shall be provided in Nylon / PVC / Aluminium samples of which shall be got approved to prevent air infiltration to openable shutters with stainless steel ball bearing.

e) Sealing the junction of windows or glazing frame with openings and / or wooden base lining around the opening with epoxy resin or other approved sealant to make the junction water tight.

f) Fixing of aluminium units in the openings with lugs 15 mm x 3.15 mm x 10 Cms long in cement concrete blocks of 15 mm x 10 mm x 10 Cms size 1:3:6 (1 cement : 3 coarse Sand:6 Hard stone aggregate 20 mm nominal size) or with wooden plugs and screws or with rawl plugs and screws or with bolts and nuts as required.

g) Door shutters shall have heavy duty double action hydraulic floor springs pivoted top and bottom with a minimum of One year guarantee.

h) Necessary locking arrangements of approved design shall be provided to door shutters including flush type tower bolts for each shutter as directed.

i) The Contractor shall furnish detailed fabrication drawings to suit site installation for approval before taking up the work.

Providing single row continuous, neoprene or PVC weather strip to prevent air infiltration to open able shutters.

j) Hoisting and working at any height including required scaffolding etc., and protecting the aluminium sections and glass from any damage, scratches etc., till being taken over by the Engineer. Rate shall include final cleaning of all items to the Engineer Satisfaction before final handing over.

k) The manufacture of the aluminium framed glazed doors & windows etc., shall conform to current Indian Standard.

l) Aluminium Sections shall be of standard extrusion and shall conform to IS 733. and shall be in accordance with the Engineer's drawing.

m) All Aluminium Sections shall be finished in natural colour electro chemical anodised to 15 microns and a piece of anodised materials shall be got approved before fabrication.

n) All doors, windows, etc., shall befinished and the frame joints shall be absolutely water tight. All frames and shutters shall be properly jointed ensuring adequate mechanical strength and absolute right angleness.

o) All doors shall be provided with Hibronze finish anodized aluminium push plates.

p) The glasses for doors, windows fixed glazing shall be fixed with aluminium anodized hibronze finish snap on glazing chips and gasket rubber. PVC weather strip shall be provided.

q) Matching Sections shall be perfectly aligned for compactness.

r) Samples of Sections for outer frame, shutter frame, hardware etc., shall be produced for prior approval.

s) The size and details of doors etc., shall generally be as per the drawings prepared by the Engineer. The Contractor shall take exact site measurements, for all the items before fabrication to avoid any discrepancies.

t) The rates quoted shall be for supply, delivery and erection etc., complete including packing and all other incidental charges.

Detailed fabrication drawings shall be furnished to suit the site installation for approval before taking up the work.

11. TECHNICAL SPECIFICATION FOR WOOD WORK

The specification covers the general requirements for wood work.

The contractor shall furnish all materials, labour, operations, equipment, tools and plants and incidental necessary and required for the completion of all carpentry and joinery work in connection with door shutters, glazing, cabinets and other items of work called for in the drawings.

The carpentry and joinery work shall include the provision of fixing of fastening devices and hardware in accordance with the drawings and attached hardware schedule. Hardware and other materials will be supplied by the contractor after obtaining prior approval of the Engineer of samples for each item of hardware.

SAMPLES AND SHOP DRAWINGS :

The contractor shall, before proceeding with the work, submit to the Engineer for his approval complete samples of the various materials including hardware and fastening devices and shop drawings and large scale details covering all joinery works.

TIMBER :

Timber used shall be of type as stated in the Schedule and of best quality. All timber shall be of natural growth and uniform in texture and shall be well and properly seasoned. It shall be free from large, loose, dead, or cluster of knots, waves, injurious open shakes, borer holes, rot, decay, knots, discoloration, soft or spongy spots, hollow pockets with or centre heart and all other defects and blemishes. Timber shall conform to IS 883.

The seasoning of timber shall be as laid down in IS : 1141.

TEAK WOOD :

Teak should be from the forests of Dandeli and Mysore in Karnataka, Malabar in Kerala, Ballarshah in MP, Bulsar in Gujarat. It shall have uniform colour reasonably straight grains and shall be free from large loose dead knots cracks, shakes, warp, twists, bends, bore holes, sap wood. For first class no individual hard and sound knot shall be more than 1 sqcm and the aggregate area of all knots shall not exceed 1/2% the area of piece and for second class 1.5 sqcm and 2% respectively. It shall be close grained and there shall not be less than 2 growth rings per cm width.

The wood shall be well seasoned. It shall be considered well seasoned if its moisture content does not exceed the limits as per IS 287. The moisture content shall be determined as per IS 287. Unless otherwise specified tolerance for door and window frames and shutters should not exceed provisions in IS 4021 & IS 1003 (part I & II).

COUNTRY WOOD & MALAYSIAN SAL

Country wood and Malaysian Sal are wood that are not classified as teak wood, honne wood, nandi and mathi wood. It shall have uniform colour, reasonably straight grains and shall be generally free from large loose deadknots, cracks, shakes, warp, twists, bends, bore holes, sap wood. No individual hard and sound knot shall be more than 1.5 sq.cm and the aggregate area of all knots shall not exceed 2% of the area of piece. It shall be close grained and there shall not be less than 2 rings per cm width.

The wood shall be well seasoned. It shall be considered well seasoned if its moisture content does not exceed the limits as per IS 287. The moisture content shall be determined as per IS 287. Unless otherwise specified tolerance for door and window frames and shutters should not exceed provisions in IS 4021 & 1003 Part I & II.

DOORS, WINDOWS & VENTILATORS :

Doors, windows and ventilators etc. shall be in accordance with the drawing in every detail and all joiner's work shall be accurately set out, framed and finished in a proper workman like manner. Frames of doors, windows and ventilators, shutter styles and rails shall be of best solid wood of quality specified in the

schedule of quantities. The scantlings shall be accurately planed smooth. Rebates, roundings and mouldings shall be made as shown on the drawings. Patching or plugging of any kind shall not be allowed.

Joints shall be simple, neat and strong. Framed joints shall be coated with suitable adhesive like glue or synthetic resin before the frames are put together. All mortice and tenon joints shall fit in fully and accurately without wedging or filling. The joints shall be pinned with hard wood or bamboo pins of 10 mm to 12 mm dia. or rust resisting star shaped metal pins of 8 mm diameter. All portions of timber abutting against or embedded in masonry or concrete shall be treated against termites by giving a coat of an approved wood preservative, for which no extra cost will be paid. Putty shall not be used to cover any defects. Unless otherwise specified, all door frames shall have six holdfasts. Holdfasts shall be provided to the ventilators if directed. Size of holdfasts shall be 400 mm x 40 mm x 5 mm M.S. flat bent to shape with fish tail and shall be fixed to frame with sufficient number of screws as directed. When door/window frames are to be fixed to RCC column or RCC wall, holdfasts shall be substituted by suitable arrangements such as coach screws, rawl bolts/grip bolts etc. to secure frames to RCC column or RCC wall as directed by the Engineer. The frame shall be fixed only after getting the approval of the Engineer.

NOVAPAN :

Novapan twin both sides laminated particles board of approved shade with all cut edges provided with teak lipping 12 mm thick with moisture proof coating with aluminium paint and chlorinated rubber paint along edges. The particle board shall conform to IS 3087 with urea Formaldehyde.

NOVATEAK :

"NOVATEAK" particle board bonded with Phenol Formaldehyde resin shall comply with the specification as per IS 3087 and shall have veneering on both sides with teak veneer faces. All exposed edges should be projected as in the case of "NOVAPAN". The exposed surface of veneered boards on both sides shall be polished fully within the quoted rates.

FIRE RESISTENCE DOOR :

The fire resistance door one hour fire rated shall be provided to computer rooms. The fire rating to doors confirming to PS 47648 and IS 3809 and as approved by the Engineer.

TOILET DOORS :

A. EXTERNAL DOORS :

Formica / Decolam laminated 300 mm wide from bottom over one side plastic coated flush door as per manufacturer specifications including necessary finishings and fittings etc.

B. INTERNAL DOORS :

Formica / Decolam laminated 300 mm wide from bottom over both sides plastic coated flush door as per manufacturer specifications including necessary finishings and fittings etc.

NOTE :

All timber for joinery or wrought formwork shall be of best Indian Teakwood unless otherwise specified and or specified quality, carefully selected free from sap and subject to inspection and approved before delivery. All teakwood to be used in this work shall be seasoned in an approved manner.

The joiner work shall be framed and put together immediately but not to be wedged up until required for fixing. The approval of the Engineer shall be obtained before any primer coat is applied.

The whole of joinery to be finished to the dimensions and sizes indicated in the drawings are subject to a tolerance to 1.50 mm of each planed face, but no allowance shall be given to flush doors, shutters, ply and other manufactured board etc.

All block boards etc. shall correspond to respective IS specifications. Flush doors shall correspond too relevant IS specifications. Samples of all block board, plywood, flush doors, etc. shall be got approved by the Engineer before placing order. All such items shall be of standard manufacture of reputed quality. Unless otherwise specified, all flush shutters shall be teak veneered on both sides. All flush shutters shall be of solid core and shall be provided with teakwood external lipping.

If after execution any shrinkage or bad workmanship is found, the Contractor shall forthwith replace or refix the same at his own cost, all as directed by the Engineer.

Rate quoted shall include for all framing, usual waste and cuttings and no extra rates or claims will be entertained on this account.

The rate for wood work shall include the cost of all sawing, planing, jointing, framing, labour and materials for raising and fixing and all workmanship and fixing and supplying of all strips, bolts, nails, triennials, spikes, keys, wedges, pins, screws etc. necessary for the framing as per specification and drawings. Edges of the beams, joists, posts, frames etc. shall be rounded, moulded or chamfered as directed without extra charges.

The Contractors shall be responsible to deliver all items at site of work. The Contractor will submit a programme of work in such a way that requirements for each floor commencing from ground floor is completed before the requirement of the next floor and arrange to have them fixed in position as the General Builders work progresses.

Timber in contact with masonry or concrete shall be treated with solignum paint or any approved antitermite treatment before fixing.

The Contractor will be making necessary holes in concrete and masonry for fixing in position and grouting. The Contractor will be responsible for the proper fixing of partitions true to plumb and alignment until completion and grouting pockets with cement concrete and make good affected portions without claim to any extra.

The iron monger fittings shall be of heavy type cast brass oxidised and of approved manufacture. Samples of all iron monger items shall be got approved by the Engineer prior to procurement.

INTERIOR DOOR SHUTTERS :

Interior wood door shutters, unless otherwise noted or specified, shall be 35 mm thick phenol formaldehyde synthetic resin thermo pressed flush shutters, teak veneered faced on both faces. The shutters shall conform to IS:2202 (PartI). Shutter make shall be approved by the Engineer.

The solid core shall be wood laminate prepared from battens of well seasoned and treated good quality wood having straight grains. The battens shall be of uniform size of about 2.5 cm width. These shall be

properly glued and machine pressed together, with grains of each piece reversed from that of adjoining one. The Longitudinal joints of the battens shall be staggered and no piece shall be less than 50 cm. in length. Alternatively, the core shall be of solid teak particle board. Edges of the core shall be lipped internally with first class teak wood battens of 4 cm. minimum depth, glued and machine pressed along with the core.

The core surface shall then have two or three veneers firmly glued on each face. The first veneer (called cross band) shall be laid with its grains at right angles to those of the core and the second and the third veneers with their grains parallel to those of the core. The under veneers shall be of good quality, durable and well seasoned wood. The face veneers shall be of minimum 1 mm thickness and of well matched and seasoned first class teak, laid along with grains of the core battens. The combined thickness of all the veneers on each face shall not be less than 4 mm. Thermosetting synthetic resin conforming to I.S. 303 or moistureproof plywood grade M.P.F.I. shall be used in manufacture. All doors shall have external lipping alround 6 to 10 mm thick in addition to internal lipping.

Block boards and ply for various items of work called for shall be of approved make. Unless otherwise shown all block boards and ply shall be teak veneered faced on both faces.

Samples of flush doors, block boards, etc., shall be submitted to the Engineer for his approval and all shutters, etc., to be used in the work shall conform to the approved sample in all respects.

HARDWARE FITTINGS :

All hardware fittings and fixtures shall be made with structural properties to sustain safety and withstand strains and stresses to which they are normally subjected, such as opening and closing, wind pressure etc. The fittings shall generally conform to relevant specifications.

They shall be made true, clean, straight, with sharply defined profiles and unless otherwise shown or specified, with true smooth surfaces and edges, free from defects, screw holes shall be counter sunk to suit the head of wood screws.

The metal shall be treated with finish as specified in the Schedule of Quantities.

Butt Hinges :

These shall be treated with finish as specified in the Schedule of Quantities.

M.S. Butt Hinges shall conform generally to the latest version of I.S.205.

M.S Butt hinges shall be manufactured from M.S sheets of approved gauges. Hinges shall be finished as specified in the respective items. The size of butt hinges shall be taken as length of the hinge.

Aldrops :

These shall be of anodised aluminium or as specified and shall be capable of smooth sliding action. Aldrops shall be finished as specified and shall conform generally to the latest version of I.S.281.

In case of single leaf door, hole of suitable size shall be made in the door frame and a plate cut to shape shall be fixed at the face of the hole. The size of aldrop shall be taken as the length of the rod.

Sliding bolts/Latches :

These shall be of M.S. Brass or as specified and shall be capable of smooth sliding action. These shall be finished as specified. The size of latch shall be taken as the length of the bolt catch.

Tower Bolts :
These shall be as specified viz., anodised aluminium tower bolts from external section.
In the case of brass and aluminium tower bolts, steel spring and ball shall be provided between the sheet and the barrel.

The size of tower bolts shall be taken as the length of barrel without top socket. The bolt shall be finished as specified.

Handles :

These shall be as described in the Schedule of Quantities and finished as specified.

PRESERVATIVE TREATMENT :

All wood work in contact with masonry shall be painted with approved asphalt or bitumen paint before placing. Care shall be taken to keep exposed faces clear from tar, etc. Tarfelt shall be used to isolate wood from masonry wherever practically possible. All concealed wood members in ceiling, partitions, cabinet work, etc., shall be treated fully and liberally with solignum before placing in position.

MODE OF MEASUREMENT :

The method of measurement for various items in the tender shall be generally in accordance with the IS : 1200 subject to the following :

All work shall be measured net as fixed. No extra measurement will be given for shape, joints, splayed, meeting stiles of doors and windows and shall be measured in unit of square metre.

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.

3. TECHNICAL SPECIFICATION FOR PAINTING WORKS

PAINTING GENERAL :

The specification covers the general requirements for various types of painting and finishing of all surfaces throughout the interior and exterior of the building. The scope shall include furnishing of all materials, labour, scaffolding, tools and appliances to do all painting and / or white / colour washing of both interior and exterior surfaces of plastering, ceiling and all carpentry works. This also include painting structural and miscellaneous steel, railings, gratings, steel doors and frames, steel sashes, windows, louvers and frames, steel rolling shutters, MS grills etc. The number of coats required in various situations and also the types of finish required for the several items of work such as cement based paint, plastic emulsion paint, oil bound distemper, synthetic enamel paint, etc., are specified in the schedule of quantities and specifications.

Before the commencement of the work the contractor shall provide sample panels of painting at his own cost for the approval of the Engineer to enable him to keep an accurate check on the materials supplied and final shade to be painted. It is however the express responsibility of the contractor to provide any deviations and defects shall have to be rectified by the contractor at his own cost.

Contractor shall protect not only his own work at all times but also all the adjacent work and materials by suitable covering, protection or other methods acceptable to the Engineer during progress of painting. It is the responsibility of the contractor upon completion of painting work to remove all paint and varnish spots from floors, walls, glass panes and other surfaces and restore them to the original conditions. The work generally to be touched up shall be attended to after all other workmen have left. All accumulated material, rubbish etc. have to be cleared and the premises left in clean, orderly and acceptable conditions.

Contractor shall provide scaffolding wherever necessary erected on double supports tied together by horizontals, no ballies, bamboo's or planks shall rest on or touch the surface which is being painted. Contractor is deemed to have considered the following while tendering and no extra claim on account of these will be entertained

A) Supplying the paint and other materials required of approved colour and brand.

B) Preparing the surfaces to be painted.

C) Providing and erecting scaffolding and removing the same after completion of the work.

D) Lifting of materials to any height and painting at all levels.

E) Application of paint as per the specification & to manufacture's instructions.

F) Curing, protecting the painted surface, adjacent work and thoroughly cleaning of the premises.

All doors, partitions etc., shall be finished in the manner specified in the drawing, specifications and schedules, wherever painting and polishing are specified, although three coats finishes specified are to be included in the rates quoted, the contractor shall be required to carry out additional coats of paint/polish to obtain uniform and good finish at no extra cost, wherever such additional coats are considered necessary in the opinion of the Engineer. If directed, putty shall be applied over the entire surface to ensure smooth and neat finish at no extra cost.

MATERIAL :

The paint shall generally conform to the chemical composition and other characteristics laid down in the relevant Indian standard specification. The entire materials required for painting work shall be obtained direct from approved manufacturers or their authorised agents and brought to site in original manufacturer's containers with seals unbroken.

Paint shall be ready mixed and of 1st quality of the approved brand and manufacture. Mixing of paint by the contractor at site will not be allowed, except with preparation of ingredients and their quality shall be strictly maintained as per manufacturer's instructions and all as directed by the Engineer. All the materials shall be kept properly protected when not actually in use. Lids of containers shall be kept closed. Materials which have become stale or flat (in the opinion of the Engineer) shall not be permitted to be used on the works and shall be removed from site forthwith. Wherever the word 'approved' occurs in these

specifications it shall mean that the competent authority for such approval is the Engineer. Any materials found not conforming to the relevant specification shall have to be removed by the contractor from the site at his own expenses. Colours shall be uniform and nonfading.

Protruding timber fibres shall be removes and all holes shall be filled with teakwood batten. The nail marks shall be covered with putty. The work shall then be sanded first with G/80 sand paper followed by G/120 or G/150 sand paper. Sanding should be taken up only when it can be followed immediately by painting.

The surface shall be thoroughly cleaned sand papered and / or rubbed with emery cloth if necessary to remove grease, mortar or any other foreign materials. In case of rusted surface, it shall be first cleaned with steel wire brushes till the corroded crust is removed. The cleaned surface shall be shiny and free from brush marks, patches, blisters and other irregularities. The surface thus finished shall be got approved before painting.

Concrete / plaster and cement plastered surfaces shall be thoroughly cleaned of mortar droppings and other stickings. All loose scales and flakes shall be removed by rubbing with hessian cloth or sand papering. All holes shall be filled and the surface rubbed smooth to get evenness of the existing surface. Area to be distempered shall be applied with one coat of white chalk solution mixed with required quantity of glue or plaster of paris and shall be sand papered before distempering. The area to be cement painted shall be wetted by sprinkling of water with fine spray. The surface shall be sprayed several times with a few minutes intervals between each spraying to allow the moisture to seek into the surface.

The sanded surface shall be dusted and a priming paint, brush coated in thin even layers. For all flush doors and teakwood approved aluminium wood primer shall be applied. If some time passes after priming another coat of primer shall be applied before under coating is done.

The cleaned surface shall be dusted and a priming coat of anticorrosive paint shall be applied.

Stopping and filling carpentry work should be done when the primer is just dry. For deep scratches, holes etc. stopping shall be done with putty of plastic wood (IS 423). Putty can be white lead with linseed oil base or synthetic metal putty.

For all minor scratches and rough surfaces, like flush door's faces filling made out of one part of white lead, two parts of whiting (powdered chalk) mixed and kneaded in double boiled linseed oil shall be evenly applied and rubbed down with G/220 or G/240 sand paper after allowing it to dry overnight.

Painting shall be done by skilled labourers in a workmanlike manner. All materials shall be evenly applied so as to be free from sags, runs, crawls, or other defects. All coats shall be of proper consistency and shall be well brushed out, so that no brush marks are visible, except varnish and enamels which shall be uniformly flowed on. The brushes shall be cleaned and in good condition before application of paint. No work shall be done under conditions that are unsuitable for production of good results.

The undercoating should be nearest to the specified colour of the finishing coat. Ready mixed synthetic enamel paint or fill paint may be used for the undercoat. The undercoat shall be uniform and free of all brush marks.

Undercoats should be completely dry before finishing coat is taken up. For synthetic enamels overnight and for oil paints, a whole day shall be left between undercoat and finishing coat. The undercoat shall then be rubbed with G/240 sand paper and dusted clean. The finishing coat of approved paint shall then be applied. If the surface is not satisadditional finish coats shall be applied at no extra cost. The paints shall be applied with bristle brushes and not horse hair ones.

The manner of taking measurements will be in accordance with IS 1200.

WHITE WASHING WALLS AND CEILINGS :

Lime used shall conform to IS 712. The wash shall be prepared from lime of approved quality.

White wash shall be prepared from fat lime or shell lime slaked on site mixed with just enough water to make a thick paste and allowed to remain for atleast 7 days before use. At the time of using, the paste shall be diluted with just sufficient water and stirred until the mixture attains the consistency of a thin cream and strained through clean and coarse cloth. Four kgs. of gum dissolved in hot water shall be added to each cu.metre of the lime used. Ultra marine blue shall be added to give required whiteness. The number of coats shall be specified in the bill of quantities and shall be applied by using flat brushes or spray pumps, on surface prepared. Before the wash is applied the surface shall be thoroughly cleaned of all dust, dirt, scales, marks and mortar drops. All holes and depressions shall be filled in with cement mortar 1:4 or lime putty. The wash shall be applied with brush with alternate coats of horizontals and verticals. When a coat is being given it shall be ensured that the previous one has dried up complete. Two or more coats of wash (as specified in the schedule of quantities) shall be applied to give uniform finished surface without any patches or cracks and brush marks. It should not come off when rubbed hard with hand. One coat of white wash shall consist of one stroke from top downwards, another from bottom upwards over the first stroke, and another from left to right before the previous one dries up. The final coat shall be perfectly uniform in appearance and free from brush marks.

COLOUR WASH :

Colour wash shall be prepared by adding mineral colours or approved pigments not affected by lime or light. Colour wash shall be applied as specified under 'white wash'. Approval of the Engineer shall be obtained in regard to exact shade before applying colour wash.

CEMENT PAINT :

The number of coats shall be indicated in the bill of quantities. The surface to be cement painted shall be thoroughly cleaned of dust, dirt, grease, oils marks, cement marks, loose scales, etc. by the use of a stiff wire brush or by coir rope. The cleaned surface should be wetted with clean water either by spray gun or any other convenient method, to ensure complete absorption. Cement paint shall not be applied on dripping or wet surface. All holes, depressions, cavities, etc. shall be filled in with cement mortar 1:4 or as directed by the Engineer, to render the entire surface smooth and even to receive the paint, at no extra cost. All fungus or organic matters, which may be present, shall be removed by scrapping and sand papering and the surface rendered smooth.

The cement paint shall be prepared in exact conformity and workable consistency as per specifications of the manufacturer. Approval of the Engineer shall be obtained in regard to the exact shade and colour before applying the cement paint. Cement paint shall be applied with good quality flat brush horizontally or vertically to ensure perfect covering. The first coat should be well brushed into the surface to form a good film appearance. The second or subsequent coats shall be applied carefully to give a good final satisfinish and may be applied by brushing or spraying. Each cement paint application should be wetted at the end of the day with a fine water spray. Twentyfour hours after the first coat has been applied, saturate the surface with water and second or subsequent coats can be applied when the surface is damp to touch. Rewater the surface with ample water after 24 hours to ensure perfect setting of the paint film.

PAINTING OIL/ENAMEL/ACRYLIC EMULSION ETC. :

Ready mixed oil paint, acrylic emulsion paint, ready mixed synthetic enamel paint, Aluminium paint, etc. shall be brought in original containers and in sealed tins. If for any reason thinner is necessary the brand and quantity of thinner recommended by the manufacturer or as instructed by the Engineer shall be used.

The surface shall be prepared as specified above and a coat of approved primer shall be applied. After 24 hours drying, specified quality paint shall be applied evenly and smoothly. If required a filler putty coating may be given to give smooth finish. Each coat shall be allowed to dry out thoroughly and then lightly rubbed down with sand paper and cleaned of dust before the next coat is applied. Number of coats shall be as specified in the item and if however the finish of the surface is not uniform additional coats as required shall be applied to get good and uniform finish at no extra cost. After completion no hair marks from the brush or clogging of paint puddles in the corners of panel angles of mouldings shall be left on the work. The glass panes floor etc., shall be cleaned of stains.

When the final coat is applied, if directed, the surface shall be rolled with a roller or if directed it shall be stippled with a stippling brush.

3. TECHNICAL SPECIFICATION FOR ACCOUSTIC PANELING WORKS

Anutone Subtex Nubby- Square Edge 595x595x15mm - Ceiling

Installation of Anutone Subtex Nubby, square edge, Glassfibre core fully encapsulated ceiling tile of size 595x595x15mm having density 100-120Kgs/m3, weight 1.5-1.8kg/m2 which is suspended by using 0.3mm thick and 15mm wide pre coated metal T15 grid system.

The T15 Grid system of 600x600mm module shall include wall angle (WA15W30) with unequal flanges of size 14&20mm wide, length 3000mm, 0.43mm thick fixed along the perimeter of walls with the help of nylon sleeves and suitable fasteners at 300mm centers. Then suspend the Main T15 (MT15W36) having flange width 15mm, height 32mm and length 3600mm from the soffit with help of soffit cleat and wire rod with leveling spring clip at 1200mm c/c. Cross T15 (CT15W12) having flange width 15mm, height 32mm and length 1200mm is then interlocked into the pre-cut slots in the Main T15 at 600mm centers in the direction perpendicular to the Main T15. Finally Cross T15 (CT15W06) having flange width 15mm, height 32mm and length 600mm are then interlocked into the pre cut slots in the 1200mm Cross T15 at 1200mm centers and in direction parallel to the Main T15. Subtex Nubby Square edge of size 595x595x15mm thick shall be placed into the grid size of 600x600mm. Ensure arrow marks behind subtex panels are orianted in one direction to achieve uniform shade.
Technical Parameters

- Core - Glassfibre
- Fire – Class 1 & P
- Acoustics – NRC 0.9
- Climate (OC RH) – 40, 95
- Termite resistance – Yes
- Light reflectance – 85 %
- Green (RC %) – 35
- Hygiene (VoC, Clean room) – Low, Class 3

• Strength, Load capacity (Kg) - Antisag

Tufbloc False Ceilings Reflection Area
Installation of magnesia board Tufbloc of Anutone make , square edge of size 1200mmx1800mmx10 mm thick to be fixed by using Main Channel MC 45 @ 1200mm centers and Strut CC22 @ 600mm centers Panel joints are filled with jointing compound (Seam + Strap + Seam) .Surface is finished with putty , primer painting and emulsion paint.

Anutone Fab Stretch above door height upto false ceilings : Upper Reaches

Installation of Anutone Stretch NRC wall fabric system by using FR Grade NRC fabric of size 1700mm width, rigid vinyl Stretch Tracks half wrap/full wrap 15mm (FS15) and Midseam 15mm (FS15), strand board, synth PF infill with requisite accessories & tools.

CC 25 mm is first installed on the wall along with infill synth pf 10X25 the marking lines with metal fasteners inserted at 300mm centers . FS15 tracks to be installed on wooden base, after applying Stick S7 adhesive on both surfaces for a true and continuous secure grip, and heavy-duty fasteners at 150mm centers on one/both sides of Stretch Tracks.

Strand square edge magnesite bonded pinewood fiber panels of size 600x1200x20mm having density 400kg/m3, weight 4kg which is fixed to wall with suitable fasteners. Synth PF 5x25mm thick adhered on strand panel by using Stick 7 adhesive. Fabric of width 1700mm is then aligned to the Stretch tracks by following the fabric thread line or pattern. The fabric is stretched and tucked into the Stretch tracks and secure into the locking jaws so that it will be smooth, free of wrinkles with the tucking tools. Note -minimum 50mm additional fabric is required for tucking hence maximum module wall fabric width would be 1600mm.

Technical Parameters

• Core - pinewoodfibre & polyfibre
• Fire – 1
• Acoustics – NRC 0.90
• Climate (OC RH) – 49, 90
• Termite resistance – Yes
• Light reflectance – Colour dependent
• Green (RC %) – 25
• Hygiene (VoC, Clean room) – Low, Class 1

Anutone wooden Panels Hall Area upto door height :- Lower Reaches

Anutone Slats – Wall

Installation of Anutone Slats made of pinewood E1 grade fiberboard, Melamine laminated finish, groove perforated slats L16-2 - (2mm Slats @16mm pitch) backlined with black acoustical fleece, tongue-groove edge for a seamless look, FR grade, of size 128x2440x16mm thick having base density 800Kg/m3, weight 12Kgs/m2 installed by using GI strut system.

The GI strut system includes GI Cross channel (CC25) having thickness 0.45mm, length 3600mm, knurled web 40mm, depth 10mm and equal flanges 15mm is fastened vertically/horizontally at every 600mm centers. Aluminium core cross channel (CC18) having thickness 0.5mm, length 2400mm, web 15mm & 27mm, depth

18mm and flanges of 7mm with suitable edge & centre brackets is then fixed perpendicular to the CC10 with the help of fasteners at every 400mm centers. Slats of size 128x 2430x16mm in then fixed perpendicular to CC18 with suitable edge & centre brackets. Contractor to provide expansion joints of 3mm at every 5mtrs bothways.Panels shall be backlined with acoustical infill of Anutone Synth PF 5x25mm thick adhered to the wall using Stick 7 adhesive.

Technical Parameters

- Core Variants - Pinewood E1 Fibreboard
- Fire – Class 1 & P
- Acoustics – NRC upto 0.75
- Climate (OC RH) – 50, 70
- Light reflectance – 75% (beech haya)
- Green (RC %) – 25
- Hygiene (VoC, Clean room) – Low, Class 1
- Strength, Load capacity (Kg) - Ball-Impact

Proposed Interior work for Incent LGD at IITM Research park, Chennai

1.0 GENERAL

Quality:

The methodologies and systems to be followed for quality assurance and the quality control aspects are elaborated in the Conditions of Contract and Additional Conditions of Contract. The technical requirements, for various types of work are indicated in these specifications.

The requirements in regard to materials, procedures and workmanship and their sampling and testing as specified herein shall be strictly adhered to, failing which a Defect, in terms of the Contract, shall be deemed to have occurred.

All work shall be in conformity with the requirements of codes, guidelines and specifications of applicable standards such as those of Bureau of Indian Standards, etc., whether or not indicated as such in these Specifications.

In the absence of applicable standards as above, the work shall be in line with the requirements of British, American or German standards and / or generally accepted practices, as may be directed by the Engineer.

Where any material / system of construction is not covered herein, the guidelines of the manufacturer / system-provider of such material / system in respect of storage, application, use, procedures, testing, etc. shall be strictly adhered to.

In all the aforesaid cases, it is the responsibility of the Contractor to submit the details thereof in time and obtain approval of the Engineer.

Materials and manufactured items are to be carefully selected, to meet the requirements of these specifications, the applicable Standards, the drawings and instructions of the Engineer.

Preferred makes:

Makes and brands of certain manufactured materials and items that are to be chosen in preference to others may be listed in these specifications and / or indicated in the Bill of Quantities / Price Schedules. The tendered rates are deemed to correspond to the costliest of these.

The Client / Engineer has the right to choose any of the makes / brands from the given list of preferred makes.

Such substitution shall attract a rebate in the rate against the Bill of Quantities / Price Schedule Item pertaining to the particular material or item, worked out in detail by the Contractor, with all supporting data and documents, and to be approved by the Engineer-in-charge.

ISI stamped / marked items may or may not be treated as technical equivalents to the makes / brands specified in the above list of preferred makes / Bill of Quantities / Price Schedule, solely at the discretion of the Engineer.
For fabricated items, local manufacturers can be considered, at the sole discretion of the Engineer.
All items / components / equipments, etc. supplied / installed shall be new. Refurbished, prefabricated, or recycled items are expressly prohibited. An undertaking to this effect shall be furnished to the Engineer, wherever and whenever he deems it necessary.
The conditions in respect of quality, makes and related aspects as stipulated in this tender document, are contractually binding.
Drawings:
The drawings enclosed to this tender document and / or available with the Engineer-in-charge for perusal of the tenderers / contractors shall form the basis for the drawings to be developed by the Contractor, at his cost.
Anything in the above drawings that requires review by the Engineer-in-charge, to facilitate proper functioning / installation / drawing details pertaining to the work under this Contract, shall forthwith be brought to the Engineer's notice, by the Contractor, in writing.
The Contractor shall examine all architectural, structural, plumbing and other services drawings, pertaining to works by him or other Contractors and as available for perusal with the Engineer, before starting his work under this Contract and report to the Engineer-in-charge anything that does not correlate with the work under this Contract or any rules / regulations / norms.
All work shall correlate well with the dimensions and conditions actually available at site, with due regard to the drawings enclosed to this tender document or any drawings made available by the Engineer and / or any drawing to be prepared by the contractor. To this end, the Contractor is required to physically ascertain the dimensions and site conditions, at his own responsibility and cost.
Within one month after the award of the contract, the Contractor shall furnish, for the approval of the purchaser, detailed shop and installation drawings of all equipment and materials including control wiring layouts required to complete the project as per specification and as required by this Contract.
The drawings shall contain name plate particulars of the individual equipment / items and the details of construction, size, arrangement, operating clearances, and performance characteristics and also the details of all related items of work by other contractors, if any.
As fitted schematic diagrams of the control system, electrical system, etc. shall be exhibited, permanently, for the guidance of the operating and maintenance personnel and the users, to the extent directed by the Engineer. The formats, sizes, material of the display and locations of such exhibits shall be as approved by the Engineer.
Statutory approvals:
The Contractor shall render all assistance that may be required by the Engineer and obtain the approval of State Electricity Board / electricity supply company and Electrical Inspectorate for the electrical system under his scope and carry out changes as called for by the Electrical Inspector at no extra cost to the Engineer. Only the deposits required for the power will be borne by the client.

Licenses:
The Contractor executing this work shall be an electrical contractor of the approved class who shall have a valid license issued by the State Government for carrying out installation work of the voltage class involved under the direct supervision of a person holding a certificate of competency for the same voltage classes, issued or recognized by the State Government.
In addition to the above stipulations, all other stipulations in the General Conditions of Contract in respect of drawings, including as-built / completion drawings, shall be applicable.
Time factor:
No stipulation herein shall become diluted in the context of time or the effect of prevailing conditions on the time available.
Costs:

The tenderer is deemed to have visited the site and ascertained the local conditions, entry, traffic restrictions, obstructions, if any, climatic conditions and also the site conditions, statutory requirements and any other aspect that may have a bearing on the work, its progress, completion and maintenance.
The tenderer is also deemed to have studied the Specifications, bill of quantities / price schedules, tender drawings and other drawings that may be available with the Engineer for perusal of tenderers, all before preparation and submission of his tender.
The tenderer is deemed to have taken into account all the above in his tender, fully covering all the costs and expenditures in respect of any and all extras likely to be incurred due to all the above, including quality and time aspects, contingencies, etc. as well as the General and Special Conditions of Contract and other documents forming the Contract.
Measurements and coverage of costs in rate:
Unless otherwise indicated in the BOQ/ Price Schedules, the rates for the various Items of work are deemed to include the cost of all materials, consumables, wastages, necessary scaffolding for working at various heights, all necessary hardware and consumables required for the entire installation, transportation, labour, supervision, tools, tackles, plant, machinery, sampling, samples, testing, documentation, obtaining and transferring guarantees and warranties from manufacturers / specialist agencies, preparing and furnishing as-built drawings.
The rates in the BOQ / Price Schedules are also deemed to include all costs towards licenses, patents, royalties, cess, seignorages, taxes, insurance, safety practices, watch and ward, security, medical aid, temporary works, utilities and services, adherence to all applicable local and government rules and regulations, cost of money, capital and funds and bidding for and operating under the Contract.
Measurements for electrification works shall be as per standard practice.
Safety:
The Contractor shall take adequate precautions to ensure complete safety and prevention of accidents at site, during installation, testing and commissioning and during operation, as elaborated in the General Conditions of Contract and / or Special Conditions of Contract.
The safety precautions shall conform to the relevant Indian Standard Codes and international codes and recommendations wherever applicable.

2. SCOPE OF WORK

The scope of work covered by this specification includes the supply and installation of all the electrical equipment and materials including testing and commissioning, unless indicated to the contrary in the Bill of Quantities / Price Schedules.

Any equipment, device and component of work not specifically mentioned in this specification but considered essential for proper design, installation and operation shall be included by the tenderer in his offer.

The successful tenderer shall carryout the installation as per the arrangement and details shown in the construction drawings, standards and instructions given by the Engineer-in-charge.

Any variation or changes to be carried out at site shall be done with the approval of the Engineer-in-charge.

The scope of work shall include, but not be limited to the supply, installation, testing and commissioning of the following:

415V LT Switchboards.

Excavation of cable trenches and backfilling.

1.1 KV grade aluminium / copper conductor XLPE / PVC insulated and PVC sheathed armoured / unarmoured power / control cables and cable terminations.

Power and communication system cable trays.

Distribution boards.

Miniature Circuit Breaker Distribution Boards, MCBs, MCCBs, ELCBs, RCCBs and RCBOs.
Earth electrode stations and earthing conductors.

Switch / socket boxes, junction boxes, draw boxes and inspection boxes.

Switches, sockets and accessories.

Wiring materials such as conduits, conduit clamping accessories.

Telecom / telephone conduiting & cabling.

Networking system conduiting & cabling.

Public address system conduiting & cabling.

Closed circuit television system conduiting & cabling.

1.1 KV grade copper conductor, FRLS multistranded PVC insulated wires.

All other installation materials, hardware and consumables.

Preparation of drawings for approval of electricity utility / CEIG.

Obtaining Safety Certificates.

3. STANDARDS
The equipment and the installation work shall conform to the requirements of the Indian Electricity Rules with it latest amendments and all relevant Standards and codes of practice of the Bureau of Indian Standards which shall include but not be limited to the following:

IS 732	Code of practice for electrical wiring installation
IS 1248	Direct acting indicating analogue electrical measuring instruments and their accessories
IS 1293	Plugs and socket outlets of rated voltage upto and including 250 volts and rated current upto and including 16 amperes
IS 1554	PVC insulated (heavy duty) electric cables
IS 2705	Current transformers
IS 3043	Code of practice for earthing

IS 5216	Safety procedures and practices in electrical work
IS 5578	Guide for marking of insulated conductors
IS 5831	PVC insulation and sheath of electric cables
IS 8130	Conductors for insulated electric cables and flexible cords
IS 9537	Conduits for electrical installations
IS 11353	Guide for uniform system of marking and identification of conductors and apparatus terminals
IS 13947	Specification for low voltage switchgear and control gear

4. GENERAL REQUIREMENTS

Galvanising:
Wherever galvanising is specified, it shall mean hot-dip galvanising with zinc coating in the range of 710-810 g/sq.m. of surface area.

Painting:
All enclosures and metal parts of the electrical equipment and installation shall be cleaned of oily substances and foreign materials such as dirt, rust, scale, oil, grease, welding flux, etc. by surface treatment encompassing degreasing, de-rusting and phosphatising.

Unless otherwise specified, all enclosures / metal parts of electrical equipment other than the panel shall be painted with two coats of primer followed by powder-coated paint or stoving grade enamel. The shade of the final coat shall be subject to Engineer's approval.

Earthing:

The metallic enclosures of single-phase equipment shall be earthed at one point while those of three-phase equipment shall be earthed at two points.

The earth electrode stations conforming to IS 3043 specifications of shall be installed to obtain an effective earthing system. The earth stations shall be provided with heavy duty SFRC / RCC covers of appropriate size.

The distance between two earth electrodes shall not be less than 3 meters. A minimum clearance of 1.5 meters shall be ensured from buildings.

Joints in the GI strips shall be welded with a lap weld of 20 mm length while those in copper shall be brazed. The welded joints shall be painted with bituminous paint and covered with bituminous gunny tape. All wires shall be terminated with tinned copper crimping type lugs.

The sizes of the earthing conductors shall be as indicated in the Bill of quantities

The armour of the cables shall be effectively earthed at the cable gland by earthing the gland using copper earth clips.

All galvanized iron / copper earthing conductors to the earth stations shall be laid at a depth of not less than 600mm from formed ground level.

All the metal conduits / enclosures shall be earthed at one point.

The earthing conductor wires unless otherwise specified shall be as follows :

Main earthing conductor from Main switch board to the earth electrode: 2 runs of 25 x 3 mm copper strip. Earth conductor inside the MSB and between MSB and all sub-switch boards: 1 run of 25 x 3 mm copper strip.

Electricity supply particulars:

All equipment and installation covered under the scope of work shall be designed for electricity supply of the following specification:

Voltage	415 V /240 V ± 10%
No. of phases	3/1
Type of system	3-phase, 4-wire / 1-phase, 2-wire
Frequency	50 Hz ± 3%
T type of neutral earthing	Solidly earthed
Short circuit level	Not exceeding 35 MVA at 415 V

5.EQUIPMENTS AND ACCESSORIES

LT PANEL BOARDS

General
The SBs shall be manufactured and installed as per CEIG standards.

The enclosures shall be designed to take care of normal stress as well as abnormal electromechanical stress due to short circuit current.

Body and construction

The Switch Boards (SBs) shall be floor mounted free standing or wall-mounting type, as specified, form-4b category, multi-tier compartmental cubicle type fabricated out of 2 mm (14G) CRCA sheet steel.

The SBs shall be single front, fixed design, having individual compartments to house each of the circuits and shall be extensible on either side.

The load bearing members of SB's shall be fabricated out of 3.15 mm thick sheet steel or 40 x 40 x 6mm MS angle.

The SBs shall be provided with a fabricated base frame of 75 mm height at the bottom, having adequate provision for grouting the Switchboards (SB's) on the foundation, in case of floor-mounting type.

The SBs shall have a degree of protection of not less than IP54 as specified in IS 13947.

The rear cover of SBs shall be welded to the framework, while dished type side doors shall be bolted to the framework.

All doors shall be provided with fixed neoprene gaskets. The doors shall be provided with quick opening type Bakelite moulded knobs with circlips.

All hardware to be used shall be zinc-passivated.

The SB's shall be painted as specified elsewhere to this specification and shall undergo suitable pre-treatment prior to painting.

Busbar:

The SBs shall be of single/double busbar type with horizontal / vertical busbars.

A horizontal / vertical busbar chamber shall be provided to connect individual feeders.

All joints in busbars system shall be of the bolted type and spring washers shall be provided at all such joints.

The busbar chamber shall be totally segregated from the rest of the compartments and shall be inaccessible under normal operating conditions.

No equipment shall be mounted on the busbar chamber.
The busbar shall be of aluminium/copper and shall have a continuous rating as indicated in the drawings. The neutral busbar shall be half the size of the phase busbar.

The busbar shall be covered with heat shrinkable PVC sleeves in the colours red, yellow, blue for the phase busbars and black for the neutral busbar.

The busbar shall be supported with high quality non-hygroscopic resin bonded on DMC / SMC insulators designed for the specified short circuit level.

The higher rating panels shall be supplied along with the test certificate to guarantee the fault withstanding capability of 25MVA at 415 Volts.

Tappings from the busbars to the feeder switch shall be by means of insulated or sleeved busbars depending on the rating and terminal capacity of the switch.

Switch board interconnection

All connection and tap offs shall be through adequately sized connectors appropriate for fault level at location.

This shall include tap off to feeders and instrument / control transformers. Alternatively current limiters of approved make and type shall be used.

For unit ratings upto 100 Amps, FRLS PVC insulated copper conductor wires of adequate size to carry full load current shall be used.

The terminations of such interconnections shall be crimped properly.

Solid connections shall be used for all rating of 100 amps and above.

All connections, tappings, clampings shall be made in an approved manner to ensure minimum contact resistance.

Before assembly joint surfaces shall be filed or finished to remove burrs, dents and oxides and silvered to maintain good continuity at all joints.

All screws, bolts, washers shall be cadmium plated.

Approved spring washers shall be used with cadmium plated high tensile steel bolts with BSF threads.

Draw out features

Air Circuit Breakers shall be provided in fully draw out cubicles, unless otherwise stated.

These cubicles shall be such that draw out is possible without disconnection of the wires and cables.
3
The power and control circuits shall have self aligning and self isolating contacts.

The fixed and moving contacts shall be easily accessible for operation and maintenance.

Mechanical interlocks shall be provided on the draw out cubicles to ensure safety and compliance to relevant Standards.
Instrument Accommodation

The meters shall not be mounted on the fuse switch / switch fuse / MCCB / MCB compartment door for which a separate and adequate compartment shall be provided and the instrumentation shall be accessible for testing and maintenance without danger of accidental contact with live parts of the Switchboard.

The current transformers for metering and for protection shall be mounted on the solid copper aluminum bus bars with proper supports.

Earthing:

Two runs of galvanized iron earth strip of size 25 x 3 mm shall be provided between the earth electrode and the panel board.

Each compartment shall be connected to the earth strip at the bottom of the board with a PVC insulated multistranded copper wire of size 6 sq.mm.

A galvanized iron earth strip of size 25 x 3 mm shall be provided at the bottom throughout the length of the board with arrangements to join with external earth strip at both ends.

The door shall be earthed with the main body through flexible copper wire.

General features:

Clamping arrangement shall be provided in the alley. All cable entries shall be from the top / Vertical cable alley common to vertical sections shall be provided for running cables. Cable bottom as per site condition or as directed by the Engineer-in-charge.

Each compartment door shall be interlocked with the switch handle such that the door cannot be opened with the switch in ON position.

The size and layout of each compartment shall be as such as to enable easy maintenance of the equipment mounted therein.

The height of the SBs shall be restricted to 2300mm including the busbar compartment at the top and the base frame at the bottom.

The minimum operating height shall not be less than 200mm for switches with a rating of less than 100A and 400mm for switches with a rating of 100A and above. The maximum operating height shall not exceed 1800mm.

The SB's shall be powder coated to Siemen's grey shade after undergoing 7-tank treatment process.

Electrical components:

All equipment shall be fixed in the compartments in such a way that they are removable and replaceable from the front only.

The current transformers shall be of the epoxy moulded window type suitable for busbar mounting.

Metering current transformers shall be of Class-1 type.

The ratio and rated burden of the current transformers shall be as specified in the drawings.

The meters shall be flush-mounting type. The voltmeter and ammeter on the incoming & outgoing feeders shall be of suitable size digital meter.

All switches and fuse-switch / switch-fuse units / change over switches shall conform to duty category AC 23 as specified in IS 13947.

All contactors shall conform to utilisation category AC 3 as specified in IS 2959.

The isolators for the switch fuse units shall be on the busbar side and the fuses on the load side. Shrouds shall be provided to screen the live parts.

The fuses shall be of the HRC link type capable of clearing the fault level specified.

All energy meters, ammeters and voltmeters shall be mounted in a separate meter compartment and shall be located at a convenient reading height.

Circuit:

The following colour code shall be adopted for the wiring of the Switch Boards (SBs):
Phase: Red, Yellow & Blue; Neutral: Black; Earth: Green.

Plastic engraved labels shall be provided for each circuit and for the board itself.

Details of the feeders of the switchboard shall be as shown in drawing.

The Board shall be of CPRI approved, supplied and installed as per CEIG standards.

Name plates and labels

Suitable engraved white on black nameplates and identification labels of metal for all Switchboards and Circuits shall be provided. These shall indicate the feeder number and feeder designation.

Drawings:

The Contractor shall submit for approval four sets of general arrangement and wiring drawings of the switchboard before commencing manufacture.

The drawings are subject to the approval of the Engineer-in-charge.

No fabrication works shall be taken up without the approval of the Engineer-in-charge.
MOULDED CASE CIRCUIT BREAKER (MCCB)
MCCB should be suitable for working on 415 V, 50 Hz supply.

It should be manually operated fixed type.

It should be double break type.

The breaker should be tested as per IS: 13947-2, IEC 60947-2, EN 60947-2.

The rated short time withstand capacity of the breaker should be 16KA/25KA/36KA, RMS for 1 second.

The operating and tripping levers / emergency stop switches should be provided.

The MCCB shall be of suitable breaking capacity as specified in drawing with microprocessor/thermal release suitable for adjustment upto 70%. Terminals should be suitable for termination of copper / aluminum conductor cable.

Doors interlock defeat facility, push to trip facility & with following accessories are required:
Shunt release
Under voltage release
Auxiliary contact block
Trip alarm contact
Rotary operating handle.
Spreader.

MINIATURE CIRCUIT BREAKER (MCB):

The MCBs shall be of the thermal-magnetic type and shall have a short circuit rating of not less than 9KA, suitable for DIN rail mounting and shall be ON in the up position and OFF in the down position of the operating knob.

The Miniature circuit breaker (MCB) shall be heat resistant, moulded type designated, manufactured at tested as per (IS8828).

The MCB shall have inverse time tripping characteristic against overloads and instantaneous trip against short circuit.

RESIDUAL CURRENT CIRCUIT BREAKER (RCCB/RCBO):

Residual Current circuit breaker shall be 415 / 240V, 4 / 2-pole current-operated type, with a sensitivity of 30 milliamps in 30 milliseconds or less tripping time & with a sensitivity of 100 milliamps in 20 milliseconds or less tripping time, suitable for DIN rail mounting inside MCB DBs.

The RCBO/RCCB shall work on direct-current operating principle using core balance current transformer.

The unit shall have a test button for testing its function.

The RCBO/RCCBs shall not have a bypassing arrangement.

FUSE SWITCH UNIT / CHANGE OVER SWITCH:

The fuse switch unit shall be of continuous rating and of heavy-duty load break type.

The unit shall be housed in dust proof 2 mm thick sheet steel enclosure having top and bottom knockout entries.

The unit shall be suitable for GI pipe / PVC conduit / metal conduits / cable entry and have adequate wiring space.

The switch-operating handle shall be interlocked with the door such that it opens only when the switch is in OFF position.

The unit shall be provided with sealing facility and shall contain HRC fuses with ratings as per the drawings.

MCB / MCCB DISTRIBUTION BOARD (MCB/MCCB DB):

The Distribution board shall be factory-made pre- wired, phase-segregated type having an enclosure made from 1.6 mm (16 SWG) CRCA sheet, with welded back and sides and detachable gland plates or suitable knockouts at top and bottom. All removable plates shall be provided with neoprene gaskets.

Only the operating handle of the MCB/MCCB shall be projecting outside the cover plate.

The incoming switch terminals shall be suitably shrouded to avoid accidental contact. Each phase or way shall also be suitably shrouded with hylam sheet.

The incoming and outgoing terminals shall be suitable for terminating cables as per the termination sheet.

The MCB Distribution board shall undergo suitable pretreatment followed by two coats of primer and two coats of stoving grade synthetic enamel paint or powder coated, as specified elsewhere in this specification.

The connections to the busbars shall be by solid copper links.

The DB's shall have phase / Neutral / Earth terminal blocks for termination of incoming and outgoing wires.

All the device wires and terminal blocks within the board shall be clearly identified by durable and legible tags corresponding to those in applicable drawings. All wiring shall be easily identified by ferrules (interlocking type) accessible for maintenance checks.

Terminal blocks should be suitable for termination of conductors / cable of required size but minimum rated cross section of the terminal block should be 6 sq.mm.

Terminal block shall be made of flame retardant polymide material. Coloured terminal blocks & FRLS wires shall be used for easy identification of RYB phases, neutral and earth.
The design of the Distribution board shall be such that the MCBs/MCCBs can be mounted without additional wiring.

All the low voltage internal wiring of the distribution boards shall be of 1.1KV grade stranded copper conductor, FRLS PVC insulated, PVC sheathed wires of core size 2.5 sq.mm for control wiring.

The DB should have name plate with its designation inscribed on it. The name plate shall be made of durable material with legible lettering. Refer its relevant SLD's for designation of DB's.

The Distribution board shall be suitable for DIN rail mounting type MCBs. The MCBs shall be mounted on the Distribution board in one or more horizontal rows such that the MCBs are ON in the up position and OFF in the down position of the operating knob.

The busbars shall be made of cadmium-coated copper and shall have a continuous rating of not less than 100A.

The DB's shall be of recess / surface mounted type with integral loose wire box. The type of DB (recessed / surface mounted) shall be subject to Engineers approval.

Multi-way neutral and earth connectors / busbar shall be provided inside the MCB Distribution board to terminate the incoming and outgoing neutral / earth conductors.

The connector / busbar shall be made of cadmium coated brass and shall have a continuous rating of not less than 50% of the busbar rating.

Plastic engraved identification labels shall be provided for each circuit and Distribution board itself.

Proper danger plate shall be provided on each board as per relevant IS.

The MCB Distribution board shall be supplied and installed as per electricity utility / CEIG Standards.

MCCB/MCB IN SHEET STEEL ENCLOSURE:

The MCCB/MCB shall have an enclosure of 1.6mm (16 G) CRCA sheet.

The enclosure shall have welded back and sides, suitable knockouts at the top and bottom and a removable front cover.

The front cover shall have a suitable cutout such that the dolly of the MCB is accessible from the front.

The enclosure shall be painted as specified elsewhere in this specification.

CABLES:

Cable shall be XLPE / PVC insulated and PVC sheathed, GI round / flat armoured / unarmoured, 1.1 KV grades, with copper or aluminium/ copper conductor conforming to IS 1554.

The insulation thickness and sheathing of cable shall be as per relevant standards.

The LT underground cables shall carry ISI Certification and should be insured against fire for transporting and storage.

The LT Underground Cables of size 6 sq.mm. and above, shall have multi-stranded conductors.

Cable glands shall be of single compression Siemens type made of brass with earth clip.

Cable lugs shall be of tinned copper and shall be of crimping type.

The insulation thickness of cable shall be as per table 1 of IS 1554 (Part I).

The sheathing of cable shall be extended type, as per Table-3 & 6 of IS 1554 (Part 1).

General requirements for all types of trays:

Trays shall not have sharp edges, burrs or projections injurious to cables.

All bolts, nuts and fasteners shall be as approved by the engineer.

Anchor fasteners shall be of 750 kg pull-out class and of approved type.

Trays shall be installed to correct line, level, plumb and alignment and shall present a neat and clean appearance.

Clearances for all types of trays:

For horizontal trays :

A clear gap of 200 mm shall be maintained between the tray and the ceiling and ceiling projections.

The vertical spacing between the trays in multi-tier stretches shall be as approved by the Engineer and in no case lesser than 250 mm.

The distance between the ceiling / ceiling projections and the bottom of the tray shall be as per Engineer's requirements and shall take care of other items of the building such as false ceiling, light fixtures, etc.

For vertical trays

A clear gap of atleast 100 mm shall be maintained between the tray and the walls behind.

This shall be achieved by approved spacers.

METALLIC CONDUITS AND FITTINGS:

Metallic conduits shall conform to standards such as IS 9537 Part-II and IS 1653. They shall be treated to prevent corrosion.

The conduits and fittings shall have a wall thickness of not less than 1.6 mm(16SWG)for conduits upto 32mm diameter not less than 2mm(14SWG) for conduit above 32mm diameter.
No conduits less than 20mm in diameters shall be used.

Saddles for surface conduit work on wall shall not be less than 0.55mm (24 gauges) & 19mm width for conduits up to 25mm dia and not less than 0.9mm (20 gauges) & 25mm width for larger diameter.

Matching inspection bends, couplers and draw boxes shall be provided at suitable locations and the sizes shall be in accordance with the respective conduit sizes.

PVC CONDUITS AND ACCESSORIES:

PVC conduits and fittings shall be of the heavy class conforming to IS 9537 Part III.

The conduits and accessories shall have a wall thickness of not less than 1.6 mm(16SWG) for conduits laid @ wall, and not less than 2mm(14SWG) for conduit laid @ concrete (ceiling).

No conduits less than 20mm in diameters shall be used.

PVC bends couplers and draw boxes shall be provided at suitable locations and the sizes shall be in accordance with the respective conduits.

Elbows shall not be used.

FANS

Ceiling Fans

The regulator shall be 2-module static type device with hum-free operation at all speed levels and also shall be energy saving capacitor based design.

Wherever required, downrods made of GI pipes and suitable to hold the particular fan shall be provided.

Exhaust Fans

The exhaust fans shall be of industrial type designed, manufactured and tested as per IS: 2312 and operating on 240 V single-phase, 50 HZ AC supply system.
The exhaust fan shall be of ring-mounted type and shall be complete with louvers made of aluminium, built into a steel frame.
The louvers shall be designed for opening and closing automatically with airflow velocity.
TELEPHONE & DATA NETWORK SYSTEM :

The scope of work shall include supply, fixing of metal box, RJ-11 telephone outlet and supply & laying of 2-pair cable/CAT-5E etc., and it shall also include all attendant and miscellaneous works such as making openings / chasing in the walls / ceilings required for the installation and then making them good in an appropriate manner.

The telephone line network components shall be as per applicable standards and executed as per standards / DOT specifications and directions of the Engineer-in-charge.

The network may comprise items such as Network jack/switch/hub/MDF (Main Distribution Frame), various sizes of Krone-type junction boxes, Jelly-filled cables, unarmoured cables, end points such as telephone sockets, etc.

The locations of the above, mounting heights / routing alignments and cable capacities / sizes shall be as per drawings.

The system requires required ports of network jack/switch/patch panel and server which shall be interlinked using 4 pair CAT-5E cable laid in 20mm/25mm diameter 1.6mm/2mm thick PVC conduit (4-pair wires shall have a colour of blue, green, brown and orange with white for each line).
Other ends of the system shall be terminated in RJ-11 Information outlets mounted in suitable Zinc passivated metal boxes.
Date network shall be executed as per standard. The system requires 16, 24, 48 port switch / patch panel and server which shall be interlinked using 4 pair CAT6 data cable laid in 20mm diameter 2 mm thick PVC conduit (4-pair wires shall have a colour of blue, green, brown and orange with white for each line).

Other ends of the system shall be terminated in RJ-45 Information outlets mounted in suitable Zinc passivated metal boxes.

Bidders shall propose and submit a comprehensive Structured Cabling Solution to form the telecommunications infrastructure (cables, faceplates, patch panels, outlets and frames, etc.) necessary to build a uniform premises distribution system, which will function for a multi-media telecommunications solution to support up to 1000Mbps transmission.

The solution should also define the method(s) of flexible patching for the telecommunications services to enable simple Moves, Adds & Changes, (MAC's) without frequent rewiring of locations and re-training of staff and to provide easy-to-follow troubleshooting steps and procedures. All the products must be from the same manufacturer, to the extent practicable.

Telephone Cables (10/20 pair) :

It should have solid annealed /tinned copper.

No joints are permitted in the runs of wire.

It should have PVC / PE insulation.

The shielding / armour can be provided as an option.

The cables shall confirm the relevant standards.

Switches :

The switch shall have 16 / 24 / 48 number of 1000 Mbps Ethernet ports.

The switch should have support for security standards.

The switch shall have the IP telephony support through external device.

The switch shall meet the requirement of relevant standards.

The switch should support comprehensive end-to-end management through a SNMP based Network management system.

Patch Panels:

It shall be compact and light weight in design with rear cable manager.

It shall be powder coated properly.

It shall meet the requirement of relevant standards.

Patch Panels shall be with 45 degree silver-plated IDCs (Insulation Displacement contacts) to provide secure reliable gas-tight connections.

It should have 19'' rack mountable with cable manager.

Rack :
The rack doors shall be of wall mountable type and it shall have suitable lock and key arrangement.

The glass doors should be minimum 4mm thick.

It shall have provision for cable entry at the bottom / top of the rack as directed by the Engineer based on site condition.

The rack shall be made of CRCA sheets minimum 1.2mm thick.

The rack shall have louvers from the bottom to the top to ensure smooth airflow and circulation.

CAT 6 cable :
The cable shall be of 4 pair unshielded twisted pair (UTP) category 6 LAN cable.

It should be insulated by High density poly-ethylene.

It operating temperature is under +15°C to 70°C.

It should have minimum bending radius of 50mm while installation.

PA SYSTEM

The scope of work shall include supply, laying of necessary cabling, supply & installation of speakers, amplifier and accessories as mentioned in the bill of quantities etc. and it shall also include all attendant and miscellaneous works such as making openings / chasing in the walls / ceilings required for the installation and then making them good in an appropriate manner.

Wiring

2 core x 1.0 sq. mm copper conductor armoured PVC insulated cables.

Speakers in the same zone are seriously interconnected by using of wires / cables.
Speakers in each zone to be connected in parallel and connected to the respective output.

Cables from each zone shall be separately routed and terminated in the Panel.

CCTV SYSTEM

The scope of work shall include supply, laying of CAT-5E/CAT-6/co-axial TV cabling through PVC conduits, supply & installation of cameras, DVR, Power supply unit and accessories as mentioned in the bill of quantities etc. And it shall also include all attendant and miscellaneous works such as making openings / chasing in the walls / ceilings required for the installation and then making them good in an appropriate manner.

6. INSTALLATION MATERIALS AND ACCESSORIES

Wires for electricity

PVC insulated multi-stranded copper FRLS wires of 1.1 KV grade as per IS 694 and ISI certification shall be used.

The type and size of wires to be used shall be as indicated in the drawings.

No joints are permitted in the runs of wires.

The following colour code shall be adopted for the wiring:

Three phase wiring	:	Red, Yellow, Blue
Single phase wiring	:	Red
Switched phase / wire from switch to light fan, bell, etc.	:	White
Neutral	:	Black
Earth	:	Green

Switch and socket Boxes

Boxes for the mounting of switches, sockets and for regulators, etc. shall be made of 1.6 mm (16G) CRCA sheet and shall be hot dip galvanised after fabrication.

The boxes shall have a provision for earthing from inside.

In case of modular system of switch / socket boxes and plate switches / sockets, the plates shall be directly mounted on the switch / socket box such that the joint between the box and the surrounding plaster is covered by the plate.

The size of switch boxes shall be selected so as to accommodate all the switches, sockets and regulators as indicated in the drawings.

Switches and Sockets

All switches for lighting, ceiling fans and 6A/16A sockets shall be of modular type 240V, 6A/16A rating, suitable for flush mounting, as indicated in the bill of quantities / price schedule or as shown in the drawings.

The 6A socket shall be of universal 5-pin type, whereas 16A sockets shall be of universal type, having both 16A and 6A, 5 pin outlets.

The sockets shall be flush mounting type. The 16A socket shall have independent fuse and indicator.

A separate switch shall control each socket.

Switches / sockets are to be installed at locations and heights that may be indicated in the drawings.

Sockets to be installed at heights less than 1000mm above FFL shall have safety shutters.

Ceiling Roses

Ceiling roses shall be made of PVC white colour suitable for mounting on junction box / wall surface with three-way connector.

PVC conduits and accessories
PVC conduits and fittings shall be of the heavy class conforming to IS 9537 Part III.

PVC bends couplers and draw boxes shall be provided at suitable locations and the sizes shall be in accordance with the respective conduits.

Elbows shall not be used.

Metallic conduits and fittings

Metallic conduits shall conform to standards such as IS 9537 Part-II and IS 1653. They shall be treated to prevent corrosion.

The conduits and fittings shall have a wall thickness of not less than 1.6 mm.

Matching inspection bends, couplers and draw boxes shall be provided at suitable locations and the sizes shall be in accordance with the respective conduit sizes.

Junction Boxes

Junction boxes for luminaire shall be made of PVC.

The junction boxes to be installed in slabs shall be of 65 mm dia and 65 mm deep. The junction boxes on wall shall be 65 mm dia and 30 mm deep.

They shall have two or four number of knockouts with extension for conduit entry, suitable for particular diameters of the conduits.

Fan hook boxes

Fan hook boxes shall be 95 mm dia and 60 mm deep and made of 16G CRCA sheet with 10 mm dia MS hook cum lug and 25 mm dia x 25 mm long conduit extension closed at one end, suitable for insertion of bolts with 4 numbers of knockouts for conduit entry, hot-dip galvanised after fabrication.
These shall be painted with two coats of red oxide primer of approved brand.

Fan hook boxes shall be submitted and approved by the Engineer / Consultant / Employer before execution.

Draw Boxes and Inspection Boxes

Draw boxes of approved sizes shall be made from 1.6mm (16G) CRCA sheets and shall be hot-dip galvanised after fabrication.

The boxes shall be covered with 3 mm thick white hylam sheet fixed to the box with brass cup washers and full threaded brass screws.

In the case of concealed flush mounting, the hylam sheet shall project 6mm beyond the box so that the sheet covers the joint between the box and the surrounding plaster.

Telephone cables

The telephone cables (10/20 pair) shall be as per relevant ITD specifications.

No joints are permitted in the runs of wires.

Computer Networking & Data Cables

CAT-6/6A/5E shielded type FRLS cables shall be laid through heavy-duty PVC conduits, taking the shortest route between the patch panel / switch port and various nodes, complete with RJ-45 Information outlet sockets.

7. INSTALLATION

INSTALLATION OF SWITCH BOARD

Switch Boards shall be mounted in the electrical rooms / any other location as indicated in the drawings, on pre-formed / pre-excavated trenches.

The portion of the trenches not covered by the switchboard shall be covered with 7 mm thick chequered steel plates with proper fastening arrangements.

All unused cable entries shall be closed with suitable blind plugs or plates made from 2 mm hot dip galvanised CRCA sheet steel bolted to the gland plates.

INSTALLATION OF MCB UNIT:

The MCB unit shall be installed in the distribution boards using zinc-passivated bolts and nuts grouted in the wall.

INSTALLATION OF CHANGE OVER SWITCH:

The change over switch shall be installed in the panels / enclosures are using zinc-passivated bolts and nuts grouted in the wall.

INSTALLATION OF CABLES

Cable installation shall be properly coordinated at site with the routing of services, utilities and wherever necessary suitable adjustment shall be made in the cable routings with a view to avoid interference with any part of the buildings, structures, equipment, utilities and services.

Wherever cables are required to enter the building, they shall be drawn through hume pipe / GI pipe. Suitable packing / sealing shall be made at both ends of the pipe to make the entry points fully watertight.

Where cables are required to cross the roads or cables and pipes of other services the cable shall be drawn through Hume pipe or GI pipe. Suitable sealing shall be made at both ends of the pipes.

All cables shall be provided with identification tags indicating cables numbers in accordance with the cable/circuit schedule. Tag shall be fixed at both ends of all cables laid in the ground. In case of cables lay on walls or over the false ceiling tags shall be fixed on both ends and at 20M spacing.

When a cable passes through a wall, tags shall be fixed at both sides of the wall. The tags shall be of durable fiber or aluminium sheet with the numbers punched on them Vertical runs of cables along the wall shall be laid through medium class-B GI pipe of and securely attached to the cables with non-corrosive wire.

For single core cables, wires shall be of non-ferrous materials.

Suitable diameter up to a height of 900 mm above finished floor level. The GI pipe shall be clipped to the wall with brass clamps and brass screws. The distance between the clamps shall not exceed 400 mm.

Standard cable grips and reels shall be utilised for cable pulling. The maximum pulling tension shall not exceed the recommended values.

Sharp bends shall be avoided in the cable runs. The bending radius shall not be less than 12 times the diameter of the cables (12D).

No joints shall be normally permitted in the runs of the cables unless the length of the run is more than the length of the standard drum supplied by cable manufacturers. In such cases when jointing is unavoidable the same shall be made by means of standard cable joint boxes/kits.

Where more than one cable has to be laid along the same route, the cables shall be laid horizontally touching each other and not one above the other.

The armour of the cables shall be effectively earthed at all terminations.

Suitable phase identifiers shall be provided at the terminals.

All cables shall be tested for proper insulation prior to laying.

The cable drums shall be transported on wheels to the place of work and the cables shall be laid out in proper direction as indicated on the drum using cable drum stands.

In case of higher size cables, the laid out cables shall run over rollers placed at close intervals and finally transferred carefully onto the trenches and racks.

Care shall be taken so that kinks and twists or any mechanical damage does not occur in the cables. Only approved cable pulling grips or other devices shall be used.

Adequate length of cables shall be pulled inside the switchboards, control panels, terminal boxes, etc., so as to permit neat termination of each core / conductor.

Control cable cores entering switchboard or control panels shall be neatly bunched and strapped with PVC perforated tapes and suitably supported to key them in position at the terminal block. All spares cores shall be neatly dressed and suitably taped at both ends.

Power cable termination shall be carried out in such a manner as to avoid strain on the terminals by providing suitable clamp near the terminals.

All power cable terminations shall be by means of crimping type cable lugs and the torque shall be 2 to 3 N-M.

Control cables shall be terminated by crimping or directly clamped in the terminal blocks by screws.

The voltage drop between cable strands and the respective product / switch / MCB terminal must be less than 10 millivolt.

All cable entry openings in the equipment shall be sealed and made entry-proof against creeping reptiles.

Cables laid in cable trays shall be clamped by means of single or multiple galvanised MS saddles and accessories. The saddles shall be placed at intervals of 1500 mm in both horizontal and vertical straight runs, at each bends and at turnings from horizontal to vertical direction vice versa.

Fire barrier with glass wool packing or suitable material shall be provided between cable ducts / trays and room.

EARTHING

The metallic enclosures of single-phase equipment shall be earthed at one point while those of three-phase equipment shall be earthed at two points.

GI plate earth stations conforming to IS: 3043 specifications of shall be installed to obtain an effective earthing system. The earth stations shall be provided with heavy duty CI/RCC covers of appropriate size.

Copper plate earth stations conforming to IS: 3043 specifications of shall be installed to obtain an effective earthing system. The earth stations shall be provided with heavy duty CI/RCC covers of appropriate size.

The distance between two earth electrodes shall not be less than 3 meters. A minimum clearance of 1.5 meters shall be ensured from buildings.

Joints in the GI strips shall be welded with a lap weld of 20 mm length while those in copper shall be brazed. The welded joints shall be painted with bituminous paint and covered with bituminous gunny tape. All wires shall be terminated with tinned copper crimping type lugs.

The sizes of the earthing conductors shall be as indicated in the Bill of quantities.

The armour of the cables shall be effectively earthed at the cable gland by earthing the gland using copper earth clips.

All copper earthing conductors to the earth stations shall be laid at a depth of not less than 600mm from formed ground level.

All the metal conduits / enclosures shall be earthed at one point.

The earthing conductor wires unless otherwise specified shall be as follows :

Main earthing conductor from Main switch board to the earth electrode: 2 runs of 25 x 3mm copper strip.

Earth conductor inside the MSB and between MSB and all sub-switch boards: 1 run of 25 x 3mm copper strip.

WIRES FOR ELECTRICITY

PVC insulated multi-stranded copper FRLS wires of 1.1 KV grade as per IS 694 and ISI certification shall be used.

The type and size of wires to be used shall be as indicated in the drawings.

No joints are permitted in the runs of wires.

The following colour code shall be adopted for the wiring:

Three phase wiring	:	Red, Yellow, Blue
Single phase wiring	:	Red
Switched phase / wire from switch to light fan, bell, etc.	:	White
Neutral	:	Black
Earth	:	Green

SWITCH AND SOCKET BOXES

Boxes for the mounting of switches, sockets and for regulators, etc. shall be made of 1.6 mm (16G) CRCA sheet and shall be hot dip galvanised after fabrication.

The boxes shall have a provision for earthing from inside.

In case of modular system of switch / socket boxes and plate switches / sockets, the plates shall be directly mounted on the switch / socket box such that the joint between the box and the surrounding plaster is covered by the plate.

The size of switch boxes shall be selected so as to accommodate all the switches, sockets and regulators as indicated in the drawings.

Switch / Socket Boxes shall be concealed in the wall and the mounting height of the boxes shall be as indicated in the drawings.

The switch and socket cover plates shall project 6 mm beyond the switch/socket box. In the case of concealed conduit wiring, the joint between the box and the surrounding plaster is covered by the cover plate. The cover plate shall be fixed with brass cup washers and full threaded brass screws.

Switch boxes are required to be mounted in partition walls also. Suitable fixing accessories shall be included for such requirements.

Where more than one Switch / Socket Box is required to be provided at close proximity, they shall be positioned in a convenient fashion.

Switchboxes shall be fixed in position using cement mortar. Cement concrete with small size aggregates shall be used where the gap exceeds 20mm. The front lips shall be flush with the face of wall plaster.

SWITCHES AND SOCKETS

All switches for lighting, ceiling fans and 6A/16A sockets shall be of modular type 240V, 6A/16A rating, suitable for flush mounting, as indicated in the bill of quantities / price schedule or as shown in the drawings.

The 6A socket shall be of universal 5-pin type, whereas 16A sockets shall be of universal type, having both 16A and 6A, 5 pin outlets.

The sockets shall be flush mounting type. The 16A socket shall have independent and indicator.

A separate switch shall control each socket.

Switches / sockets are to be installed at locations and heights that may be indicated in the drawings.

Sockets to be installed at heights less than 1000mm above FFL shall have safety shutters.

CEILING ROSES

Ceiling roses shall be made of PVC white colour suitable for mounting on junction box / wall surface with three-way connector.

MCB DISTRIBUTION BOARD:

MCB Distribution Board shall be fixed with bolts and nuts grouted to the wall in the cupboards / niches provided by civil agency and as shown in the drawings.

MCB UNIT:

The installation shall be carried out in accordance with the Indian Electricity Rules, the Codes of Practice of the Bureau of Indian Standards and other relevant regulations.

The MCB unit shall be installed in the distribution boards using zinc-passivated bolts and nuts grouted in the wall.

CIRCUIT BREAKERS:

The installation shall be carried out in accordance with the Indian Electricity Rules, the Codes of Practice.

WIRING

PVC insulated wires shall be drawn through concealed PVC conduits and / or surface mounted PVC conduits.

The wires of a circuit shall not run through the conduits, junction boxes, and switch / socket boxes of another circuit. Common draw boxes with hylam barriers separating individual circuit wires may be adopted to minimise the number of draw boxes.

The maximum number of PVC insulated wires which can be drawn in conduits of various sizes shall be as given below :

Nominal cross-sectional area of wire (sq.mm.)	Sizes of conduit		
	20 mm	25 mm	32 mm
1.5	5	10	12
2.5	5	8	12
4.0	3	6	8
6.0	2	5	7
10.0	2	4	5
16.0	-	2	3

Wires shall be terminated at the switch boxes with suitable crimping type tinned copper lugs.

Wiring shall be carried out by looping the phase conductors at the switch box and the neutral conductors at the lights, fans and sockets.

For looping of wires in switch boxes, shrouded type multi-way 10A/20A rated connectors shall be used.

The circuit wiring shall be in accordance with the drawings.

CIRCUIT WIRING

Circuit wiring shall mean wiring from the MCB distribution board to first switch box and subsequent switch boxes of the circuit and shall include necessary length of wires in the circuit, draw box connectors, ferrules, lugs, etc.

Circuit chart shall be prepared and fixed inside the distribution board doors.

Circuit wiring shall be terminated with copper lugs, sockets and ferruling has to be carried out as per circuit chart.

POINT WIRING

Point wiring shall include all work necessary to complete wiring of a switch / socket circuit of any length from the tapping point of the distribution circuit to socket / light / fan / call bell / starter, etc. points. The point wiring shall include all the materials as indicated in the Point Wiring Chart forming part of this specification.

CEILING FANS

Concealed type fan hook boxes shall be used for mounting of the ceiling fans.

The fan shall be fixed to the hook in such a way that the canopy covers the opening of the fan hook box. The down rod shall be exactly in the centre of the box.

EXHAUST FANS

Exhaust fans shall be mounted on a galvanised MS ring, which, in turn shall be fitted in the openings provided for the purpose.

CONDUITS:

Conduiting shall comprise the conduits and necessary bends and couplers for vertical dropping and for joining together conduits respectively.

The diameter and routes of the conduits shall be as indicated in the drawings, which are to be prepared and furnished by the contractor, based on the fittings layout & single line diagram and such other drawings made available by the Engineer-in-charge.

Draw boxes shall be provided at every 10m length of conduiting meant for wiring, in stretches involving more than two bends and where the alignment passes through ceiling slabs which are at different levels as well as at points where specifically called for as per drawings or as directed by the Engineer. Elbows shall not be used. Top of the box 100mm to 300 mm below the ceiling level, unless indicated to the contrary by the Engineer-in-charge.

The draw boxes and junction boxes shall be covered with 3 mm thick hylam sheet of approved colour fixed to the box with brass cup washers and full threaded brass screws.

In case of concealed flush mounting, the hylam sheet shall project 6mm beyond the box so that the sheet covers the joint between the box and the surrounding plaster.

GI fish wires shall be provided in the conduits.

All openings shall be sealed to prevent entry of concrete or creatures.

Conduits, draw boxes, junction boxes, fan hook boxes, etc., which would be concealed, shall be secured in position by tying to the reinforcement bars using binding wire or appropriate check nails in case of masonry.

Conduits, accessories, junction boxes and fan hook boxes to be concealed in masonry shall be set into necessary chases, secured in position and the chase patched up using cement mortar. The dimensions of the chases shall be appropriate for the sizes of the concealed items and as approved.

PVC items shall be jointed together using approved adhesive only.

The conduits, accessories, junction boxes and fan hook boxes fixed in position shall be inspected thoroughly during concreting and concealing, for any displacements, damages, etc. Sufficient stock of materials and workmen shall be deployed to immediately attend to any rectifications. A thorough check for any damages or chokages shall also be carried out after concealment. All such measures and rectifications shall be at the Contractor's own cost.

Conduits and sleeves meant for passage of cables, etc. shall be fixed on / through masonry / RCC members or laid in excavated / pre-formed trenches, all as approved by the Engineer. Curves in the alignment of metallic conduits shall be achieved by bending to profile using non-heat methods only, without the use of elbows.

Wherever the masonry walls are chased for concealing the conduits and switch boxes, it shall be plaster using cement mortar until get good finish.

LUMINAIRES

The installation of luminaires shall be at locations indicated in the drawings with necessary fixing accessories and down rods wherever required, etc.

CONTROL CABLES

Control cable cores entering switchboard or control panels shall be neatly bunched and strapped with PVC perforated tapes and suitably supported to key them in position at the terminal block. All spares cores shall be neatly dressed and suitably taped at both ends.

Control cables shall be terminated by crimping or directly clamped in the terminal blocks by screws.

DATA NETWORKING / TELEPHONE / PA / CCTV SYSTEM CONDUITS

Separate conduits shall be provided for each wiring/cabling.

Conduits shall be laid from the communication room/shaft to respective outlet box, made of 1.6mm Zinc passivated CRCA sheet steel and of size 100x100x50mm.

The height of the telephone/data outlet box shall be as per the drawings/or directed by the Engineer.

The outlet box shall be covered with 3 mm thick hylam sheet of approved colour on which the telephone/data socket pin will be fixed.

The covers of outlet box shall be provided with designation label with inscription “Telephone/Data” as the case may be.

The label tags shall be engraved plastic type with white lettering on black background. The size of the labels shall not exceed 60 x 20mm.

8. TESTING

8.1 Routine tests as per relevant Indian Standards shall be conducted on switchboards and other parts of the installation.

Any tests required to be done in response to the requirement of statutory authorities shall also be carried out.

Six copies of test certificates shall be submitted to the Engineer.

The following tests shall be carried out by the Contractor at site in the presence of the Engineer:

Insulation resistance tests

Continuity tests

Polarity test of switches.

10. ABBREVIATIONS

The abbreviations mentioned below, wherever they appear in the Specifications and Bill of Quantities or elsewhere shall have the meaning or implication thereby assigned to them.

Abbreviation	Meaning	Abbreviation	Meaning
%	Percent	M.S. / MS	Mild Steel
°C	Degrees Celsius	mm	Millimetre
A	Ampere	MSB	Main switch board
AC	Alternating current / air conditioning	MVA	Mega volt ampere
BIS	Bureau of Indian Standards	OD	Outer dimension
C.I. / CI	Cast Iron	P.C.C. / PCC	Plain Cement Concrete
CEIG	Chief Electrical Inspector to Government	PVC	Polyvinyl chloride
Cm	Centimetre	R.C.C. / RCC	Reinforced Cement Concrete
CPCB	Central Pollution Control Board	Rm / RM	Running metre or Linear metre
CRCA	Cold rolled cold annealed	RMC	Ready-mixed concrete
cu.m.	Cubic metre	RR	Random rubble
Dia	Diameter	Rs.	Rupees
ELCB	Earth Leakage Circuit breaker	Specification	Technical Specification
etc.	Etcetera	sq.mm.	Square millimetre
ø	Diameter	SS	Stainless steel
G.I. / GI	Galvanised Iron	SWG / G	Gauge
kV	Kilo volt	V	Volts
m or M	Metre	IE	Indian Electricity
HRC	High rupture capacity	IP	Ingress protection
Hz	Hertz	IS	Indian Standards

11. MATERIALS FOR POINT WIRING

The following “Point Wiring Chart” indicates the scope of materials to be covered in point wiring supply and installation:

11. MATERIALS FOR POINT WIRING

11.1 The following “Point Wiring Chart” indicates the scope of materials to be covered in point wiring supply and installation:

Sl. no.	Description	Fluorescent luminaire	Wall mounting luminaire	Ceiling mounting luminaire	Bulkhead luminaire	Ceiling Fan with regulator	6A Socket dependent / independent	16A socket independent	Wall-mounting fan & exhaust fan
	Legend : ✓ Included X Not included								
1	Switch / socket box.	✓	✓	✓	✓	✓	✓	✓	✓
2	6 / 16 Amps flush type switches.	✓	✓	✓	✓	✓	✓	✓	✓
3	Ceiling roses (three pin connectors).	✓	✓	✓	✓	✓	X	X	✓
4	Universal type socket, 6 Amps, 5-pin.	X	X	X	X	X	✓	X	X
5	Universal type socket, 16 Amps, 5-pin.	X	X	X	X	X	X	✓	X
6	1.5 sq.mm. PVC insulated FRLS multistranded copper wire three runs (phase, earth & neutral).	✓	✓	✓	✓	✓	X	X	✓
7	2.5 sq.mm. PVC insulated FRLS multistranded copper wire two runs (phase & neutral) and 1.5 sq.mm. PVC insulated FRLS multistranded copper wire one run (earth)	X	X	X	X	X	✓	X	X
8	4 sq.mm. PVC insulated FRLS multistranded copper wire two runs (phase & neutral) and 2.5 sq.mm. PVC insulated FRLS multistranded copper wire one run (earth)	X	X	X	X	X	X	✓	X
9	Bakelite connectors, crimping type ferrules copper lugs, draw boxes, and cover plates (3mm thick hylam sheet of approved colour shade), brass cup washers, and brass screws.	✓	✓	✓	✓	✓	✓	✓	✓
10	Fan hook with boxes & round sheet	X	X	X	X	✓	X	X	X
11	Conduits.	✓	✓	✓	✓	✓	✓	✓	✓
12	Batten holder.	X	X	✓	X	X	X	X	X
13	Angle holder.	X	✓	X	X	X	X	X	X
14	Ceiling / wall plate	✓	✓	✓	✓	X	X	X	✓
15	Ceiling rose (with three-way connector)	✓	✓	✓	✓	✓	X	X	✓
16	Conduits & Junction boxes	✓	✓	✓	✓	✓	✓	✓	✓
17	2M Stepped regulator	X	X	X	X	✓	X	X	X

Proposed Interior work for Incent LGD at IITM Research park, Chennai

1.0 TECHNICAL SPECIFICATIONS:

1.1 SCOPE

The scope of this section comprises the supply, erection testing and commissioning of Variable Refrigerant Flow System conforming to these specifications and in accordance with the requirements of Drawing and Schedule of Quantities.

1.2 TYPE

Units shall be air cooled, variable refrigerant volume air conditioner consisting of one outdoor unit and multiple indoor units. Each indoor units shall have the capability to cool or heat independently for the requirement of the rooms.

The indoor units on any circuit can be of different type and also controlled individually. Following type of indoor units shall be connected to the system:

Ceiling mounted cassette type (Multi flow)
Ceiling mounted High static Duct type
Wall mounted hiwall type

Compressor installed in each modular outdoor unit shall be equipped with multi inverter compressors for higher reliability, improved life, better backup and duty cycling purpose. The system shall be capable of changing the rotating speed of inverter compressor by inverter controller to follow variations in cooling and heating load.

Outdoor unit shall be suitable for mix match connection of all type of indoor units.

The refrigerant piping between indoor units and outdoor unit shall be possible to extend up to 175m with maximum 50m level difference without any oil traps.

Both indoor units and outdoor unit shall be factory assembled, tested and filled with first charge of refrigerant before delivering at site.

1.3 OUTDOOR UNIT

The outdoor unit shall be factory assembled, weather proof casing, constructed from heavy gauge mild steel panels and coated with baked enamel finish. The unit should be completely factory wired, tested with all necessary controls:

Each modular inverter outdoor shall be DC twin rotary compressor/ Scroll.

In case of modular outdoor units, the outdoor unit shall have at least 1 inverter compressor so arranged that the operation is not disrupted with failure of any inverter compressor and if one inverter compressor malfunctions, other continues to provide emergency operation smoothly till repair is effected.

It should also be provided with duty cycling for multiple inverter compressor switching starting sequence for better stability and prolonging equipment life.

The outdoor unit shall be modular in design and should be allowed for side-by-side installation.

The unit shall be provided with its own microprocessor control panel.

The outdoor units should have anti-corrosion paint free base plate for easy mounting of unit.

The machine must have a sub cool feature to use coil surface more effectively thru proper circuit/bridge so that it prevents the flushing of refrigerant from long piping due to this effect thereby achieving energy savings.

The outdoor unit should be fitted with low noise, aero spiral design fan with aero fitting grill for spiral discharge airflow to reduce pressure loss and should be fitted with DC fan motor inverter type for better efficiency.

The condensing unit shall be designed to operate safely when connected to multiple fan coil units.

1.4 COMPRESSOR

The compressor shall be highly efficient Rotary/ Scroll type and capable of inverter control. The inverter compressor shall change the speed in accordance to the variation in cooling or heating load requirement:

All outdoor units shall have multiple steps of capacity control to meet load fluctuation and indoor unit individual control. All parts of compressor shall be sufficiently lubricated stock. Forced lubrication may also be employed.

Oil heater shall be provided in the compressor casing.

1.5 HEAT EXCHANGER

The heat exchanger shall be constructed with copper tubes mechanically bonded to aluminum fins to form a cross fin coil.

The aluminum fins shall be covered by suitable anti-corrosion resin film.

The unit shall be with e-pass heat exchanger to optimize the path of heat exchanger and for better efficiency of condenser.
The unit shall be provided with necessary number of direct driven low noise level propeller type fans arranged for vertical discharge. Each fan shall have a safety guard.

1.6 REFRIGERANT CIRCUIT

The refrigerant circuit shall include liquid & gas shut-off valves and a solenoid valves at condenser end.
The equipment must have in built refrigerant stabilization control for proper refrigerant distribution.

All necessary safety devices shall be provided to ensure the safely operation of the system.

Refrigerant shall be R410a or R 407.

1.7 SAFETY DEVICES

All necessary safety devices shall be provided to ensure safe operation of the system. Minimum requirements shall be high-pressure switch, fuse, fan drive overload protector, fusible plug, over load relay, overload protection for inverter.

1.8 OIL RECOVERY SYSTEM

Unit shall be equipped with an oil recovery system to ensure stable operation with long refrigeration piping lengths.

The system shall be provided with oil balancing circuit to avoid poor lubrication.

1.9 INDOOR UNIT

This section deals with supply, installation, testing, commissioning of various type of indoor units confirming to general specification and suitable for the duty selected. The type, capacity and size of indoor units shall be as specified in detailed Bill Of Quantities

GENERAL

Indoor units shall be either ceiling mounted cassette type, or ceiling mounted ductable type or floor standing type or wall mounted type or other as specified in BOQ. Each unit shall have electronic control valve to control refrigerant flow rate respond to load variations of the room.

The address of the indoor unit shall be set automatically in case of individual and group control.

In case of centralized control, it shall be set by remote controller

The fan shall be dual suction, aerodynamically designed turbo, multi blade type, statically & dynamically balanced to ensure low noise and vibration free operation of the system. The fan shall be direct driven type, mounted directly on motor shaft having supported from housing.

The cooling coil shall be made out of seamless copper tubes and have continuous aluminum fins. The fins shall be spaced by collars forming an integral part. The tubes shall be staggered in the direction of airflow. The tubes shall be hydraulically/ mechanically expanded for minimum thermal contact resistance with fins. Each coils shall be factory tested at 21kg/sqm air pressure under water.

Unit shall have cleanable type filter fixed to an integrally moulded plastic/ Aluminium frame. The filter shall be easily serviceable.

Each indoor unit shall have computerized PID control for maintaining design room temperature. Each unit shall be provided with microprocessor thermostat for cooling and heating.

Each unit shall be with wired LCD type remote controller. The remote controller shall memorize the latest malfunction code for easy maintenance. The controller shall have self-diagnostic features for easy and quick maintenance and service. The controller shall be able to change fan speed and angle of swing flap individually as per requirement.

CEILING MOUNTED CASSETTE TYPE UNIT (MULTI FLOW TYPE)

The unit shall be ceiling mounted type. The unit shall include pre-filter, fan section and DX-coil section. The housing of the unit shall be powder coated galvanized steel. The body shall be light in weight and shall be able to suspend from four corners. The fan shall be aerodynamically designed diffuser turbo fan type.

Unit shall have an external attractive panel for supply and return air. Unit shall have four way supply air grilles on sides and return air grille in center.

Each unit shall have high lift drain pump, fresh air intake provision (if specified) Low gas detection system and very low operating sound.

All the indoor units regardless of their difference in capacity should have same decorative panel size for harmonious aesthetic point of view. It should have provision of connecting branch ducts.

CEILING MOIUNTED DUCTABLE TYPE UNIT

Unit shall be suitable for ceiling mounted type. The unit shall include pre filter, fan section & DX coil section .The housing of unit shall be light weight powder coated galvanized steel. The unit shall have high static fan for Ductable arrangement.

CEILING SUSPENDED TYPE

Unit shall be suitable for ceiling suspended arrangement below false ceiling.

The unit include pre filter, fan section & DX coil section. The housing of unit shall be light weight powder coated galvanized steel.

Unit shall have an attractive external casing for supply and return air.

CENTRALIZED TYPE REMOTE CONTROLLER

(Option if specified in BOQ)

A multifunctional compact centralized controller shall be provided with the system.

It shall be able to control up to 64 groups of indoor units with the following functions: -

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

Temperature settling for each indoor unit or zone.

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

Monitoring of operation status such as operation mode & temperature setting of individual indoor units, maintenance information, trouble shooting information.

Display of air conditioner operation history.

Daily management automation through yearly schedule function with possibility of various schedules.

The controller shall have wide screen user-friendly display and can be wired by a non polar 2 wire transmission cable to a distance of 1 km. away from indoor unit.

1.10 REFRIGERANT PIPING:

All refrigerant piping system shall be seamless copper pipe 18 gauge up to 19.1 mm and hard drawn copper pipe of 1 mm wall thickness beyond 19.1 mm. All fittings shall be copper. The piping shall be carried out following good engineering practice, and shall be neatly and adequately supported at intervals not exceeding 2500 mm.

The bends shall be preferably of long radius bends.
The piping shall be complete with charging connections, suction line insulation, and all other items reasonably considered necessary.
Before joining any piping, the internals shall be thoroughly cleaned, by passing a cloth by means of a cable or wire, through the entire length. The piping shall be continuously kept clean during erection. After the joints are constructed, the entire system shall be blown with dry nitrogen.
The refrigerant piping shall be subjected to a pressure testing to a pressure of 21 Kg/ sqcm (Liquid Line) and to a pressure of 10 Kg/ sqcm (suction line). Pressure shall be maintained in the system for not less than 24 hours.
After the pressure testing and before the gas charging, the system shall be evacuated to a pressure of 700 mm of Mercury and held for 4 hours.
The piping quantities indicated in the Schedule are only approximate and for the purpose or proper evaluation of the tenders. It will be the responsibility of the tenderer to design the entire piping system, utilizing only those piping indicated under the Schedule.
All pipng supports shall be adequately designed and shall have anchor fasteners, vibration isolators etc.
Elastomatic Nitrile rubber insulation of 19mm thickness shall be provided for the refrigerant lines. To protect this insulation, the same shall be covered with poly shield coating with at least two coats of resin and hardener. Fibreglass tape shall be helically wound over this and further shall have two coats of finish resin for smooth finish.
Drainpipes shall be with suitably sized PVC pipes and insulated with 6 mm thick Elastomatic Nitrile Rubber.
U traps, wherever required, shall be provided for the drainpipe.

1.11 DUCTING:

The ducting shall be of galvanized sheet steel with zinc coating as per class 8.Thickness of the sheet shall be as under:

Rectangular duct upto 750mm	24 gauge
Rectangular duct 751 to 1250mm	22 gauge
Rectangular duct 1251 to 2400mm	20 gauge
Rectangular duct above 2401 mm	18 gauge

ERECTION REQUIREMENTS:

All ducts shall be fabricated and installed in workman like manner, generally conforming to the relevant ISI codes.

Ducts shall be straight and smooth on the inside with neatly finished joints. Joints shall be made air-tight.

Changes in dimensions and shape of ducts shall be gradual. Curved elbows shall have a centre line radius equal to one and a half times the width of the duct. Air turns shall be installed with vanes, arranged to permit the air to make the turn without appreciable turbulence.

All ducts shall be rigid and shall be adequately supported and braced where required with standing seams, tees or angles, of ample size to keep the ducts true to shape and to prevent buckling, vibration and breaking. Ducts upto 610mm width shall have a minimum of 40x3mm angle support and ducts larger than this shall have 50x6mm angle support.

All branch takeoffs and collars shall be provided with turning vanes.

All necessary allowances and provisions shall be made by the contractor for beams, or other obstructions in the building, whether or not the same are shown on the drawings. Where necessary to avoid beams or

other structural work, plumbing or other pipes and or conduits, the ducts shall be transformed, divided or curved to one side, the required area being maintained, all as per the site requirements.

If a duct cannot be run as shown on the drawings, the contractor shall install the duct between the required points in accordance with other services and as per approval of the Engineer.

All duct work shall be independently supported from building construction. All horizontal ducts shall be rigidly and securely supported, in an approved manner, with trapeze hangers formed of MS rods of 10mm at every 2.5 meter centres. All vertical duct work shall be supported by structural members at each floor level.

The ducts shall not be supported from false ceiling hangers or be permitted to rest on false ceiling.

All ducts shall be totally free from vibration under all conditions of operation. Whenever duct work is connected to fans, air handling units or blower coil units that may cause vibrations in the ducts, ducts shall be provided with flexible connections, located close to the unit. Unit connections shall be constructed of fire resistant flexible double canvas connection of minimum 150mm long securely bonded and bolted on both sides. Sleeve shall be made smooth and the connecting duct work rigidly held by independent supports on both ends. The flexible connection shall be suitable for pressures at the point of installation.

All plenums at the outlet of the unit shall be constructed of 18G GI sheet with suitable angle bracings, inspection doors etc.

All scaffolding required for erection/ testing of pipelines shall be arranged by the contractor at his cost.

1.12 FIRE DAMPERS

a. All supply air ducts at air handling unit room shall be provided with approved fire dampers of at least 1.5 hours fire rating.

b. Fire damper blades shall be one piece folded high strength galvanized steel construction. In normal position these blades shall be gathered and stacked at the frame head providing maximum air passage and preventing passing air currents from creating noise or chatter. The blades shall be held in position through a fusible link to close in case of fire. A potential free contact shall be provided in the fire panel of each floor by the fire alarm vendor. The AC contractor shall wire this to the AHU motor starter to trip the same in case of fire.

c. Each fire damper shall be tested after installation to ensure closing on actuation of the connected fire alarm system.

The fire damper frames shall be of 18 gauge GI and the blades of 22 gauge GI.

1.13 INSULATION:

THERMAL INSULATION OF PIPE:

a. All the pipes and equipment, operating at temperatures lower than the ambient shall be insulated in the manner specified.

b. Insulation of 50 mm thick TF quality thermocole with 26 G Aluminium cladding will be provided for the piping in the plant room and other open, visible areas and 50 mm thick TF quality thermocole insulation with cement plastering will be provided for the piping in the shafts and over the false ceiling.

c. The method of insulation is as under:

Clean the surface to be insulated.
Apply 2 coats of non-flammable cold adhesive as specified by the manufacturer.
Fix the insulation of the specified thickness over the surface of the pipe tightly.
Seal all the joints of the insulation with cold bitumen.
Cover the above with jute hessian cloth.
Fix 22 G GI wire netting over the hessian.
Apply two layers of sand cement plaster of 12mm total thickness / cladding with 26 G aluminium over the insulation.

THERMAL INSULATION OF DUCT:

The tail end duct shall be insulated in the following manner.

a. The insulation material for the ducting shall be 12mm Nitrile rubber material, laminated with Aluminium foil.

b. The method of insulation is as under:
Clean the surface to be insulated.
Apply one coat of primer paint.
Fix the insulation of the specified thickness over the surface of the duct tightly.
Seal all the joints with 75mm wide PVC tapes.

ACOUSTIC INSULATION OF DUCT:

The first 3 M of the ducting from the unit outlet shall be acoustically insulated in the following manner:

Armasound or equivalent material rigid board of 12 mm thick is to be secured on the inside of the duct through GI bolts, GI nuts and GI washers.
The insulation shall be covered with tissue paper.
Finally, 26 G perforated Aluminium sheet shall be provided over the tissue paper.

HVAC

1.0 CONDITIONS OF TENDER

SALIENT COMMERCIAL POINTS:

The contract completion time will be six (6) months from the date of release of the order.
The standard terms of payment shall be 80% against prorate delivery of materials, 10% against prorate erection and final 10% after completion against the submission of bank guarantee for 5% valid for a period of 1 year from the date of completion.
The standard terms of payment shall be followed.
The period of payment of interim bills will be a maximum of 15 days of presentation of the bill.
The successful bidder shall enter into an agreement as per the format, within 15 days of receipt of order.
Only proven equipment and working satisfactorily for the last 3 years shall be offered.
All the equipment including the chillers shall have 18 months guarantee from the date of handing over.
All the twochillers shall be factory tested as per ARI/ AHRI and shall be witnessed by the purchasers Engineers (2 persons). All the charges including transportation from Chennai to the place of manufacture and accommodation charges shall be included in the offer.
AMC rates for 5(Subsequent years) after the guarantee period shall also be indicated.

1.1 SIGNATURES:

In the event of the tender being submitted by a firm, it must be signed separately by each member thereof, or in the event of the absence of any partner, it must be signed on his behalf by a person holding a power of Attorney the copy of which shall be produced with the tender and it must disclose that the firm is registered under the Indian Partnership Act.

Each and every signature given shall be separately witnessed. A contract or contractors who himself/themselves has/have tendered or who may tender for the same work shall not witness the tender of another person for the work. Failure to observe this condition would render tenders of the contractors tendering as well as witnessing the tenders liable for summary rejection.

QUOTING RATES:

The tenderer must quote his rates only on the proper form of tender, both in figures and words, both in decimal coinage, in the respective spaces provided therefor. The amount for each item should be worked out in figures only for the probable quantities specified in the bills of quantities but the requisite totals given both in figures and words.

Special care is to be taken to write the rates in figures and words in such a way that no interpolation is possible. Erasures and alterations must be avoided, but if errors are made while pricing the bills of quantities, the wrong figures and words must be neatly scored out under the initials of the tenderer and the correct figures and words neatly rewritten but not overwritten. Overwriting is not permitted and may entail rejection of the tender.

RATES IN FIGURES & WORDS:

In the case of figures, the word 'Rs.' Should be written before the figures of 'rupees' and paise should be eliminated by rounding to the nearest rupee; in the case of words the word "Rupees" should similarly precede closely, following each rate and each amount. 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'. It should invariably be upto two decimal places.

ERRORS:

Errors in the bills of quantities shall be dealt with in the following manner:

In the event of discrepancy between the rates quoted in words and the rates in figures the former shall prevail.

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 net rate shall be regarded as firm and extension shall be amended on the basis of the rates.

All errors in totaling in the amount column and in carrying forward the total shall be corrected.

Any omissions to include in the totals shall be corrected.

The bills of quantities are stamped 'original' and 'duplicate'. If there is any discrepancy in the rates, units and amounts between the 'original' and 'duplicate' the figures and words in the original are liable to be taken as correct and the duplicate corrected accordingly.

The tender total shall be accordingly amended except that there shall be no rectification of any errors, omissions or wrong estimate, in the prices inserted by the tenderer in the bills of quantities.

ALTERNATIVE ITEMS:

Where alternative items are included, only the rates in figures and words are to be entered and not the amounts thereof. A tender which does not show the rates in figures and words for the alternative items may be rejected. The Employer reserve to himself the right to take into account any or all of the alternative items for the purpose of accepting a tender or to operate upon any or all of the said alternative items during the execution of the work, partly or fully as required.

QUANTITIES LIABLE TO VARY:

The quantities furnished in the bills of quantities are only probable quantities liable to alteration by omission, deduction or addition, and it should be clearly understood that the contract is not a Lumpsum Contract and the Employer, do not, in any way, assure the tenderer or guarantee that the said probable quantities are correct or that the work would correspond thereto. Payments will be regulated on the actual quantities of supplies made or work done at the accepted rates.

1.7 DRAWINGS, SPECIFICATIONS & BILL OF QUANTITIES:

The drawings, specifications and the bills of quantities, forming parts of the contract, are explanatory of and are complementary to one another, representing together the supplies to be made/ the works/ installations to be carried out.

If neither the drawings nor the specifications nor the accepted bills of quantities include any part/parts the intention to include which is nevertheless clearly to be inferred and which are obviously necessary for the proper execution of the work or the completion of the supplies, all such parts shall be supplied or/;and executed by the contractor at no extra charge.

Anything contained in one or another of (a) the drawings, (b) the specifications and (c) the accepted bills of quantities and not found in the others will be equally binding as if contained in each of them.

TENDERER NOT TO MAKE ALTERATIONS:

No alterations which are made by the tenderer in the drawings, specifications or probable quantities accompanying this notice will be recognized, and if any such alterations are made the tender will be invalid. Remarks or explanations should be set out in a covering letter and will become binding only if specifically accepted in writing by the Employer at the time of acceptance of the tender. Any tender which purports to alter, vary or omit any of the conditions herein is liable to be rejected.

TENDERER TO VISIT SITE/ BEAR COST OF TENDERING:

The tenderer must obtain for himself on his own responsibility and at his own expense all the information necessary including risks, contingencies and other circumstances to enable him to make a proper tender and to enter into a contract with the Employer. He must examine the drawings, specifications, conditions and so on and must inspect the site of work and the works in progress and acquaint himself with local conditions, means of access to the work, the nature of the work, in fact all matters pertaining thereto before he submits his tender.

He shall also take due note of the stipulation, if any, made in the bills of quantities for rebate to be given by him/recovery to be made in his bills towards works done already by other agency and quote his rates for the work to be done (by him) accordingly.

The tenderer shall also bear all expense in connection with the preparation and submission of his tender.

Omission, neglect or failure on the part of the tenderer to so obtain requisite and reliable information on any matter affecting his tender, the contract and the construction, completion and maintenance (during defects liability period) of the work shall not relieve the tenderer whose tender is accepted from any liability in respect of the contract.

The tenderer whose tender is accepted shall not be entitled to make any claim for increase in the rates quoted and accepted except in pursuance of any specific provision in the contract for such and then only in terms of that specific provision, or to make any representation on the ground that he was supplied with any information or given any promise or guarantee of any sort, by the Employer, his agents and servants, the Consultant or their representatives or any other persons, unless such information, promise or guarantee is furnished to the tenderer in advance of the date of receipt of tenders and in writing under proper authority.

INFORMATIONS TO BE FURNISHED BY THE TENDERER:

The tenderer shall submit with his tender a list of large works of a like nature executed by him with details of magnitude and cost, the agencies for whom the works were carried out, the time taken to complete such works and such other information to enable the employer to assess his financial and technical capabilities and shall also specify in the appropriate column of the "List of approved makes of equipment/ plant and statement of makes offered by the tenderer", the makes for which he quotes, attaching wherever necessary samples/illustrations/descriptive literature to enable the Employer to truly assess his tender.

1.11 TENDERER TO FURNISH DETAILS OF LICENCES ETC:

The tenderer shall furnish details of licenses /certificates granted to him and/or to professionally qualified and/or licensed technical personnel/workmen on his staff who will be engaged on the work (and submit, if called for the licenses /certificates for inspection by the Consultant/Employer).

TENDER TO COVER ALL COSTS/ CONTINGENCIES:

The tender must be complete in itself, properly worked out to cover all the contractor's obligations under the contract and all matters and things necessary for the proper completion of the work, and the rates quoted therein must be correct and sufficient to cover the contractors' costs, overheads and profits etc., completely for the individual items of work including cost for all necessary materials and labour unless specified otherwise, incidental charges, for such as but not limited to water, electric power, tools, plant, machinery, testing apparatus, scaffolding, sheds if necessary, making, aligning, access to site, clearing site etc., taxes, excise or any other such tax or duty levied by Govt., Central or Local or Local Authority, Octroi, etc. if and as applicable, Insurances against loss or damage by fire, theft, or other usual risks till the work is completed in all respects according to the true meaning and intent of the contract and delivered up.
Electricity consumed shall be metered and the cost specified by the employer to be born by the contractor.

1.13 CURRENT RATES OF LEVIES TO BE SPELT OUT:

Where taxes, duties, etc. are declared as not included in the rates, or stated to be extra as applicable the tenderer shall state in his tender the current levies and the elements in his prices on which such levies are chargeable, failing which the tender will be deemed to be incomplete and subject to rejection.

NO VARIATION/ ESCALATION TO QUOTED RATES:

The rates shall be firm and not subject to any variations in prices of components, basic material exchange rates, taxes, duties, etc. railway freight and the like, labour rates, etc. The rates are not subject to escalation otherwise than as specifically provided for in the contract.

TENDER VALIDITY:

The tenders submitted shall remain open for acceptance for a period of 3 months from the date of their opening. Should any tenderer withdraw his tender before the expiry of the said period or makes any modifications to his tender which are not acceptable to the Employer the tender will be treated as having been rejected or abandoned.

RIGHTS OF EMPLOYER:

The Employer does not bind himself to accept the lowest tender and reserves to himself the right to reject any or all of the tenders received without the assignment of any reason thereof.

The Employer further reserves the right to delete or reduce any item or section of the bills of quantities without assigning any reason therefor, or split up the work into convenient parts and award the split up portions to different tenderers and the rates quoted and the terms and conditions shall hold good as if the full work as tendered for was awarded to the tenderer and no claim will be admissible in this regard.

FORMAL AGREEMENT:

The tenderer whose tender is accepted will be required to execute a formal agreement with the Employer, but his liability under the contract shall commence from the date of written order to commence work. The contractor shall bear all expenses in connection with the execution of the said agreement including fees for stamping and registering of documents as required. Failure to execute the agreement as required will entail refusal by the Consultant of certificates for payment.

1.18 NO INTEREST ON EMD/SD:

Wherever applicable, Earnest money/Retention Money will bear no interest whatsoever until the date of their release.

1.19 COMPENSATION DEDUCTABLE FROM DEPOSITS:

All compensations or other sums of money payable by the contractor to the Employer under the terms of contract may be deducted from the EMD and the Security Deposit if the amounts so permit and the contractor shall, unless such deposit has become payable otherwise, within 10 days after such deduction, make good in cash the amount so deducted.

1.20 WORKING DRAWINGS:

The successful tenderer, within two weeks of the award of the work to him shall submit to the Employer he working drawings necessary for the proper execution of the work, conforming to the specifications for approval. The work shall be carried out strictly in accordance with the approved drawings and specifications.

1.21 TIME BOUND PROGRAMME:

The tenderer shall submit to the Consultant, a time bound program in the form of a chart or otherwise for completion of the work in accordance with the contract and the work shall be carried out strictly according to the approved program which will form part of the agreement and be the basis for assessment of progress under the relevant conditions of contract.

1.22 EMPLOYERS ROLE:

The work will be carried out under the directions and supervision of and subject to the approval in all respects by the Consultant/ Employer.

1.23 DRAWINGS/DOCUMENTS APPROVAL:

The Contractor shall, if and where necessary at his own cost prepare the necessary drawings and submit them for and obtain the approval of the CEIG or CEA or other appropriate State Authority, as applicable to the Electrical Installation executed under this contract. Any fees or charges paid to Govt. of such other Authority by the contractor on behalf of the Employer will be reimbursed to him (contractor) on production of necessary proof of payment. The contractor shall also go through the necessary formalities and follow up with the CEIG or CEA or the other appropriate State Authority in the matter of obtaining approval of drawings, inspections and safety certificate, service connection to the new/additional installations to enable the Employer to use the installation as soon it is taken over by him.

1.24 FINAL DRAWINGS & CERTIFICATES:

On completion of the work the contractor shall furnish four sets of wiring diagrams and of complete layout as executed in the installation. He shall also furnish a completion and test certificate and guarantee certificate. The Consultant will be not issue the final certificate unless the provisions of this clause have been compiled with.

1.25 CONTRACTORS REPRESENTATIVE:

On acceptance of the tender the contractor shall in writing and at once inform the Employer and the Consultant the names of his accredited representative (s) who will be responsible to take instructions from the Consultant /Employer.

1.26 ASSIGNING WORKS:

The work or any part of it shall not be transferred, assigned or sublet without the written consent of the Employer.

1.27 OTHER AGENCIES WORK:

The contractor shall be required to co-operate and work in co-ordination with and afford reasonable facilities for such other agencies/specialists as are/may be employed by the Employer on other works/sub-works in connection with project/scheme of which this work forms part and in this connection it shall be deemed that the contractor had prior to tendering inspected the premises/site/work and taken all circumstances into consideration.

1.28 WORK TO BE INSURED:

The contractor will be required to insure the work and keep it insured until one month after the date of taking over the work/installation by the Employer, or otherwise in terms of the contract against loss or damage by fire and other usual risks other than risks excepted in terms of the Contract, with an insurer whose name is to be approved by the Employer.

1.29 ACTS OF GOVERNMENT:

The contractor is required to comply with all Acts of Govt. relating to labour and the Rules and Regulations made there under form time to time and to submit at the proper times all particulars and statements required to be furnished to the Labour Authorities.

1.30 SAFETY CODES:

In carrying out the work the contractor shall strictly comply with the provisions of the Safety code generally as under:

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First aid appliances including adequate supply of sterilized dressing and cotton wool shall be maintained in a readily accessable location.

The injured person shall be taken to a Public Hospital without loss of time, incases where the injury necessitates hospitalization.

Suitable and strong scaffolds should be provided for workmen for all works that cannot safely be done from ground.

No portable single ladder shall be over 8 metres in length. The width between the side rails shall not be less than 30cm (clear) and the distance between two adjacent rungs not more than 30cm. When a ladder is used an extra helper shall be engaged for holding the ladder.

Excavated material shall not be placed within 1.5 meters of the edge of the trench or half of the depth of trench whichever is more. All trenches and excavations shall be provided with necessary fencing and lighting.

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 the minimum height of which shall be one meter.

No floor, roof or other part of the structure shall be so loaded with debris or materials as to render it unsafe.

Workers employed on handling hazardous material shall be provided with protective footwear and rubber hand gloves.

Those engaged in welding works shall be provided with welder's protective eye shields and gloves.

No paint containing lead or lead products shall be used except in the form of paste or readymade paint.

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

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

Hoisting machines and tackle used in the works, including their attachments, anchorage and supports shall be maintained in perfect condition.

Ropes used in hoisting or lowering material or as a means of suspension shall be of durable quality and of adequate strength and free from defects.

2.0 CONDITIONS OF CONTRACT:

2.1 INTERPRETATION OF CLAUSES :

In construing these conditions, the specifications, 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.

Headings and marginal notes to the conditions of contract shall not be deemed to form part thereof or be taken into consideration in the interpretation or construction thereof or of the contract.

Where the context so requires (i) words importing persons include firms and corporations and (ii) words importing the singular only also include in plural and vice versa.

Employer shall mean INCENT.

Consultant shall mean PADGRO Consultants, Chennai

c) Contractor shall mean ---------- and include his/their legal representatives, permitted assigns, or successors.

Site shall mean the land and /or other places, on into or through which work is to be executed under the contract or an adjacent land, path or street through which work is to be executed under the contract or any adjacent land, path or street which may be allotted for use for the purpose of carrying out the contract.

The contract or this contract shall mean the Tender Documents comprising the notice inviting tender, form of tender, the conditions of tender, the drawings, and priced bills of quantities with their preambles, the acceptance thereof, and the articles of agreement, together with its appendix and special conditions, designs drawings and instructions issued from time to time by the Consultant and all these documents taken together are deemed to form one contract and shall be complementary to the another.

Bills of Quantities variously also termed priced bills of quantities, 'schedule of quantities', 'schedule of rates' shall mean the schedule of quantities originally furnished with the notice inviting tender, duly priced in by the tenderer and accepted by the Employer for inclusion as a part of the contract for determining the consideration payable to the contractor for executing the work and as part of the contract agreement it is also referred to as the contract schedule.

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 to the 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

Act of Insolvency shall mean any Act of Insolvency as defined by the Presidency Towns Insolvency Act, or the provincial Insolvency Act or any act amending such original.

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 the price of that item a similar percentage or proportionate sum provided always that in determining the percentage or proportion of the sum so added or deducted by the contractor, the total 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.

The works (or the work) shall unless there be something either in the subject or context repugnant to such construction, be considered and taken to mean the works by virtue of the contract contracted to be executed whether temporary or permanent, and whether original, altered, substituted or additional. Wherever the word "Work" is used it shall cover "installation" also under the same definition

Excepted risks are risks due to riots (otherwise than among contractor's Employees) and civil commotion (in so far as both these are uninsurable), war (whether declared or not), invasion, act of foreign enemies, civil war, rebellion, revolution, insurrection, military or usurped power, any acts of Government, damage from air craft, acts of God such as earthquake, lightning, unprecedented floods and other causes over which the contractor has no control and accepted as such by the employer or causes solely to use or occupation in a manner for which the works/installations were not designed, by Employer of the said works/installations in respect of which certificate of completion has been issued or a cause solely due to faulty design of works.

Provisional items shall mean items for which only very approximate quantities have been included in the tender documents.

Virtual completion of works/ installations shall mean the substantial completion of the works/installations in accordance with the contract enabling the Employer to take over the same.

2.2 EMPLOYER'S INSTRUCTIONS:

The contractor shall execute the whole and every part of the work in the most substantial and workmanlike manner and both as regards materials and otherwise in every respect. In strict accordance with the specifications, conforming exactly, fully and faithfully to the designs, drawings and instructions in respect of the work given by the Employer and under the directions of and under the supervision of the subject to the approval in all respects by the Employer who may in their discretion and from time to time issue further drawings, and/or written instructions, directions and/or written instructions, details and explanations which are hereafter collectively referred to as "Employer's Instructions", with regard to:

Variation or modification of the design including structural design, including structural design, quality or quantity of works or the addition or omission of any work.
Any discrepancy in the drawings or between the schedule or quantities and/or drawings and/or drawings and /or specifications.
The removal from the site of any materials brought thereon by the contractor and the substitution of any other materials thereof.
The dismissal from the works of any persons employed thereupon.
The opening up for inspection of any work covered up.
The amending and making good of any defects.
The removal and/or re execution of any works executed by the contractors, on account of defects.

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

2.3 MANNER OF EXECUTION OF WORK:

The Employer shall be entitled to direct at what point or points and in what manner the works are to be commenced, and form time to time carried on.

VARIATION IN QUANTITY:

All requisitions for variations or matter concerning drawings specifications, and schedule of quantities or additional instructions or detailed drawings should be placed by the Contractor with the Employer at least 10 days in advance of the dates by which such are required by the Contractor for commencing (their) implementation.

AGREEMENT:

The contract shall remain in the custody of the Employer and shall be produced by him at his office as and when required by the Employer of the Contractor. The Contractor on the signing hereof shall be furnished by the Employer free of cost with a certified copy of the agreement and one copy of each of the said drawings issued during the progress of the works. Any further copies of such drawings required by the Contractor shall be paid for by him. The contractor shall keep one copy each of all drawings on the works and the Employer or

his authorized representative shall at all reasonable times have access to the same. Before the issue of the final certificate to the Contractor he shall, if so required, forthwith return to the Employer all drawings and specification.

SCOPE OF THE CONTRACTOR:

The Contractor shall be deemed to have satisfied himself before tendering as to the correctness and sufficiency of his tender for the works and of the rates and amounts stated in the schedule of quantities and/ or the schedule of rates and amounts which rates and amounts shall except as otherwise provided cover all his obligations under the contract, and all matters and things necessary for the proper completion of the works.

The contractor shall provide at his own cost all materials (except such materials if any, may in accordance with the contract supplied by the Employer), machinery, plant, tools, appliances, implements, ladders, cordage, tackle, scaffolding, temporary works including access roads, etc. together with carriage thereof to and from the site, in fact everything necessary or proper for the proper execution of the work, whether original, altered or substituted according to the true intent and meaning of the drawings, schedule of quantities and specifications, original or substituted taken together whether the same may or may not be particularly shown or described therein provided that the same may be reasonably inferred there from, and if the contractor finds any discrepancy in the drawings, or between the drawings, schedule of quantities and the specifications, he shall immediately and in writing refer to the Employer who shall decide which is to be followed.

CONTRACTOR'S SITE OFFICE

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.

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 termite, ants, and other insects. The Contractor shall provide at his own cost all artificial light required for the work.

PROTECTIVE MEASURES:

The Contractor from the time he is 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. Contractor shall indemnify the Employer against any possible damage to the building, roads, or member of the public in the course of execution of the work. The contractor shall provide necessary temporary enclosures, gates, entrances, etc. for the protection of the work and materials, and for altering and adopting the same as may be required, removing on completion of the works and making good all works disturbed.

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 tools and materials of sub-contractors and remove the same on completion. Sheds for storage of cement are to have regular floor raised above the ground.

2.10 CONFORMING TO LOCAL REGULATIONS:

The contractor shall conform to the provisions of any Act of the Legislature relating to the works and to the Regulations and Bye-laws of any Authority and of any water, lighting and other companies and/ or Authorities with whose systems the structure is proposed to be connected, and shall, before making any variations from the drawings or specifications that may be necessitated by so conforming, give to the Employer written notice, specifying the variation proposed to be made and the reason for it, and apply for instructions thereon. In case the contractor shall not within ten days receive such instructions he shall proceed with the work, conforming to the provisions, Regulations, or bye-laws in question and any variation so necessitated shall be dealt with under relevant clauses elsewhere in this specifications.

The Contractor shall bring to the attention of the Employer all notices required by the said Acts, regulations or bye-laws 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 works and lodge the receipts with the Employer.

The Contractor shall indemnify the Employer against all claims in respect of patent rights and shall defend all actions arising from such claims and shall himself pay all royalties, license fees, damages, cost and charges of all and every sort that may legitimately be incurred in respect thereof.

The Employer is entitled to deduct all taxes and rates as per existing laws and rules, from any moneys due or that may become due to the contractor.

The Contractor shall indemnify the Employer from and against all claims, demands, proceedings, damages, costs and expenses which may be brought or made against the Employer or to which it may be put by reason of the Contractor not conforming to or complying with any of the provisions or requirements of any Act or Statute, Central or State, Rules, Regulations, Bye-laws of Local Authorities, Panchayat, Collector or any other Companies relating to or in connection with the works or to Labour or for supply of water, light or other amenities at the site.

2.11 SETTING OUT WORK:

The Contractor shall on the basis of dimensioned drawings and information necessary for the purpose, furnished by the Employer, set out the works on site at his own expense and be responsible for the correctness of the positions, levels, dimensions and alignment of all parts thereof. All benches and datum shall be maintained by the contractor at the site, as long as required by the Employer, for them to check, but the checking of any setting out by the representative of the Employer shall not in any way relieve the contractor of the responsibility for the correctness thereof and he shall amend at his own cost and to the satisfaction of the Consultant any error in the setting out or consequential to wrong setting out, found at any stage during the progress of the work or during the defects liability period after completion of the work.

2.12 MATERIALS & WORKMANSHIP:

All materials and workmanship shall so far as procurable conform strictly to requirements in accordance with the drawings and as 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 Employer furnish proof to his satisfaction that they so conform and if required shall also furnish all invoices, accounts, receipts and other vouchers for the purpose.

In the case of all products which are in the approved lists of the I.S.I., no material will be collected at site which does not bear the I.S.I. mark unless the Institution does not affix its mark on that material.

The Contractor shall place orders for all materials required in time and in any case not later than the dates fixed in the approved program. Where in the matter of procurement of such materials as are collected or the distribution of which is regulated by Government, Central or Local, or by any other Central or Local Authority, the Employer is obliged to issue any certificate or sign applications for license or permit, by virtue of

regulation by such Government or Authority or by Custom or practice, it shall be the sole responsibility of the contractor to arrange for all the formalities to be completed in time and follow up the matter with the concerned Authorities and to procure the materials in time for incorporation in the works/ installations according to the approved program, and the Employer will not assume any responsibility for delays in this regard nor for the payment of fines, penalties, demurrage and so forth due to the contractor not taking timely action in the process of procurement. The contractor shall not raise any plea quoting delays in the completion of the formalities or of delays by the Authorities concerned for any compensation whatsoever.

However, the Contractor shall before he places orders for supply, furnish and produce to the Employer, at his own expense, samples of materials including patented products and those under specific makes, including approved makes proposed to be used in the works, well in time, notwithstanding prior approval by Employer of such products and makes; such prior approval shall not constitute a waiver of the rule regarding approval of samples. In all cases when makers/ manufacturers have test certificates for their goods/articles/products/ processes/equipment, Photostat copies of such certificates shall be produced by the contractor along with the samples.

The Employer will within two weeks of the date of supply of samples or within such further period as it may depending upon each case require intimate to the Contractor whether the samples are approved by him or not. If samples are not approved the Contractor shall forthwith arrange to supply to the Employer for his approval fresh samples complying with the specifications.

The contractor shall indemnify the Employer or any agent, servant or employee of the Employer against any action, claim or proceeding relating to infringement or use of any patent or design or any alleged patent or design rights and shall pay any royalties or other charges which may be payable in respect of any article or material or part thereof included in the contract. In the event of any claims being made on or action being brought against the Employer or any agent, servant or employee of the Employer in respect of any such matter as aforesaid, the contractor shall immediately be notified thereof. Provided that such indemnity shall not apply when such infringement has taken place in complying with specific direction issued by the Employer in connection with the contract, but the contractor shall pay any royalties or other charges payable in respect of any such use, the amount so paid being reimbursed to the contractor only if the use was the result of any drawings and/or specifications issued after conclusion of the contract.

All charges on account of octroi, terminal or sales tax and other duties on materials obtained for the works from any source, (other than materials supplied by the Employer) shall be borne by the contractor.

The Employer shall be entitled to have tests carried out on the work or its parts or accessories, either during its progress or on completion, where and when deemed necessary or on any materials to be incorporated/incorporated in the work/installation supplied by the contractor or otherwise notwithstanding that the work or its parts or accessories or the said materials have been accepted and passed/passed for incorporation and the contractor shall on being directed to do so promptly arrange for the tests to be carried out excepting in the case of “Mandatory tests” listed else where in this specifications which he (the contractor) shall regularly carry out in routine fashion without having to be given any further directions.

The scope of the clause regarding tests will cover not only materials/ articles of every day use and of ordinary description but also patented products and those under specific makes, including approved makes, notwithstanding that satisfactory test certificates from makers/manufacturers have been produced in accordance with sub-clause iv above.

The contractor shall also arrange for necessary field tests to be carried out in the case of materials/ articles of everyday use and of ordinary description; regularly under the directions and in the presence of the Employees’ representative, to determine the suitability of such items for use in the work.

The costs of the tests and of the materials and labour and equipment, if any, involved in the testing operations shall be borne by the contractor in all cases except as otherwise provided for in the contract.

2.13 SUPERVISION BY CONTRACTOR:

The Contractor shall give all necessary personal supervision during the execution of the works, and as long thereafter as the Consultant may consider necessary until the expiration of the "Defects Liability Period". The contractor shall also during the whole time the works are in progress, employ a competent and qualified representative whose name shall be approved by the Employer and who shall constantly be in attendance at the works while the men are at work. Any directions, explanations, instructions, or notices given by the Employer to such representative shall be deemed to have been given to the contractor.

If the contractor fails to appoint and keep on the works a competent and qualified representative as aforesaid the Employer shall have powers to suspend the works till such time a competent qualified representative as aforesaid is posted and the contractor shall not be entitled to claim extension of time on the plea of such suspension of the works. The contractor shall also engage on the work an adequate number of qualified and experienced technical persons to ensure that the work is executed to conform strictly to drawings and specifications.

2.14 DISMISSAL OF WORKMEN:

The Contractor shall on the request of the Employer immediately dismiss from the works any person employed thereon by him who may, in the opinion of the Employer be incompetent or misconduct himself, and such persons shall not be again employed on the works without the permission of the Employer. Such dismissal shall not form the basis for a claim for compensation or damages of any kind against the Employer or any of his/their representatives.

ACCESS TO WORKS:

The Employer, and his respective representative shall at all reasonable times have free access to the works and/or to the workshops, factories or other places where materials are lying or from which they are being obtained and the contractor shall give the Employer, and his representative, all reasonable facilities necessary for inspection and examination and tests of the materials and workmanship. No person unauthorized by the Employer except the representatives of Public Authorities shall be allowed on the works at any time. All drawings relating to the work issued to the contractor together with an authenticated copy of the accepted (priced) schedule of quantities are to be kept at the site and the Employer or their authorized representatives shall be given access to such drawings, schedules whenever necessary.

SITE ENGINEER:

The terms "Site Engineer/Asst. Engineer" shall mean the person appointed, and acting under the orders of the Employer to inspect the works in the absence of the Employer; the contractor shall afford the Site Engineer/Asst. Engineer/Clerk of Works every facility and assistance for inspecting the works and materials and for checking and measuring the work and materials. Such person/persons shall be considered to act solely as inspectors.

If any work or materials be not approved by the Site Engineer/Asst. Engineer or any such representative, such work shall be suspended or the use of such material shall be discontinued until the decision of the Employer is obtained. The work will from time to time be examined by the Employer, the Site Engineer/Asst. Engineer, but such examination shall not in any way exonerate the contractor from the obligation to remedy any defects which may be found to exist at any stage of the works or after the same is completed. Subject to the limitation of this Clause the contractor shall take instructions only from the Employer.

WORK NOT TO BE SUBLET:

The whole of the works included in the contract shall be executed by the contractor who shall not directly or indirectly transfer, assign or under let the contract or any part share thereof or interest therein without the written consent of the Employer; and no undertaking shall relieve the contractor from the full and entire responsibility of the contract or from active superintendence of the works during their progress.

VARIATION NOT TO VITIATE CONTRACT:

No alteration, omission or variation shall vitiate this contract but in case the Employer thinks proper at any time during the progress of the works to make any alterations in or additions to or omissions from or substitutions for the original drawings, specifications, designs and instructions, or any alterations in the kind or quality of the materials to be used in the work and shall give notice thereof to the contractor, in writing, the contractor shall alter, add to or omit from or substitute for as the case may require, in accordance with such notice and carry out the amended work on the same conditions in all respects on which he agreed to do the main work, but the contractor shall not do any work extra to or make any alterations or additions to or omissions from or substitutions in the works or any deviation from any of the provisions of the contract stipulations, specifications or contract drawings without the previous consent in writing of the Consultant and the value of such extras, alterations, additions or omissions or substitutions shall in all cases be determined by the Consultant with the prior approval in writing.

2.19 NO COMPENSATION FOR ALTERATION OR RESTRICTION OF WORKS:

If at any time after the commencement of the work the Employer for any reason whatsoever does not require the whole or part or parts thereof as specified in the tender to be carried out, they shall give notice in writing of the fact to the contractor who shall have no claim for any compensation whatsoever on account of any profit which he might have derived from the execution of the work in full, but which he did not derive in consequence of the full amount of the work not having been carried out. Nor shall he have any claim for compensation by reason of any alterations having been made in the original specifications, drawings, designs and instructions which shall involve curtailment of the work originally contemplated.

2.20 MEASUREMENT OF WORKS:

The Employer may from time to time intimate to the contractor that he requires the works to be measured, and the contractor shall forthwith attend or send a qualified Agent to assist the Employer in taking such measurements and making calculations and to furnish all particulars or to give all assistance required by either of them.

Provided that the contractor shall give notice of not less than ten clear days to the Employer or his representative in charge of the work before covering up or placing beyond the reach of measurement any work in order that the same may be measured and correct dimensions thereof be taken before the same is covered up or placed beyond reach of measurement and shall not cover up and place beyond reach of measurement any work without the consent of the Employer and his representative in charge of the work so shall within the aforesaid period of ten days inspect the work and cause the measurements to be made; if, any work be so covered up without the consent of the Employer or his representative in charge of the work, the same shall be uncovered at the contractor's expense, or in default thereof no payment or allowance shall be made for such work or materials with which the same was executed.

Should the contractor not attend or neglect or omit to send such agent then the measurements taken by the Employer, or a person approved by him shall be taken to be correct measurements of the works. Such measurements shall be taken in accordance with the Indian Standard Method of Measurement, unless otherwise provided for elsewhere in this contract.

The contractor or his agent may at the time of measurement take such notes and details as he may require.

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

2.21 PRICE VARIATION:

The rates for additional, altered, substituted work shall be arrived at in accordance with the following rules:

The nett rates or prices in the contract schedule shall determine the valuation of (the rates for) the extra work (item) where such extra work (item) is of similar character and is executed under similar conditions as the work priced therein.

If the rates for the extra, altered or substituted (deviated) work are not provided for (available) in the contract schedule, they shall to the extent possible be derived out of the rates given in that schedule for similar or near similar items. For the purpose of such derivation, where necessary and when so directed, the contractor shall furnish detailed analysis for the said similar or near similar items in the contract schedule. For such portions of the analysis for the extra, altered or substituted (deviated) work for which prices cannot be abstracted from the corresponding analysis of rates for the said similar or near similar items in the contract schedule, market rates substantiated by purchase bills/vouchers shall be adopted, using factors and constants for quantum's of material, labour T & P and sundries from CPWD/Standard PWD data/analysis, in the order thus written, adding towards profits and overheads an appropriate margin not exceeding 15%. When called upon to do so the contractor shall submit the required purchase bills/vouchers.

In the case of additional, altered or substituted (diverted) work for which rates cannot reasonably be derived as at (ii) and (iii) above, the rates shall be worked out adopting market prices, substantiated by purchase bills/vouchers, using factors and constants for quantum's of material, labour, T&P and sundries from CPWD/Standard PWD/Data Analysis in the order thus written, adding towards profits and overheads an appropriate margin not exceeding 15%. When called upon to do so the contractor shall submit his purchase bills/vouchers, to the Consultant.

The provisions in sub-clauses (i) to (iii) will not apply to contract schedule items or altered or substituted (deviated) items (the quantities of) which individually exceed the corresponding provisions in the contract schedule by more than 20% when the deviation limit as defined below and as referred to in the tender is exceeded, and when the said deviation limit is not exceeded (a) by more than 50% in the case of items of work above plinth level and (b) by more than 100% in the case of items below plinth level.

In such case, only for such items where, and for such quantities only as are in excess of the quantities provided in the contract schedule for original items or items which stand altered or substituted (deviated) by more than the percentages specified in sub-para above and for items for which the rates cannot reasonably be derived as at sub-clauses (ii) and (iii) above, market rates shall be applied.

v) The questions as to what particular items, being similar or near similar to the additional, altered or substituted (deviated) work in the contract schedule are to be adopted for derivation of rates for the additional, altered or substituted (deviated) work and in the contract schedule are to be adopted for derivation of rates for the additional, altered or substituted (deviated) work and whether the said rates cannot be derived from similar or near similar items in the contract schedule will be decided by the Consultant.

In case (ii) to (iv) the contractor is required to submit his analysis of rates adopting the principles enunciated and the Employer, after scrutinizing the analysis and other papers furnished, will allow such rates as he considers reasonable.

Where extra work is of such a nature that it cannot be properly measured or valued the contractor shall be allowed day work prices at the nett rates stated in the tender or the priced schedule of quantities or, if not so stated, then at rates not exceeding the minimum local day work rates and wages for the district, notified by the concerned authority, provided that in either case if required by the Employer, vouchers, muster rolls and other documents required for proper verification of the labour employed and the materials deployed on the said work and the costs thereof be delivered to the Employer or his representative at or before the end of the week following that in which the work has been executed.

The question as to whether extra work is of such nature that it cannot be properly measured or valued will be decided by the Employer. The margin to be allowed on actual costs to the contractor towards profits and overheads shall be an appropriate percentage not exceeding 15%.

Deviation Limit: is the value by which the total executed contract value including authorized variation is in excess of the original contract value, expressed as a percentage and shall be adjudged on the sum total of all additions, omissions, reductions, alterations or substitutions (deviations) covered by authorized variations. The values of prime cost sums shall not be included in calculating the above percentage.

2.22 REMOVAL OF IMPROPER WORKS, MATERIALS ETC.

The Employer shall, during the progress of the work, have full powers to order in writing, removal from the works within such reasonable time or items as may be specified in the order, of any materials which in the opinion of the Employer are not in accordance with the specifications or the instructions of the Employer, or do not conform to approved samples, the substitution of the rejected materials by proper other materials, and the removal and proper re-execution of any work executed with unsound, imperfect or unskilled workmanship or with materials not in accordance with the contract, notwithstanding that the same may have been passed or/and certified or/and paid for 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 out such order, the Employer shall have the power to employ and pay other persons to carry out the same without being answerable or accountable for any loss or damage that may happen or arise in such materials removed and all expenses consequent on or incidental thereto as certified by the Employer shall be borne by the contractor, or may be deducted by the Employer from any moneys due or that may become due to the contractor.

In lieu of re-execution of any work not in accordance with the contract the Employer may in their option allow it to remain but will allow for such work reduced rates. The decision of the Employer to exercise his option in this regard and the quantum of reduction to be made in the rate for the item in question shall be final and binding on the contractor.

2.23 DEFECTS LIABILITY PERIOD:

Any defect, shrinkage, settlement or other faults which may appear within the 'Defects Liability Period' stated in the specification, or if none be so stated, then within 18 months after the virtual completion of the works, arising in the opinion of the Employer from materials or workmanship not in accordance with the contract, shall on demand which shall be made within the defects liability period, in writing by the Employer, and within such reasonable time as shall be stated therein specifying the work, materials or articles complained of notwithstanding that the same may have been passed or/and certified, paid for, be amended and made good by the contractor, at his own proper charge and cost and in case of default the Employer may employ and pay other person or persons to amend and make good such defects, shrinkage, settlements or other faults and all damages, loss and expenses consequent thereon or incidental thereto shall be made good and borne by the contractor and such damages, loss and expenses be recoverable from him (the

contractor) by the Employer or may be deducted by the Employer from any moneys due or that may become due to the contractor Employer may in lieu of such amending and making good by the contractor deduct from any moneys due or that may become due to the contractor a sum to be determined by the Employer equivalent to the cost of amending and making good such work and in the event of the amount retained being insufficient, recover the balance from the contractor, together with any expenses the Employer may have incurred in connection therewith. Should any defective work have been done of material supplied by any subcontractor employed on the works who has been nominated or approved by the Employer as provided in this specification, contractor shall be liable to make the same good in the same manner as if such work or materials had been done or supplied by the contractor himself. The contractor shall remain liable under the provisions of this Clause notwithstanding the signing by the Employer of any certificate including the final certificate, or the passing of any accounts.

CONTRACTOR LIABLE FOR DAMAGE DONE:

The contractor shall be responsible for all injury to persons, animals, or things, and for all structural and decorative damage to property which may arise from the operation or neglect of himself or of any nominated sub-contractor's employee whether such injury or damage arises from carelessness, accident or any other cause whatever in any way connected with the carrying out of the contract. This Clause shall be held to include, inter-alia, any damage to buildings, whether immediately adjacent or otherwise, and any damage to roads, streets, foot-paths, bridges, or ways as well as all damages caused to the buildings and works forming the subject of this contract by frost or other inclemency of weather. The contractor shall indemnify the Employer and hold him harmless in respect of all and any expenses arising from any such injury or damage under any Acts of Government or otherwise and also in respect of any award of compensation or damages consequent upon such claims.

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 of Third Party.

The contractor shall indemnify the Employer against all claims which may be made against the Employer by any member of the Public or other 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 issuers a Policy of Insurance in the joint names of the Employer and contractor against such risks and deposit such policy or Policies with the Consultant from time to time during the currency of this contract. The contractor shall also similarly indemnify the Employer against all claims which may be made upon the Employer 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 sub-contractor and shall at his own expense effect and maintain, until the virtual completion of the contract, with an approved insurer a Policy of Insurance in the joint names of the Employer and the contractor against such risks and deposit such policy or policies with the Consultant from time to time during the currency of the contract.

The Insurance policies above stated shall be taken for a minimum sum of Rs.5 lakhs with indemnity of Rs. One Lakh for any single accident.

The contractor shall be responsible for anything which may be excluded from the Insurance Policies above referred to and also for all other damages to any property arising out of and incidental to the negligent or defective carrying out of this contract. He shall also indemnify the Employer in respect of any costs, charges or expenses arising out of claim or proceedings and also in respect of award of compensation for damage arising there from.

The Employer shall be at liberty and is hereby empowered to deduct the amount of any damage, compensation, costs, charges and expense arising 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.

2.25 RESPONSIBILITY FOR THE SAFETY OF BUILDING:

The contractor shall be responsible for the safety of the works (including the materials, temporary buildings and plant) until they are taken over by the Employer.

2.26 INSURANCE OF THE WORKERS:

The contractor shall within 14 days from the date of commencement of the work insure the works at his cost and keep them insured until one month after the works are taken over by the Employer or three months after the date of completion whichever is earlier, against loss or damage by fire and usual risks other than fire against which insurers generally provide cover in a CONTRACTOR'S ALL RISK POLICY, with an insurer to be approved by the Consultant, progressively for the full amount of the contract, in three stages, beginning with 1/3 of the contract value, and for any further sum as called upon to do so by the Employer, the premium of such further sum being allowed to the contractor as an authorized extra. Such policy shall cover the property of the Employer only and surveyor's fees for assessing the claim and in connection with his services generally in reinstatement and shall not cover any property of the contractor or of any sub-contractor or employee. The contractor shall deposit the policy and receipts for the premiums paid with the Employer within twenty-one days of the date of commencement of the work unless otherwise instructed by the Employer. In default of the contractor insuring as provided above, the Employer may insure and may deduct the premiums paid from any money that may be due or that 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 insurers should they elect to do so, proceed with all due diligence with the completion of the works in the same manner as though the fire or other such usual risk had not occurred and in all respects under the same conditions of contract. The contractor in case of rebuilding or reinstatement after fire or other such usual risk shall be entitled to such extension of time for completion as the Employer deems fit.

2.27 LIQUIDATED DAMAGES:

If the contractor fails to complete the works by the date stated or within any extended time as per provision contained herein below, the contractor shall pay or allow to the employer the sum named in the appendix as "Liquidated Damages" for the period during which the said works shall so remain incomplete by the date of completion of the work as defined in the contract, and the Employer may deduct such damages from any moneys due or that may become due to the contractor.

2.28 EXTENSION OF TIME:

If the contractor shall desire an extension of time for completion of the work on the grounds of his having been unavoidably hindered by such causes as (a) force majeure or (b) any exceptional inclement weather or (c) proceedings taken or threatened by or dispute with adjoining or neighboring owners or public authorities arising otherwise than through the contractor's own defaults or (d) the work or delays of other contractors or tradesmen engaged or nominated by the Employer and not referred to in the schedule of quantities and or specification or (e) strike or lockout affecting any of the building trades or directly the work or (f) delays in the supply of materials stipulated to be supplied by the Employer, or any other ground that may reasonably be held to be valid by the Employer, he shall apply in writing to the Employer within 15 days of the date of such hindrance on account of which he desires such extension as aforesaid and the Employer, if in his opinion reasonable grounds have been shown therefor, may with the previous approval in writing of the Employer make a fair and reasonable extension of time for completion of the contract works, but the contractor shall

nevertheless constantly use his endeavors to prevent delay and shall do all that may reasonably be required of him to proceed with the work expeditiously provided.

- That the contractor shall have no claim whatever other than extension of time for the delay in completion of the work due to such hindrance and

- That the contractor shall suspend the works whenever called upon to do so in writing by the Employer and shall be allowed reasonable extension of time for completion of work due to such suspension of work and nothing else.

2.29 TERMINATION OF CONTRACT BY EMPLOYER:

If the contractor being an individual or a firm commits any "Act of Insolvency", or shall be adjudged an insolvent or being an Incorporated Company shall have an order for compulsory winding up made against it or pass an effective resolution for winding up voluntarily or be subject to the supervisor of the court and of official assignee or the Liquidate in such acts of insolvency or winding up, as the case may be, and shall be unable within 7 days after notice to him requiring him to do so, to show to the reasonable satisfaction of the Consultant that he is able to carry out and fulfil the contract and to give security thereof if so required by the Employer:

OR if the contractor (whether an individual, firm or incorporated company) shall suffer execution to be issued:

OR shall suffer any payment under this contract to be attached by or on behalf of any of the creditors of the contractor;

OR shall assign or sublet this contract without the consent in writing of the Employer first obtained;

OR shall charge or encumber this contract or any payments due or which may become due to the contractor there under;

OR if the Employer notices:

i.) has abandoned the contract, or
ii) has failed to commence the work, or has without any lawful excuse under these conditions suspended the progress of the works for 14 days after receiving the Employer's notice to proceed. Or
iii) has failed to proceed 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 the materials from the site or to pull down and replace work for seven days after receiving from the Employer's written notice that the said materials or work were not approved and were rejected by the Employer 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 for seven days after written notice shall have been given to the contractor requiring him (the contractor) to observe or perform the same, or
vi)has to the detriment of good workmanship or without the consent in writing of the Employer sublet any part of the contract.

Then and in any of the said cases the employer may notwithstanding any previous waiver, after giving seven day's notice in writing to the contractor, determine the contract, but without thereby affecting the powers of the Employer or the obligations and liabilities of the contractor the whole of which shall continue to be 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. And further the Employer by his agents or servants may enter upon and take possession of the works and all plant, tools, scaffoldings, sheds, machinery, steam or

other power utensils and materials lying upon the premises or the adjoining land or roads, and use the same as his own property or may deploy the same by means of his own servants and workmen in carrying on and completing the works or by employing other contractor or person or persons to complete the work and the contractor's shall not in any way interrupt or do any act, matter, or thing to prevent or hinder such other contractor's or other person or persons employed for completing and finishing or using the materials and plant for the works. When the work shall be completed or as soon thereafter as convenient the Consultant shall give notice in writing to the contractor to remove his surplus materials and plant and should be contractor fail to do so within a period of 14 days after receipt of such notice by him the Employer shall be entitled to sell the same by public action and give credit to the contractor for the amount realized.

The contractors' account shall also be credited with the amount that would have been payable to him, for the uncompleted work (completed by the Employer through other contractor's or person or persons are aforesaid) in terms of his agreement as if the contract had not been determined and he (the contractor) had continued to execute the work to its completion. The actual gross expense to the Employer including incidental charges in completing the uncompleted work through other contractors' or persons or persons shall be debited to the contractor's account if it be not less than the credit for the uncompleted work as above referred; if however, the said debit to be made be less than the said credit, then the amount to be debited shall be equal to the value of the credit given as above referred.

The Employer shall thereafter ascertain and certify in writing what (if anything) in final accounting is due to be payable to the contractor by the Employer or to the Employer by the contractor for the sale of surplus materials and plant and loss the Employer shall have been put to in procuring the works to be completed. The amount, if any, owing to the contractor and which shall be so certified shall thereupon be paid by the Employer to the contractor and vice-versa; and the certificate of the Employer in this regard shall be final and conclusive between the parties.

2.30 TERMINATION OF THE CONTRACT BY THE CONTRACTOR:

If payment of the amount payable by the Employer shall be in arrears and unpaid for thirty days after notice in writing requiring payment of the amount as aforesaid shall have been given by the contractor to the employer, or if the Employer interferes with or obstructs the issue of any such certificate, or the Employer commits any "act of insolvency" or if the Employer (being an individual or Firm) shall be adjudged an insolvent, or (being an incorporated company) shall have an order made against him or pass an effective Resolution for winding up, either compulsory or subject to the suppression of the Court or Voluntarily, or if the official assignee or the employer shall repudiate the contact, or if the Official Assignee or the Liquidator in any such winding up shall be unable within fifteen days after notice to him requiring him to do so to show to the reasonable satisfaction of the contractor that he is able to carry out and fulfil the contract and to make all payments due, and to become due thereunder, and if required by the contractor, to give security for the same, or if the works be stopped for three months under the order of the Consultant or the employer or by an injunction or other order of any Court of Law, then and in any of the said cases the contractor shall be at liberty to determine the contract by notice in writing to the Employer, and he shall be entitled to recover from the Employer, payment for all works executed in terms of the contract and for any loss he may sustain upon any plant or materials supplied or purchased or prepared for the purpose of the contract.

In arriving at the amount of such payment the net rates contained in the contractor's original tender shall be followed or where the same may not apply, valuation shall be made in accordance with other provisions hereinbefore.

2.31 CERTIFICATE & PAYMENT:

A bill in triplicate shall be submitted by the contractor, each month on or before the date fixed by the Employer, or if no date be so fixed, by the 15th of the month, along with detailed measurements, neatly recorded by him in an approved form of measurement book, also in triplicate for the work executed in the

previous month, and the Employer shall, consistent with the stipulation in the specification regarding “value of work for Interim Certificates” (or at closer intervals at his discretion), check/take the measurements or cause the measurements to be checked/taken for the purpose of having the same to be verified and to the extent work has been executed in accordance with the contract, issue interim certificate, and the Employer, after technical scrutiny of the bill, shall make payment to the contractor on the basis of such certificates , subject to retention of such sums at the percentage specified till the whole of the retention money (part of security deposit) is collected wherefor the installments (interim payments) shall be upto the full value of the work subsequently so executed and fixed.

The Employer may in his discretion include in the interim certificate such amount as he may consider proper on account of any materials which are in his opinion non-perishable and are in accordance with the contract and which have been brought on the site (but not prematurely) in connection therewith and adequately stored and/or protected against damage by weather or other cause but which have not at the time of advance been incorporated in the work, 75% oftheir purchase value on production of vouchers for the same subject to a maximum of basic prices. When materials on account of which such advance has been made under this sub-clause are incorporated in the work the amount of the advance shall be deducted from the next payment made under any of the Clauses of this contract, and in any case within 3 months of the date of payment of each advance.

All interim payments aforesaid 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 powers of the Employer 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.

And when the works have been virtually completed and the Employer shall have issued the completion certificate in accordance with the specification, the contractor shall submit the final bill in respect of the contract works within one month thereafter and the Employer, shall duly check/verify the measurements of the work done, and to the extent work has been carried out in accordance with the contract, issue the certificate on the final bill. The Employer shall make payment to the contractor on this final bill certificate within 3 (three) months, subject to retention of such sums at the percentage specified. Final payment comprising the return of all retention amounts shall be made by the Employer to the contractor on the basis of the final certificate thereof to be issued in writing by the Employer after the expiration of the period referred to as “Defects Liability Period” from the date of virtual completion of the work or as soon after the expiration of such period as all the work has been finally completed and after all defects have been made good by the contractor in accordance with the true intent and meaning of the contract whichever shall last happen.

Provided always that the issue by the Consultant of any certificate during the progress of the works or at or after their completion shall not relieve the contractor of his liabilities of this specification nor relieve him of 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 the case of all defects and insufficiencies in the works or materials which a reasonable examination would not have disclosed. Non certificate of the Consultant shall by itself be conclusive evidence that any work or materials to which it relates are in accordance with the contract neither will the contractor have a claim for any amounts that might have certified in any INTERIM/PREFINAL BILL and paid by the Employer and which might subsequently be discovered as not respect the employer’s decision shall be final and binding.

The Employer shall have power to withhold any certificate if the works or any parts thereof are not being carried out to his satisfaction.

2.32 EMD/ RETENTION AMOUNT CARRY NO INTEREST:

Earnest/ Retention money, or the balance of it available with the Employer, shall be refunded to the contractor in the manner specified and shall bear no interest whatsoever until the date of its return, unless otherwise provided for in this contract.

2.33 SETTLEMENT OF DISPUTES:

Except where provided in the Contract, all questions and disputes relating to the meaning of the specifications, design, drawings and instructions herein before mentioned and as to the quality of workmanships or materials used on the work or as to any other question, claim, right, matter or thing whatsoever in any way arising out of or relating to the Contract, design, drawings, specifications, estimates, instructions, orders of these conditions or otherwise concerning the work or the execution or failure to execute the same whether arising during the progress of works, or after the cancellation, termination, completion or abandonment thereof shall be dealt with as mentioned hereunder:

If the Contractor consider that he is entitled to any extra payment or compensation in respect of the works over and above the amount admitted as payable by the Consultant/ Employer or in the case of Contractor wants to dispute the validity of any deductions of recoveries made or proposed to be made from the contract or raise any dispute, the contractor shall forthwith give notice in writing of his claim, or disputes to the Employer and endorse a copy of the same to the Consultant within 30 days from the date of disallowance thereof or the date of deduction or recovery. The said notice shall give full particulars of the claim, grounds on which it is based and detailed calculations of the amount claimed and the contractor shall not be entitled to raise any claim nor shall the Employer be in any way liable in respect of any claim by the contractor unless notice of such claim shall have been given by the contractor. The contractor shall be deemed to have waived and extinguished all his rights in respect of any claim not notified to the Employer in writing in the manner and within the time aforesaid.
The Employer shall give his decision in writing on the claims notified by the contractor. The contractor may, within 30 days of the receipt of the decision of the Employer submit his claims to the Employer.
If the conciliation proceedings are terminated without settlement of the disputes, within a period of 30 days of termination.
It is a term of this contract that the party invoking arbitration shall give a list of disputes with amounts claimed in respect of each dispute along with the notice for appointment of the arbitrator.

The conciliation and arbitration shall be conducted in accordance with the provisions of the Arbitration & Conciliation Act 1996 or any statutory modification or reenactment thereof and the rules made thereunder.

It is also a term of the contract that the arbitrator shall be deemed to have entered on the reference on the date he issues notice to both the parties calling them to submit their statement of claims and counter statement of claims. The venue of the arbitration shall be such place as may be fixed by the arbitrator in his sole discretion.

2.34 EMPLOYER ENTITLED TO RECOVER COMPENSATION PAID TO WORKMEN:

If, for any reason the Employer is obliged, by virtue of the provisions of sub-section (I) of Section 12 of the workmen's compensation Act 1923, to pay compensation to a workman employed by the contractor, in the execution of the works, the Employer will recover from the contractor the amount of compensation so paid, and without prejudice to the rights of the Employer will be at liberty to recover such amount or any part thereof by deducting it from the security deposit or from any sum due by the Employer to the contractor under this contract or otherwise. The Employer shall not be bound to contest any claim made against him under sub-section (1) of Section 12, of the said Act, except on the written request of the contractor and upon

his giving to the Employer full security for all costs for which the employer might become liable in consequence of contesting such claim.

2.35 LABOUR LAWS/REGULATIONS:

The contractor shall employ labour in sufficient numbers directly or through sub-contractor to maintain throughout the period of the contract the rate of progress required according to the approved program of work and of quality to ensure proper workmanship in accordance with the specifications and drawings and the Consultant's instructions.

The contractor will comply with the provisions of all Acts of Government relating to labour and the rules and regulations made thereunder from time to time including the Payment of wages Act, the Employer's Liability Act, Workmen's compensation Act, and Contract Labour/Regulation and Abolition Act, 1970 and Central Rules, 1971. He shall also submit at the proper times all particulars and statements required to be furnished to the Labour Authorities on being directed to do so.

The contractor shall register and obtain necessary licenses, maintain all registers, records, notices and documents and submit returns as prescribed by various enactment's required under various statutes including the Contract Labour (Regulation and abolition) Act 1970 and Rules made thereunder as applicable to the Contractor and ensure compliance of all statutory regulations that are in force and that may become applicable in future from time to time in all matters concerning this contract.

The contractor shall indemnify the employer against any liability that may arise due to the non-compliance of any provision under the said Contract labour (Abolition Regulation) Act. 1970 or any enactment affecting the work contemplated under this contract.

2.36 GENERAL INDEMNITY:

"The contractor shall indemnify the employer from and against all claims, demands, proceedings, damages, costs and expense which it may be put by reason of the contractor not conforming to or complying with any of the provisions or requirements of any Act or Statute, Central or State, Rules, Regulations, Bye-laws of local Authorities, Panchayat, Collector or any Companies relating to or in connection with the works or to labour or for supply of water, light or other amenities at the site".

TECHNICAL SPECIFICATIONS FOR THE HVAC SYSTEM

INTENT OF THE SPECIFICATION:

INCENT proposes to construct a research lab cum office within the IIT Madras Research Park. The labs in the INCENT office are to be designed as per ISO class 8 clean room standards complete with 3 stage filtration including HEPA filtration. The other areas are considered with normal air conditioning.

IIT Madras Research Park has a central chilled water system and provides a CHW tapping point to all the tenants. We will be using ceiling suspended units connected to this central chilled water system.

AREA STATEMENT:

Sl No.	Area Desc	Area sqft.
1	Seminar room	326.0
2	Reception	181.7
3	DISC 1	78.1
4	Analytical Lab	485.6
5	SSMG lab	602.8
6	Workspace	
7	Workspace	
8	RF lab	246.9
9	Discussion 3	96.2
10	Cabin 3	147.0
11	EMI lab	116.2
12	Main workspace	136.4
13	Cabin 1	89.7
14	DISC 2	90.2
15	Cabin 2	84.3
16	MPCVD	558.6
17	MPCVD Office	69.8
18	Accounts room	247.9
19	Development lab	536.7
20	Wet lab	192.6

The following specifications highlight the technical requirements of the proposed system.

BASIS OF DESIGN:

Air conditioning system design:

PARAMETER	DESIGN DATA
Outside design conditions (deg C)	39.4 DB/ 27.8 WB.
Inside conditions to be maintained	21 +/- 1 deg C DB for all the labs and offices RH for the labs at 40-60%.
Area/Occupancy/Equipment load, etc	As furnished in the table below
Fresh air rate	7 CFM per person or 2 air changes per hour, whichever is higher.
Plant operation	9 AM to 5 PM.
Exposed roof	Insulated with 32mm thick nitrile rubber insulation
Power supply	415 V, 50c/s, 3 phase 4 wire system.

Areas considered for air conditioning:

Clean Room Areas:

Sl No.	Area Desc	Area sqft.	HeatLoads	Temperature & ON/OFF control
1	Analytical Lab	485.6	5	Independent
2	SSMG lab	602.8	7.02	Independent
3	RF lab	246.9	6	Independent
4	Discussion 3	96.2	1	
5	Cabin 3	147.0	1.5	Independent
6	EMI lab	116.2	6.15	
7	MPCVD	558.6	11.68	Independent
8	MPCVD Office	69.8	0.8	
9	Development lab	536.7	11.64	Independent

Sl No.	Area Desc	Area sqft.	HeatLoads
1	Seminar room	326.0	4.2
2	Reception	181.7	1.4
3	DISC 1	78.1	0.8
4	Workspace		2
5	Workspace		1.5
6	Main workspace	136.4	2
7	Cabin 1	89.7	1
8	DISC 2	90.2	1
9	Cabin 2	84.3	1
10	Accounts room	247.9	2
11	Wet lab	192.6	2

Sl No.	Area Desc	Area sqft.	HeatLoads	Temperature & ON/OFF control	Unit Selection
1	Analytical Lab	485.6	5	Independent	1 no. x 12 TR CSU
2	SSMG lab	602.8	7.02	Independent	
3	RF lab	246.9	6	Independent	1 no. x 14 TR CSU
4	Discussion 3	96.2	1		
5	Cabin 3	147.0	1.5	Independent	
6	EMI lab	116.2	6.15		
7	MPCVD	558.6	11.68	Independent	1 no. x 12 TR
8	MPCVD Office	69.8	0.8		
9	Development lab	536.7	11.64	Independent	1 no. x 12 TR

All the above units shall have 2 stage of filtration in the AHU with 110 mm SP and with HEPA plenum with filters in the terminal.

All the above AHUs shall be of VFD type

The CSU shall also have dehumidification heater banks in the AHU to maintain RH between 40-60%

3. The ducting system for these units shall be Aluminium ducting
Individual ON/OFF control and temperature control shall be provided for each of the areas as shown in the above table
The temperature and ON/OFF thermostat shall vary the speed of the VFD Ceiling suspended AHU.

Sl No.	Area Desc	Area sqft.	HeatLoads	Unit Selection
1	Seminar room	326.0	4.2	1 no. x 18 TR CSU
2	Reception	181.7	1.4	
3	DISC 1	78.1	0.8	
4	Workspace		2	
5	Workspace		1.5	
6	Main workspace	136.4	2	
7	Cabin 1	89.7	1	
8	DISC 2	90.2	1	
9	Cabin 2	84.3	1	
10	Accounts room	247.9	2	
11	Wet lab	192.6	2	

I. DATA SHEET FOR AHUs:

AHU TYPE 1:

Sl.	DESCRIPTION	TECHNICAL REQUIREMENTS
1.	AHU type	Double skinned, ceiling suspended with casing thickness for both inner and outer with 0.6mm plain/ pre coated GI.
2.	Air Quantity/ TR	18 TR/ 7200 CFM, 40 mm SP – 1 no.
3.	Type of motor	TEFC, Squirrel Cage induction, 415 V, 3 phase, class F with IP 55, with IE2 rating. VFD Type
4.	Accessories required	a) In/Out thermometer. b) In/Out pressure gauges. Isolating valve, Audco BF type. 3 way mixing valve with actuator & sensor. 4/6 row chilled water coil. Air filters. 1.2 mm SS drain pan. Air Outlet dampers. Flexible connections. Star delta/DOP starter panel with ON/OFF switch Earthing with 6 SWG copper wire. Fire Damper at SA duct outlet. Fresh air cowl with screen and damper. UVC lamps
5.	Acceptable makes	Voltas/ Blue Star/ Carrier/ System Air (Saiver)/ ETA/ Cary

		Aire/ Edge Tech/Luftek

AHU TYPE 2 (For Labs):

Sl.	DESCRIPTION	TECHNICAL REQUIREMENTS
1.	AHU type	Double skinned, ceiling suspended double skinned, with casing thickness for both inner and outer with 0.6mm plain/ pre coated GI complete with mixing box. The AHUs to be provided with 50 mm thick PUF insulation.
2.	Air Quantity/ TR	5600 CFM/110 mm SP, 14 TR capacity – 1 no. 4800 CFM/110 mm SP, 12 TR capacity – 3 nos.
3.	Type of motor	TEFC, Squirrel Cage induction, 415 V, 3 phase, class F with IP 55, IE2 rating. VFD type
4.	Filtration	a) HEPA filter fixed terminally b) Fine filter in AHU c) Pre filter in AHU
4.	Accessories required	Isolating valve, Audco BF type 4 row chilled water coil. 1.2 mm SS drain pan. Air Outlet dampers. Flexible connections. VFD Starter panel with isolator, and power wiring/ double earthing to motor. Earthing with 6 SWG copper wire. Fire Damper at SA duct outlet. Fresh air cowl with screen and damper. Differential pressure switch for indicating the hepa filter condition Dehumidification heater banks to control RH between 40-60% One digital thermometer and humidity indicator for each OT UVCLamp 3-way mixing valve with sensor and actuator
5.	Acceptable makes	Voltas/ Blue Star/ Carrier/ System Air (Suvidha)/ ETA/ Cary Aire/ Edge Tech/Luftek

II.DATA SHEET FOR THE AHU VFD STARTER PANEL:

Sl.	Description	Feeder details.
1.	PANEL Quantity required: 36 sets	Incoming with isolator/ outgoing switch of adequate rating. Starter with VFD Instrumentation panel with Volt Meter/ Ammeter/ selector switches/ phase indicating LEDs.

GENERAL TECHNICAL REQUIREMENTS:

SCOPE OF WORK

The general scope of work to be carried out under this contract is illustrated in Drawings, Specifications and the schedule of quantities. Not withstanding any thing contained in this, the tenderer is to offer a proven and tested equipment to meet the requirements of this specification.

WORKS TO BE ARRANGED BY THE PURCHASER:

The owner will arrange to provide the following:

Incoming cable with earthing to all the motors.
Civil foundation works for the chillers, pumps and the cooling towers.

The contractor shall provide all allied works, including making openings in walls/floor for taking piping, ducting etc. The contractor shall also supply and fix any wooden frames required for fixing the grills, diffusers, fire damper, fresh air intake etc. All openings made for the above purposes shall be finished neatly with cement plastering etc.

BYE LAWS AND REGULATIONS

The installation shall be in conformity with the Bye Laws, Regulations and Standards of the local authorities concerned in so far as these become applicable to the installation.

If the Drawings or Specifications require something which violates the Bye Laws and Regulations, then the Bye Laws and Regulations shall govern the requirement of this installation.

WORKING PERMITS AND INSURANCE :

The Contractor shall obtain all work permits/ licenses required for the personnel employed at the work site and shall strictly adhere to all the rules & regulations of the purchaser. All statutory rules like PF, minimum wages etc., are to be followed strictly and registers as required by the law are to be maintained at site.

The contractor shall also fully cover the personnel employed and the materials used under comprehensive insurance, valid upto the duration of the contract plus 3 months.

DRAWINGS

The Contractor shall follow the tender drawings in preparation of his shop drawings and for subsequent installation work. He shall check the drawings of other agencies to verify spaces in which his work will be installed.

Maximum headroom and maintenance shall be maintained at all points. Where headroom appears inadequate, the contractor shall notify the purchaser before proceeding with the installation.

The Contractor shall examine all architectural, structural, plumbing, electrical and other services drawings before starting the work and report to the purchaser any discrepancies, coordinate installation of this work with other services and agencies.

TECHNICAL DATA

The tenderer must submit the technical data for all the items quoted quantity alongwith their tenders. Failure to furnish technical data with tender, may result in rejection of tenders.

SHOP DRAWINGS

Within one week after the award of the contract, the contractor shall furnish, for the approval of the purchaser, two sets of detailed shop drawings of all equipment and materials including plant room layout, ducting, piping and control wiring layouts required to complete the project as per specification and as required by the purchaser. These drawings shall contain details of construction, size, arrangement, operating clearance, performance characteristics and capacity of all items of equipment, also the details of all related items of work by other contractors. Each item of equipment proposed shall be a standard catalog product of an established manufacturer as per specifications.

After final approval has been obtained from the purchaser, the contractor shall submit a further ten sets of shop drawings. No material or equipment shall be supplied for installation at the site until the contractor has in his possession, the approved shop drawings for the particular material or equipment.

The shop drawings shall be submitted for approval sufficiently in advance of planned delivery and installation of any materials, to allow the purchaser ample time for scrutiny. No claims for extension of time shall be entertained because of any delay in the work due to his failure to produce shop drawings at the right time, in accordance with the approved program.

Approval of shop drawings shall not be considered as a guarantee of measurements or of building dimension. Where drawings are approved, said approval does not mean that drawings have been checked in detail nor does it in any way relieve the contractor of the responsibility or requirement to furnish material or perform work as required by the contract.

Where the work of the contractor has to be installed will interfere withwork of other agencies, he shall assist in working out space conditions to make a satisfactory adjustment. If so directed by the purchaser, the contractor shall prepare composite working drawings and sections at a suitable scale clearly showing how his work is to be installed in relation to the work of other agencies. If the contractor installs his work before coordinating with other trades, he shall make all the necessary changes without extra cost to the purchaser.

QUIET OPERATION AND VIBRATION ISOLATION

All equipment shall operate under all conditions of load without any sound or vibration which is objectionable in the opinion of the purchaser. In case of rotating machinery sound or vibration noticeable outside the room in which it is installed, shall be considered objectionable. Such conditions shall be corrected by the contractor at his own expense. The maximum sound within 1M of the equipments shall not exceed 60 dB.

ACCESSIBILITY

The contractor shall verify the sufficiency of the size of the shafts and openings,clearance in cavity walls and piping. His failure to communicate insufficiency of any of the above shall constitute his acceptance of sufficiency of the same. The contractor shall locate all equipments which must be serviced, operated or maintained in fully accessible positions. The exact location and size of all access panels, required for each concealed control damper, valve or other devices requiring attendance, shall be finalised and communicated in sufficient time, to be provided in the normal course of work, failing which the contractor shall make all the necessary repairs and changes at his own expenses.

ELECTRICAL INSTALLATION

It is to be clearly understood that the final responsibility for the sufficiency, adequacy and conformity to the contract requirements, of the electrical installation work for airconditioning services, lies solely with the contractor.

All statutory approvals for electrical installation under the scope of this tender like CEIG / CEA approvals etc., shall be obtained out by the contractor. The required fees shall be paid by the purchaser but all other incidental expenses in connection with the inspection/ approval etc., shall be borne by the contractor.

MATERIALS AND EQUIPMENT

All materials and equipment shall conform to the relevant Indian Standards and shall be of the approved make and design. General specifications for the various equipments / works are enclosed. Wherever these are not totally clarified, the construction shall be carried out as per the relevant IS specifications.

MANUFACTURER'S INSTRUCTION

Where manufacturers have furnished specific instructions, relating to the material and equipment used in this job, covering points not specifically mentioned in these documents, such instructions shall be followed in all cases.

INSPECTION & TESTING

The purchaser's authorized representative shall have full powers to inspect any portion of the work, examine the materials, workmanship and getting the materials / equipments tested at the contractor's works or at any other place from where equipments/ materials are procured. These examinations will not relieve the contractor any of his responsibility for meeting the requirements of the specifications and it will be the contractor's responsibility to rectify/ replace such works/ equipments not found in accordance at his cost.

All the testing and measuring instruments and labour required shall be provided by the contractor at his cost. The contractor shall also calibrate the instruments used for testing at reputed calibration centers.

REJECTION OF DEFECTIVE PLANTS/EQIPMENTS:

If the completed works or equipment or any portion there of taken over is found to be defective, or fail to fulfil any specification requirements, the contractor shall, on receipt of written notice, shall make good the defective works at his cost within a stipulated time frame. The purchaser shall have full powers to carry out such repair works at the risk and cost of the contractor, in case the contractor fail to carry out this within the stipulated time.

The purchaser shall have the right to operate the plant whether or not such equipments have been accepted.

BALANCING, TESTING AND COMMISSIONING

Balancing of all air and water systems and all tests as called for in the specifications shall be carried out by the contractor in accordance with the specifications and relevant local codes.

The results of these testing shall be submitted for scrutiny. Four copies of the certified manufacturer's performance readings for each piece of equipment shall be submitted alongwith the test results.

The Contractor shall arrange, all necessary balancing and testing equipment, instruments, materials, accessories and the requisite labour. Any defects in materials and / or in workmanship detected in the course of testing shall be rectified by the contractor entirely at his own cost, to the satisfaction of the purchaser. The installation shall be tested again after removal of defects and shall be commissioned only after approval of the purchaser. All tests shall be carried out in the presence of purchaser's representative.

COMPLETION DRAWINGS

On completion of the work in all respects, the contractor shall supply six (6) complete sets of drawings, on approved scale, indicating the work as installed. These drawings shall clearly indicate the complete plant room layouts, ducting and piping layouts, location of all concealed piping, valves, controls, dampers, wiring and other services. The contractor shall also submit six (6) sets of consolidated control diagrams, technical literature of all equipment and materials. The contractor shall frame under glass in the AHU room, the respective duct layout drawings.

GUARANTEE AND DEFECTS LIABILITY PERIOD

The contractor shall guarantee that all equipments shall be free of any defects due to defective materials and bad workmanship and the equipment shall operate satisfactorily with the performance & efficiencies not less than the guaranteed values. The guarantee period shall be valid for a period of eighteen (18) months after successful completion of the performance tests.

TRAINING OF PERSONNEL;

The Contractor shall provide adequate training to the engineer/ Plant Operator, for the operation and maintenance of the air conditioning plant. The training is to be given during installation and commissioning of the system.

As built drawings and equipment brochures, manuals operating procedures, etc shall be handed over in both hard & soft copy.

TECHNICAL SPECIFICATIONS:

4.1 DUCTING:

The ducting shall be of galvanized sheet steel with zinc coating as per class 8.Thickness of the sheet shall be as under:

GI ducting:

Rectangular duct upto 750mm	24 gauge
Rectangular duct 751 to 1250mm	22 gauge
Rectangular duct 1251 to 2400mm	20 gauge
Rectangular duct above 2401 mm	18 gauge

Al ducting:

Rectangular duct upto 750mm	22 gauge
Rectangular duct 751 to 1250mm	20 gauge
Rectangular duct 1251 to 2400mm	18 gauge

ERECTION REQUIREMENTS:

All ducts shall be fabricated and installed in workman like manner, generally conforming to the relevant ISI codes.

Ducts shall be straight and smooth on the inside with neatly finished joints. Joints shall be made air-tight.

Changes in dimensions and shape of ducts shall be gradual. Curved elbows shall have a centre line radius equal to one and a half times the width of the duct. Air turns shall be installed with vanes, arranged to permit the air to make the turn without appreciable turbulence.

All ducts shall be rigid and shall be adequately supported and braced where required with standing seams, tees or angles, of ample size to keep the ducts true to shape and to prevent buckling, vibration and breaking. Ducts upto 610mm width shall have a minimum of 40x3mm angle support and ducts larger than this shall have 50x6mm angle support.

All branch takeoffs and collars shall be provided with turning vanes.

All necessary allowances and provisions shall be made by the contractor for beams, or other obstructions in the building, whether or not the same are shown on the drawings. Where necessary to avoid beams or other structural work, plumbing or other pipes and or conduits, the ducts shall be transformed, divided or curved to one side, the required area being maintained, all as per the site requirements.

If a duct cannot be run as shown on the drawings, the contractor shall install the duct between the required points in accordance with other services and as per approval of the Engineer.

All duct work shall be independently supported from building construction. All horizontal ducts shall be rigidly and securely supported, in an approved manner, with trapeze hangers formed of MS rods of 10mm at every 2.5 meter centres. All vertical duct work shall be supported by structural members at each floor level.

The ducts shall not be supported from false ceiling hangers or be permitted to rest on false ceiling.

All ducts shall be totally free from vibration under all conditions of operation. Whenever duct work is connected to fans, air handling units or blower coil units that may cause vibrations in the ducts, ducts shall be provided with flexible connections, located close to the unit. Unit connections shall be constructed of fire resistant flexible double canvas connection of minimum 150mm long securely bonded and bolted on both sides. Sleeve shall be made smooth and the connecting duct work rigidly held by independent supports on both ends. The flexible connection shall be suitable for pressures at the point of installation.

All plenums at the outlet of the unit shall be constructed of 18G GI sheet with suitable angle bracings, inspection doors etc.

All scaffolding required for erection/ testing of pipelines shall be arranged by the contractor at his cost.

4.2 FIRE DAMPERS

a. All supply air ducts at air handling unit room shall be provided with approved fire dampers of at least 1.5 hours fire rating.

b. Fire damper blades shall be one piece folded high strength galvanized steel construction. In normal position these blades shall be gathered and stacked at the frame head providing maximum air passage and preventing passing air currents from creating noise or chatter. The blades shall be held in position through a fusible link to close in case of fire. A potential free contact shall be provided in the fire panel of each floor by the fire alarm vendor. The AC contractor shall wire this to the AHU motor starter to trip the same in case of fire.

c. Each fire damper shall be tested after installation to ensure closing on actuation of the connected fire alarm system.

The fire damper frames shall be of 18 gauge GI and the blades of 22 gauge GI.

VOLUME CONTROL DAMPERS:

a.Frame shall be of high strength galvanized steel construction and shall be of min. thickness 1.2 mm.
b. Blades shall be of double skinned high quality extruded Al construction. Blades shall be coupled by toothed nylon gearsor equivalent material which provides opposed blade operation.
c. Hand locking quadrant shall be provided with clear open/close indication and min. three intermediate open positions (1/4 – 1/2 - 3/4).
d. Foam gasket is sealed across the blade edges to minimize air leakage between the blades.

4.3 INSULATION:

THERMAL INSULATION OF PIPE:

a. All the pipes and equipment, operating at temperatures lower than the ambient shall be insulated in the manner specified.

b. Insulation of 50 mm thick TF quality thermocole with 26 G Aluminium cladding will be provided for the piping for all areas.

c. The method of insulation is as under:
Clean the surface to be insulated.
Apply 2 coats of non-flammable cold adhesive as specified by the manufacturer.
Fix the insulation of the specified thickness over the surface of the pipe tightly.
Seal all the joints of the insulation with cold bitumen.
Cover the above with jute hessian cloth.
Fix 22 G GI wire netting over the hessian.
Applycladding with 26 G aluminium over the insulation.

THERMAL INSULATION OF DUCT:

The tail end duct shall be insulated in the following manner.

a. The insulation material for the ducting shall be 19 mm Nitrile rubber material, laminated with Aluminium foil.

b. The method of insulation is as under:
Clean the surface to be insulated.
Apply one coat of primer paint.
Fix the insulation of the specified thickness over the surface of the duct tightly.
Seal all the joints with 75mm wide PVC tapes.

ACOUSTIC INSULATION OF DUCT:

The first 3 M of the ducting from the unit outlet shall be acoustically insulated in the following manner:

Armasound or equivalent material rigid board of 15 mm thick is to be secured on the inside of the ductthrough GI bolts, GI nuts and GI washers.
The insulation shall be covered with tissue paper.
Finally, 26 G perforated Aluminium sheet shall be provided over the tissue paper.

AHU ROOM WALL ACOUSTIC INSULATION:

Walls facing the air conditioning area of the AHU room shall be insulated as under:

Clean the wall area to be insulated
Fix GI channel work to form a grid equal to the dimension of the commercially available armasound or equivalent material
The thickness of the frame shall be constructed to accommodate 50 mm thick armasound or equivalent material
Fix 50 mm thick armasound or equivalent material of density not more than 14 kg/cum
Fix tissue paper over the insulation and fix properly to the grid work
Finally, provide 26 gauge perforated aluminium sheet over the tissue paper fixing properly to the grid work.
Please note only brass screws shall be used for fixing the tissue paper and aluminum sheet
Alternatively, the armasound board shall come with Al foil lamination

4.4 AXIAL FLOW EXHAUST FANS

Propeller fan for wall or panel mounting to convey air directly to the outside.
Sickle Blade impellers, in conjunction with the external rotor motors to be provided.
Wall plate should be made of high grade galvanized sheet steel, with painted finish.
Fans should be statically and dynamically balanced according to ISO 1940 standard.
Low noise level (max of 60 dB) with high efficiency of atleast 90%.
All mounting accessories shall be provided.
Outlet gravity shutters also to be provided as standard accessory as part of the fans

4.5 SUPPLY, RETURN& EXHAUST DIFFUSERS

a. The supply and return air diffusers shall be anodized aluminum construction, square or rectangular as per the drawings. Diffusers for different spaces shall be selected in consultation with the Purchaser.

b. Supply air diffusers shall be equipped with fixed air distribution grids, removable key operated volume control dampers of GI construction, and as required in specific applications.

c. Linear diffusers, if required as per the drawings, shall be anodized aluminum construction; one or two way blow linear diffusers. Supply air diffusers shall be provided with GI volume control balancing dampers within the supply air collar. Diffusers for different spaces shall be selected in consultation with the Purchaser, and provided as per requirements of Schedule of Quantities.

d. The supply air collar will be made to project at least 15mm outside the vertical face of the false ceiling, and is to be trimmed flush with the false ceiling face, before fixing the grill. If this is not done, the Purchaser reserves the right to reject the entire ducting system.

4.7 AIR HANDLING UNIT:

The accepted makes of the AHU and the chilled water coils are Voltas/ Blue Star/ Carrier/ System Air (Suvidha)/ ETA/ Cary Aire/ Edge Tech/Luftek
The unit shall be of the double skinned casing type. The outer casing shall be 0.60mm thick Galvanised steel and the inner casing shall be 0.60mm thick Galvanised steel . The insulation material shall be PUF or equivalent material of minimum 25mm thick sand witched between the two panels, as per the standards of the manufacturer. For the AHUs in the lab alone& outdoor AHUs will have PUF insulation shall be of 50 mm thickness.
The drain pan shall be of stainless steel material of not less than 1.2mm thick.

The blower shall be of Nicotra or Lau or Kruger make and shall be DIDW forward curved impellar of galvanized construction. The shaft shall be of steel, liberally designed and supported on ball or roller bearings adequately sized.
The drive motor shall be of VFD type of TEFC squirrel cage induction motor with IP 55 protection and with Class F insulation, with IE2 efficiency rating. The acceptable makes are Siemens/ Kirloskar/ ABB/ NGEF. The design, construction features and testing of the motors shall be as per the latest version of IS 325. Routine test certificates shall be furnished for the motor. The motors shall have IE2 efficiency rating.
The drive motor shall be preferably direct coupled. If this feature is not possible, suitably designed V belts shall be provided.
The AHU shall have inspection covers for attending to various parts requiring maintenance.
The AHU shall be ceiling suspended.
The chilled water coil shall be of copper tube with Aluminium fins. The coil shall be with 6 rows with 12 fins per inch spacing. The coil shall be tested for a pressure of 10 Kg per sq.cm (g) and test reports shall be furnished for this.
The filters shall be viscous metallic 50mm thick. Alternately HDPE filters of equivalent thickness are acceptable.
Drain connections shall be provided on both ends and shall be suitably piped to the nearest drain.
Motors up to and including 7.5 HP shall have DOL starter and above this rating shall have Star/ Delta starter.
Maximum noise level of 60 dB upto 1 M from the equipment;

AHU sub-panel wall mounted type suitable for indoor installation with 1 no. main incomer switch with necessary isolator, 1no. outgoing feeder & 1 no. starter with VFD/Bypass arrangement, Auto manual selector switch, indication lamps, necessary OLR,relays and power contactors(DOL starter up to 7.5HP and star delta starter above 7.5 HP) and single phase supply for 2/3 way valve.

TESTING:

The AHU, after completely assembled with the chilled water coil, will have to be run tested at site, to establish the following:

a) Air Quantity.

Power consumption.
Static pressure.
Noise and vibration.

4.9 PIPING

Acceptable makes of pipe: BST/GST/Jindal/ Hissar/ TATA/ T&M.
Acceptable make of valves: Slim seal butterfly type of Audco.
Acceptable make of NRV: Intervalve.
Air Vent valve: Bronze/ Gun metal of Leader make.

Pipe sizes shall be as required for the individual fluid flows.

All water pipes shall be MS class ‘C’ (Heavy class) upto 150mm dia as per I S 1239 and 6 mm thick above 150mm diameter as per IS 3589. All jointing in the pipe system shall be by welding, or as directed at site. All welding shall be done by qualified welders and shall strictly conform to Indian standards code of procedure for manual metal arc welding.

All pipes and their steel supports shall be thoroughly cleaned and given one primary coat of red oxide paint before being installed. All welding methods shall be subject to the approval.

Fittings shall be of heavy class of pressure rating suitable for the piping system. Fitting used on welded piping shall be of weldable type.

Tee off connections shall be through equal / reducing tees. Drilling and tapping of the walls of the main pipe shall not be resorted to for piping upto 150mm dia.

Gate valves shall be Audco butterfly type as per sizes specified and shall be suitable for not less than 14 kg per sq.cm. working pressure. The body shall be cast iron/ cast steel and the gate shall be SS 304.

Flanges of approved make and thickness as per IS codes shall be provided at required intervals and at connections to the equipments. Suitable asbestos fibre / rubber insertion gaskets (minimum 3mm thick) shall be provided.

Non return (check) valves shall be of slim seal type of Intervalve make. The body shall be CI and the gate shall be SS 304. This shall be designed for an internal pressure of 14 kg / sq.cm.

Strainers shall be Y type or pot type indicated with MS construction designed shall have 2mm thick stainless steel screen with 6mm perforations. Screen shall be removable and replaceable without disconnection of the main pipes.

After water pipes has been installed and tested, all exposed piping shall be given two finish coats, of approved paint, conforming to relevant ISI codes.

Pipes shall be properly supported on suitable MS supports as per the instructions. The contractor shall adequately design all the brackets, saddles, anchors, clamps and hangers and be responsible for their structural sufficiency.

Pipe supports shall be of steel adjustable for height and primer coated with rust preventive paint and finish coated with black paint.

Vertical riser shall be parallel to walls and column lines and shall straight and plumb, risers passing from floor to floor shall be supported at each floor slab by clamps attached to pipe and with a 15 mm thick rubber pad. Where pipes pass through the terrace floor, suitable flashing shall be provided to prevent water leakage.

Pipe sleeves, 50mm larger diameter than pipes, shall be provided wherever pipes through wall slabs and annualar space filled with fibre glass.

All pipes shall be tested to hydrostatic test pressure of 15 kg per. Sq.cm. gauge for a period of not less than 8 hours. All leaks and defects in joints revealed during the testing shall be rectified and got approved at site.

Piping repaired subsequent to the above pressure test shall be re tested in the same manner.

Isolating valves shall be provided at all required points. The valves provided for the underground mains shall have valve chambers with CI covers. Drain valves shall be provided at all lowest points in plant room, lowest points in riser pipes and wherever required for draining the entire water.

After pressure testing, the pipes shall be painted with approved color code.

The contractor shall provide all materials, tools, equipment, instruments, and labour required to perform the test and to remove water resulting from cleaning and after testing.

All scaffolding required for erection/ testing of pipelines shall be arranged by the contractor at his cost.

Air vent valves, drain valves of adequate size is to be provided at the highest points and lowest points whether specified in schedule of quantities or not.

4.11 MOTOR:

The drive motor shall be of VFD driven TEFC squirrel cage induction motor with IP 55 protection and with Class F insulation. The acceptable makes are Siemens/ Kirloskar/ ABB/ NGEF. The design, construction features and testing of the motors shall be as per the latest version of IS 325. Routine test certificates shall be furnished for the motor.

The drive motor shall be preferably direct coupled. If this feature is not possible, suitably designed V belts shall be provided.

The starter will be of VFD type automatic starting & a lockable off switch.

4.13 AIR BALANCING

After the installation is completed and re-commissioned, the contractor shall carry out the air balancing at least on two occasions, one during summer months (April – June) and other during monsoon/winter (September – December). The temperatures of various sections including the cabin are also to be measured simultaneously and air quantity adjustments wherever required is to be done properly and shown to the consultant. The air balancing, depending upon the situation may even have to be carried out for more than two days on both occasions. The purchaser reserves the right to with-hold the security deposit till such time the air balancing is completed satisfactorily.

5.0 LIST OF ACCEPTABLE MAKES OF EQUIPMENTS:

Motor : Siemens/ Kirloskar/ NGEF/ ABB.
Starters : L & T/Siemens/Honewell
Exhaust Fans : Almonard/Kruger/Nadi/Nicotra/Lau
AHUs : Voltas/ Blue Star/ Carrier/ System Air (Saiver)/ ETA/ Cary Aire/ Edge Tech/Luftek
Cables(power) : Finolex/Polycab/Havells
Cables (control) : Finolex.
Grills/ Diffusers : Air Master/ Air Breeze/Cosmic
G I Sheets : Jindal/ Nippon/ SAIL.
Wall mounted fans : Almonard, Nicotra, Havells.
Nitrile rubber : A-flex/k-flex
UV lamp : Philips, Seimens or equivalent. Should be easily maintained and replaceable in India.
VFD Starter Panel : Siemens/L&T/ABB/Danfoss
3 way mixing valve : Honeywell

ELECTRICAL TECHNICAL SPECIFICATIONS

SALIENT CONDITIONS OF CONTRACT

1. The successful Contractors have to furnish a detailed **BAR CHART** indicating their schedule programme for all the major activities within 3 days from the date of written order to commence the work. This **BAR CHART** will be referred for during the progress of the work to establish the periodical landmarks of achievement of work. If necessary, the revised **BAR CHART** based on the revised scope of work have to be submitted by the Contractor.

2. The Electricity & Water required to execute the work would be provided by the CLIENT at a particular point only and the Contractors have to make their own arrangements for tapping the supply at various points.

3. The successful Tenderer should appoint a **Project Engineer** who is well acquainted with the nature of work. He should be in a position to answer for any clarification during site visit by Engineers.

4. The Tenderers after collecting Tender document should thoroughly study the relevant drawings in relation with BOQ and if any discrepancies to be discussed / written to Client prior to submission of Tender.

5. Contractors are expected to strictly adhere to the labour laws in force from time to time by Central Government. The necessary records should be maintained at site and an amenity to the labours has to be made available at site as per law. The labours should be paid the salary in time as per the minimum wage act. The labour license shall also to be obtained from the authorities concerned.

6. **The Contractor should prepare and submit the following drawings and obtain approval before starting the work at site.**

- **a. Lighting wiring with fixtures layout**
- **b. Raceway drawing for Electrical, data & telephone**
- **c. UPS wiring drawing**
- **d. OEM's letter on specification to be submitted for the project.**

After completion of work as built drawings for the above drawings are to be submitted along with the final bill in the form of three sets of hard copy in colour and one soft copy.

7. The successful Tenderer awarded with the Electrical work assumes overall responsibilities and are solely responsible for co-ordination with other agencies and execution of works as per specification within the time frame to the satisfaction of Client as per Tender conditions. Any dispute if arise among them to be sorted out / settled at their level. The successful Tenderer is the sole representative for whole Electrical work and they/ he is liable for any clauses of this Tender.

8. Necessary I**nsurance policies** such as CAR policy/ Workmen's Compensation, Third Party liability to be taken before commencing the work and the original policies to be deposited with the CLIENT.

9. Necessary **Labor License** to be taken before commencement of work.

Client will not pay any mobilization advance/ material advance and there will not be any escalation for the work.

10. No deviation will be allowed in the material specified.

11. The Tenderer is required to inspect the site and obtain for himself on his own responsibility and at his own expense all necessary information and particulars to enable him to submit a proper Tender.

12. The Contractor at site verify the dimensions shown in the drawings before he takes up actual manufacture of the several items, making allowances for the actual dimensions that prevail at site.

13. If neither the drawings nor the specifications nor the accepted bills of quantities include any part/ parts the intention to include which is never the less clearly to be inferred and which are obviously necessary for the proper completion of the works/ installations, all such parts shall be supplied and executed by the Contractor at no extra charge.

14. Anything contained in one or another of (a) the drawings (b) the specifications and (c) the accepted bills of quantities and not found in the other will be equally binding as if contained in each of them.

15. The work will be done strictly in accordance with specification and drawings and as instructed the Architects/ Client.

16. The descriptions in the bills of quantities are brief and have been compiled as correctly as possible but are not meant to be exhaustive.

17. The Contractor should arrange for inspection of the sample of each item by the Architects/ Client proceeding with the work of manufacturing other units. The samples should be produced for inspection and approval of the Architects/ Client in the stages (1) after the same is assembled and made ready as per the Architects/ Client drawings and (2) after completing the finishing items viz., polishing/ painting etc.

18. It may clearly be noted that the inspection and approval of the items of work at any stage shall not exonerate the Contractor of his responsibilities in respect of the quality of work, workmanship and quality of materials.

19. The work should be completed as per the items specified elsewhere in the document and the rate quoted shall rate quoted shall include for doing work round the clock. No extra is payable in this respect.

20. The successful tenderer shall co-ordinate to other agencies engaged in the Project.

21. Specification of relevant clause of NBC / CPWD shall be the base line requirements to execute the items of work

22. Contractor shall ensure safety of personnel and property working in the premises. Any damages caused by the negligence of the contractor while execution should be restored & made good by the contractor at his own cost and risk.

23. Site meetings will be held to review the progress and quality evaluation. The Contractor shall depute a senior representative along with the site representative and suppliers as required to the site meetings and ensure all follow up actions.

24. The Contractor shall cart away all debris, refuse etc. arising from the work from the site and deposit the same as directed by the Architect/ Consultant at his own cost. It is the responsibility of the Contractor to obtain from the local authorities concerned to the effect that all rubbish arising out of Contractor‘s activities at the construction site or any other off-site activities borrow pits has been properly disposed of.

25. Procurement of materials

The Contractor shall make his own arrangements to procure all the required materials for the work. All wastages and losses in weight shall be to the Contractor’s account.

26. Excise duty, taxes, levies etc : The Contractor shall pay and be responsible for payment of all taxes, duties, levies, royalties, fees, cess or charges in respect of the works including but not limited to sales tax, tax on works Contract excise duty, and octroi, payable in respect of materials, equipment plant and other things required for the contact. All of the aforesaid taxes, duties, levies, fees and charges shall be to the Contractor’s account and the CLIENT shall not be required to pay any additional or extra amount on this account. Variation of taxes, duties, fees, levies etc if any, till completion of work shall be deemed to be included in the quoted rates and no extra amount on this account. Variation of taxes, duties, fees, levies etc: if any, till completion of work shall be

deemed to be included in the quoted rates and no extra claim on this account will in any case be entertained. If a new tax or duty or levy or cess or royalty or octroi is imposed under as statue or law during the currency of Contract the same shall be borne by the Contractor.

27. Acceptance of Tender

The CLIENT shall have the right to reject / cancel any or all Tenders without assigning any reason. They are not to bind to accept the lowest or any tender and the Tenderer or Tenderers shall have no right to question the acts of the CLIENT. However adequate transparency would be maintained by the CLIENT.

28. The prices shall be Firm for the duration of Contract plus all authorized extensions of time plus three months period after completion of work.

29. All necessary test certificates for the equipment and ducts are to be submitted in triplicate before scheduling the materials.

GENERAL CONDITIONS OF CONTRACT

1.0 Definitions

"Contract" means the documents forming the tender and the acceptance thereof and the formal agreement executed between INCENT LGD(Client) and the contractor, together with the documents referred therein including these conditions, the specifications, designs, drawings and instructions issued from time to time by the Architects/Client and all these documents taken together shall be deemed to form one contract and shall be complementary to one another.

1.1 In the contract the following expressions shall, unless the context otherwise requires, have the meaning hereby respectively assigned to them.

1.1.2 'Site Engineer' shall mean an Engineer appointed by the CLIENT as their representative to give instructions to the contractors.

1.1.3 'The Contractor' shall mean the individual or firm or company whether incorporated or not, undertaking the works and shall include legal personal representative of such individual or the composing the firm or company and the permitted assignees of such individual or firms of company.

The expression 'works' or 'work' shall mean the permanent or temporary work described in the 'Scope of Work" and/or to be executed in accordance with the contract and includes materials, apparatus, equipment, temporary supports, fittings and things of all kinds to be provided, the obligations of the contractor hereunder and work to be done by the contractor under the contract.

1.1.4 'Engineer' shall mean the representative of the Architect/consultant.

1.1.5 'Drawings' shall mean the drawings prepared by the Architects and issued by the Engineer and referred to in the specifications and any modifications of such drawings as may be issued by the Engineer from time to time 'Contract value shall mean the value of the entire work as stipulated in the letter of acceptance of tender subject to such additions thereto or deductions there from as may be made under the provision herein after contained.

1.1.6 'Specifications' shall mean the specifications referred to in the tender and any modifications thereof as may time to time be furnished or approved by the architect/ consultant "Month" means calendar month.

1.1.7 "Week" means seven consecutive days.

1.1.8 "Day" means a calendar day beginning and ending at 00 Hrs and 24 hrs respectively.

CLAUSE

2.0 **Total Security Deposit**

Total Security deposit comprise of :
Earnest Money Deposit
Initial Security Deposit
Retention Money

3.0 Language Errors, Omissions and Discrepancies

In case of errors, omissions and/or disagreement between written and scaled dimensions on the drawings or between the drawings and specifications etc, the following order shall apply.

i) Between scaled and written dimension (or description) on a drawing, the latter shall be adopted.

ii) Between the written or shown description or dimensions in the drawings and the corresponding one in the specification the former shall be taken as correct.

iii) Between written description of the item in the specifications and descriptions in bills of quantities of the same item, the latter shall be adopted.

iv) In case of difference between rates written in figures and words, the rate in words shall prevail.

v) Between the duplicate/subsequent copies of the tender, the original tender shall be taken as correct.

4.0 Scope of Work

The contractor shall carry out, complete and maintain the said work in every respect strictly in accordance with this contract and with the directions of and to the satisfaction of the CLIENT to be communicated through the architect/consultant. The architect/consultant at the directions of the CLIENT from time to time issue further drawings and/or written instructions, details directions and explanations which are hereafter collectively referred to as Architect's/Consultant's instructions in regard to : the variation or modification of the design, quality or quantity of work or the addition or omission or substitution of any work, any discrepancy in the drawings or between the BOQ and/or drawings and/or specifications, the removal from the site of any material brought thereon by the contractor and the substitution of any other materials thereof, the demolition, removal and/or re-execution of any work executed by him, the dismissal from the work of any person employed/engaged thereupon.

5 (i) Letter of Acceptance

Within the validity period of the tender the CLIENT shall issue a letter of acceptance either directly or through the architect by registered post or otherwise depositing at the address of the contractor as given in the tender to enter into a Contract for the execution of the work as per the terms of the tender. The letter of acceptance shall constitute a binding contract between the CLIENT and the contractor.

5 (ii) Contract Agreement

On receipt of intimation of the acceptance of tender from the CLIENT/Architect the successful tenderer shall be bound to implement the contract and within fifteen days thereof he shall sign an agreement in a non-judicial stamp paper of appropriate value.

6.0 Ownership of drawings

All drawings, specifications and copies thereof furnished by the CLIENT through its architect/ consultants are the properties of the CLIENT. They are not to be used on other work.

7.0 Detailed drawings and instructions

The CLIENT through its architects/consultants shall furnish with reasonable promptness additional instructions by means of drawings or otherwise necessary for the proper execution of the work. All such drawings and instructions shall be consistent with the contract documents, true developments thereof and reasonably inferable there from.

The work shall be executed in conformity therewith and the contractor prepare a detailed programme schedule indicating therein the date of start and completion of various activities on receipt of the work order and submit the same to the CLIENT through the Architect/Consultant.

Copies of Agreement

Two copies of agreement/tender document duly signed by both the parties with the drawings shall be handed over to the contractors.

8.0 Liquidated Damages

If the contractor fails to maintain the required progress to complete the work and clear the site including vacating their office on or before the contracted or extended date or completion without justification in support of the cause of delay, he may be called upon without prejudice to any other right of remedy available under the law to the CLIENT on account of such breach to pay a liquidated damages at the rate of 0.5% of the contract value per week subject to a maximum of 5% of the contract value.

9.0 Materials, Appliances and Employees

Unless or otherwise specified the contractor shall provide and pay for all materials, labour, water, power, tools, equipment transportation and any other facilities that are required for the satisfactory execution and completion of the work. Unless or otherwise specified all materials shall be new and both workmanship and materials shall be best

quality. The contractor shall at all times enforce strict discipline and good order among his employees and shall not employ on the work any unfit person or anyone not skilled in the work assigned to him. Workman whose work or behaviour is found to be unsatisfactory by the CLIENT/Architect/Consultant he shall be removed from the site immediately.

10.0 Permits, Laws and Regulations

Permits and licences required for the execution of the work shall be obtained by the contractor at his own expenses.

The contractor shall give notices and comply with the regulations, laws, and ordinances rules, applicable to the contractor. If the contractor observes any discrepancy between the drawings and specifications, he shall promptly notify the CLIENT in writing under intimation of the Architect/Consultant. If the contractor performs any act which is against the law, rules and regulations he shall meet all the costs arising there from and shall indemnify the CLIENT any legal actions arising there from.

11.0 Setting out Work

The contractor shall set out the work and shall be responsible for the true and perfect setting out of the same and for the correctness of the positions, levels, dimensions, and alignment of all parts thereof and get it approved by the architect/consultant before proceeding with the work. If at any time any error in this respect shall appear during the progress of the works, irrespective of the fact that the layout had been approved by the architect/consultant the contractor shall be responsible for the same and shall at his own expenses rectify such error, if so, required to satisfaction of the CLIENT.

12.0 Protection of works and property

The contractor shall continuously maintain adequate protection, of all his work from damage and shall protect the CLIENT's properties from injury or loss arising in connection with contract. He shall make good any such damage, injury, loss due to his fault or negligence except which are due to causes beyond his control.

He shall take adequate care and steps for protection of the adjacent properties. The contractor shall take all precautions for safety and protection of his employees on the works and shall comply with all applicable provisions of Government and local bodies' safety laws and building codes to prevent accidents, or injuries to persons or property of about or adjacent to his place of work. The contractor shall take insurance covers as per clause 24.0 at his own cost. The policy may be taken in joint names of the contractors and the CLIENT and the original policy may be lodged with the CLIENT.

13.0 Inspection of Work

The CLIENT/Architect/Consultant or their representatives shall at all reasonable time have free access to the work site and/or to the workshop, factories or other places where materials are lying or from where they are obtained and the contractor shall give every facility to the CLIENT, Architect/Consultant and their representatives necessary for inspection and examination and test of the materials and workmanship. No person unless authorized by the CLIENT/Architect/Consultant except the representative of Public authorities shall be allowed on the work at any time. The proposed work either during its construction stage or its completion can also be inspected by the Chief Technical Examiner's organization a wing of Central Vigilance Commission.

14.0 Assignment and subletting

The whole of work included in the contract shall be executed by the contractor and he shall not directly entrust and engage or indirectly transfer assign or underlet the contract or any part or share thereof or interest therein without the written consent of the CLIENT through the architect and no undertaken shall relieve the contractor from the responsibility of the contractor from active superintendence of the work during its progress.

15.0 Quality of Materials, Workmanship & Test

(i) All materials and workmanship shall be best of the respective kinds described in the contract and in accordance with Architect/Consultant instructions and shall be subject from time to time to such tests as the architect/consultant may direct at the place of manufacture or fabrication or on the site or an approved testing laboratory. The contractor shall provide such assistance, instruments, machinery, labour and materials

(ii) Samples

All samples of adequate numbers, size, shades & pattern as per specifications shall be supplied by the contractor without any extra charges. If certain items proposed to be used are of such nature that samples cannot be presented

or prepared at the site detailed literature/test certificate of the same shall be provided to the satisfaction of the Architect/ consultant. Before submitting the sample/literature the contractor shall satisfy himself that the material/equipment for which he is submitting the samples/literature meet with the requirement of tender specification. Only when the samples are approved in writing by the architect/consultant the contractor shall proceed with the procurement and installation of the particular material/equipment. The approved samples shall be signed by the Architect/Consultant for identification and shall be kept on record at site office until the completion of the work for inspection/comparison at any time. The Architect/Consultant shall take reasonable time to approve the sample. Any delay that might occur in approving the samples for reasons of its not meeting the specifications or other discrepancies inadequacy in furnishing samples of best qualities from various manufacturers and such other aspects causing delay on the approval of the materials/equipments etc shall be to the account of the contractor.

(iii) Cost of tests

a) The cost of making any test shall be borne by the contractor if such test is intended by or provided for in the specifications or BOQ.

(iv) Cost of test not provided for

If any test is ordered by the Architect/ Consultant which is either :

(a) If so intended by or provided for or (in the cases above mentioned) is not so particularised or through so intended or provided for but ordered by the Architect/Consultant which is either to be carried out by an independent person at any place other than the site or the place of manufacture or fabrication of the materials tested or any Government/approved laboratory, then the cost of such test shall be borne by the contractor.

16.0 Obtaining Information related to execution of work

No claim by the contractor for additional payment shall be entertained which is consequent upon failure on his part to obtain correct information as to any matter affecting the execution of the work nor any misunderstanding or the obtaining incorrect information or the failure to obtain correct information relieve him from any risks or from the entire responsibility for the fulfilment of contract.

17.0 Contractor's superintendence

The contractor shall give necessary personal superintendence during the execution of the works and as long, thereafter, as the Architect/consultant may consider necessary until the expiry of the defects liability period, stated hereto.

18.0 Quantities

i)The bill of quantities (BOQ) unless or otherwise stated shall be deemed to have been prepared in accordance with the Indian Standard Method of Measurements

The rate quoted shall remain valid for variation of quantity against individual item to any extent subject to maximum variation of the contract value by 25%. The entire amount paid under Clause 20 hereof as well as amounts of prime cost and provisional sums, if any, shall be excluded.

ii)Variation exceeding 25% : The items of work executed in relation to variation exceeding 25% shall be paid on the basis of provisions of clause 22(e) hereof.

19.0 Works to be measured

The Architect/Consultant may from time to time intimate to the contractor that he required the work to be measured and the contractor shall forthwith attend or send a qualified representative to assist the Architect in taking such measurements and calculation and to furnish all particulars or to give all assistance required by any of them. Such measurements shall be taken in accordance with the Mode of measurements detailed in the specifications. The representative of the Architect/Consultant shall take joint measurements with the contractor's representative and the measurements shall be entered in the measurement book. The contractor or his authorized representative shall sign all the pages of the measurement book in which the measurements have been recorded in token of his acceptance. All the corrections shall be duly attested by both representatives. No over writings shall be made in the M book. Should the contractor not attend or neglect or omit to depute his representative to take measurements then the measurements recorded by the representative of the Architect/consultant shall be final. All authorized extra work, omissions and all variations made shall be included in such measurements.

20.0 Variations:

No alteration, omission or variation ordered in writing by the Architect/Consultant shall vitiate the contract.

In case the CLIENT/Architect/Consultant thinks proper at any time during the progress of works to make any alteration in, or additions to or omission from the works or any alteration in the kind or quality of the materials to be used therein, the Architect/Consultant shall give notice thereof in writing to the contractor or shall confirm in writing within seven days of giving such oral instructions the contractor shall alter to, 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 alteration or additions to or omissions from the works or any deviation from any of the provisions of the contract, stipulations, specifications or contract drawings without previous consent in writing of the Architect/Consultant and the value of such extras, alterations, additions or omissions shall in all cases be determined by the Architect/Consultant and the same shall be added to or deducted from the contract value, as the case may be.

21.0 Valuation of Variations

No claim for an extra shall be allowed unless it shall have been executed under the authority of the Architect/Consultant with the concurrence of the CLIENT as herein mentioned. 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 contract 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 herein.

ii)Rates for all items, wherever possible should be derived out of the rates givenin the priced BOQ.

b)The net prices of the original tender shall determine the value of the items omitted, provided if omissions do not vary the conditions under which any remaining items of works are carried out, otherwise the prices for the same shall be valued under sub clause (c) hereunder.

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 or works are carried out, then the contractor shall within 7 days of the receipt of the letter of acceptance inform the Architect/Consultant of the rate which he intends to charge for such items of work, duly supported by analysis of the rate or rates claimed and the Architect/Consultant shall fix such rate or prices as in the circumstances in his opinion are reasonable and proper, based on the market rate.

d)Where extra work cannot be properly measured or valued the contractor shall be allowed day work prices at the net rates stated in the tender of the BOQ 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/Consultant) the workman's name and materials employed be delivered for verifications to the Architect/Consultant at or before the end of the week following that in which the work has been executed.

e)It is further clarified that for all such authorized extra items where rates cannot be derived from the tender, the contractor shall submit rates duly supported by rate analysis worked on the "market rate basis" for material, labour, hire/running charges of equipment and wastages etc plus 15% towards establishment charges, contractor's overheads and profit. Such items shall not be eligible for escalation.

22.0 Final Measurement

The measurement and valuation in respect of the contract shall be completed within six months of the virtual completion of the work.

23.0 Virtual Completion Certificate (VCC)

On successful completion of entire works covered by the contract to the full satisfaction of the CLIENT, the contractor shall ensure that the following works have been completed to the satisfaction of the CLIENT.

a)Clear the site of all scaffolding, wiring, pipes, surplus materials, contractor's labour, equipment and machinery.

b)Demolish, dismantle and remove the contractor's site office, temporary works, structures including labour sheds/camps and constructions and other items and things whatsoever brought upon or erected at the site or any land allotted to the contractor by the CLIENT and not incorporated in the permanent works.

c)Remove all rubbish, debris etc from the site and the land allotted to the contractor by the CLIENT and shall clear, level and dress, compact the site as required by the CLIENT.

d)Shall put the CLIENT in undisputed custody and possession of the site and all land allotted by the CLIENT.

e)Shall hand over the work in a peaceful manner to the CLIENT.

f)All defects/imperfections have been attended and rectified as pointed out by the CLIENT to the full satisfaction of CLIENT.

Upon the satisfactory fulfilment by the contractor as stated above, the contractor shall be entitled to apply to the Architect/Consultant for the certificate. If the Architect/Consultant is satisfied of the completion of the work, relative to which the completion certificate has been sought, the Architect/Consultant shall within fourteen (14) days of the receipt of the application for virtual completion certificate, issue a VCC in respect of the work for which the VCC has been applied.

This issuance of a VCC shall be without prejudice to the CLIENT's rights and contractor's liabilities under the contract including the contractor's liability for defects liability period nor shall the issuance of VCC in respect of the works or work at any site be construed as a waiver of any right or claim of the CLIENT against the contractor in respect of works or work at the site and in respect of which the VCC has been issued.

24.0 Work by other agencies

The CLIENT/Architect/Consultant reserves the rights to use premises and any portion of the site for execution of any work not included in the scope of this contract which it may desire to have carried out by other persons simultaneously and the contractor shall not only allow but also extend reasonable facilities for the execution of such work. The contractor however shall not be required to provide any plant or material for the execution of such work except by special arrangement with the CLIENT. Such work shall be carried out in such manners not to impede the progress of the works included in the contract.

25.0 Insurance of Works

25.1 Without limiting his obligations and responsibilities under the contract the contractor shall insure in the joint names of the CLIENT and the contractor against all loss or damages from whatever cause arising other than the excepted risks, for which he is responsible under the terms of contract and in such a manner that the CLIENT and contractor are covered for the period stipulated in clause 28 of GCC and are also covered during the period of maintenance for loss or damage arising from a cause, occurring prior to the commencement of the period of maintenance and for any loss or damage occasioned by the contractor in the course of any operations carried out by him for the purpose of complying with his obligations under clause.

a)The works for the time being executed to the estimated current Contract value thereof, or such additional sum as may be specified together with the materials for incorporation in the works at their replacement value.

b)The constructional plant and other things brought on to the site by the contractor to the replacement value of such constructional plant and other things.

c)Such insurance shall be effected with an insurer and in terms approved by the CLIENT which approval shall not be unreasonably withheld and the contractor shall whenever required produce to the Architect/Consultant the policy of insurance and the receipts for payment of the current premiums.

25.2 Damage to persons and property

The contractor shall, except if and so far as the contract provides otherwise indemnify the CLIENT against all losses and claims in respect of injuries or damages to any person or material or physical damage to any property whatsoever which may arise out of or in consequence of the execution and maintenance of the works and against all claims proceedings, damages, costs, charges and expenses whatsoever in respect of or in relation thereto except any compensation of damages for or with respect to :

a)The permanent use or occupation of land by or any part thereof.

b)The right of CLIENT to execute the works or any part thereof, on, over, under, in or through any lands.

c)Injuries or damages to persons or properties which are unavoidable result of the execution or maintenance of the works in accordance with the contract.

d)Injuries or damage to persons or property resulting from any act or neglect of the CLIENT, their agents, employees or other contractors not being employed by the contractor or in respect of any claims, proceedings, damages, costs, charges and expenses in respect thereof or in relation thereto or where the injury or damage was contributed to by the contractor, his servants or agents such part of the compensation as may be just and equitable having regard to the extent of the responsibility of the CLIENT, their employees, or agents or other employees, or agents or other contractors for the damage or injury.

25.3 Contractor to indemnify CLIENT

The contractor shall indemnify the CLIENT against all claims, proceedings, damages, costs, charges and expenses in respect of the matters referred to in the provision sub-clause 26.2 of this clause.

25.4 Contractor's superintendence

The contractor shall fully indemnify and keep indemnified the CLIENT against any action, claim, or proceeding relating to infringement or use of any patent or design or any alleged patent or design rights and shall pay any royalties which may be payable in respect of any article or part thereof included in the contract. In the event of any claim made under or action brought against CLIENT in respect of such matters as aforesaid the contractor shall be immediately notified thereof and the contractor shall be at liberty, at his own expenses to settle any dispute or to conduct any litigation that may arise there from, provided that the contractor shall not be liable to indemnify the CLIENT if the infringement of the patent or design or any alleged patent or design right is the direct result of an order passed by the Architect/Consultant in this behalf.

25.5 Third Party Insurance

25.5.1 Before commencing the execution of the work the contractor but without limiting his obligations and responsibilities under clause 26.0 of GCC shall insure against his liability for any material or physical damage, loss, or injury which may occur to any property including that of CLIENT, or to any person, including any employee of the CLIENT, by or arising out of the execution of the works or in the carrying out of the contract, otherwise than due to the matters referred to in the provision to clause 26.0 thereof.

25.5.2 Minimum Amount of Third Party Insurance

Such insurance shall be affected with an insurer and in terms approved by the CLIENT which approval shall not be reasonably withheld and for at least the amount stated below. The contractor shall, whenever required, produce to the Architect/Consultant the policy or policies of insurance cover and receipts for payment of the current premiums.

25.6 The minimum insurance cover for physical property, injury, and death is Rs.5.0 lacs per occurrence with the number of occurrences limited to four. After each occurrence contractor will pay additional premium necessary to make insurance valid for four occurrences always.

25.7 Accident or Injury to Workmen

25.7.1 The CLIENT shall not be liable for or in respect of any damages or compensation payable at law in respect or in consequence of any accident or injury to any workmen or other person in the employment of the contractor or any sub-contractor, save and except an accident or injury resulting from any act or default of the CLIENT or their agents, or employees. The contractor shall indemnify and keep indemnified CLIENT against all such damages and compensation, save and except as aforesaid and against all claims, proceedings, costs, charges and expenses whatsoever in respect thereof or in relation thereto.

25.7.2 Insurance against accidents etc to workmen

The contractor shall insure against such liability with an insurer approved by the CLIENT during the whole of the time any person employed by him on the works and shall, when required, produce to the architect/consultant such policy of insurance and receipt for payment of the current premium. Provided always that, in respect of any persons employed by any sub-contractor the contractor's obligation to insure as aforesaid under this sub-clause shall be satisfied if the sub contractor shall have insured against the liability in respect of such persons in such manner that CLIENT is indemnified under the policy but the contractor shall require such sub-contractor to produce to the Architect/Consultant when required such policy of insurance and the receipt for the payment of the current premium.

25.7.3 Remedy on Contractor's failure to insure

If the contractor fails to effect and keep in force the insurance referred to above or any other insurance which he may be required to effect under the terms of contract, then and in any such case the CLIENT may effect and keep in force any such insurance and pay such premium or premiums as may be necessary for that purpose and from time to time deduct the amount so paid by the CLIENT as aforesaid and also deduct 15% of contract value from any amount due or which may become due to the contractor, or recover the same as debt from the contractor.

25.7.4 Without prejudice to the other rights of the CLIENT against contractors, in respect of such default, the CLIENT shall be entitled to deduct from any sums payable to the contractor the amount of any damages costs, charges, and other expenses paid by the CLIENT and which are payable by the contractors under this clause. The contractor shall

upon settlement by the insurer of any claim made against the insurer pursuant to a policy taken under this clause, proceed with due diligence to rebuild or repair the works destroyed or damaged. In this event all the monies received from the insurer in respect of such damage shall be paid to the contractor and the contractor shall not be entitled to any further payment in respect of the expenditure incurred for rebuilding or repairing of the materials or goods destroyed or damaged.

26.0 Commencement of Works

The date of commencement of the work will be reckoned as the recorded date of handing over site by the CLIENT or 15 days from the date of issue of Letter of Acceptance of CLIENT, whichever is later.

27.0 Time for completion

Time is the essence of the contract and shall be strictly observed by the contractor. The entire work shall be completed within a period of 150 days from the date of commencement. If required in the contract or as directed by the Architect/Consultant, the contractor shall complete certain portions of work before completion of the entire work. However the completion date shall be reckoned as the date by which the whole work is completed as per the terms of the contract.

28.0 Extension of Time

If, in the opinion of the Architect/Consultant, the work be delayed for reasons beyond the control of the contractor, the Architect/Consultant may submit a recommendation to the CLIENT to grant a fair and reasonable extension of time for completion of work as per the terms of contract. If the contractor needs an extension of time for the completion of work or if the completion of work is likely to be delayed for any reasons beyond the due date of completion as stipulated in the contract, the contractor shall apply to the CLIENT through the Architect/Consultant in writing at least 30 days before the expiry of the scheduled time and while applying for extension of time he shall furnish the reasons in detail and his justification if any, for the delays. The architect/consultant shall submit their recommendations to the CLIENT in the prescribed format for granting extension of time. While granting extension of time the contractor shall be informed the period extended time which will qualify for levy of liquidated damages. For the balance period in excess of original stipulated period and duly sanctioned extension of time by the CLIENT the provision of liquidated damages as stated under clause 9 of GCC shall become applicable. Further contract shall remain in force even for the period beyond the due date of completion irrespective whether the extension is granted or not.

29.0 Rate of progress

Whole of the materials, plant and labour to be provided by the contractor and the mode, manner and speed of execution and maintenance of the works are to be of a kind and conducted in a manner to the satisfaction of the Architect/Consultant. Should the rate of progress of the work or any part thereof be at any time be in the opinion of the Architect/ Consultant too slow to ensure the completion of the whole of the work by the prescribed time or extended time for completion the Architect/Consultant shall thereupon take such steps as considered necessary by the Architect/Consultant to expedite progress so as to complete the woks by the prescribed time or extended time. Such communications from the Architect/Consultant neither shall relieve the contractor from fulfilling obligations under the contract nor he shall be entitled to raise any claims arising out of such directions.

30.0 Work during nights and holidays

Subject to any provision to the contrary contained in the contract no permanent work shall save as herein provided be carried on during the night or on holidays without the permission in writing of the Architect/Consultant, save when the work is unavoidable or absolutely necessary for the saving of life or property or for the safety of the work in which case the contractor shall immediately advise the Architect/Consultant. However the provision of the clause shall not be applicable in the case of any work which becomes essential to carry by rotary or double shifts in order to achieve the progress and quality of the part of the works being technically required and continued with the prior approval of the Architect/consultant at no extra cost to the CLIENT.

All work at night after obtaining approval from competent authorities shall be carried out without unreasonable noise and disturbance.

31.0 No compensation for restrictions of work

If at any time after acceptance of the tender CLIENT shall decide to abandon or reduce the scope of work for any reason whatsoever and hence not require the whole or any part of the work to be carried out, the

Architect/Consultant shall give notice in writing to that effect to the contractor and the contractor shall act accordingly in the matter. The contractor shall have no claim to any payment of compensation or otherwise whatsoever, on account of any profit or advantage which he might have derived from the execution of the work fully but which he did not derive in consequence of the foreclosure of the whole or part of the work.

Provided that the contractor shall be paid the charges on the cartage only of materials actually and bona fide brought to the site of the work by the contractor and rendered surplus as a result of the abandonment, curtailment of the work or any portion thereof and then taken back by the contractor, provided however that the Architect/Consultant shall have in such cases the option of taking over all or any such materials at their purchase price or a local current rate whichever is less.

In case of such stores having been issued from CLIENT stores and returned by the contractor to stores, credit shall be given to him at the rates not exceeding those at which were originally issued to the contractor after taking into consideration and deduction for claims on account of any deterioration or damage while in the custody of the contractor and in this respect the decision of Architect/Consultant shall be final.

32.0 Suspension of work

i)The contractor shall, on receipt of the order in writing of the Architect/Consultant (whose decision shall be final and binding on the contractor) suspend the progress of works or any part thereof for such time and in such manner as Architect/ Consultant may consider necessary so as not cause any damage or injury to the work already done or endanger the safety thereof for any of following reasons.

a)On account any default on the part of the contractor, or

b)For proper execution of the works or part thereof for reasons other than the default of the contractor, or

c)For safety of the works or part thereof.

The contractor shall, during such suspension, properly protect and secure the works to the extent necessary and carry out the instructions given in that behalf by the Architect/Consultant.

ii)If the suspension is ordered for reasons (b) and (c) in sub-Para (i) above :

The contractor shall be entitled to an extension of time equal to the period of every such suspension. No compensation whatsoever shall be paid on this account.

33.0 Action when the whole security deposit is forfeited

In any case in which under any clause or clauses of this contract, the Contractor shall have rendered himself liable to pay compensation amounting to the whole of his security deposit the Architect/Consultant shall have the power to adopt any of the following course as they may deem best suited to the interest of the CLIENT.

a)To rescind the contract (of which rescission notice in writing to the contractor by the Architect/Consultant shall be conclusive evidence) and in which case the security deposit of the contractor shall be forfeited and be absolutely at the disposal of CLIENT.

b)To employ labour paid by the CLIENT and to supply materials to carry out the work, or any part of the work, debiting the contractor with the cost of the labour and materials (the cost of such labour and materials as worked out by the Architect/ Consultant shall be final and conclusive against the contractor) and crediting him with the value of the work done, in all respects in the same manner and at the same manner and at the same rates as if it had been carried out by the contractor under the terms of this contract the certificate of Architect/Consultant as to the value of work done shall be final and conclusive against the contractor.

c)To measure up the work of the contractor, and to take such part thereof as shall be unexecuted, out of his hands, and to give it to another contractor to complete in which case any expenses which may be incurred in excess of the sum which would have been paid to the original contractor, if the whole work had been executed by him (of the amount of which excess the certificates in writing of the Architects/ Consultant shall be final and conclusive) shall be borne by original contractor and may be deducted from any money due to him by CLIENT under the contract or otherwise, or from his security deposit or the proceeds of sale thereof, or sufficient part thereof.

In the event of any of above courses being adopted by the CLIENT the contractor shall have no claim to compensation for any loss sustained by him by reasons of his having purchased or procured any material or entered into any engagements or make any advances on account of, or with a view to the execution of the work or the performance of the contract and in case the contract shall be rescinded under the provision aforesaid, the contractor shall not be

entitled to recover or to be paid any sum or any work thereto for actually performed under this contract, unless, and until the Architect/Consultant will have certified in writing the performance of such work and the value payable in respect thereof, and he shall only be entitled to be paid the value so certified.

34.0 Owner's Right to Terminate the Contract

If the contractor being an individual or a firm commit any 'Act of Insolvency' or shall be adjusted an insolvent or being an incorporated company shall have an order for compulsory winding up voluntarily or subject to the supervision of Government and of the Official Assignee of the liquidator in such acts of insolvency or winding up shall be unable within seven days after notice to him to do so, to show to the reasonable satisfaction of the Architect/Consultant that he is able to carry out and fulfil 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 to be issued or shall suffer any payment under this contract to be attached by or on behalf of any of the creditors of the contractor.

Or shall assign or sublet this contract without the consent in writing of the CLIENT through the Architect/Consultant or shall charge or encumber this contract or any payment due to which may become due to the contractor there under.

a)Has abandoned the contract; or

b)Has failed to commence the works, or has without any lawful excuse under these conditions suspended the progress of the works for 14 days after receiving from the CLIENT through the Architect/Consultant written notice to proceed, or

c)Has failed to proceed with the works with such diligence and failed to make such due progress as would enable the works to be completed within the time agreed upon, or has failed to remove the materials from the site or to pull down and replace work within seven days after written notice from the CLIENT through the Architect/ Consultant that the said materials were condemned and rejected by the Architect/ Consultant under these conditions; or 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 for seven days after written notice shall have been given to the contractor to observe or perform the same or has to the detriment of good workmanship or in defiance of the CLIENT's or Architect's/Consultant's instructions to the contrary subject any part of the contract. Then and in any of said cases the CLIENT and or the Architect/Consultant, may not withstanding any previous waiver, after giving seven days notice in writing to the contractor, determine the contract, but without thereby affecting the powers of the CLIENT or the Architect/Consultant or the obligation 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 had been executed by or on behalf of the contractor. And, further the CLIENT through the Architect/Consultant, their agents or employees may enter upon and take possession of the work and all plants, tools, scaffoldings, materials, sheds, machineries lying upon the premises or on the adjoining lands or roads, use the same by means of their own employees or workmen in carrying on and completing the work or by engaging any other contractors or persons to complete the work and the contractor shall not in any was interrupt or do any act, matter or thing to prevent or hinder such other contractor or other persons employed for completing and finishing or using the materials and plant for the works.

When the works shall be completed or as soon thereafter as convenient the CLIENT or the Architect/Consultant shall give a notice in writing to the contractor to remove his surplus materials and plants and should the contractor fail to do so within 14 days after receipt thereof by him the CLIENT sell the same by public auction after due publication and shall adjust the amount realized by such auction. The contractor shall have no right to question any of the act of the CLIENT incidental to the sale of the materials etc.

35.0 Certificate of Payment

The contractor shall be entitled under the certificates to be issued by the Architect/ Consultant to the contractor within 10 working days from the date of certificate to the payment from CLIENT from time to time. The CLIENT shall recover the statutory recoveries and other dues including the retention amount from the certificate of payment.

Provided always that the issue of any certificate by the Architect/Consultant during the progress of works or completion shall not have effect as certificate of satisfaction or relieve the contractor from his liability under clause.

The Architect/Consultant shall have power to withhold the certificate if the work or any part thereof is not carried out to their satisfaction.

The Architect/Consultant may by any certificate make any corrections required in previous certificate.

The CLIENT shall modify the certificate of payment as issued by the Architect/Consultant from time to time while making the payment.

The contractor shall submit interim bills only after taking actual measurements and properly recorded in the Measurement book (M.B).

The contractor shall not submit interim bills when the approximate value of work done by him is less than and the minimum interval between two such bills shall be one month.

The final bill may be submitted by contractor within a period of one month from the date of virtual completion and Architect/Consultant shall issue the certificate of payment within a period of two months. The CLIENT shall pay the amount within a period of three months from the date of issue of certificate provided there is no dispute in respect of rates and quantities.

The contractor shall submit the interim bills in the prescribed format with all details.

36.0 Settlement of Disputes and Arbitration

Except where otherwise provided in the contract all questions and disputes relating to the meaning of the specifications, design, drawings and instructions herein before mentioned and as to the quality of workmanship or materials used on the work or as to any other question, claim, right, matter or thing whatsoever in any way arising out of or relating to the contract, designs, drawings, specifications, estimates, instructions, orders or these conditions or otherwise concerning the work or the execution or failure to execute the same, whether arising during the progress of the work or after the cancellation, termination, completion or abandonment thereof shall be dealt with as mentioned hereinafter :

i)If the contractor considers that he is entitled to any extra payment or compensation in respect of the works over and above the amounts admitted as payable by the Architect or in case the contractor wants to dispute the validity of any deductions or recoveries made or proposed to be made from the contract or raise any dispute, the Contractor shall forthwith give notice in writing of his claim, or dispute to the Assistant General Manager (Premises& Estate)/Dy.General Manager (Premises)and endorse a copy of the same to the Architect, within 30 days from the date of disallowance thereof or the date of deduction or recovery. The said notice shall give full particulars of the claim, grounds on which it is based and detailed calculations of the amount claimed and the contractor shall not be entitled to raise any claim nor shall the CLIENT be in any way liable in respect of any claim by the contractor unless notice of such claim shall have been given by the contractor to the Assistant General Manager (Premises& Estate)/Dy.General Manager (premises) in the manner and within the time as aforesaid. The contractor shall be deemed to have waived and extinguished all his rights in respect of any claim not notified to theAssistant General Manager (Premises& Estate)/Dy.General Manager (premises) in writing in the manner and within the time aforesaid.

ii)The Assistant General Manager (Premises& Estate)/Dy.General Manager (premises) shall give his decision in writing on the claims notified by the contractor. The contractor may within 30 days of the receipt of the decision of the Assistant General Manager (Premises& Estate)/Dy.General Manager (premises) submit his claims to the conciliating authority namely the Circle Development Officer/General Manager (Corporate Services) for conciliation along with all details and copies of correspondence exchanged between him and the Assistant General Manager (Premises& Estate)/Dy.General Manager (premises)

iii)If the conciliation proceedings are terminated without settlement of the disputes, the contractor shall, within a period of 30 days of termination thereof shall give a notice to the concerned Chief General Manager/Dy.Managing Director &Corporate Development Officer of the CLIENT for appointment of an arbitrator to adjudicate the notified claims failing which the claims of the contractor shall be deemed to have been considered absolutely barred and waived.

iv)Except where the decision has become final, binding and conclusive in terms of the contract, all disputes or differences arising out of the notified claims of the contractor as aforesaid and all claims of the CLIENT shall be referred for adjudication through arbitration by the Sole Arbitrator appointed by the Chief General Manager/Dy.Managing Director &Corporate Development Officer. It will also be no objection to any such appointment that the Arbitrator so appointed is a CLIENT Officer and that he had to deal with the matters to which the Contract relates in the course of his duties as CLIENT Officer. If the arbitrator so appointed is unable or unwilling to act or resigns his appointment or vacates his office due to any reason whatsoever another sole arbitrator shall be appointed

in the manner aforesaid by the said Chief General Manager/Dy.Managing Director &Corporate Development Officer. Such person shall be entitled to proceed with the reference from the stage at which it was left by his predecessor.

It is a term of this contract that the party invoking arbitration shall give a list of disputes with amounts claimed in respect of each dispute along with the notice for appointment of arbitrator.

It is also a term of this contract that no person other than a person appointed by such Chief General Manager aforesaid should act as arbitrator.

The conciliation and arbitration shall be conducted in accordance with the provisions of the Arbitration & Conciliation Act 1996 or any statutory modification or re-enactment thereof and the rules made there under.

It is also a term of the contract that if any fees are payable to the arbitrator these shall be paid equally by both the parties. However, no fees will be payable to the arbitrator if he is a CLIENT Officer.

It is also a term of the contract that the arbitrator shall be deemed to have entered on the reference on the date he issues notice to both the parties calling them to submit their statement of claims and counter statement of claims. The venue of the arbitration shall be such place as may be fixed by the arbitrator in his sole discretion. 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) shall be in the discretion of the arbitrator who may direct to any by whom and in what manner, such costs or any part thereof shall be paid and fix or settle the amount of costs to be so paid.

37.0 Treasure Trove etc.

Any treasure trove, coin or object antique which may be found on the site shall be the property of CLIENT and shall be handed over to the CLIENT immediately.

38.0 Method of Measurement

Unless otherwise mentioned in the schedule of quantities or in mode of measurement, the measurement will be on the net quantities or work produced in accordance with up to date. Rules laid down by the Bureau of Indian Standards. In the event any dispute/disagreement the decision of the Architect/Consultant shall be final and binding on the contractor.

39.0 Maintenance of Registers

The contractor shall maintain the following registers as per the enclosed format at site of work and should produce the same for inspection of CLIENT/Architect/Consultant whenever desired by them. The contractor shall also maintain the records/registers as required by the local authorities/Government from time to time.

- **i)** Register for hindrance to work
- **ii)** Register for running account bill
- **iii)** Register for labour

40.0 Force Majeure

43.1 Neither contractor not CLIENT shall be considered in default in performance of their obligations if such performance is prevented or delayed by events such as war, hostilities revolution, riots, civil commotion, strikes, lockout, conflagrations, epidemics, accidents, fire, storms, floods, droughts, earthquakes or ordinances or any act of god or for any other cause beyond the reasonable control of the party affected or prevented or delayed. However a notice is required to be given within 30 days from the happening of the event with complete details, to the other party to the contract, if it is not possible to serve a notice, within the shortest possible period without delay.

40.2 As soon as the cause of force majeure has been removed the party whose ability to perform its obligations has been affected, shall notify the other of such cessation and the actual delay incurred in such affected activity adducing necessary evidence in support thereof.

40.3 From the date of occurrence of a case of force majeure obligations of the party affected shall be suspended during the continuance of any inability so caused. With the cause itself and inability resulting there from having been removed, the agreed time of completion of the respective obligations under this agreement shall stand extended by a period equal to the period of delay occasioned by such events.

40.4 Should one or both parties be prevented from fulfilling the contractual obligations by a state of force majeure lasting to a period of 6 months or more the two parties shall mutually decide regarding the future execution of this agreement.

41.0 Local Laws, Acts, Regulations

The contractor shall strictly adhere to all prevailing labour laws inclusive of contract labour (regulation and abolition act of 1970) and other safety regulations. The contractor shall comply with the provision of all labour legislation including the latest requirements of all the Acts, laws, any other regulations that are applicable to the execution of the project.

i)Minimum Wages Act, 1948 (Amended)

ii)Payment of Wages Act 1936 (Amended)

iii)Workmen's Compensation Act 1923 (Amended)

iv)Contract Labour Regulation and Abolition Act 1970 and Central Rules 1971 (Amended)

v)Apprentice Act 1961 (Amended)

vi)Industrial Employment (Standing Order) Act 1946 (Amended)

vii)Personal Injuries (Compensation Insurance) Act 1963 and any other modifications

viii)Employees' Provident Fund and Miscellaneous Provisions Act 1952 and amendment thereof

ix)Shop and Establishment Act

x)Any other Act or enactment relating thereto and rules framed there under from time to time.

The Contract shall be interpreted in accordance with the laws of the Union of India and shall be subject to the exclusive jurisdiction of courts at Chennai.

42.0 SAFETY CODE:

Safety as per industrial practise and statutory authorities requirements and instructions of the consultant to be complied.

43.0 Accidents

The contractor shall immediately on occurrence of any accident at or about the site or in connection with the execution of the work report such accident to the Architect/Consultant. The contractor shall also report immediately to the competent authority whenever such report is required to be lodged by the law and take appropriate actions thereof.

44.0 Photographs of works carried out

The Contractor shall every month supply at his own cost a reasonable number of Maxi size colored photographs of the works carried out from time to time as per the instructions of, the Architect / Consultant. In the event of any dispute or termination of Contract either by the Employer / CLIENT or the Contractor as provided for in the respective Clause, the Contractor shall arrange to obtain Photographs of the works completed up to the date of such termination of Contract.

45.0 Technical Audit Clause

The work is liable to be technically audited by the chief Technical Examiner of the Central Vigilance Commission of the Government of India from time to time. Any defects, improvements or testing etc. pointed out by the Chief Technical Examiner should be carried out by the Contractor at his own cost and any deduction suggested by the CTE will be effected.

The Employer shall have a right to cause a technical examination and audit of works and the final bills of the Contractor including all supporting vouchers, abstract, 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 in respect of any work done by the Contractor under the Contract the Contractor shall be liable to return the amount of over payment and it will be lawful for the employer to recover the same from any sum or due to him and in any other manner legally permissible and if it is found, that the Contractor was paid less then what was due to his under the Contract in respect of any work, executed by him under the Contract the amount of such under payment shall be duly paid by the Employer.

Any sum of money due and payable to the Contractor (including Security deposit returnable to him) under this Contract may be appropriated by the Employer and set off against any claim of the Employer for the payment of a sum of money arising out of or under any other Contract made by the Contractor with the Employer.

46.0. Deletion of items from Bills of Quantities

The CLIENT reserves the right to delete any item from the bill of quantities drawn up. The Contractor will not have any claim on this account whatsoever.

47.0 Non-Availability of Specified Materials / Items

In case of materials / Items which are not available, the Contractor shall have to submit a letter from manufacturer to that effect. Alter proper verification, alternative material may be selected by the Employer/Architect / Consultant. In the case there will not be any increase of the quoted rates. However, if Accepted alternative is cheaper the cost benefit is to be passed on to the Employer.

48.0 Address for Service

All letters and Notices under or pursuant to these presents shall be hand delivered against acknowledgement or sent by Registered Post with Acknowledgement due at the respective addresses mentioned below. Any change in the addresses shall be duly intimated by the concerned Party to all others.

I. Address of Employer :

Assistant General Manager (Civil), CLIENT,
Premises & Estate Department, 4th Floor, Local head office,
Chennai 600 006

II. Address for the Contractors :

PART – F

SAFETY CODES

29.1.1. First aid appliances including adequate supply of sterilized dressing and cotton wool shall be kept in a readily accessible place.

29.1.2. An injured person shall be taken to a public hospital without loss of time, in cases where the injury necessitates hospitalization.

29.1.3. Suitable and strong scaffolds should be provided for workmen for all works that cannot safely be done from the ground.

29.1.4. No portable single ladder shall be over 8 meters in length. The width between the side rails shall not be less than 30 cm. (clear) and the distance between two adjacent rungs shall not be more than 30 cm. When a ladder is used an extra mazdoor shall be engaged for holding ladder.

29.1.5. The excavated material shall not be placed within 1.5 meters of the edge of the trench or half of the depth of trench whichever is more. All trenches and excavations shall be provided with necessary fencing and lighting.

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

29.1.7. No floor, roof or other part of the structure shall be so overloaded with debris or materials as to render it unsafe.

29.1.8. Those engaged in welding works shall be provided with welder's protective eye shields and gloves.

29.1.8.i. No paint containing lead or lead products shall be used except in the form of paste or readymade paint.

29.1.8.ii. Suitable facemasks should be supplied for use by the workers when the paint is applied in the form of spray or surface having lead paint dry rubbed and scrapped.

29.1.9. Hoisting machines and tackle used in the works, including their attachments, anchorage and supports shall be in perfect condition.

29.1.10. The ropes used in hoisting or lowering material or as a means of suspension shall be of durable quality and adequate strength and free from defects.

29.1.11. The work should be carried out as per IER 1956 amended up-to-date and to the entire satisfaction of CLIENT/Architect/Electrical Consultant.

29.1.12. Colour coding should be strictly followed for the entire installation as per standards. Circuit wires and point wires should have distinct colour coding.

29.1.13. All the MCB used in the works should berated for 10 KA and with 'D' curve

29.1.14. The distribution board, A/c control box, switch control boxes, etc., shall have the enclosures as supplied by the manufacturer.

29.1.15. Circuit wiring shall be measured from the distribution board up to first switch control box only. Looping circuit shall not be paid for separately.

29.1.16. All circuit shall be run in individual conduits only. Circuits of the same phases if required may be run in the same conduit with the consent of the Electrical Consultant. However he rates for the same shall be revised accordingly.

29.1.17. Junction / adopter box shall be provided wherever necessary for termination of conduit / cable as required without any additional cost. Junction boxes are permitted only above MDB/PDB/LB. junction boxes if required in other places, shall be fixed only with the consent of the Architect.

29.1.18. The rates quoted shall be inclusive of all civil works for embedding the conduit (in ceiling / wall / floor), recessing switch control box, distribution boards, etc., with rough plastering. Chicken mesh should be used while plastering when number of conduits exceeds two in a row.

29.1.19. The rates quoted shall be inclusive of all taxes, GST and duties currently as applicable.

29.1.20. The quoted rates shall be self-sustaining and shall remain valid for any increase or decrease in quantity.

29.1.21. The rates quoted shall remain firm till the entire installation is handed over. No revision of rates shall be entertained at any cause.

29.1.22. All equipment used in the work shall be new and of best quality confirming to IS and ISI stamped unless otherwise approved.

29.1.23. Additional work if any required by the client shall be carried out with the consent of the CLIENT/Architect/Electrical Consultant.

29.1.24. Necessary shop drawing shall be submitted for all the panel boards for the approval of the CLIENT/Architect/Electrical Consultant.

29.1.25. The underground cable laid in ground should be buried to a depth of 750 mm below the ground level land shall be protected with well burnt bricks both on sides and on top over a sand cushion of 150 mm fine river sand. (75 mm below and 75 mm above the cable. The rates should also include for making good of the surface as required. Suitable cable route indicators should be provided the interval of 25 mtrs. as per the site requirements without any additional cost. HT cable should be buried to a depth of 1000 mm below ground level.

29.1.26. The earth electrode should be provided only in the presence of Electrical Consultant / Client's Engineer.

29.1.27. The contractor should test all the cables for insulation and the earth electrode or resistance and submit the results to the Electrical Consultant / Client.

29.1.28. The CLIENT / Architect reserves the right to accept / reject / cancel any or all tenders either in full or in part without assigning any reason.

29.1.29. The contractor should submit 3 copies of 'As build drawings' for the entire installation showing the conduit layout, location of panels, DBs, switch control boxes etc., along with the final bill. Final bill will not be entertained without the 'As build drawings'.

29.1.30. It is the responsibility of the contractor to liaise with the local electricity board, get the feasible report, additional load sanction and obtain the connection for the premises as required. However the client shall

arrange to pay necessary deposit and service connection charges, etc., to the electricity board.

29.1.31. Taxes as per statutory requirement shall be deducted from the contractor's bill before making final payment.

29.1.32. Retention money as stipulated in the tender will be withheld from the contractor's bill and the same shall be released after completion of defects liability period.

29.1.33. All the panels should be tested for high voltage and installation as per norms without any additional cost in the presence of CLIENTs Engineer / Electrical Consultant.

29.1.34. The test results for the panels should be submitted in triplicate.

29.1.35. The minimum and maximum operating height for all the panels should be maintained at 450 mm & 1800 mm respectively from the finished floor level.

29.1.36. Copper bus bars should be provided for the entire length of the bus bar chamber and suitable ventilation louver should be provided in the bus bar chamber. Meter / Fuse switch unit should not be fixed in the bus bar chamber.

29.1.37. All the feeders in the panel board should be suitably identified with reverse engraving plates with the details of feeder, cable size etc.

29.1.38. Removable type glad plate should be provided in the cable chamber and suitable gland holes should be provided in the panel (including for spare / dummies) before powder coating.

29.1.39. Door of the cable chamber should be provided with the push type spring loaded knobs and should be made in two sections if the length exceeds more than 1200 mm.

29.1.40. The panel should be provided with ring main earthing using 25 x 3 mm copper flat and all the feeders in the panel should be provided with two distinct earth connections. The earth flat run inside the bus chamber should be suitably shrouded and the earth flat distinctly colour coded.

PART – G

LIST OF MAKES

S.No.	Description	Approved Makes
1.	FRLS copper wires	RR Kabel, Polycab, Havells
2.	Modular switches and sockets	MK Blenze plus, Panasonic Vision, Legrand Myrius
3.	UG cables	Polycab, Havells, RR Kabel
4.	UG cable gland and lug	Dowells, Jainson, Lotus
5.	Switchgears	Legrand, Schneider, ABB, L&T
6.	Main LT panel	CPRI approved panel manufacturers
7.	PVC conduits (ISI marked)	Avon Plast, Aeroplat, Vasavi
8.	MS conduits (ISI marked)	BEC, Vimco, GB, Gupta Brothers
9.	Speaker	Bosch, JBL , Ahuja
10.	Music system cable	Polycab, Havells, RR Kabel
11.	Exhaust fan & ceiling fan	Crompton, Almonard, Bajaj, Orient, Usha
12.	Light fittings	Wipro, Crompton, Havells, Philips

NOTE:

a) The contractors shall use only the specified materials as mentioned above and shall submit the list along with the drawings before starting the work at site.

b) All the materials shall be as per the latest BIS standards.

c) In case of non-availability of any material, approval of the CLIENT's Engineer must be obtained before using any other material and the approval is subject to adjustment of the cost of the material.

d) Before placing order, the contractor must submit a letter from OEMs stating the specifications of the materials to be used for the project.

e) Before placing order, the contractor must submit the sample & test certificates of the materials to be used and obtain prior approval from the CLIENT.

HVAC

1.0 CONDITIONS OF TENDER

SALIENT COMMERCIAL POINTS:

1. The contract completion time will be six (6) months from the date of release of the order.
2. The standard terms of payment shall be 80% against prorate delivery of materials, 10% against prorate erection and final 10% after completion against the submission of bank guarantee for 5% valid for a period of 1 year from the date of completion.
3. The standard terms of payment shall be followed.
4. The period of payment of interim bills will be a maximum of 15 days of presentation of the bill.
5. The successful bidder shall enter into an agreement as per the format, within 15 days of receipt of order.
6. Only proven equipment and working satisfactorily for the last 3 years shall be offered.
7. All the equipment including the chillers shall have 18 months guarantee from the date of handing over.
8. All the twochillers shall be factory tested as per ARI/ AHRI and shall be witnessed by the purchasers Engineers (2 persons). All the charges including transportation from Chennai to the place of manufacture and accommodation charges shall be included in the offer.
9. AMC rates for 5(Subsequent years) after the guarantee period shall also be indicated.

1.1 SIGNATURES:

(i) In the event of the tender being submitted by a firm, it must be signed separately by each member thereof, or in the event of the absence of any partner, it must be signed on his behalf by a person holding a power of Attorney the copy of which shall be produced with the tender and it must disclose that the firm is registered under the Indian Partnership Act.

(ii) Each and every signature given shall be separately witnessed. A contract or contractors who himself/themselves has/have tendered or who may tender for the same work shall not witness the tender of another person for the work. Failure to observe this condition would render tenders of the contractors tendering as well as witnessing the tenders liable for summary rejection.

1.2 QUOTING RATES:

(i) The tenderer must quote his rates only on the proper form of tender, both in figures and words, both in decimal coinage, in the respective spaces provided therefor. The amount for each item should be worked out in figures only for the probable quantities specified in the bills of quantities but the requisite totals given both in figures and words.

(ii) Special care is to be taken to write the rates in figures and words in such a way that no interpolation is possible. Erasures and alterations must be avoided, but if errors are made while pricing the bills of quantities, the wrong figures and words must be neatly scored out under the initials of the tenderer and the correct figures and words neatly rewritten but not overwritten. Overwriting is not permitted and may entail rejection of the tender.

1.3 RATES IN FIGURES & WORDS:

In the case of figures, the word 'Rs.' Should be written before the figures of 'rupees' and paise should be eliminated by rounding to the nearest rupee; in the case of words the word "Rupees" should similarly precede closely, following each rate and each amount. 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'. It should invariably be upto two decimal places.

1.4 ERRORS:

Errors in the bills of quantities shall be dealt with in the following manner:

i) In the event of discrepancy between the rates quoted in words and the rates in figures the former shall prevail.

ii) 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 net rate shall be regarded as firm and extension shall be amended on the basis of the rates.

iii) All errors in totaling in the amount column and in carrying forward the total shall be corrected.

iv) Any omissions to include in the totals shall be corrected.

v) The bills of quantities are stamped 'original' and 'duplicate'. If there is any discrepancy in the rates, units and amounts between the 'original' and 'duplicate' the figures and words in the original are liable to be taken as correct and the duplicate corrected accordingly.

vi) The tender total shall be accordingly amended except that there shall be no rectification of any errors, omissions or wrong estimate, in the prices inserted by the tenderer in the bills of quantities.

1.5 ALTERNATIVE ITEMS:

Where alternative items are included, only the rates in figures and words are to be entered and not the amounts thereof. A tender which does not show the rates in figures and words for the alternative items may be rejected. The Employer reserve to himself the right to take into account any or all of the alternative items for the purpose of accepting a tender or to operate upon any or all of the said alternative items during the execution of the work, partly or fully as required.

1.6 QUANTITIES LIABLE TO VARY:

The quantities furnished in the bills of quantities are only probable quantities liable to alteration by omission, deduction or addition, and it should be clearly understood that the contract is not a Lumpsum Contract and the Employer, do not, in any way, assure the tenderer or guarantee that the said probable quantities are correct or that the work would correspond thereto. Payments will be regulated on the actual quantities of supplies made or work done at the accepted rates.

1.7 DRAWINGS, SPECIFICATIONS & BILL OF QUANTITIES:

(i) The drawings, specifications and the bills of quantities, forming parts of the contract, are explanatory of and are complementary to one another, representing together the supplies to be made/ the works/ installations to be carried out.

(ii) If neither the drawings nor the specifications nor the accepted bills of quantities include any part/parts the intention to include which is nevertheless clearly to be inferred and which are obviously necessary for the proper

execution of the work or the completion of the supplies, all such parts shall be supplied or/;and executed by the contractor at no extra charge.

(iii) Anything contained in one or another of (a) the drawings, (b) the specifications and (c) the accepted bills of quantities and not found in the others will be equally binding as if contained in each of them.

1.8 TENDERER NOT TO MAKE ALTERATIONS:

No alterations which are made by the tenderer in the drawings, specifications or probable quantities accompanying this notice will be recognized, and if any such alterations are made the tender will be invalid. Remarks or explanations should be set out in a covering letter and will become binding only if specifically accepted in writing by the Employer at the time of acceptance of the tender. Any tender which purports to alter, vary or omit any of the conditions herein is liable to be rejected.

1.9 TENDERER TO VISIT SITE/ BEAR COST OF TENDERING:

(i) The tenderer must obtain for himself on his own responsibility and at his own expense all the information necessary including risks, contingencies and other circumstances to enable him to make a proper tender and to enter into a contract with the Employer. He must examine the drawings, specifications, conditions and so on and must inspect the site of work and the works in progress and acquaint himself with local conditions, means of access to the work, the nature of the work, in fact all matters pertaining thereto before he submits his tender.

(ii) He shall also take due note of the stipulation, if any, made in the bills of quantities for rebate to be given by him/recovery to be made in his bills towards works done already by other agency and quote his rates for the work to be done (by him) accordingly.

(iii) The tenderer shall also bear all expense in connection with the preparation and submission of his tender.

(iv) Omission, neglect or failure on the part of the tenderer to so obtain requisite and reliable information on any matter affecting his tender, the contract and the construction, completion and maintenance (during defects liability period) of the work shall not relieve the tenderer whose tender is accepted from any liability in respect of the contract.

(v) The tenderer whose tender is accepted shall not be entitled to make any claim for increase in the rates quoted and accepted except in pursuance of any specific provision in the contract for such and then only in terms of that specific provision, or to make any representation on the ground that he was supplied with any information or given any promise or guarantee of any sort, by the Employer, his agents and servants, the Consultant or their representatives or any other persons, unless such information, promise or guarantee is furnished to the tenderer in advance of the date of receipt of tenders and in writing under proper authority.

1.10 INFORMATIONS TO BE FURNISHED BY THE TENDERER:

The tenderer shall submit with his tender a list of large works of a like nature executed by him with details of magnitude and cost, the agencies for whom the works were carried out, the time taken to complete such works and such other information to enable the employer to assess his financial and technical capabilities and shall also specify in the appropriate column of the “List of approved makes of equipment/ plant and statement of makes offered by the tenderer”, the makes for which he quotes, attaching wherever necessary samples/illustrations/descriptive literature to enable the Employer to truly assess his tender.

1.11 TENDERER TO FURNISH DETAILS OF LICENCES ETC:

The tenderer shall furnish details of licenses /certificates granted to him and/or to professionally qualified and/or licensed technical personnel/workmen on his staff who will be engaged on the work (and submit, if called for the licenses /certificates for inspection by the Consultant/Employer).

1.12 **TENDER TO COVER ALL COSTS/ CONTINGENCIES:**

The tender must be complete in itself, properly worked out to cover all the contractor's obligations under the contract and all matters and things necessary for the proper completion of the work, and the rates quoted therein must be correct and sufficient to cover the contractors' costs, overheads and profits etc., completely for the individual items of work including cost for all necessary materials and labour unless specified otherwise, incidental charges, for such as but not limited to water, electric power, tools, plant, machinery, testing apparatus, scaffolding, sheds if necessary, making, aligning, access to site, clearing site etc., taxes, excise or any other such tax or duty levied by Govt., Central or Local or Local Authority, Octroi, etc. if and as applicable, Insurances against loss or damage by fire, theft, or other usual risks till the work is completed in all respects according to the true meaning and intent of the contract and delivered up.
Electricity consumed shall be metered and the cost specified by the employer to be born by the contractor.

1.13 CURRENT RATES OF LEVIES TO BE SPELT OUT:

Where taxes, duties, etc. are declared as not included in the rates, or stated to be extra as applicable the tenderer shall state in his tender the current levies and the elements in his prices on which such levies are chargeable, failing which the tender will be deemed to be incomplete and subject to rejection.

1.14 NO VARIATION/ ESCALATION TO QUOTED RATES:

The rates shall be firm and not subject to any variations in prices of components, basic material exchange rates, taxes, duties, etc. railway freight and the like, labour rates, etc. The rates are not subject to escalation otherwise than as specifically provided for in the contract.

1.15 TENDER VALIDITY:

The tenders submitted shall remain open for acceptance for a period of 3 months from the date of their opening. Should any tenderer withdraw his tender before the expiry of the said period or makes any modifications to his tender which are not acceptable to the Employer the tender will be treated as having been rejected or abandoned.

1.16 RIGHTS OF EMPLOYER:

(i) The Employer does not bind himself to accept the lowest tender and reserves to himself the right to reject any or all of the tenders received without the assignment of any reason thereof.

(ii) The Employer further reserves the right to delete or reduce any item or section of the bills of quantities without assigning any reason therefor, or split up the work into convenient parts and award the split up portions to different tenderers and the rates quoted and the terms and conditions shall hold good as if the full work as tendered for was awarded to the tenderer and no claim will be admissible in this regard.

1.17 FORMAL AGREEMENT:

The tenderer whose tender is accepted will be required to execute a formal agreement with the Employer, but his liability under the contract shall commence from the date of written order to commence work. The contractor shall bear all expenses in connection with the execution of the said agreement including fees for stamping and

registering of documents as required. Failure to execute the agreement as required will entail refusal by the Consultant of certificates for payment.

1.18 NO INTEREST ON EMD/SD:

Wherever applicable, Earnest money/Retention Money will bear no interest whatsoever until the date of their release.

1.19 COMPENSATION DEDUCTABLE FROM DEPOSITS:

All compensations or other sums of money payable by the contractor to the Employer under the terms of contract may be deducted from the EMD and the Security Deposit if the amounts so permit and the contractor shall, unless such deposit has become payable otherwise, within 10 days after such deduction, make good in cash the amount so deducted.

1.20 WORKING DRAWINGS:

The successful tenderer, within two weeks of the award of the work to him shall submit to the Employer he working drawings necessary for the proper execution of the work, conforming to the specifications for approval. The work shall be carried out strictly in accordance with the approved drawings and specifications.

1.21 TIME BOUND PROGRAMME:

The tenderer shall submit to the Consultant, a time bound program in the form of a chart or otherwise for completion of the work in accordance with the contract and the work shall be carried out strictly according to the approved program which will form part of the agreement and be the basis for assessment of progress under the relevant conditions of contract.

1.22 EMPLOYERS ROLE:

The work will be carried out under the directions and supervision of and subject to the approval in all respects by the Consultant/ Employer.

1.23 DRAWINGS/DOCUMENTS APPROVAL:

The Contractor shall, if and where necessary at his own cost prepare the necessary drawings and submit them for and obtain the approval of the CEIG or CEA or other appropriate State Authority, as applicable to the Electrical Installation executed under this contract. Any fees or charges paid to Govt. of such other Authority by the contractor on behalf of the Employer will be reimbursed to him (contractor) on production of necessary proof of payment. The contractor shall also go through the necessary formalities and follow up with the CEIG or CEA or the other appropriate State Authority in the matter of obtaining approval of drawings, inspections and safety certificate, service connection to the new/additional installations to enable the Employer to use the installation as soon it is taken over by him.

1.24 FINAL DRAWINGS & CERTIFICATES:

On completion of the work the contractor shall furnish four sets of wiring diagrams and of complete layout as executed in the installation. He shall also furnish a completion and test certificate and guarantee certificate. The Consultant will be not issue the final certificate unless the provisions of this clause have been compiled with.

1.25 CONTRACTORS REPRESENTATIVE:

On acceptance of the tender the contractor shall in writing and at once inform the Employer and the Consultant the names of his accredited representative (s) who will be responsible to take instructions from the Consultant /Employer.

1.26 ASSIGNING WORKS:

The work or any part of it shall not be transferred, assigned or sublet without the written consent of the Employer.

1.27 OTHER AGENCIES WORK:

The contractor shall be required to co-operate and work in co-ordination with and afford reasonable facilities for such other agencies/specialists as are/may be employed by the Employer on other works/sub-works in connection with project/scheme of which this work forms part and in this connection it shall be deemed that the contractor had prior to tendering inspected the premises/site/work and taken all circumstances into consideration.

1.28 WORK TO BE INSURED:

The contractor will be required to insure the work and keep it insured until one month after the date of taking over the work/installation by the Employer, or otherwise in terms of the contract against loss or damage by fire and other usual risks other than risks excepted in terms of the Contract, with an insurer whose name is to be approved by the Employer.

1.29 ACTS OF GOVERNMENT:

The contractor is required to comply with all Acts of Govt. relating to labour and the Rules and Regulations made there under form time to time and to submit at the proper times all particulars and statements required to be furnished to the Labour Authorities.

1.30 SAFETY CODES:

In carrying out the work the contractor shall strictly comply with the provisions of the Safety code generally as under:

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a) First aid appliances including adequate supply of sterilized dressing and cotton wool shall be maintained in a readily accessable location.
b) The injured person shall be taken to a Public Hospital without loss of time, incases where the injury necessitates hospitalization.
c) Suitable and strong scaffolds should be provided for workmen for all works that cannot safely be done from ground.
d) No portable single ladder shall be over 8 metres in length. The width between the side rails shall not be less than 30cm (clear) and the distance between two adjacent rungs not more than 30cm. When a ladder is used an extra helper shall be engaged for holding the ladder.
e) Excavated material shall not be placed within 1.5 meters of the edge of the trench or half of the depth of trench whichever is more. All trenches and excavations shall be provided with necessary fencing and lighting.
f) 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 the minimum height of which shall be one meter.
g) No floor, roof or other part of the structure shall be so loaded with debris or materials as to render it unsafe.
h) Workers employed on handling hazardous material shall be provided with protective footwear and rubber hand gloves.
i) Those engaged in welding works shall be provided with welder's protective eye shields and gloves.
j) No paint containing lead or lead products shall be used except in the form of paste or readymade paint. Suitable facemasks should be supplied for use by the workers when the paint is applied in the form of spray or a surface having lead paint is dry rubbed and scraped.
k) Overalls shall be supplied by the contractor to the painter and adequate facilities shall be provided to enable the working painters to wash themselves during periods of cessation of work.
l) Hoisting machines and tackle used in the works, including their attachments, anchorage and supports shall be maintained in perfect condition.
m) Ropes used in hoisting or lowering material or as a means of suspension shall be of durable quality and of adequate strength and free from defects.

2.0 CONDITIONS OF CONTRACT:

2.1 INTERPRETATION OF CLAUSES :

i) In construing these conditions, the specifications, 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.

ii) Headings and marginal notes to the conditions of contract shall not be deemed to form part thereof or be taken into consideration in the interpretation or construction thereof or of the contract.

iii) Where the context so requires (i) words importing persons include firms and corporations and (ii) words importing the singular only also include in plural and vice versa.

a) Employer shall mean INCENT.

b) Consultant shall mean PADGRO Consultants, Chennai

c) Contractor shall mean ---------- and include his/their legal representatives, permitted assigns, or successors.

d) Site shall mean the land and /or other places, on into or through which work is to be executed under the contract or an adjacent land, path or street through which work is to be executed under the contract or any adjacent land, path or street which may be allotted for use for the purpose of carrying out the contract.

e) The contract or this contract shall mean the Tender Documents comprising the notice inviting tender, form of tender, the conditions of tender, the drawings, and priced bills of quantities with their preambles, the acceptance thereof, and the articles of agreement, together with its appendix and special conditions, designs drawings and instructions issued from time to time by the Consultant and all these documents taken together are deemed to form one contract and shall be complementary to the another.

f) Bills of Quantities variously also termed priced bills of quantities, 'schedule of quantities', 'schedule of rates' shall mean the schedule of quantities originally furnished with the notice inviting tender, duly priced in by the tenderer and accepted by the Employer for inclusion as a part of the contract for determining the consideration payable to the contractor for executing the work and as part of the contract agreement it is also referred to as the contract schedule.

g) 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 to the 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

h) Act of Insolvency shall mean any Act of Insolvency as defined by the Presidency Towns Insolvency Act, or the provincial Insolvency Act or any act amending such original.

i) 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 the price of that item a similar percentage or proportionate sum provided always that in determining the percentage or proportion of the sum so added or deducted by the contractor, the total 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.

j) The works (or the work) shall unless there be something either in the subject or context repugnant to such construction, be considered and taken to mean the works by virtue of the contract contracted to be executed whether temporary or permanent, and whether original, altered, substituted or additional. Wherever the word "Work" is used it shall cover "installation" also under the same definition

k) Excepted risks are risks due to riots (otherwise than among contractor's Employees) and civil commotion (in so far as both these are uninsurable), war (whether declared or not), invasion, act of foreign enemies, civil war, rebellion, revolution, insurrection, military or usurped power, any acts of Government, damage from air craft, acts of God such as earthquake, lightning, unprecedented floods and other causes over which the contractor has no control and accepted as such by the employer or causes solely to use or occupation in a manner for which the works/installations were not designed, by Employer of the said works/installations in respect of which certificate of completion has been issued or a cause solely due to faulty design of works.

l) Provisional items shall mean items for which only very approximate quantities have been included in the tender documents.

m) Virtual completion of works/ installations shall mean the substantial completion of the works/installations in accordance with the contract enabling the Employer to take over the same.

2.2 EMPLOYER'S INSTRUCTIONS:

a) The contractor shall execute the whole and every part of the work in the most substantial and workmanlike manner and both as regards materials and otherwise in every respect. In strict accordance with the specifications, conforming exactly, fully and faithfully to the designs, drawings and instructions in respect of the work given by the Employer and under the directions of and under the supervision of the subject to the approval in all respects by the Employer who may in their discretion and from time to time issue further drawings, and/or written instructions, directions and/or written instructions, details and explanations which are hereafter collectively referred to as "Employer's Instructions", with regard to:

- Variation or modification of the design including structural design, including structural design, quality or quantity of works or the addition or omission of any work.
- Any discrepancy in the drawings or between the schedule or quantities and/or drawings and/or drawings and /or specifications.
- The removal from the site of any materials brought thereon by the contractor and the substitution of any other materials thereof.
- The dismissal from the works of any persons employed thereupon.
- The opening up for inspection of any work covered up.
- The amending and making good of any defects.
- The removal and/or re execution of any works executed by the contractors, on account of defects.

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

2.3 MANNER OF EXECUTION OF WORK:

The Employer shall be entitled to direct at what point or points and in what manner the works are to be commenced, and form time to time carried on.

2.4 VARIATION IN QUANTITY:

All requisitions for variations or matter concerning drawings specifications, and schedule of quantities or additional instructions or detailed drawings should be placed by the Contractor with the Employer at least 10 days in advance of the dates by which such are required by the Contractor for commencing (their) implementation.

2.5 AGREEMENT:

The contract shall remain in the custody of the Employer and shall be produced by him at his office as and when required by the Employer of the Contractor. The Contractor on the signing hereof shall be furnished by the Employer free of cost with a certified copy of the agreement and one copy of each of the said drawings issued during the progress of the works. Any further copies of such drawings required by the Contractor shall be paid for by him. The contractor shall keep one copy each of all drawings on the works and the Employer or his authorized representative shall at all reasonable times have access to the same. Before the issue of the final certificate to the Contractor he shall, if so required, forthwith return to the Employer all drawings and specification.

2.6 SCOPE OF THE CONTRACTOR:

The Contractor shall be deemed to have satisfied himself before tendering as to the correctness and sufficiency of his tender for the works and of the rates and amounts stated in the schedule of quantities and/ or the schedule of rates and amounts which rates and amounts shall except as otherwise provided cover all his obligations under the contract, and all matters and things necessary for the proper completion of the works.

The contractor shall provide at his own cost all materials (except such materials if any, may in accordance with the contract supplied by the Employer), machinery, plant, tools, appliances, implements, ladders, cordage, tackle, scaffolding, temporary works including access roads, etc. together with carriage thereof to and from the site, in fact everything necessary or proper for the proper execution of the work, whether original, altered or substituted according to the true intent and meaning of the drawings, schedule of quantities and specifications, original or substituted taken together whether the same may or may not be particularly shown or described therein provided that the same may be reasonably inferred there from, and if the contractor finds any discrepancy in the drawings, or between the drawings, schedule of quantities and the specifications, he shall immediately and in writing refer to the Employer who shall decide which is to be followed.

2.7 CONTRACTOR'S SITE OFFICE

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.

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 termite, ants, and other insects. The Contractor shall provide at his own cost all artificial light required for the work.

2.8 PROTECTIVE MEASURES:

The Contractor from the time he is 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. Contractor shall indemnify the Employer against any possible damage to the building, roads, or member of the public in the course of execution of the work. The contractor shall provide necessary temporary enclosures, gates, entrances, etc. for the protection of the work and materials, and for altering and adopting the same as may be required, removing on completion of the works and making good all works disturbed.

2.9 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 tools and materials of sub-contractors and remove the same on completion. Sheds for storage of cement are to have regular floor raised above the ground.

2.10 CONFORMING TO LOCAL REGULATIONS:

The contractor shall conform to the provisions of any Act of the Legislature relating to the works and to the Regulations and Bye-laws of any Authority and of any water, lighting and other companies and/ or Authorities with whose systems the structure is proposed to be connected, and shall, before making any variations from the drawings or specifications that may be necessitated by so conforming, give to the Employer written notice, specifying the variation proposed to be made and the reason for it, and apply for instructions thereon. In case the contractor shall not within ten days receive such instructions he shall proceed with the work, conforming to the provisions, Regulations, or bye-laws in question and any variation so necessitated shall be dealt with under relevant clauses elsewhere in this specifications.

The Contractor shall bring to the attention of the Employer all notices required by the said Acts, regulations or bye-laws 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 works and lodge the receipts with the Employer.

The Contractor shall indemnify the Employer against all claims in respect of patent rights and shall defend all actions arising from such claims and shall himself pay all royalties, license fees, damages, cost and charges of all and every sort that may legitimately be incurred in respect thereof.

The Employer is entitled to deduct all taxes and rates as per existing laws and rules, from any moneys due or that may become due to the contractor.

The Contractor shall indemnify the Employer from and against all claims, demands, proceedings, damages, costs and expenses which may be brought or made against the Employer or to which it may be put by reason of the Contractor not conforming to or complying with any of the provisions or requirements of any Act or Statute, Central or State, Rules, Regulations, Bye-laws of Local Authorities, Panchayat, Collector or any other Companies relating to or in connection with the works or to Labour or for supply of water, light or other amenities at the site.

2.11 SETTING OUT WORK:

The Contractor shall on the basis of dimensioned drawings and information necessary for the purpose, furnished by the Employer, set out the works on site at his own expense and be responsible for the correctness of the positions, levels, dimensions and alignment of all parts thereof. All benches and datum shall be maintained by the contractor at the site, as long as required by the Employer, for them to check, but the checking of any setting out by the representative of the Employer shall not in any way relieve the contractor of the responsibility for the correctness thereof and he shall amend at his own cost and to the satisfaction of the Consultant any error in the setting out or consequential to wrong setting out,

found at any stage during the progress of the work or during the defects liability period after completion of the work.

2.12 MATERIALS & WORKMANSHIP:

(i) All materials and workmanship shall so far as procurable conform strictly to requirements in accordance with the drawings and as 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 Employer furnish proof to his satisfaction that they so conform and if required shall also furnish all invoices, accounts, receipts and other vouchers for the purpose.

(ii) In the case of all products which are in the approved lists of the I.S.I., no material will be collected at site which does not bear the I.S.I. mark unless the Institution does not affix its mark on that material.

(iii) The Contractor shall place orders for all materials required in time and in any case not later than the dates fixed in the approved program. Where in the matter of procurement of such materials as are collected or the distribution of which is regulated by Government, Central or Local, or by any other Central or Local Authority, the Employer is obliged to issue any certificate or sign applications for license or permit, by virtue of regulation by such Government or Authority or by Custom or practice, it shall be the sole responsibility of the contractor to arrange for all the formalities to be completed in time and follow up the matter with the concerned Authorities and to procure the materials in time for incorporation in the works/ installations according to the approved program, and the Employer will not assume any responsibility for delays in this regard nor for the payment of fines, penalties, demurrage and so forth due to the contractor not taking timely action in the process of procurement. The contractor shall not raise any plea quoting delays in the completion of the formalities or of delays by the Authorities concerned for any compensation whatsoever.

(iv) However, the Contractor shall before he places orders for supply, furnish and produce to the Employer, at his own expense, samples of materials including patented products and those under specific makes, including approved makes proposed to be used in the works, well in time, notwithstanding prior approval by Employer of such products and makes; such prior approval shall not constitute a waiver of the rule regarding approval of samples. In all cases when makers/ manufacturers have test certificates for their goods/articles/products/ processes/equipment, Photostat copies of such certificates shall be produced by the contractor along with the samples.

(v) The Employer will within two weeks of the date of supply of samples or within such further period as it may depending upon each case require intimate to the Contractor whether the samples are approved by him or not. If samples are not approved the Contractor shall forthwith arrange to supply to the Employer for his approval fresh samples complying with the specifications.

(vi) The contractor shall indemnify the Employer or any agent, servant or employee of the Employer against any action, claim or proceeding relating to infringement or use of any patent or design or any alleged patent or design rights and shall pay any royalties or other charges which may be payable in respect of any article or material or part thereof included in the contract. In the event of any claims being made on or action being brought against the Employer or any agent, servant or employee of the Employer in respect of any such matter as aforesaid, the contractor shall immediately be notified thereof. Provided that such indemnity shall not apply when such infringement has taken place in complying with specific direction issued by the Employer in connection with the contract, but the contractor shall pay any royalties or other charges payable in respect of any such use, the amount so paid being reimbursed to the contractor only if the use was the result of any drawings and/or specifications issued after conclusion of the contract.

(vii) All charges on account of octroi, terminal or sales tax and other duties on materials obtained for the works from any source, (other than materials supplied by the Employer) shall be borne by the contractor.

(viii) The Employer shall be entitled to have tests carried out on the work or its parts or accessories, either during its progress or on completion, where and when deemed necessary or on any materials to be incorporated/incorporated in the work/installation supplied by the contractor or otherwise notwithstanding that the work or its parts or accessories or the said materials have been accepted and passed/passed for incorporation and the contractor shall on being directed to do so promptly arrange for the tests to be carried out excepting in the case of "Mandatory tests" listed else where in this specifications which he (the contractor) shall regularly carry out in routine fashion without having to be given any further directions.

(ix) The scope of the clause regarding tests will cover not only materials/ articles of every day use and of ordinary description but also patented products and those under specific makes, including approved makes, notwithstanding that satisfactory test certificates from makers/manufacturers have been produced in accordance with sub-clause iv above.

(x) The contractor shall also arrange for necessary field tests to be carried out in the case of materials/ articles of everyday use and of ordinary description; regularly under the directions and in the presence of the Employees' representative, to determine the suitability of such items for use in the work.

(xi) The costs of the tests and of the materials and labour and equipment, if any, involved in the testing operations shall be borne by the contractor in all cases except as otherwise provided for in the contract.

2.13 SUPERVISION BY CONTRACTOR:

The Contractor shall give all necessary personal supervision during the execution of the works, and as long thereafter as the Consultant may consider necessary until the expiration of the "Defects Liability Period". The contractor shall also during the whole time the works are in progress, employ a competent and qualified representative whose name shall be approved by the Employer and who shall constantly be in attendance at the works while the men are at work. Any directions, explanations, instructions, or notices given by the Employer to such representative shall be deemed to have been given to the contractor.

If the contractor fails to appoint and keep on the works a competent and qualified representative as aforesaid the Employer shall have powers to suspend the works till such time a competent qualified representative as aforesaid is posted and the contractor shall not be entitled to claim extension of time on the plea of such suspension of the works. The contractor shall also engage on the work an adequate number of qualified and experienced technical persons to ensure that the work is executed to conform strictly to drawings and specifications.

2.14 DISMISSAL OF WORKMEN:

The Contractor shall on the request of the Employer immediately dismiss from the works any person employed thereon by him who may, in the opinion of the Employer be incompetent or misconduct himself, and such persons shall not be again employed on the works without the permission of the Employer. Such dismissal shall not form the basis for a claim for compensation or damages of any kind against the Employer or any of his/their representatives.

2.15 ACCESS TO WORKS:

The Employer, and his respective representative shall at all reasonable times have free access to the works and/or to the workshops, factories or other places where materials are lying or from which they are being obtained and the contractor shall give the Employer, and his representative, all reasonable facilities necessary for inspection and examination and tests of the materials and workmanship. No person unauthorized by the Employer except the representatives of Public Authorities shall be allowed on the works at any time. All drawings relating to the work issued to the contractor together with an authenticated copy of the accepted (priced) schedule of quantities are to be kept at the site and the Employer or their authorized representatives shall be given access to such drawings, schedules whenever necessary.

2.16 SITE ENGINEER:

The terms "Site Engineer/Asst. Engineer" shall mean the person appointed, and acting under the orders of the Employer to inspect the works in the absence of the Employer; the contractor shall afford the Site Engineer/Asst. Engineer/Clerk of Works every facility and assistance for inspecting the works and materials and for checking and measuring the work and materials. Such person/persons shall be considered to act solely as inspectors.

If any work or materials be not approved by the Site Engineer/Asst. Engineer or any such representative, such work shall be suspended or the use of such material shall be discontinued until the decision of the Employer is obtained. The work will from time to time be examined by the Employer, the Site Engineer/Asst. Engineer, but such examination shall not in any way exonerate the contractor from the obligation to remedy any defects which may be found to exist at any stage of the works or after the same is completed. Subject to the limitation of this Clause the contractor shall take instructions only from the Employer.

2.17 WORK NOT TO BE SUBLET:

The whole of the works included in the contract shall be executed by the contractor who shall not directly or indirectly transfer, assign or under let the contract or any part share thereof or interest therein without the written consent of the Employer; and no undertaking shall relieve the contractor from the full and entire responsibility of the contract or from active superintendence of the works during their progress.

2.18 VARIATION NOT TO VITIATE CONTRACT:

No alteration, omission or variation shall vitiate this contract but in case the Employer thinks proper at any time during the progress of the works to make any alterations in or additions to or omissions from or substitutions for the original drawings, specifications, designs and instructions, or any alterations in the kind or quality of the materials to be used in the work and shall give notice thereof to the contractor, in writing, the contractor shall alter, add to or omit from or substitute for as the case may require, in accordance with such notice and carry out the amended work on the same conditions in all respects on which he agreed to do the main work, but the contractor shall not do any work extra to or make any alterations or additions to or omissions from or substitutions in the works or any deviation from any of the provisions of the contract stipulations, specifications or contract drawings without the previous consent in writing of the Consultant and the value of such extras, alterations, additions or omissions or substitutions shall in all cases be determined by the Consultant with the prior approval in writing.

2.19 NO COMPENSATION FOR ALTERATION OR RESTRICTION OF WORKS:

If at any time after the commencement of the work the Employer for any reason whatsoever does not require the whole or part or parts thereof as specified in the tender to be carried out, they shall give notice in writing of the fact to the contractor who shall have no claim for any compensation whatsoever on account of any profit which he might have derived from the execution of the work in full, but which he did not derive in consequence of the full amount of the work not having been carried out. Nor shall he have any claim for compensation by reason of any alterations having been made in the original specifications,

drawings, designs and instructions which shall involve curtailment of the work originally contemplated.

2.20 **MEASUREMENT OF WORKS:**

The Employer may from time to time intimate to the contractor that he requires the works to be measured, and the contractor shall forthwith attend or send a qualified Agent to assist the Employer in taking such measurements and making calculations and to furnish all particulars or to give all assistance required by either of them.

Provided that the contractor shall give notice of not less than ten clear days to the Employer or his representative in charge of the work before covering up or placing beyond the reach of measurement any work in order that the same may be measured and correct dimensions thereof be taken before the same is covered up or placed beyond reach of measurement and shall not cover up and place beyond reach of measurement any work without the consent of the Employer and his representative in charge of the work so shall within the aforesaid period of ten days inspect the work and cause the measurements to be made; if, any work be so covered up without the consent of the Employer or his representative in charge of the work, the same shall be uncovered at the contractor's expense, or in default thereof no payment or allowance shall be made for such work or materials with which the same was executed.

Should the contractor not attend or neglect or omit to send such agent then the measurements taken by the Employer, or a person approved by him shall be taken to be correct measurements of the works. Such measurements shall be taken in accordance with the Indian Standard Method of Measurement, unless otherwise provided for elsewhere in this contract.

The contractor or his agent may at the time of measurement take such notes and details as he may require.

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

2.21 PRICE VARIATION:

The rates for additional, altered, substituted work shall be arrived at in accordance with the following rules:

i) The nett rates or prices in the contract schedule shall determine the valuation of (the rates for) the extra work (item) where such extra work (item) is of similar character and is executed under similar conditions as the work priced therein.

ii) If the rates for the extra, altered or substituted (deviated) work are not provided for (available) in the contract schedule, they shall to the extent possible be derived out of the rates given in that schedule for similar or near similar items. For the purpose of such derivation, where necessary and when so directed, the contractor shall furnish detailed analysis for the said similar or near similar items in the contract schedule. For such portions of the analysis for the extra, altered or substituted (deviated) work for which prices cannot be abstracted from the corresponding analysis of rates for the said similar or near similar items in the contract schedule, market rates substantiated by purchase bills/vouchers shall be adopted, using factors and constants for quantum's of material, labour T & P and sundries from CPWD/Standard PWD data/analysis, in the order thus written, adding towards profits and overheads an appropriate margin not exceeding 15%. When called upon to do so the contractor shall submit the required purchase bills/vouchers.

iii) In the case of additional, altered or substituted (diverted) work for which rates cannot reasonably be derived as at (ii) and (iii) above, the rates shall be worked out adopting market prices, substantiated by purchase bills/vouchers, using factors and constants for quantum's of material, labour, T&P and sundries from CPWD/Standard PWD/Data Analysis in the order thus written, adding towards profits and overheads an appropriate margin not exceeding 15%. When called upon to do so the contractor shall submit his purchase bills/vouchers, to the Consultant.

iv) The provisions in sub-clauses (i) to (iii) will not apply to contract schedule items or altered or substituted (deviated) items (the quantities of) which individually exceed the corresponding provisions in the contract schedule by more than 20% when the deviation limit as defined below and as referred to in the tender is exceeded, and when the said deviation limit is not exceeded (a) by more than 50% in the case of items of work above plinth level and (b) by more than 100% in the case of items below plinth level.

In such case, only for such items where, and for such quantities only as are in excess of the quantities provided in the contract schedule for original items or items which stand altered or substituted (deviated) by more than the percentages specified in sub-para above and for items for which the rates cannot reasonably be derived as at sub-clauses (ii) and (iii) above, market rates shall be applied.

v) The questions as to what particular items, being similar or near similar to the additional, altered or substituted (deviated) work in the contract schedule are to be adopted for derivation of rates for the additional, altered or substituted (deviated) work and in the contract schedule are to be adopted for derivation of rates for the additional, altered or substituted (deviated) work and whether the said rates cannot be derived from similar or near similar items in the contract schedule will be decided by the Consultant.

vii) In case (ii) to (iv) the contractor is required to submit his analysis of rates adopting the principles enunciated and the Employer, after scrutinizing the analysis and other papers furnished, will allow such rates as he considers reasonable.

viii) Where extra work is of such a nature that it cannot be properly measured or valued the contractor shall be allowed day work prices at the nett rates stated in the tender or the priced schedule of quantities or, if not so stated, then at rates not exceeding the minimum local day work rates and wages for the district, notified by the concerned authority, provided that in either case if required by the Employer, vouchers, muster rolls and other documents required for proper verification of the labour employed and the materials deployed on the said work and the costs thereof be delivered to the Employer or his representative at or before the end of the week following that in which the work has been executed.

The question as to whether extra work is of such nature that it cannot be properly measured or valued will be decided by the Employer. The margin to be allowed on actual costs to the contractor towards profits and overheads shall be an appropriate percentage not exceeding 15%.

ix) Deviation Limit: is the value by which the total executed contract value including authorized variation is in excess of the original contract value, expressed as a percentage and shall be adjudged on the sum total of all additions, omissions, reductions, alterations or substitutions (deviations) covered by authorized variations. The values of prime cost sums shall not be included in calculating the above percentage.

2.22 REMOVAL OF IMPROPER WORKS, MATERIALS ETC.

The Employer shall, during the progress of the work, have full powers to order in writing, removal from the works within such reasonable time or items as may be specified in the order, of any materials which in the opinion of the Employer are not in accordance with the specifications or the instructions of the Employer, or do not conform to approved samples, the substitution of the rejected materials by proper other materials, and the removal and proper re-execution of any work executed with unsound, imperfect or unskilled workmanship or with materials not in accordance with the contract, notwithstanding that the same may have been passed or/and certified or/and paid for 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 out such order, the Employer shall have the power to employ and pay other persons to carry out the same without being answerable or accountable for any loss or damage that may happen or arise in such materials removed and all expenses consequent on or incidental thereto as certified by the Employer shall be borne by the contractor, or may be deducted by the Employer from any moneys due or that may become due to the contractor.

In lieu of re-execution of any work not in accordance with the contract the Employer may in their option allow it to remain but will allow for such work reduced rates. The decision of the Employer to exercise his option in this regard and the quantum of reduction to be made in the rate for the item in question shall be final and binding on the contractor.

2.23 DEFECTS LIABILITY PERIOD:

Any defect, shrinkage, settlement or other faults which may appear within the 'Defects Liability Period' stated in the specification, or if none be so stated, then within 18 months after the virtual completion of the works, arising in the opinion of the Employer from materials or workmanship not in accordance with the contract, shall on demand which shall be made within the defects liability period, in writing by the Employer, and within such reasonable time as shall be stated therein specifying the work, materials or articles complained of notwithstanding that the same may have been passed or/and certified, paid for, be amended and made good by the contractor, at his own proper charge and cost and in case of default the Employer may employ and pay other person or persons to amend and make good such defects, shrinkage, settlements or other faults and all damages, loss and expenses consequent thereon or incidental thereto shall be made good and borne by the contractor and such damages, loss and expenses be recoverable from him (the contractor) by the Employer or may be deducted by the Employer from any moneys due or that may become due to the contractor Employer may in lieu of such amending and making good by the contractor deduct from any moneys due or that may become due to the contractor a sum to be determined by the Employer equivalent to the cost of amending and making good such work and in the event of the amount retained being insufficient, recover the balance from the contractor, together with any expenses the Employer may have incurred in connection therewith. Should any defective work have been done of material supplied by any subcontractor employed on the works who has been nominated or approved by the Employer as provided in this specification, contractor shall be liable to make the same good in the same manner as if such work or materials had been done or supplied by the contractor himself. The contractor shall remain liable under the provisions of this Clause notwithstanding the signing by the Employer of any certificate including the final certificate, or the passing of any accounts.

2.24 CONTRACTOR LIABLE FOR DAMAGE DONE:

The contractor shall be responsible for all injury to persons, animals, or things, and for all structural and decorative damage to property which may arise from the operation or neglect of himself or of any nominated sub-contractor's employee whether such injury or damage arises from carelessness, accident or any other cause whatever in any way connected with the carrying out of the contract. This Clause shall be held to include, inter-alia, any damage to buildings, whether immediately adjacent or otherwise, and any damage to roads, streets, foot-paths, bridges, or ways as well as all damages caused to the buildings and works forming the subject of this contract by frost or other inclemency of weather. The contractor shall indemnify the Employer and hold him harmless in respect of all and any expenses arising from any such injury or damage under any Acts of Government or otherwise and also in respect of any award of compensation or damages consequent upon such claims.

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 of Third Party.

The contractor shall indemnify the Employer against all claims which may be made against the Employer by any member of the Public or other 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 issuers a Policy of Insurance in the joint names of the Employer and contractor against such risks and deposit such policy or Policies with the Consultant from time to time during the currency of this contract. The contractor shall also similarly indemnify the Employer against all claims which may be made upon the Employer 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 sub-contractor and shall at his own expense effect and maintain, until the virtual completion of the contract, with an approved insurer a Policy of Insurance in the joint names of the Employer and the contractor against such risks and deposit such policy or policies with the Consultant from time to time during the currency of the contract.

The Insurance policies above stated shall be taken for a minimum sum of Rs.5 lakhs with indemnity of Rs. One Lakh for any single accident.

The contractor shall be responsible for anything which may be excluded from the Insurance Policies above referred to and also for all other damages to any property arising out of and incidental to the negligent or defective carrying out of this contract. He shall also indemnify the Employer in respect of any costs, charges or expenses arising out of claim or proceedings and also in respect of award of compensation for damage arising there from.

The Employer shall be at liberty and is hereby empowered to deduct the amount of any damage, compensation, costs, charges and expense arising 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.

2.25 RESPONSIBILITY FOR THE SAFETY OF BUILDING:

The contractor shall be responsible for the safety of the works (including the materials, temporary buildings and plant) until they are taken over by the Employer.

2.26 INSURANCE OF THE WORKERS:

The contractor shall within 14 days from the date of commencement of the work insure the works at his cost and keep them insured until one month after the works are taken over by the Employer or three months after the date of completion whichever is earlier, against loss or damage by fire and usual risks other than fire against which insurers generally provide cover in a CONTRACTOR'S ALL RISK POLICY, with an insurer to be approved by the Consultant, progressively for the full amount of the contract, in three stages, beginning with 1/3 of the contract value, and for any further sum as called upon to do so by the Employer, the premium of such further sum being allowed to the contractor as an authorized extra. Such policy shall cover the property of the Employer only and surveyor's fees for assessing the claim and in connection with his services generally in reinstatement and shall not cover any property of the contractor or of any sub-contractor or employee. The contractor shall deposit the policy and receipts for the premiums paid with the Employer within twenty-one days of the date of commencement of the work unless otherwise instructed by the Employer. In default of the contractor insuring as provided above, the Employer may insure and may deduct the premiums paid from any money that may be due or that 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 insurers should they elect to do so, proceed with all due diligence with the completion of the works in the same manner as though the fire or other such usual risk had not occurred and in all respects under the same conditions of contract. The contractor in case of rebuilding or reinstatement after fire or other such usual risk shall be entitled to such extension of time for completion as the Employer deems fit.

2.27 LIQUIDATED DAMAGES:

If the contractor fails to complete the works by the date stated or within any extended time as per provision contained herein below, the contractor shall pay or allow to the employer the sum named in the appendix as "Liquidated Damages" for the period during which the said works shall so remain incomplete by the date of completion of the work as defined in the contract, and the Employer may deduct such damages from any moneys due or that may become due to the contractor.

2.28 EXTENSION OF TIME:

If the contractor shall desire an extension of time for completion of the work on the grounds of his having been unavoidably hindered by such causes as (a) force majeure or (b) any exceptional inclement weather or (c) proceedings taken or threatened by or dispute with adjoining or neighboring owners or public authorities arising otherwise than through the contractor's own defaults or (d) the work or delays of other contractors or tradesmen engaged or nominated by the Employer and not referred to in the schedule of

quantities and or specification or (e) strike or lockout affecting any of the building trades or directly the work or (f) delays in the supply of materials stipulated to be supplied by the Employer, or any other ground that may reasonably be held to be valid by the Employer, he shall apply in writing to the Employer within 15 days of the date of such hindrance on account of which he desires such extension as aforesaid and the Employer, if in his opinion reasonable grounds have been shown therefor, may with the previous approval in writing of the Employer make a fair and reasonable extension of time for completion of the contract works, but the contractor shall nevertheless constantly use his endeavors to prevent delay and shall do all that may reasonably be required of him to proceed with the work expeditiously provided.

- That the contractor shall have no claim whatever other than extension of time for the delay in completion of the work due to such hindrance and

- That the contractor shall suspend the works whenever called upon to do so in writing by the Employer and shall be allowed reasonable extension of time for completion of work due to such suspension of work and nothing else.

2.29 TERMINATION OF CONTRACT BY EMPLOYER:

If the contractor being an individual or a firm commits any "Act of Insolvency", or shall be adjudged an insolvent or being an Incorporated Company shall have an order for compulsory winding up made against it or pass an effective resolution for winding up voluntarily or be subject to the supervisor of the court and of official assignee or the Liquidate in such acts of insolvency or winding up, as the case may be, and shall be unable within 7 days after notice to him requiring him to do so, to show to the reasonable satisfaction of the Consultant that he is able to carry out and fulfil the contract and to give security thereof if so required by the Employer:

OR if the contractor (whether an individual, firm or incorporated company) shall suffer execution to be issued:

OR shall suffer any payment under this contract to be attached by or on behalf of any of the creditors of the contractor;

OR shall assign or sublet this contract without the consent in writing of the Employer first obtained;

OR shall charge or encumber this contract or any payments due or which may become due to the contractor there under;

OR if the Employer notices:

i.) has abandoned the contract, or
ii) has failed to commence the work, or has without any lawful excuse under these conditions suspended the progress of the works for 14 days after receiving the Employer's notice to proceed. Or
iii) has failed to proceed 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 the materials from the site or to pull down and replace work for seven days after receiving from the Employer's written notice that the said materials or work were not approved and were rejected by the Employer 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 for seven days after written notice shall have been given to the contractor requiring him (the contractor) to observe or perform the same, or
vi)has to the detriment of good workmanship or without the consent in writing of the Employer sublet any part of the contract.

Then and in any of the said cases the employer may notwithstanding any previous waiver, after giving seven day's notice in writing to the contractor, determine the contract, but without thereby affecting the powers of the Employer or the obligations and liabilities of the contractor the whole of which shall continue to be 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. And further the Employer by his agents or servants may enter upon and take possession of the works and all plant, tools, scaffoldings, sheds, machinery, steam or other power utensils and materials lying upon the premises or the adjoining land or roads, and use the same as his own property or may deploy the same by means of his own servants and workmen in carrying on and completing the works or by employing other contractor or person or persons to complete the work and the contractor's shall not in any way interrupt or do any act, matter, or thing to prevent or hinder such other contractor's or other person or persons employed for completing and finishing or using the materials and plant for the works. When the work shall be completed or as soon thereafter as convenient the Consultant shall give notice in writing to the contractor to remove his surplus materials and plant and should be contractor fail to do so within a period of 14 days after receipt of such notice by him the Employer shall be entitled to sell the same by public action and give credit to the contractor for the amount realized.

The contractors' account shall also be credited with the amount that would have been payable to him, for the uncompleted work (completed by the Employer through other contractor's or person or persons are aforesaid) in terms of his agreement as if the contract had not been determined and he (the contractor) had continued to execute the work to its completion. The actual gross expense to the Employer including incidental charges in completing the uncompleted work through other contractors' or persons or persons shall be debited to the contractor's account if it be not less than the credit for the uncompleted work as above referred; if however, the said debit to be made be less than the said credit, then the amount to be debited shall be equal to the value of the credit given as above referred.

The Employer shall thereafter ascertain and certify in writing what (if anything) in final accounting is due to be payable to the contractor

by the Employer or to the Employer by the contractor for the sale of surplus materials and plant and loss the Employer shall have been put to in procuring the works to be completed. The amount, if any, owing to the contractor and which shall be so certified shall thereupon be paid by the Employer to the contractor and vice-versa; and the certificate of the Employer in this regard shall be final and conclusive between the parties.

2.30 TERMINATION OF THE CONTRACT BY THE CONTRACTOR:

If payment of the amount payable by the Employer shall be in arrears and unpaid for thirty days after notice in writing requiring payment of the amount as aforesaid shall have been given by the contractor to the employer, or if the Employer interferes with or obstructs the issue of any such certificate, or the Employer commits any "act of insolvency" or if the Employer (being an individual or Firm) shall be adjudged an insolvent, or (being an incorporated company) shall have an order made against him or pass an effective Resolution for winding up, either compulsory or subject to the suppression of the Court or Voluntarily, or if the official assignee or the employer shall repudiate the contact, or if the Official Assignee or the Liquidator in any such winding up shall be unable within fifteen days after notice to him requiring him to do so to show to the reasonable satisfaction of the contractor that he is able to carry out and fulfil the contract and to make all payments due, and to become due thereunder, and if required by the contractor, to give security for the same, or if the works be stopped for three months under the order of the Consultant or the employer or by an injunction or other order of any Court of Law, then and in any of the said cases the contractor shall be at liberty to determine the contract by notice in writing to the Employer, and he shall be entitled to recover from the Employer, payment for all works executed in terms of the contract and for any loss he may sustain upon any plant or materials supplied or purchased or prepared for the purpose of the contract.

In arriving at the amount of such payment the net rates contained in the contractor's original tender shall be followed or where the same may not apply, valuation shall be made in accordance with other provisions hereinbefore.

2.31 CERTIFICATE & PAYMENT:

A bill in triplicate shall be submitted by the contractor, each month on or before the date fixed by the Employer, or if no date be so fixed, by the 15th of the month, along with detailed measurements, neatly recorded by him in an approved form of measurement book, also in triplicate for the work executed in the previous month, and the Employer shall, consistent with the stipulation in the specification regarding "value of work for Interim Certificates" (or at closer intervals at his discretion), check/take the measurements or cause the measurements to be checked/taken for the purpose of having the same to be verified and to the extent work has been executed in accordance with the contract, issue interim certificate, and the Employer, after technical scrutiny of the bill, shall make payment to the contractor on the basis of such certificates , subject to retention of such sums at the percentage specified till the whole of the retention money (part of security deposit) is collected wherefor the installments (interim payments) shall be upto the full value of the work subsequently so executed and fixed.

The Employer may in his discretion include in the interim certificate such amount as he may consider proper on account of any materials which are in his opinion non-perishable and are in accordance with the contract and which have been brought on the site (but not prematurely) in connection therewith and adequately stored and/or protected against damage by weather or other cause but which have not at the time of advance been incorporated in the work, 75% oftheir purchase value on production of vouchers for the same subject to a maximum of basic prices. When materials on account of which such advance has been made under this sub-clause are incorporated in the work the amount of the advance shall be deducted from the next payment made under any of the Clauses of this contract, and in any case within 3 months of the date of payment of each advance.

All interim payments aforesaid 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 powers of the Employer 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.

And when the works have been virtually completed and the Employer shall have issued the completion certificate in accordance with the specification, the contractor shall submit the final bill in respect of the contract works within one month thereafter and the Employer, shall duly check/verify the measurements of the work done, and to the extent work has been carried out in accordance with the contract, issue the certificate on the final bill. The Employer shall make payment to the contractor on this final bill certificate within 3 (three) months, subject to retention of such sums at the percentage specified. Final payment comprising the return of all retention amounts shall be made by the Employer to the contractor on the basis of the final certificate thereof to be issued in writing by the Employer after the expiration of the period referred to as "Defects Liability Period" from the date of virtual completion of the work or as soon after the expiration of such period as all the work has been finally completed and after all defects have been made good by the contractor in accordance with the true intent and meaning of the contract whichever shall last happen.

Provided always that the issue by the Consultant of any certificate during the progress of the works or at or after their completion shall not relieve the contractor of his liabilities of this specification nor relieve him of 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 the case of all defects and insufficiencies in the works or materials which a reasonable examination would not have disclosed. Non certificate of the Consultant shall by itself be conclusive evidence that any work or materials to which it relates are in accordance with the contract neither will the contractor have a claim for any amounts that might have certified in any INTERIM/PREFINAL BILL and paid by the Employer and which

might subsequently be discovered as not respect the employer's decision shall be final and binding.

The Employer shall have power to withhold any certificate if the works or any parts thereof are not being carried out to his satisfaction.

2.32 EMD/ RETENTION AMOUNT CARRY NO INTEREST:

Earnest/ Retention money, or the balance of it available with the Employer, shall be refunded to the contractor in the manner specified and shall bear no interest whatsoever until the date of its return, unless otherwise provided for in this contract.

2.33 SETTLEMENT OF DISPUTES:

Except where provided in the Contract, all questions and disputes relating to the meaning of the specifications, design, drawings and instructions herein before mentioned and as to the quality of workmanships or materials used on the work or as to any other question, claim, right, matter or thing whatsoever in any way arising out of or relating to the Contract, design, drawings, specifications, estimates, instructions, orders of these conditions or otherwise concerning the work or the execution or failure to execute the same whether arising during the progress of works, or after the cancellation, termination, completion or abandonment thereof shall be dealt with as mentioned hereunder:

i) If the Contractor consider that he is entitled to any extra payment or compensation in respect of the works over and above the amount admitted as payable by the Consultant/ Employer or in the case of Contractor wants to dispute the validity of any deductions of recoveries made or proposed to be made from the contract or raise any dispute, the contractor shall forthwith give notice in writing of his claim, or disputes to the Employer and endorse a copy of the same to the Consultant within 30 days from the date of disallowance thereof or the date of deduction or recovery. The said notice shall give full particulars of the claim, grounds on which it is based and detailed calculations of the amount claimed and the contractor shall not be entitled to raise any claim nor shall the Employer be in any way liable in respect of any claim by the contractor unless notice of such claim shall have been given by the contractor. The contractor shall be deemed to have waived and extinguished all his rights in respect of any claim not notified to the Employer in writing in the manner and within the time aforesaid.

ii) The Employer shall give his decision in writing on the claims notified by the contractor. The contractor may, within 30 days of the receipt of the decision of the Employer submit his claims to the Employer.

iii) If the conciliation proceedings are terminated without settlement of the disputes, within a period of 30 days of termination.

iv) It is a term of this contract that the party invoking arbitration shall give a list of disputes with amounts claimed in respect of each dispute along with the notice for appointment of the arbitrator.

The conciliation and arbitration shall be conducted in accordance with the provisions of the Arbitration & Conciliation Act 1996 or any statutory modification or reenactment thereof and the rules made thereunder.

It is also a term of the contract that the arbitrator shall be deemed to have entered on the reference on the date he issues notice to both the parties calling them to submit their statement of claims and counter statement of claims. The venue of the arbitration shall be such place as may be fixed by the arbitrator in his sole discretion.

2.34 EMPLOYER ENTITLED TO RECOVER COMPENSATION PAID TO WORKMEN:

If, for any reason the Employer is obliged, by virtue of the provisions of sub-section (I) of Section 12 of the workmen's compensation Act 1923, to pay compensation to a workman employed by the contractor, in the execution of the works, the Employer will recover from the contractor the amount of compensation so paid, and without prejudice to the rights of the Employer will be at liberty to recover such amount or any part thereof by deducting it from the security deposit or from any sum due by the Employer to the contractor under this contract or otherwise. The Employer shall not be bound to contest any claim made against him under sub-section (1) of Section 12, of the said Act, except on the written request of the contractor and upon his giving to the Employer full security for all costs for which the employer might become liable in consequence of contesting such claim.

2.35 LABOUR LAWS/REGULATIONS:

1. The contractor shall employ labour in sufficient numbers directly or through sub-contractor to maintain throughout the period of the contract the rate of progress required according to the approved program of work and of quality to ensure proper workmanship in accordance with the specifications and drawings and the Consultant's instructions.

2. The contractor will comply with the provisions of all Acts of Government relating to labour and the rules and regulations made thereunder from time to time including the Payment of wages Act, the Employer's Liability Act, Workmen's compensation Act, and Contract Labour/Regulation and Abolition Act, 1970 and Central Rules, 1971. He shall also submit at the proper times all particulars and statements required to be furnished to the Labour Authorities on being directed to do so.

3. The contractor shall register and obtain necessary licenses, maintain all registers, records, notices and documents and submit returns as prescribed by various enactment's required under various statutes including the Contract Labour (Regulation and abolition) Act 1970 and Rules made thereunder as applicable to the Contractor and ensure compliance of all statutory regulations that are in force and that may become applicable in future from time to time in all matters concerning this contract.

4. The contractor shall indemnify the employer against any liability that may arise due to the non-compliance of any provision under the said Contract labour (Abolition Regulation) Act. 1970 or any enactment affecting the work contemplated under this contract.

2.36 GENERAL INDEMNITY:

"The contractor shall indemnify the employer from and against all claims, demands, proceedings, damages, costs and expense which it may be put by reason of the contractor not conforming to or complying with any of the provisions or requirements of any Act or Statute, Central or State, Rules, Regulations, Bye-laws of local Authorities, Panchayat, Collector or any Companies relating to or in connection with the works or to labour or for supply of water, light or other amenities at the site".

TECHNICAL SPECIFICATIONS FOR THE HVAC SYSTEM

1.1.0 INTENT OF THE SPECIFICATION:

INCENT proposes to construct a research lab cum office within the IIT Madras Research Park. The labs in the INCENT office are to be designed as per ISO class 8 clean room standards complete with 3 stage filtration including HEPA filtration. The other areas are considered with normal air conditioning.

IIT Madras Research Park has a central chilled water system and provides a CHW tapping point to all the tenants. We will be using ceiling suspended units connected to this central chilled water system.

AREA STATEMENT:

Sl No.	Area Desc	Area sqft.
1	Seminar room	326.0
2	Reception	181.7
3	DISC 1	78.1
4	Analytical Lab	485.6
5	SSMG lab	602.8
6	Workspace	
7	Workspace	
8	RF lab	246.9
9	Discussion 3	96.2
10	Cabin 3	147.0
11	EMI lab	116.2
12	Main workspace	136.4
13	Cabin 1	89.7
14	DISC 2	90.2
15	Cabin 2	84.3
16	MPCVD	558.6
17	MPCVD Office	69.8
18	Accounts room	247.9
19	Development lab	536.7
20	Wet lab	192.6

The following specifications highlight the technical requirements of the proposed system.

2.1.0 BASIS OF DESIGN:

Air conditioning system design:

PARAMETER	DESIGN DATA
Outside design conditions (deg C)	39.4 DB/ 27.8 WB.
Inside conditions to be maintained	21 +/- 1 deg C DB for all the labs and offices RH for the labs at 40-60%.
Area/Occupancy/Equipment load, etc	As furnished in the table below
Fresh air rate	7 CFM per person or 2 air changes per hour, whichever is higher.
Plant operation	9 AM to 5 PM.
Exposed roof	Insulated with 32mm thick nitrile rubber insulation
Power supply	415 V, 50c/s, 3 phase 4 wire system.

Areas considered for air conditioning:
Clean Room Areas:

Sl No.	Area Desc	Area sqft.	HeatLoads	Temperature & ON/OFF control
1	Analytical Lab	485.6	5	Independent
2	SSMG lab	602.8	7.02	Independent
3	RF lab	246.9	6	Independent
4	Discussion 3	96.2	1	
5	Cabin 3	147.0	1.5	Independent
6	EMI lab	116.2	6.15	
7	MPCVD	558.6	13.68	Independent
8	MPCVD Office	69.8	0.8	
9	Development lab	536.7	7.88	Independent

Sl No.	Area Desc	Area sqft.	HeatLoads
1	Seminar room	326.0	4.2
2	Reception	181.7	1.4
3	DISC 1	78.1	0.8
4	Workspace		2
5	Workspace		1.5
6	Main workspace	136.4	2
7	Cabin 1	89.7	1
8	DISC 2	90.2	1
9	Cabin 2	84.3	1
10	Accounts room	247.9	2
11	Wet lab	192.6	2
8	MPCVD Office	69.8	0.8

Sl No.	Area Desc	Area sqft.	HeatLoads	Temperature & ON/OFF control	Unit Selection
1	Analytical Lab	485.6	5	Independent ON/OFF & temperature thermostat	1 no. x 12 TR CSU 110 mm SP (with pre and microvee filter and terminal heap filter)
2	SSMG lab	602.8	7.02	Independent ON/OFF & temperature thermostat	
3	RF lab	246.9	6	Independent ON/OFF & temperature thermostat	1 no. x 14 TR CSU 110 mm SP (with pre and microvee filter and terminal heap filter)
4	Discussion 3	96.2	1		
5	Cabin 3	147.0	1.5		
6	EMI lab	116.2	6.15		
7	Seminar room	326.0	4.2	No ON/OFF or temperature control	1 no. x 8 TR CSU 30 mm SP Only pre filter
8	Reception	181.7	1.5		
9	DISC 1	78.1	0.8		
10	Workspace	400	2.5		
11	Main workspace	136.4	2	No On/OFF or temperature control	1 no. x 35 TR floor mounted AHU 60 mm SP (with pre and microvee filter fitted)
12	Cabin 1	89.7	1		
13	DISC 2	90.2	1		
14	Cabin 2	84.3	1		
15	Accounts room	247.9	2		
16	Wet lab	192.6	2		
17	MPCVD Office	69.8	0.8		
18	MPCVD lab	560	14	Independent ON/OFF & temperature thermostat	For the two labs, fan filter unit will be provided at the terminal
19	Development lab	205	8	Independent ON/OFF & temperature thermostat	

1. All the above units shall have 2 stage of filtration in the AHU with 110 mm SP and with HEPA plenum with filters in the terminal.
2. All the above AHUs shall be of VFD type
3. The CSUs for the lab and the floor mounted AHU shall also have dehumidification heater banks fitted to maintain RH between 40-60%
4. 3. The ducting system for all the labs shall be Aluminium ducting
5. Individual ON/OFF control and temperature control shall be provided for each of the areas as shown in the above table
6. The temperature and ON/OFF thermostat shall vary the speed of the VFD Ceiling suspended AHU.

I. DATA SHEET FOR AHUs

AHU :

Sl.	DESCRIPTION	TECHNICAL REQUIREMENTS
1.	AHU type	Double skinned, ceiling suspended double skinned, with casing thickness for both inner and outer with 0.6mm plain/ pre coated GI complete with mixing box. The AHUs to be provided with 50 mm thick PUF insulation.

2.	Air Quantity/ TR	a. 35 TR floor mounted, 60 mm SP with pre and microvee filter with terminal heap fan filter unit for the labs alone b. 14 TR ceiling suspended, 110 mm SP with pre and microvee filter and terminal hepa filter c. 12 TR ceiling suspended, 110 mm SP with pre and microvee filter and terminal hepa filter d. 8 TR ceiling suspended, 30 mm SP with pre filter
3.	Type of motor	TEFC, Squirrel Cage induction, 415 V, 3 phase, class F with IP 55, IE2 rating. VFD type
4.	Filtration	a) HEPA filter fixed terminally b) Fine filter in AHU c) Pre filter in AHU
4.	Accessories required	a) Isolating valve, Audco BF type b) 4 row chilled water coil. c) 1.2 mm SS drain pan. d) Air Outlet dampers. e) Flexible connections. f) VFD Starter panel with isolator, and power wiring/ double earthing to motor. g) Earthing with 6 SWG copper wire. h) Fire Damper at SA duct outlet. i) Fresh air cowl with screen and damper. j) Differential pressure switch for indicating the hepa filter condition k) Dehumidification heater banks to control RH between 40-60% l) One digital thermometer and humidity indicator for each OT m) UVCLamp n) 3-way mixing valve with sensor and actuator
5.	Acceptable makes	Voltas/ Blue Star/ Carrier/ System Air (Suvidha)/ ETA/ Cary Aire/ Edge Tech/Luftek

II.DATA SHEET FOR THE AHU VFD STARTER PANEL:

Sl.	Description	Feeder details.
1.	PANEL Quantity required: 36 sets	- Incoming with isolator/ outgoing switch of adequate rating. - Starter with VFD - Instrumentation panel with Volt Meter/ Ammeter/ selector switches/ phase indicating LEDs.

3.1.0 GENERAL TECHNICAL REQUIREMENTS:

3.1.1 SCOPE OF WORK

The general scope of work to be carried out under this contract is illustrated in Drawings, Specifications and the schedule of quantities. Not withstanding any thing contained in this, the tenderer is to offer a proven and tested equipment to meet the requirements of this specification.

3.1.2 WORKS TO BE ARRANGED BY THE PURCHASER:

The owner will arrange to provide the following:

a. Incoming cable with earthing to all the motors.
b. Civil foundation works for the chillers, pumps and the cooling towers.

The contractor shall provide all allied works, including making openings in walls/floor for taking piping, ducting etc. The contractor shall also supply and fix any wooden frames required for fixing the grills, diffusers, fire damper, fresh air intake etc. All openings made for the above purposes shall be finished neatly with cement plastering etc.

3.1.3 BYE LAWS AND REGULATIONS

The installation shall be in conformity with the Bye Laws, Regulations and Standards of the local authorities concerned in so far as these become applicable to the installation.

If the Drawings or Specifications require something which violates the Bye Laws and Regulations, then the Bye Laws and Regulations shall govern the requirement of this installation.

3.1.4 WORKING PERMITS AND INSURANCE :

The Contractor shall obtain all work permits/ licenses required for the personnel employed at the work site and shall strictly adhere to all the rules & regulations of the purchaser. All statutory rules like PF, minimum wages etc., are to be followed strictly and registers as required by the law are to be maintained at site.

The contractor shall also fully cover the personnel employed and the materials used under comprehensive insurance, valid upto the duration of the contract plus 3 months.

3.1.5 DRAWINGS

The Contractor shall follow the tender drawings in preparation of his shop drawings and for subsequent installation work. He shall check the drawings of other agencies to verify spaces in which his work will be installed.

Maximum headroom and maintenance shall be maintained at all points. Where headroom appears inadequate, the contractor shall notify the purchaser before proceeding with the installation.

The Contractor shall examine all architectural, structural, plumbing, electrical and other services drawings before starting the work and report to the purchaser any discrepancies, coordinate installation of this work with other services and agencies.

3.1.6 TECHNICAL DATA

The tenderer must submit the technical data for all the items quoted quantity alongwith their tenders. Failure to furnish technical data with tender, may result in rejection of tenders.

3.1.7 SHOP DRAWINGS

Within one week after the award of the contract, the contractor shall furnish, for the approval of the purchaser, two sets of detailed shop drawings of all equipment and materials including plant room layout, ducting, piping and control wiring layouts required to complete the project as per specification and as

required by the purchaser. These drawings shall contain details of construction, size, arrangement, operating clearance, performance characteristics and capacity of all items of equipment, also the details of all related items of work by other contractors. Each item of equipment proposed shall be a standard catalog product of an established manufacturer as per specifications.

After final approval has been obtained from the purchaser, the contractor shall submit a further ten sets of shop drawings. No material or equipment shall be supplied for installation at the site until the contractor has in his possession, the approved shop drawings for the particular material or equipment.

The shop drawings shall be submitted for approval sufficiently in advance of planned delivery and installation of any materials, to allow the purchaser ample time for scrutiny. No claims for extension of time shall be entertained because of any delay in the work due to his failure to produce shop drawings at the right time, in accordance with the approved program.

Approval of shop drawings shall not be considered as a guarantee of measurements or of building dimension. Where drawings are approved, said approval does not mean that drawings have been checked in detail nor does it in any way relieve the contractor of the responsibility or requirement to furnish material or perform work as required by the contract.

Where the work of the contractor has to be installed will interfere withwork of other agencies, he shall assist in working out space conditions to make a satisfactory adjustment. If so directed by the purchaser, the contractor shall prepare composite working drawings and sections at a suitable scale clearly showing how his work is to be installed in relation to the work of other agencies. If the contractor installs his work before coordinating with other trades, he shall make all the necessary changes without extra cost to the purchaser.

3.1.8 QUIET OPERATION AND VIBRATION ISOLATION

All equipment shall operate under all conditions of load without any sound or vibration which is objectionable in the opinion of the purchaser. In case of rotating machinery sound or vibration noticeable outside the room in which it is installed, shall be considered objectionable. Such conditions shall be corrected by the contractor at his own expense. The maximum sound within 1M of the equipments shall not exceed 60 dB.

3.1.9 ACCESSIBILITY

The contractor shall verify the sufficiency of the size of the shafts and openings,clearance in cavity walls and piping. His failure to communicate insufficiency of any of the above shall constitute his acceptance of sufficiency of the same. The contractor shall locate all equipments which must be serviced, operated or maintained in fully accessible positions. The exact location and size of all access panels, required for each concealed control damper, valve or other devices requiring attendance, shall be finalised and communicated in sufficient time, to be provided in the normal course of work, failing which the contractor shall make all the necessary repairs and changes at his own expenses.

3.1.10 ELECTRICAL INSTALLATION

It is to be clearly understood that the final responsibility for the sufficiency, adequacy and conformity to the contract requirements, of the electrical installation work for airconditioning services, lies solely with the contractor.

All statutory approvals for electrical installation under the scope of this tender like CEIG / CEA approvals etc., shall be obtained out by the contractor. The required fees shall be paid by the purchaser but all other incidental expenses in connection with the inspection/ approval etc., shall be borne by the contractor.

3.1.11 MATERIALS AND EQUIPMENT

All materials and equipment shall conform to the relevant Indian Standards and shall be of the approved make and design. General specifications for the various equipments / works are enclosed. Wherever these are not totally clarified, the construction shall be carried out as per the relevant IS specifications.

3.1.12 MANUFACTURER'S INSTRUCTION

Where manufacturers have furnished specific instructions, relating to the material and equipment used in this job, covering points not specifically mentioned in these documents, such instructions shall be followed in all cases.

3.1.13 INSPECTION & TESTING

The purchaser's authorized representative shall have full powers to inspect any portion of the work, examine the materials, workmanship and getting the materials / equipments tested at the contractor's works or at any other place from where equipments/ materials are procured. These examinations will not relieve the contractor any of his responsibility for meeting the requirements of the specifications and it will be the contractor's responsibility to rectify/ replace such works/ equipments not found in accordance at his cost.

All the testing and measuring instruments and labour required shall be provided by the contractor at his cost. The contractor shall also calibrate the instruments used for testing at reputed calibration centers.

3.1.14 REJECTION OF DEFECTIVE PLANTS/EQIPMENTS:

If the completed works or equipment or any portion there of taken over is found to be defective, or fail to fulfil any specification requirements, the contractor shall, on receipt of written notice, shall make good the defective works at his cost within a stipulated time frame. The purchaser shall have full powers to carry out such repair works at the risk and cost of the contractor, in case the contractor fail to carry out this within the stipulated time.

The purchaser shall have the right to operate the plant whether or not such equipments have been accepted.

3.1.15 BALANCING, TESTING AND COMMISSIONING

Balancing of all air and water systems and all tests as called for in the specifications shall be carried out by the contractor in accordance with the specifications and relevant local codes.

The results of these testing shall be submitted for scrutiny. Four copies of the certified manufacturer's performance readings for each piece of equipment shall be submitted alongwith the test results.

The Contractor shall arrange, all necessary balancing and testing equipment, instruments, materials, accessories and the requisite labour. Any defects in materials and / or in workmanship detected in the course of testing shall be rectified by the contractor entirely at his own cost, to the satisfaction of the purchaser. The installation shall be tested again after removal of defects and shall be commissioned only

after approval of the purchaser. All tests shall be carried out in the presence of purchaser's representative.

3.1.16 COMPLETION DRAWINGS

On completion of the work in all respects, the contractor shall supply six (6) complete sets of drawings, on approved scale, indicating the work as installed. These drawings shall clearly indicate the complete plant room layouts, ducting and piping layouts, location of all concealed piping, valves, controls, dampers, wiring and other services. The contractor shall also submit six (6) sets of consolidated control diagrams, technical literature of all equipment and materials. The contractor shall frame under glass in the AHU room, the respective duct layout drawings.

3.1.17 GUARANTEE AND DEFECTS LIABILITY PERIOD

The contractor shall guarantee that all equipments shall be free of any defects due to defective materials and bad workmanship and the equipment shall operate satisfactorily with the performance & efficiencies not less than the guaranteed values. The guarantee period shall be valid for a period of eighteen (18) months after successful completion of the performance tests.

3.1.18 TRAINING OF PERSONNEL;

The Contractor shall provide adequate training to the engineer/ Plant Operator, for the operation and maintenance of the air conditioning plant. The training is to be given during installation and commissioning of the system.

As built drawings and equipment brochures, manuals operating procedures, etc shall be handed over in both hard & soft copy.

4.0 TECHNICAL SPECIFICATIONS:

4.1 DUCTING:

The ducting shall be of galvanized sheet steel with zinc coating as per class 8.Thickness of the sheet shall be as under:

GI ducting:

Rectangular duct upto 750mm	24 gauge
Rectangular duct 751 to 1250mm	22 gauge
Rectangular duct 1251 to 2400mm	20 gauge
Rectangular duct above 2401 mm	18 gauge

Al ducting:

Rectangular duct upto 750mm	22 gauge
Rectangular duct 751 to 1250mm	20 gauge
Rectangular duct 1251 to 2400mm	18 gauge

ERECTION REQUIREMENTS:

a. All ducts shall be fabricated and installed in workman like manner, generally conforming to the relevant ISI codes.

b. Ducts shall be straight and smooth on the inside with neatly finished joints. Joints shall be made air-tight.

c. Changes in dimensions and shape of ducts shall be gradual. Curved elbows shall have a centre line radius equal to one and a half times the width of the duct. Air turns shall be installed with vanes, arranged to permit the air to make the turn without appreciable turbulence.

d. All ducts shall be rigid and shall be adequately supported and braced where required with standing seams, tees or angles, of ample size to keep the ducts true to shape and to prevent buckling, vibration and breaking. Ducts upto 610mm width shall have a minimum of 40x3mm angle support and ducts larger than this shall have 50x6mm angle support.

e. All branch takeoffs and collars shall be provided with turning vanes.

f. All necessary allowances and provisions shall be made by the contractor for beams, or other obstructions in the building, whether or not the same are shown on the drawings. Where necessary to avoid beams or other structural work, plumbing or other pipes and or conduits, the ducts shall be transformed, divided or curved to one side, the required area being maintained, all as per the site requirements.

g. If a duct cannot be run as shown on the drawings, the contractor shall install the duct between the required points in accordance with other services and as per approval of the Engineer.

h. All duct work shall be independently supported from building construction. All horizontal ducts shall be rigidly and securely supported, in an approved manner, with trapeze hangers formed of MS rods of 10mm at every 2.5 meter centres. All vertical duct work shall be supported by structural members at each floor level.

i. The ducts shall not be supported from false ceiling hangers or be permitted to rest on false ceiling.

j. All ducts shall be totally free from vibration under all conditions of operation. Whenever duct work is connected to fans, air handling units or blower coil units that may cause vibrations in the ducts, ducts shall be provided with flexible connections, located close to the unit. Unit connections shall be constructed of fire resistant flexible double canvas connection of minimum 150mm long securely bonded and bolted on both sides. Sleeve shall be made smooth and the connecting duct work rigidly held by independent supports on both ends. The flexible connection shall be suitable for pressures at the point of installation.

k. All plenums at the outlet of the unit shall be constructed of 18G GI sheet with suitable angle bracings, inspection doors etc.

l. All scaffolding required for erection/ testing of pipelines shall be arranged by the contractor at his cost.

4.2 FIRE DAMPERS

a. All supply air ducts at air handling unit room shall be provided with approved fire dampers of at least 1.5 hours fire rating.

b. Fire damper blades shall be one piece folded high strength galvanized steel construction. In normal position these blades shall be gathered and stacked at the frame head providing maximum air passage

and preventing passing air currents from creating noise or chatter. The blades shall be held in position through a fusible link to close in case of fire. A potential free contact shall be provided in the fire panel of each floor by the fire alarm vendor. The AC contractor shall wire this to the AHU motor starter to trip the same in case of fire.

c. Each fire damper shall be tested after installation to ensure closing on actuation of the connected fire alarm system.

d. The fire damper frames shall be of 18 gauge GI and the blades of 22 gauge GI.

VOLUME CONTROL DAMPERS:

a.Frame shall be of high strength galvanized steel construction and shall be of min. thickness 1.2 mm.
b. Blades shall be of double skinned high quality extruded Al construction. Blades shall be coupled by toothed nylon gearsor equivalent material which provides opposed blade operation.
c. Hand locking quadrant shall be provided with clear open/close indication and min. three intermediate open positions (1/4 – 1/2 - 3/4).
d. Foam gasket is sealed across the blade edges to minimize air leakage between the blades.

4.3 INSULATION:

THERMAL INSULATION OF PIPE:

a. All the pipes and equipment, operating at temperatures lower than the ambient shall be insulated in the manner specified.

b. Insulation of 50 mm thick TF quality thermocole with 26 G Aluminium cladding will be provided for the piping for all areas.

c. The method of insulation is as under:
Clean the surface to be insulated.
Apply 2 coats of non-flammable cold adhesive as specified by the manufacturer.
Fix the insulation of the specified thickness over the surface of the pipe tightly.
Seal all the joints of the insulation with cold bitumen.
Cover the above with jute hessian cloth.
Fix 22 G GI wire netting over the hessian.
Applycladding with 26 G aluminium over the insulation.

THERMAL INSULATION OF DUCT:

The tail end duct shall be insulated in the following manner.

a. The insulation material for the ducting shall be 19 mm Nitrile rubber material, laminated with Aluminium foil.

b. The method of insulation is as under:
- Clean the surface to be insulated.
- Apply one coat of primer paint.
- Fix the insulation of the specified thickness over the surface of the duct tightly.
- Seal all the joints with 75mm wide PVC tapes.

ACOUSTIC INSULATION OF DUCT:

The first 3 M of the ducting from the unit outlet shall be acoustically insulated in the following manner:

Armasound or equivalent material rigid board of 15 mm thick is to be secured on the inside of the ductthrough GI bolts, GI nuts and GI washers.
The insulation shall be covered with tissue paper.
Finally, 26 G perforated Aluminium sheet shall be provided over the tissue paper.

AHU ROOM WALL ACOUSTIC INSULATION:

Walls facing the air conditioning area of the AHU room shall be insulated as under:

- Clean the wall area to be insulated
- Fix GI channel work to form a grid equal to the dimension of the commercially available armasound or equivalent material
- The thickness of the frame shall be constructed to accommodate 50 mm thick armasound or equivalent material
- Fix 50 mm thick armasound or equivalent material of density not more than 14 kg/cum
- Fix tissue paper over the insulation and fix properly to the grid work
- Finally, provide 26 gauge perforated aluminium sheet over the tissue paper fixing properly to the grid work.
- Please note only brass screws shall be used for fixing the tissue paper and aluminum sheet
- Alternatively, the armasound board shall come with Al foil lamination

4.4 AXIAL FLOW EXHAUST FANS

- Propeller fan for wall or panel mounting to convey air directly to the outside.
- Sickle Blade impellers, in conjunction with the external rotor motors to be provided.
- Wall plate should be made of high grade galvanized sheet steel, with painted finish.
- Fans should be statically and dynamically balanced according to ISO 1940 standard.
- Low noise level (max of 60 dB) with high efficiency of atleast 90%.
- All mounting accessories shall be provided.
- Outlet gravity shutters also to be provided as standard accessory as part of the fans

4.5 SUPPLY, RETURN& EXHAUST DIFFUSERS

a. The supply and return air diffusers shall be anodized aluminum construction, square or rectangular as per the drawings. Diffusers for different spaces shall be selected in consultation with the Purchaser.

b. Supply air diffusers shall be equipped with fixed air distribution grids, removable key operated volume control dampers of GI construction, and as required in specific applications.

c. Linear diffusers, if required as per the drawings, shall be anodized aluminum construction; one or two way blow linear diffusers. Supply air diffusers shall be provided with GI volume control balancing dampers within the supply air collar. Diffusers for different spaces shall be selected in consultation with the Purchaser, and provided as per requirements of Schedule of Quantities.

d. The supply air collar will be made to project at least 15mm outside the vertical face of the false ceiling, and is to be trimmed flush with the false ceiling face, before fixing the grill. If this is not done, the Purchaser reserves the right to reject the entire ducting system.

4.7 AIR HANDLING UNIT:

- The accepted makes of the AHU and the chilled water coils are Voltas/ Blue Star/ Carrier/ System Air (Suvidha)/ ETA/ Cary Aire/ Edge Tech/Luftek
- The unit shall be of the double skinned casing type. The outer casing shall be 0.60mm thick Galvanised steel and the inner casing shall be 0.60mm thick Galvanised steel . The insulation material shall be PUF or equivalent material of minimum 25mm thick sand witched between the two panels, as per the standards of the manufacturer. For the AHUs in the lab alone& outdoor AHUs will have PUF insulation shall be of 50 mm thickness.
- The drain pan shall be of stainless steel material of not less than 1.2mm thick.
- The blower shall be of Nicotra or Lau or Kruger make and shall be DIDW forward curved impellar of galvanized construction. The shaft shall be of steel, liberally designed and supported on ball or roller bearings adequately sized.
- The drive motor shall be **of VFD type** of TEFC squirrel cage induction motor with IP 55 protection and with Class F insulation, with IE2 efficiency rating. The acceptable makes are Siemens/ Kirloskar/ ABB/ NGEF. The design, construction features and testing of the motors shall be as per the latest version of IS 325. Routine test certificates shall be furnished for the motor. The motors shall have IE2 efficiency rating.
- The drive motor shall be preferably direct coupled. If this feature is not possible, suitably designed V belts shall be provided.
- The AHU shall have inspection covers for attending to various parts requiring maintenance.
- The AHU shall be ceiling suspended.
- The chilled water coil shall be of copper tube with Aluminium fins. The coil shall be with 6 rows with 12 fins per inch spacing. The coil shall be tested for a pressure of 10 Kg per sq.cm (g) and test reports shall be furnished for this.
- The filters shall be viscous metallic 50mm thick. Alternately HDPE filters of equivalent thickness are acceptable.
- Drain connections shall be provided on both ends and shall be suitably piped to the nearest drain.
- Motors up to and including 7.5 HP shall have DOL starter and above this rating shall have Star/ Delta starter.
- Maximum noise level of 60 dB upto 1 M from the equipment;

AHU sub-panel wall mounted type suitable for indoor installation with 1 no. main incomer switch with necessary isolator, 1no. outgoing feeder & 1 no. starter with VFD/Bypass arrangement, Auto manual selector switch, indication lamps, necessary OLR,relays and power contactors(DOL starter up to 7.5HP and star delta starter above 7.5 HP) and single phase supply for 2/3 way valve.

- **TESTING:**

The AHU, after completely assembled with the chilled water coil, will have to be run tested at site, to establish the

following:

a) Air Quantity.
b) Power consumption.
c) Static pressure.
d) Noise and vibration.

4.9 PIPING

Acceptable makes of pipe: BST/GST/Jindal/ Hissar/ TATA/ T&M.
Acceptable make of valves: Slim seal butterfly type of Audco.
Acceptable make of NRV: Intervalve.
Air Vent valve: Bronze/ Gun metal of Leader make.

Pipe sizes shall be as required for the individual fluid flows.

a. All water pipes shall be MS class 'C' (Heavy class) upto 150mm dia as per I S 1239 and 6 mm thick above 150mm diameter as per IS 3589. All jointing in the pipe system shall be by welding, or as directed at site. All welding shall be done by qualified welders and shall strictly conform to Indian standards code of procedure for manual metal arc welding.

b. All pipes and their steel supports shall be thoroughly cleaned and given one primary coat of red oxide paint before being installed. All welding methods shall be subject to the approval.

c. Fittings shall be of heavy class of pressure rating suitable for the piping system. Fitting used on welded piping shall be of weldable type.

d. Tee off connections shall be through equal / reducing tees. Drilling and tapping of the walls of the main pipe shall not be resorted to for piping upto 150mm dia.

e. Gate valves shall be Audco butterfly type as per sizes specified and shall be suitable for not less than 14 kg per sq.cm. working pressure. The body shall be cast iron/ cast steel and the gate shall be SS 304.

f. Flanges of approved make and thickness as per IS codes shall be provided at required intervals and at connections to the equipments. Suitable asbestos fibre / rubber insertion gaskets (minimum 3mm thick) shall be provided.

g. Non return (check) valves shall be of slim seal type of Intervalve make. The body shall be CI and the gate shall be SS 304. This shall be designed for an internal pressure of 14 kg / sq.cm.

h. Strainers shall be Y type or pot type indicated with MS construction designed shall have 2mm thick stainless steel screen with 6mm perforations. Screen shall be removable and replaceable without disconnection of the main pipes.

i. After water pipes has been installed and tested, all exposed piping shall be given two finish coats, of approved paint, conforming to relevant ISI codes.

j. Pipes shall be properly supported on suitable MS supports as per the instructions. The contractor shall adequately design all the brackets, saddles, anchors, clamps and hangers and be responsible for their structural sufficiency.

k. Pipe supports shall be of steel adjustable for height and primer coated with rust preventive paint and finish coated with black paint.

l. Vertical riser shall be parallel to walls and column lines and shall straight and plumb, risers passing from floor to floor shall be supported at each floor slab by clamps attached to pipe and with a 15 mm thick rubber pad. Where pipes pass through the terrace floor, suitable flashing shall be provided to prevent water leakage.

m. Pipe sleeves, 50mm larger diameter than pipes, shall be provided wherever pipes through wall slabs and annualar space filled with fibre glass.

n. All pipes shall be tested to hydrostatic test pressure of 15 kg per. Sq.cm. gauge for a period of not less than 8 hours. All leaks and defects in joints revealed during the testing shall be rectified and got approved at site.

o. Piping repaired subsequent to the above pressure test shall be re tested in the same manner.

p. Isolating valves shall be provided at all required points. The valves provided for the underground mains shall have valve chambers with CI covers. Drain valves shall be provided at all lowest points in plant room, lowest points in riser pipes and wherever required for draining the entire water.

q. After pressure testing, the pipes shall be painted with approved color code.

r. The contractor shall provide all materials, tools, equipment, instruments, and labour required to perform the test and to remove water resulting from cleaning and after testing.

s. All scaffolding required for erection/ testing of pipelines shall be arranged by the contractor at his cost.

t. Air vent valves, drain valves of adequate size is to be provided at the highest points and lowest points whether specified in schedule of quantities or not.

4.11 MOTOR:

- The drive motor shall be of VFD driven TEFC squirrel cage induction motor with IP 55 protection and with Class F insulation. The acceptable makes are Siemens/ Kirloskar/ ABB/ NGEF. The design, construction features and testing of the motors shall be as per the latest version of IS 325. Routine test certificates shall be furnished for the motor.

- The drive motor shall be preferably direct coupled. If this feature is not possible, suitably designed V belts shall be provided.

- The starter will be of VFD type automatic starting & a lockable off switch.

4.13 AIR BALANCING

After the installation is completed and re-commissioned, the contractor shall carry out the air balancing at least on two occasions, one during summer months (April – June) and other during monsoon/winter (September – December). The temperatures of various sections including the cabin are also to be measured simultaneously and air quantity adjustments wherever required is to be done properly and shown to the consultant. The air balancing, depending upon the situation may even have to be carried out for more than two days on both occasions. The purchaser reserves the right to with-hold the security deposit till such time the air balancing is completed satisfactorily.

4.14 FAN FILTER UNIT WITH HEPA FILTRATION

- Fan filter unit shall be of SS construction SS grade 304
- Noise level not exceeding 60 db
- The fan should be able to develop static required for the hepa filter
- HEPA filter – 99.9% efficiency at .3 microns

- Accessories – should indicate hepa filter condition,
- Air velocity not exceeding 500 FPM across the terminal

5.0 LIST OF ACCEPTABLE MAKES OF EQUIPMENTS:

CHW pipes : BST/GST/Jindal/ Hissar/ TATA/ T&M.
Ducting : Jindal/SAIL/NIPPON
Grills/ Diffusers : Air Master/ Air Breeze/Cosmic
Thermal insulation : Armaflex, Armacell, A-flex
Acoustic insulation : Armasound or equivalent
AHU : Voltas/ Blue Star/ Carrier/ System Air (Suvidha)/ Luftek/ Cary Aire/ Edge Tech/ZECO
Centrifugal Blower : Nicotra/ Kruger/ Lau/ Nadi/ Almonard.
Motor : Siemens/ Kirloskar/ NGEF/ ABB.
Starters : Siemens/L&T/ABB/Danfoss
Exhaust Fans : Almonard/Kruger/Nadi/Nicotra/Lau
Cables(power) : Finolex/Polyca/Havells
Cables (control) : Finolex/Polyca/Havells
G I Sheets : Jindal/ Nippon/ SAIL/JS
UV Lamp : Philips, Seimens or equivalent. Should be easily maintained and replaceable in India.
Y Strainer : Sant/Emarald
Balancing valve : Advance/Intervalve
3 way mixing valve : JCI/Siemens/Honeywell
Butterfly valve/balancing valve/check valve : Advance/AUDCO/Intervalve
Air terminals : Caryaire/System air
Cooling tower : Paharpur/ Advance/ Mihir/ Bell
HEPA: AAF or equivalent

Fire Works

1.0 CONDITIONS OF TENDER

1.1 SIGNATURES:

(iii) In the event of the tender being submitted by a firm, it must be signed separately by each member thereof, or in the event of the absence of any partner, it must be signed on his behalf by a person holding a power of Attorney the copy of which shall be produced with the tender and it must disclose that the firm is registered under the Indian Partnership Act.

(iv) Each and every signature given shall be separately witnessed. A contract or contractors who himself/themselves has/have tendered or who may tender for the same work shall not witness the tender of another person for the

work. Failure to observe this condition would render tenders of the contractors tendering as well as witnessing the tenders liable for summary rejection.

1.7 QUOTING RATES:

(iii) The tenderer must quote his rates only on the proper form of tender, both in figures and words, both in decimal coinage, in the respective spaces provided therefor. The amount for each item should be worked out in figures only for the probable quantities specified in the bills of quantities but the requisite totals given both in figures and words.

(iv) Special care is to be taken to write the rates in figures and words in such a way that no interpolation is possible. Erasures and alterations must be avoided, but if errors are made while pricing the bills of quantities, the wrong figures and words must be neatly scored out under the initials of the tenderer and the correct figures and words neatly rewritten but not overwritten. Overwriting is not permitted and may entail rejection of the tender.

1.8 RATES IN FIGURES & WORDS:

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.2=15p; in the case of words the word "Rupees" should similarly precede and the words "Paise only" should be written at the end, closely, following each rate and each amount. 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'. It should invariably be upto two decimal places.

1.9 ERRORS:

Errors in the bills of quantities shall be dealt with in the following manner:

vii) In the event of discrepancy between the rates quoted in words and the rates in figures the former shall prevail.

viii) 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 nettrate shall be regarded as firm and extension shall be amended on the basis of the rates.

ix) All errors in totalling in the amount column and in carrying forward the total shall be corrected.

x) Any omissions to include in the totals shall be corrected.

xi) The bills of quantities are stamped 'original' and 'duplicate'. If there is any discrepancy in the rates, units and amounts between the 'original' and 'duplicate' the figures and words in the original are liable to be taken as correct and the duplicate corrected accordingly.

xii) The tender total shall be accordingly amended except that there shall be no rectification of any errors, omissions or wrong estimate, in the prices inserted by the tenderer in the bills of quantities.

1.10 ALTERNATIVE ITEMS:

Where alternative items are included, only the rates in figures and words are to be entered and not the amounts thereof. A tender which does not show the rates in figures and words for the alternative items may be rejected. The Employer reserve to himself the right to take into account any or all of the alternative items for the purpose of accepting a tender or to operate upon any or all of the said alternative items during the execution of the work, partly or fully as required.

1.11 QUANTITIES LIABLE TO VARY:

The quantities furnished in the bills of quantities are only probable quantities liable to alteration by omission, deduction or addition, and it should be clearly understood that the contract is not a Lumpsum Contract and the Employer, do not, in any way, assure the tednerer or guarantee that the said probable quantities are correct or that the work would correspond thereto. Payments will be regulated on the actual quantities of supplies made or work done at the accepted rates.

1.7 DRAWINGS, SPECIFICATIONS & BILL OF QUANTITIES:

(iv) The drawings, specifications and the bills of quantities, forming parts of the contract, are explanatory of and are complementary to one another, representing together the supplies to be made/ the works/ installations to be carried out.

(v) If neither the drawings nor the specifications nor the accepted bills of quantities include any part/parts the intention to include which is nevertheless clearly to be inferred and which are obviously necessary for the proper execution of the work or the completion of the supplies, all such parts shall be supplied or/;and executed by the contractor at no extra charge.

(vi) Anything contained in one or another of (a) the drawings, (b) the specifications and (c) the accepted bills of quantities and not found in the others will be equally binding as if contained in each of them.

1.11 TENDERER NOT TO MAKE ALTERATIONS:

No alterations which are made by the tenderer in the drawings, specifications or probable quantities accompanying this notice will be recognized, and if any such alterations are made the tender will be invalid. Remarks or explanations should be set out in a covering letter and will become binding only if specifically accepted in writing by the Employer at the time of acceptance of the tender. Any tender which purports to alter, vary or omit any of the conditions herein is liable to be rejected.

1.12 TENDERER TO VISIT SITE/ BEAR COST OF TENDERING:

(vi) The tenderer must obtain for himself on his own responsibility and at his own expense all the information necessary including risks, contingencies and other circumstances to enable him to make a proper tender and to enter into a contract with the Employer. He must examine the drawings, specifications, conditions and so on and must inspect the site of work and the works in progress and acquaint himself with local conditions, means of access to the work, the nature of the work, in fact all matters pertaining thereto before he submits his tender.

(vii) He shall also take due note of the stipulation, if any, made in the bills of quantities for rebate to be given by him/recovery to be made in his bills towards works done already by other agency and quote his rates for the work to be done (by him) accordingly.

(viii) The tenderer shall also bear all expense in connection with the preparation and submission of his tender.

(ix) Omission, neglect or failure on the part of the tenderer to so obtain requisite and reliable information on any matter affecting his tender, the contract and the construction, completion and maintenance (during defects liability period) of the work shall not relieve the tenderer whose tender is accepted from any liability in respect of the contract.

(x) The tenderer whose tender is accepted shall not be entitled to make any claim for increase in the rates quoted and accepted except in pursuance of any specific provision in the contract for such and then only in terms of that specific provision, or to make any representation on the ground that he was supplied with any information or given any promise or guarantee of any sort, by the Employer, his agents and servants, the Consultant or their representatives or any other persons, unless such information, promise or guarantee is furnished to the tenderer in advance of the date of receipt of tenders and in writing under proper authority.

1.13 INFORMATIONS TO BE FURNISHED BY THE TENDERER:

The tenderer shall submit with his tender a list of large works of a like nature executed by him with details of magnitude and cost, the agencies for whom the works were carried out, the time taken to complete such works and such other information to enable the employer to assess his financial and technical capabilities and shall also specify in the appropriate column of the "List of approved makes of equipment/ plant and statement of makes offered by the tenderer", the makes for which he quotes, attaching wherever necessary samples/illustrations/descriptive literature to enable the Employer to truly assess his tender.

1.11 TENDERER TO FURNISH DETAILS OF LICENCES ETC:

The tenderer shall furnish details of licenses /certificates granted to him and/or to professionally qualified and/or licensed technical personnel/workmen on his staff who will be engaged on the work (and submit, if called for the licenses /certificates for inspection by the Consultant/Employer).

1.13 **TENDER TO COVER ALL COSTS/ CONTINGENCIES:**

The tender must be complete in itself, properly worked out to cover all the contractor's obligations under the contract and all matters and things necessary for the proper completion of the work, and the rates quoted therein must be correct and sufficient to cover the contractors' costs, overheads and profits etc., completely for the individual items of work including cost for all necessary materials and labour unless specified otherwise, incidental charges, for such as but not limited to water, electric power, tools, plant, machinery, testing apparatus, scaffolding, sheds if necessary, making, aligning, access to site, clearing site etc., taxes, excise or any other such tax or duty levied by Govt., Central or Local or Local Authority, Octroi, etc. if and as applicable, Insurances against loss or damage by fire, theft, or other usual risks till the work is completed in all respects according to the true meaning and intent of the contract and delivered up.

1.13 CURRENT RATES OF LEVIES TO BE SPELT OUT:

Where taxes, duties, etc. are declared as not included in the rates, or stated to be extra as applicable the tenderer shall state in his tender the current levies and the elements in his prices on which such levies are chargeable, failing which the tender will be deemed to be incomplete and subject to rejection.

1.18 NO VARIATION/ ESCALATION TO QUOTED RATES:

The rates shall be firm and not subject to any variations in prices of components, basic material exchange rates, taxes, duties, etc. railway freight and the like, labour rates, etc. The rates are not subject to escalation otherwise than as specifically provided for in the contract.

1.19 TENDER VALIDITY:

The tenders submitted shall remain open for acceptance for a period of 3 months from the date of their opening. Should any tenderer withdraw his tender before the expiry of the said period or makes any modifications to his tender which are not acceptable to the Employer the tender will be treated as having been rejected or abandoned.

1.20 RIGHTS OF EMPLOYER:

(iii) The Employer does not bind himself to accept the lowest tender and reserves to himself the right to reject any or all of the tenders received without the assignment of any reason thereof.

(iv) The Employer further reserves the right to delete or reduce any item or section of the bills of quantities without assigning any reason therefor, or split up the work into convenient parts and award the split up portions to different tenderers and the rates quoted and the terms and conditions shall hold good as if the full work as tendered for was awarded to the tenderer and no claim will be admissible in this regard.

1.21 FORMAL AGREEMENT:

The tenderer whose tender is accepted will be required to execute a formal agreement with the Employer, but his liability under the contract shall commence from the date of written order to commence work. The contractor shall bear all expenses in connection with the execution of the said agreement including fees for stamping and registering of documents as required. Failure to execute the agreement as required will entail refusal by the Consultant of certificates for payment.

1.18 NO INTEREST ON EMD/SD:

Earnest money/Retention Money will bear no interest whatsoever until the date of their release.

1.19 COMPENSATION DEDUCTABLE FROM DEPOSITS:

All compensations or other sums of money payable by the contractor to the Employer under the terms of contract may be deducted from the EMD and the Security Deposit if the amounts so permit and the contractor shall, unless such deposit has become payable otherwise, within 10 days after such deduction, make good in cash the amount so deducted.

1.20 WORKING DRAWINGS:

The successful tenderer, within two weeks of the award of the work to him shall submit to the Employer the working drawings necessary for the proper execution of the work, conforming to the specifications for approval. The work shall be carried out strictly in accordance with the approved drawings and specificaitons.

1.21 TIME BOUND PROGRAMME:

The tenderer shall submit to the Consultant, a time bound program in the form of a chart or otherwise for completion of the work in accordance with the contract and the work shall be carried out strictly according to the approved program which will form part of the agreement and be the basis for assessment of progress under the relevant conditions of contract.

1.22 EMPLOYERS ROLE:

The work will be carried out under the directions and supervision of and subject to the approval in all respects by the Consultant/ Employer.

1.23 DRAWINGS/DOCUMENTS APPROVAL:

The Contractor shall, if and where necessary at his own cost prepare the necessary drawings and submit them for and obtain the approval of the CEIG or CEA or other appropriate State Authority, as applicable to the Electrical Installation executed under this contract. Any fees or charges paid to Govt. of such other Authority by the contractor on behalf of the Employer will be reimbursed to him (contractor) on production of necessary proof of payment. The contractor shall also go through the necessary formalities and follow up with the CEIG or CEA or the other appropriate State Authority in the matter of obtaining approval of drawings, inspections and safety

certificate, service connection to the new/additional installations to enable the Employer to use the installation as soon it is taken over by him.

1.24 FINAL DRAWINGS & CERTIFICATES:

On completion of the work the contractor shall furnish four sets of wiring diagrams and of complete layout as executed in the installation. He shall also furnish a completion and test certificate and guarantee certificate. The Consultant will be not issue the final certificate unless the provisions of this clause have been compiled with.

1.25 CONTRACTORS REPRESENTATIVE:

On acceptance of the tender the contractor shall in writing and at once inform the Employer and the Consultant the names of his accredited representative (s) who will be responsible to take instructions from the Consultant /Employer.

1.26 ASSIGNING WORKS:

The work or any part of it shall not be transferred, assigned or sublet without the written consent of the Employer.

1.27 OTHER AGENCIES WORK:

The contractor shall be required to co-operate and work in co-ordination with and afford reasonable facilities for such other agencies/specialists as are/may be employed by the Employer on other works/sub-works in connection with project/scheme of which this work forms part and in this connection it shall be deemed that the contractor had prior to tendering inspected the premises/site/work and taken all circumstances into consideration.

1.28 WORK TO BE INSURED:

The contractor will be required to insure the work and keep it insured until one month after the date of taking over the work/installation by the Employer, or otherwise in terms of the contract against loss or damage by fire and other usual risks other than risks excepted in terms of the Contract, with an insurer whose name is to be approved by the Employer.

1.29 ACTS OF GOVERNMENT:

The contractor is required to comply with all Acts of Govt. relating to labour and the Rules and Regulations made there under form time to time and to submit at the proper times all particulars and statements required to be furnished to the Labour Authorities.

1.30 SAFETY CODES :

In carrying out the work the contractor shall strictly comply with the provisions of the Safety code generally as under:

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n) First aid appliances including adequate supply of sterilized dressing and cotton wool shall be maintained in a readily accessible location.
o) The injured person shall be taken to a Public Hospital without loss of time, incases where the injury necessitates hospitalization.
p) Suitable and strong scaffolds should be provided for workmen for all works that cannot safely be done from ground.
q) No portable single ladder shall be over 8 metres in length. The width between the side rails shall not be less than 30cm (clear) and the distance between two adjacent rungs not more than 30cm. When a ladder is used an extra helper shall be engaged for holding the ladder.
r) Excavated material shall not be placed within 1.5 meters of the edge of the trench or half of the depth of trench whichever is more. All trenches and excavations shall be provided with necessary fencing and lighting.
s) 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 the minimum height of which shall be one meter.
t) No floor, roof or other part of the structure shall be so loaded with debris or materials as to render it unsafe.

u) Workers employed on handling hazardous material shall be provided with protective footwear and rubber hand gloves.
v) Those engaged in welding works shall be provided with welder's protective eye shields and gloves.
w) No paint containing lead or lead products shall be used except in the form of paste or readymade paint. Suitable facemasks should be supplied for use by the workers when the paint is applied in the form of spray or a surface having lead paint is dry rubbed and scraped.
x) Overalls shall be supplied by the contractor to the painter and adequate facilities shall be provided to enable the working painters to wash themselves during periods of cessation of work.
y) Hoisting machines and tackle used in the works, including their attachments, anchorage and supports shall be maintained in perfect condition.
z) Ropes used in hoisting or lowering material or as a means of suspension shall be of durable quality and of adequate strength and free from defects.

2.0 CONDITIONS OF CONTRACT:

2.1 INTERPRETATION OF CLAUSES:

iv) In construing these conditions, the specifications, 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.

v) Headings and marginal notes to the conditions of contract shall not be deemed to form part thereof or be taken into consideration in the interpretation or construction thereof or of the contract.

vi) Where the context so requires (i) words importing persons include firms and corporations and (ii) words importing the singular only also include in plural and vice versa.

c) Employer shall mean Incent, Chennai.

d) Consultant shall mean PADGRO, Chennai.

c) Contractor shall mean ---------- and include his/their legal representatives, permitted assigns, or successors.

n) Site shall mean the land and /or other places, on into or through which work is to be executed under the contract or an adjacent land, path or street through which work is to be executed under the contract or any adjacent land, path or street which may be allotted for use for the purpose of carrying out the contract.

o) The contract or this contract shall mean the Tender Documents comprising the notice inviting tender, form of tender, the conditions of tender, the drawings, and priced bills of quantities with their preambles, the acceptance thereof, and the articles of agreement, together with its appendix and special conditions, d`esigns drawings and instructions issued from time to time by the Consultant and all these documents taken together are deemed to form one contract and shall be complementary to the another.

p) Bills of Quantities variously also termed priced bills of quantities, 'schedule of quantities', 'schedule of rates' shall mean the schedule of quantities originally furnished with the notice inviting tender, duly priced in by the tenderer and accepted by the Employer for inclusion as a part of the contract for determining the consideration payable to the contractor for executing the work and as part of the contract agreement it is also referred to as the contract schedule.

q) 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 to the 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

r) Act of Insolvency shall mean any Act of Insolvency as defined by the Presidency Towns Insolvency Act, or the provincial Insolvency Act or any act amending such original.

s) 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 the price of that item a similar percentage or proportionate sum provided always that in determining the percentage or proportion of the sum so added or deducted by the contractor, the total 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.

t) The works (or the work) shall unless there be something either in the subject or context repugnant to such construction, be considered and taken to mean the works by virtue of the contract contracted to be executed whether temporary or permanent, and whether original, altered, substituted or additional. Wherever the word "Work" is used it shall cover "installation" also under the same definition

u) Excepted risks are risks due to riots (otherwise than among contractor's Employees) and civil commotion (in so far as both these are uninsurable), war (whether declared or not), invasion, act of foreign enemies, civil war, rebellion, revolution, insurrection, military or usurped power, any acts of Government, damage from air craft, acts of God such as earthquake, lightning, unprecedented floods and other causes over which the contractor has no control and accepted as such by the employer or causes solely to use or occupation in a manner for which the works/installations were not designed, by Employer of the said works/installations in respect of which certificate of completion has been issued or a cause solely due to faulty design of works.

v) Provisional items shall mean items for which only very approximate quantities have been included in the tender documents.

w) Virtual completion of works/ installations shall mean the substantial completion of the works/installations in accordance with the contract enabling the Employer to take over the same.

2.2 EMPLOYER'S INSTRUCTIONS:

b) The contractor shall execute the whole and every part of the work in the most substantial and workmanlike manner and both as regards materials and otherwise in every respect. In strict accordance with the specifications, conforming exactly, fully and faithfully to the designs, drawings and instructions in respect of the work given by the Employer and under the directions of and under the supervision of the subject to the approval in all respects by the Employer who may in their discretion and from time to time issue further drawings, and/or written instructions, directions and/or written instructions, details and explanations which are hereafter collectively referred to as "Employer's Instructions", with regard to:

- Variation or modification of the design including structural design, including structural design, quality or quantity of works or the addition or omission of any work.
- Any discrepancy in the drawings or between the schedule or quantities and/or drawings and/or drawings and /or specifications.
- The removal from the site of any materials brought thereon by the contractor and the substitution of any other materials thereof.
- The dismissal from the works of any persons employed thereupon.
- The opening up for inspection of any work covered up.
- The amending and making good of any defects.
- The removal and/or re execution of any works executed by the contractors, on account of defects.

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

2.3 MANNER OF EXECUTION OF WORK:

The Employer shall be entitled to direct at what point or points and in what manner the works are to be commenced, and form time to time carried on.

2.4 VARIATION IN QUANTITY:

All requisitions for variations or matter concerning drawings specifications, and schedule of quantities or additional instructions or detailed drawings should be placed by the Contractor with the Employer at least 10 days in advance of the dates by which such are required by the Contractor for commencing (their) implementation.

2.10 AGREEMENT:

The contract shall remain in the custody of the Employer and shall be produced by him at his office as and when required by the Employer of the Contractor. The Contractor on the signing hereof shall be furnished by the Employer free of cost with a certified copy of the agreement and one copy of each of the said drawings issued during the progress of the works. Any further copies of such drawings required by the Contractor shall be paid for by him. The contractor shall keep one copy each of all drawings on the works and the Employer or his authorized representative shall at all reasonable times have access to the same. Before the issue of the final certificate to the Contractor he shall, if so required, forthwith return to the Employer all drawings and specification.

2.11 SCOPE OF THE CONTRACTOR:

The Contractor shall be deemed to have satisfied himself before tendering as to the correctness and sufficiency of his tender for the works and of the rates and amounts stated in the schedule of quantities and/ or the schedule of rates and amounts which rates and amounts shall except as otherwise provided cover all his obligations under the contract, and all matters and things necessary for the proper completion of the works.

The contractor shall provide at his own cost all materials (except such materials if any, may in accordance with the contract supplied by the Employer), machinery, plant, tools, appliances, implements, ladders, cordage, tackle, scaffolding, temporary works including access roads, etc. together with carriage thereof to and from the site, in fact everything necessary or proper for the proper execution of the work, whether original, altered or substituted according to the true intent and meaning of the drawings, schedule of quantities and specifications, original or substituted taken together whether the same may or may not be particularly shown or described therein provided that the same may be reasonably inferred there from, and if the contractor finds any discrepancy in the drawings, or between the drawings, schedule of quantities and the specifications, he shall immediately and in writing refer to the Employer who shall decide which is to be followed.

2.12 CONTRACTOR'S SITE OFFICE

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.

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 termite, ants, and other insects. The Contractor shall provide at his own cost all artificial light required for the work.

2.13 PROTECTIVE MEASURES:

The Contractor from the time he is 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. Contractor shall indemnify the Employer against any possible damage to the building, roads, or member of the public in the course of execution of the work. The contractor shall provide necessary temporary enclosures, gates, entrances, etc. for the protection of the work and materials, and for altering and adopting the same as may be required, removing on completion of the works and making good all works disturbed.

2.14 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 tools and materials of sub-contractors and remove the same on completion. Sheds for storage of cement are to have regular floor raised above the ground.

2.10 CONFORMING TO LOCAL REGULATIONS:

The contractor shall conform to the provisions of any Act of the Legislature relating to the works and to the Regulations and Bye-laws of any Authority and of any water, lighting and other companies and/ or Authorities with whose systems the structure is proposed to be connected, and shall, before making any variations from the drawings or specifications that may be necessitated by so conforming, give to the Employer written notice, specifying the variation proposed to be made and the reason for it, and apply for instructions thereon. In case the contractor shall not within ten days receive such instructions he shall proceed with the work, conforming to the provisions, Regulations, or bye-laws in question and any variation so necessitated shall be dealt with under relevant clauses elsewhere in this specifications.

The Contractor shall bring to the attention of the Employer all notices required by the said Acts, regulations or bye-laws 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 works and lodge the receipts with the Employer.

The Contractor shall indemnify the Employer against all claims in respect of patent rights and shall defend all actions arising from such claims and shall himself pay all royalties, license fees, damages, cost and charges of all and every sort that may legitimately be incurred in respect thereof.

The Employer is entitled to deduct all taxes and rates as per existing laws and rules, from any moneys due or that may become due to the contractor.

The Contractor shall indemnify the Employer from and against all claims, demands, proceedings, damages, costs and expenses which may be brought or made against the Employer or to which it may be put by reason of the Contractor not conforming to or complying with any of the provisions or requirements of any Act or Statute, Central or State, Rules, Regulations, Bye-laws of Local Authorities, Panchayat, Collector or any other Companies relating to or in connection with the works or to Labour or for supply of water, light or other amenities at the site.

2.11 SETTING OUT WORK:

The Contractor shall on the basis of dimensioned drawings and information necessary for the purpose, furnished by the Employer, set out the works on site at his own expense and be responsible for the correctness of the positions, levels, dimensions and alignment of all parts thereof. All benches and datum shall be maintained by the contractor at the site, as long as required by the Employer, for them to check, but the checking of any setting out by the representative of the Employer shall not in any way

relieve the contractor of the responsibility for the correctness thereof and he shall amend at his own cost and to the satisfaction of the Consultant any error in the setting out or consequential to wrong setting out, found at any stage during the progress of the work or during the defects liability period after completion of the work.

2.12 MATERIALS & WORKMANSHIP:

(xii) All materials and workmanship shall so far as procurable conform strictly to requirements in accordance with the drawings and as 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 Employer furnish proof to his satisfaction that they so conform and if required shall also furnish all invoices, accounts, receipts and other vouchers for the purpose.

(xiii) In the case of all products which are in the approved lists of the I.S.I., no material will be collected at site which does not bear the I.S.I. mark unless the Institution does not affix its mark on that material.

(xiv) The Contractor shall place orders for all materials required in time and in any case not later than the dates fixed in the approved program. Where in the matter of procurement of such materials as are collected or the distribution of which is regulated by Government, Central or Local, or by any other Central or Local Authority, the Employer is obliged to issue any certificate or sign applications for license or permit, by virtue of regulation by such Government or Authority or by Custom or practice, it shall be the sole responsibility of the contractor to arrange for all the formalities to be completed in time and follow up the matter with the concerned Authorities and to procure the materials in time for incorporation in the works/ installations according to the approved program, and the Employer will not assume any responsibility for delays in this regard nor for the payment of fines, penalties, demurrage and so forth due to the contractor not taking timely action in the process of procurement. The contractor shall not raise any plea quoting delays in the completion of the formalities or of delays by the Authorities concerned for any compensation whatsoever.

(xv) However, the Contractor shall before he places orders for supply, furnish and produce to the Employer, at his own expense, samples of materials including patented products and those under specific makes, including approved makes proposed to be used in the works, well in time, notwithstanding prior approval by Employer of such products and makes; such prior approval shall not constitute a waiver of the rule regarding approval of samples. In all cases when makers/ manufacturers have test certificates for their goods/articles/products/ processes/equipment, Photostat copies of such certificates shall be produced by the contractor along with the samples.

(xvi) The Employer will within two weeks of the date of supply of samples or within such further period as it may depending upon each case require intimate to the Contractor whether the samples are approved by him or not. If samples are not approved the Contractor shall forthwith arrange to supply to the Employer for his approval fresh samples complying with the specifications.

(xvii) The contractor shall indemnify the Employer or any agent, servant or employee of the Employer against any action, claim or proceeding relating to infringement or use of any patent or design or any alleged patent or design rights and shall pay any royalties or other charges which may be payable in respect of any article or material or part thereof included in the contract. In the event of any claims being made on or action being brought against the Employer or any agent, servant or employee of the Employer in respect of any such matter as aforesaid, the contractor shall immediately be notified thereof. Provided that such indemnity shall not apply when such infringement has taken place in complying with specific direction issued by the Employer in connection with the contract, but the contractor shall pay any royalties or other charges payable in respect of any such use, the amount so paid being reimbursed to the contractor only if the use was the result of any drawings and/or specifications issued after conclusion of the contract.

(xviii) All charges on account of octroi, terminal or sales tax and other duties on materials obtained for the works from any source, (other than materials supplied by the Employer) shall be borne by the contractor.

(xix) The Employer shall be entitled to have tests carried out on the work or its parts or accessories, either during its progress or on completion, where and when deemed necessary or on any materials to be incorporated/incorporated in the work/installation supplied by the contractor or otherwise notwithstanding that the work or its parts or accessories or the said materials have been accepted and passed/passed for incorporation and the contractor shall on being directed to do so promptly arrange for the tests to be carried out excepting in the case of "Mandatory tests" listed else where in this specifications which he (the contractor) shall regularly carry out in routine fashion without having to be given any further directions.

(xx) The scope of the clause regarding tests will cover not only materials/ articles of every day use and of ordinary description but also patented products and those under specific makes, including approved makes, notwithstanding that satisfactory test certificates from makers/manufacturers have been produced in accordance with sub-clause iv above.

(xxi) The contractor shall also arrange for necessary field tests to be carried out in the case of materials/ articles of everyday use and of ordinary description; regularly under the directions and in the presence of the Employees' representative, to determine the suitability of such items for use in the work.

(xxii) The costs of the tests and of the materials and labour and equipment, if any, involved in the testing operations shall be borne by the contractor in all cases except as otherwise provided for in the contract.

2.13 SUPERVISION BY CONTRACTOR:

The Contractor shall give all necessary personal supervision during the execution of the works, and as long thereafter as the Consultant may consider necessary until the expiration of the "Defects Liability Period". The contractor shall also during the whole time the works are in progress, employ a competent and qualified representative whose name shall be approved by the Employer and who shall constantly be in attendance at the works while the men are at work. Any directions, explanations, instructions, or notices given by the Employer to such representative shall be deemed to have been given to the contractor.

If the contractor fails to appoint and keep on the works a competent and qualified representative as aforesaid the Employer shall have powers to suspend the works till such time a competent qualified representative as aforesaid is posted and the contractor shall not be entitled to claim extension of time on the plea of such suspension of the works. The contractor shall also engage on the work an adequate number of qualified and experienced technical persons to ensure that the work is executed to conform strictly to drawings and specifications.

2.14 DISMISSAL OF WORKMEN:

The Contractor shall on the request of the Employer immediately dismiss from the works any person employed thereon by him who may, in the opinion of the Employer be incompetent or misconduct himself, and such persons shall not be again employed on the works without the permission of the Employer.

Such dismissal shall not form the basis for a claim for compensation or damages of any kind against the Employer or any of his/their representatives.

2.19 ACCESS TO WORKS:

The Employer, and his respective representative shall at all reasonable times have free access to the works and/or to the workshops, factories or other places where materials are lying or from which they are being obtained and the contractor shall give the Employer, and his representative, all reasonable facilities necessary for inspection and examination and tests of the materials and workmanship. No person unauthorized by the Employer except the representatives of Public Authorities shall be allowed on the works at any time. All drawings relating to the work issued to the contractor together with an authenticated copy of the accepted (priced) schedule of quantities are to be kept at the site and the Employer or their authorized representatives shall be given access to such drawings, schedules whenever necessary.

2.20 SITE ENGINEER:

The terms "Site Engineer/Asst. Engineer" shall mean the person appointed, and acting under the orders of the Employer to inspect the works in the absence of the Employer; the contractor shall afford the Site Engineer/Asst. Engineer/Clerk of Works every facility and assistance for inspecting the works and materials and for checking and measuring the work and materials. Such person/persons shall be considered to act solely as inspectors.

If any work or materials be not approved by the Site Engineer/Asst. Engineer or any such representative, such work shall be suspended or the use of such material shall be discontinued until the decision of the Employer is obtained. The work will from time to time be examined by the Employer, the Site Engineer/Asst. Engineer, but such examination shall not in any way exonerate the contractor from the obligation to remedy any defects which may be found to exist at any stage of the works or after the same is completed. Subject to the limitation of this Clause the contractor shall take instructions only from the Employer.

2.21 WORK NOT TO BE SUBLET:

The whole of the works included in the contract shall be executed by the contractor who shall not directly or indirectly transfer, assign or under let the contract or any part share thereof or interest therein without the written consent of the Employer; and no undertaking shall relieve the contractor from the full and entire responsibility of the contract or from active superintendence of the works during their progress.

2.22 VARIATION NOT TO VITIATE CONTRACT:

No alteration, omission or variation shall vitiate this contract but in case the Employer thinks proper at any time during the progress of the works to make any alterations in or additions to or omissions from or substitutions for the original drawings, specifications, designs and instructions, or any alterations in the kind or quality of the materials to be used in the work and shall give notice thereof to the contractor, in writing, the contractor shall alter, add to or omit from or substitute for as the case may require, in accordance with such notice and carry out the amended work on the same conditions in all respects on which he agreed to do the main work, but the contractor shall not do any work extra to or make any alterations or additions to or omissions from or substitutions in the works or any deviation from any of the provisions of the contract stipulations, specifications or contract drawings without the previous consent in writing of the Consultant and the value of such extras, alterations, additions or omissions or substitutions shall in all cases be determined by the Consultant with the prior approval in writing.

2.19 NO COMPENSATION FOR ALTERATION OR RESTRICTION OF WORKS:

If at any time after the commencement of the work the Employer for any reason whatsoever does not require the whole or part or parts thereof as specified in the tender to be carried out, they shall give notice in writing of the fact to the contractor who shall have no claim for any compensation whatsoever on account of any profit which he might have derived from the execution of the work in full, but which he did not derive in consequence of the full amount of the work not having been carried out. Nor shall he have any claim for compensation by reason of any alterations having been made in the original specifications, drawings, designs and instructions which shall involve curtailment of the work originally contemplated.

2.20 **MEASUREMENT OF WORKS:**

The Employer may from time to time intimate to the contractor that he requires the works to be measured, and the contractor shall forthwith attend or send a qualified Agent to assist the Employer in taking such measurements and making calculations and to furnish all particulars or to give all assistance required by either of them.

Provided that the contractor shall give notice of not less than ten clear days to the Employer or his representative in charge of the work before covering up or placing beyond the reach of measurement any work in order that the same may be measured and correct dimensions thereof be taken before the same is covered up or placed beyond reach of measurement and shall not cover up and place beyond reach of measurement any work without the consent of the Employer and his representative in charge of the work so shall within the aforesaid period of ten days inspect the work and cause the measurements to be made; if, any work be so covered up without the consent of the Employer or his representative in charge of the work, the same shall be uncovered at the contractor's expense, or in default thereof no payment or allowance shall be made for such work or materials with which the same was executed.

Should the contractor not attend or neglect or omit to send such agent then the measurements taken by the Employer, or a person approved by him shall be taken to be correct measurements of the works. Such measurements shall be taken in accordance with the Indian Standard Method of Measurement, unless otherwise provided for elsewhere in this contract.

The contractor or his agent may at the time of measurement take such notes and details as he may require.

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

2.21 PRICE VARIATION:

The rates for additional, altered, substituted work shall be arrived at in accordance with the following rules:

i) The nett rates or prices in the contract schedule shall determine the valuation of (the rates for) the extra work (item) where such extra work (item) is of similar character and is executed under similar conditions as the work priced therein.

ii) If the rates for the extra, altered or substituted (deviated) work are not provided for (available) in the contract schedule, they shall to the extent possible be derived out of the rates given in that schedule for similar or near similar items. For the purpose of such derivation, where necessary and when so directed, the contractor shall furnish detailed analysis for the said similar or near similar items in the contract schedule. For such portions of the analysis for the extra, altered or substituted (deviated) work for which prices cannot be abstracted from the corresponding analysis of rates for the said similar or near similar items in the contract schedule, market rates substantiated by purchase bills/vouchers shall be adopted, using factors and constants for quantum's of material, labour T & P and sundries from CPWD/Standard PWD data/analysis, in the order thus written, adding towards profits and overheads an appropriate margin not exceeding 15%. When called upon to do so the contractor shall submit the required purchase bills/vouchers.

iii) In the case of additional, altered or substituted (diverted) work for which rates cannot reasonably be derived as at (ii) and (iii) above, the rates shall be worked out adopting market prices, substantiated by purchase bills/vouchers, using factors and constants for quantum's of material, labour, T&P and sundries from

CPWD/Standard PWD/Data Analysis in the order thus written, adding towards profits and overheads an appropriate margin not exceeding 15%. When called upon to do so the contractor shall submit his purchase bills/vouchers, to the Consultant.

iv) The provisions in sub-clauses (i) to (iii) will not apply to contract schedule items or altered or substituted (deviated) items (the quantities of) which individually exceed the corresponding provisions in the contract schedule by more than 20% when the deviation limit as defined below and as referred to in the tender is exceeded, and when the said deviation limit is not exceeded (a) by more than 50% in the case of items of work above plinth level and (b) by more than 100% in the case of items below plinth level.

In such case, only for such items where, and for such quantities only as are in excess of the quantities provided in the contract schedule for original items or items which stand altered or substituted (deviated) by more than the percentages specified in sub-para above and for items for which the rates cannot reasonably be derived as at sub-clauses (ii) and (iii) above, market rates shall be applied.

v) The questions as to what particular items, being similar or near similar to the additional, altered or substituted (deviated) work in the contract schedule are to be adopted for derivation of rates for the additional, altered or substituted (deviated) work and in the contract schedule are to be adopted for derivation of rates for the additional, altered or substituted (deviated) work and whether the said rates cannot be derived from similar or near similar items in the contract schedule will be decided by the Consultant.

x) In case (ii) to (iv) the contractor is required to submit his analysis of rates adopting the principles enunciated and the Employer, after scrutinizing the analysis and other papers furnished, will allow such rates as he considers reasonable.

xi) Where extra work is of such a nature that it cannot be properly measured or valued the contractor shall be allowed day work prices at the nett rates stated in the tender or the priced schedule of quantities or, if not so stated, then at rates not exceeding the minimum local day work rates and wages for the district, notified by the concerned authority, provided that in either case if required by the Employer, vouchers, muster rolls and other documents required for proper verification of the labour employed and the materials deployed on the said work and the costs thereof be delivered to the Employer or his representative at or before the end of the week following that in which the work has been executed.

The question as to whether extra work is of such nature that it cannot be properly measured or valued will be decided by the Employer. The margin to be allowed on actual costs to the contractor towards profits and overheads shall be an appropriate percentage not exceeding 15%.

xii) Deviation Limit: is the value by which the total executed contract value including authorized variation is in excess of the original contract value, expressed as a percentage and shall be adjudged on the sum total of all additions, omissions, reductions, alterations or substitutions (deviations) covered by authorized variations. The values of prime cost sums shall not be included in calculating the above percentage.

2.22 REMOVAL OF IMPROPER WORKS, MATERIALS ETC.

The Employer shall, during the progress of the work, have full powers to order in writing, removal from the works within such reasonable time or items as may be specified in the order, of any materials which in the opinion of the Employer are not in accordance with the specifications or the instructions of the Employer, or do not conform to approved samples, the substitution of the rejected materials by proper other materials, and the removal and proper re-execution of any work executed with unsound, imperfect or unskilled workmanship or with materials not in accordance with the contract, notwithstanding that the same may have been passed or/and certified or/and paid for 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 out such order, the Employer shall have the power to employ and pay other persons to carry out the same without being answerable or accountable for any loss or damage that may happen or arise in such materials removed and all expenses consequent on or incidental thereto as certified by the Employer shall be borne by the contractor, or may be deducted by the Employer from any moneys due or that may become due to the contractor.

In lieu of re-execution of any work not in accordance with the contract the Employer may in their option allow it to remain but will allow for such work reduced rates. The decision of the Employer to exercise his option in this regard and the quantum of reduction to be made in the rate for the item in question shall be final and binding on the contractor.

2.23 DEFECTS LIABILITY PERIOD:

Any defect, shrinkage, settlement or other faults which may appear within the 'Defects Liability Period' stated in the specification, or if none be so stated, then within 12 months after the virtual completion of the works, arising in the opinion of the Employer from materials or workmanship not in accordance with the contract, shall on demand which shall be made within the defects liability period, in writing by the Employer, and within such reasonable time as shall be stated therein specifying the work, materials or articles complained of notwithstanding that the same may have been passed or/and certified, paid for, be amended and made good by the contractor, at his own proper charge and cost and in case of default the Employer may employ and pay other person or persons to amend and make good such defects, shrinkage, settlements or other faults and all damages, loss and expenses consequent thereon or incidental thereto shall be made good and borne by the contractor and such damages, loss and expenses be recoverable from him (the contractor) by the Employer or may be deducted by the Employer from any moneys due or that may become due to the contractor Employer may in lieu of such amending and making good by the contractor deduct from any moneys due or that may become due to the contractor a sum to be determined by the Employer equivalent to the cost of amending and making good such work and in the event of the amount retained being insufficient, recover the balance from the contractor, together with any expenses the Employer may have incurred in connection therewith. Should any defective work have been done of material supplied by any subcontractor employed on the works who has been nominated or approved by the Employer as provided in this specification, contractor shall be liable to make the same good in the same manner as if such work or materials had been done or supplied by the contractor himself. The contractor shall remain liable under the provisions of this Clause notwithstanding the signing by the Employer of any certificate including the final certificate, or the passing of any accounts.

2.25 CONTRACTOR LIABLE FOR DAMAGE DONE:

The contractor shall be responsible for all injury to persons, animals, or things, and for all structural and decorative damage to property which may arise from the operation or neglect of himself or of any nominated sub-contractor's employee whether such injury or damage arises from carelessness, accident or any other cause whatever in any way connected with the carrying out of the contract. This Clause shall be held to include, inter-alia, any damage to buildings, whether immediately adjacent or otherwise, and any damage to roads, streets, foot-paths, bridges, or ways as well as all damages caused to the buildings and works forming the subject of this contract by frost or other inclemency of weather. The contractor shall indemnify the Employer and hold him harmless in respect of all and any expenses arising from any such injury or damage under any Acts of Government or otherwise and also in respect of any award of compensation or damages consequent upon such claims.

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 of Third Party.

The contractor shall indemnify the Employer against all claims which may be made against the Employer by any member of the Public or other 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 issuers a Policy of Insurance in the joint names of the Employer and contractor against such risks and deposit such policy or Policies with the Consultant from time to time during the currency of this contract. The contractor shall also similarly indemnify the Employer against all claims which may be made upon the Employer 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 sub-contractor and shall at his own expense effect and maintain, until the virtual completion of the contract, with an approved insurer a Policy of Insurance in the joint names of the Employer and the contractor against such risks and deposit such policy or policies with the Consultant from time to time during the currency of the contract.

The Insurance policies above stated shall be taken for a minimum sum of Rs.5 lakhs with indemnity of Rs. One Lakh for any single accident.

The contractor shall be responsible for anything which may be excluded from the Insurance Policies above referred to and also for all other damages to any property arising out of and incidental to the negligent or defective carrying out of this contract. He shall also indemnify the Employer in respect of any costs, charges or expenses arising out of claim or proceedings and also in respect of award of compensation for damage arising there from.

The Employer shall be at liberty and is hereby empowered to deduct the amount of any damage, compensation, costs, charges and expense arising 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.

2.25 RESPONSIBILITY FOR THE SAFETY OF BUILDING:

The contractor shall be responsible for the safety of the works (including the materials, temporary buildings and plant) until they are taken over by the Employer.

2.26 INSURANCE OF THE WORKERS:

The contractor shall within 14 days from the date of commencement of the work insure the works at his cost and keep them insured until one month after the works are taken over by the Employer or three months after the date of completion whichever is earlier, against loss or damage by fire and usual risks other than fire against which insurers generally provide cover in a CONTRACTOR'S ALL RISK POLICY, with an insurer to be approved by the Consultant, progressively for the full amount of the contract, in three stages, beginning with 1/3 of the contract value, and for any further sum as called upon to do so by the Employer, the premium of such further sum being allowed to the contractor as an authorized extra. Such policy shall cover the property of the Employer only and surveyor's fees for assessing the claim and in connection with his services generally in reinstatement and shall not cover any property of the contractor or of any sub-contractor or employee. The contractor shall deposit the policy and receipts for the premiums paid with the Employer within twenty-one days of the date of commencement of the work unless otherwise instructed by the Employer. In default of the contractor insuring as provided above, the Employer may insure and may deduct the premiums paid from any money that may be due or that 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 insurers should they elect to do so, proceed with all due diligence with the completion of the works in the same manner as though the fire or other such usual risk had not occurred and in all respects under the same conditions of contract. The contractor in case of rebuilding or reinstatement after fire or other such usual risk shall be entitled to such extension of time for completion as the Employer deems fit.

2.27 LIQUIDATED DAMAGES:

If the contractor fails to complete the works by the date stated or within any extended time as per provision contained herein below, the contractor shall pay or allow to the employer the sum named in the appendix as "Liquidated Damages" for the period during which the said works shall so remain incomplete by the date of completion of the work as defined in the contract, and the Employer may deduct such damages from any moneys due or that may become due to the contractor.

2.28 EXTENSION OF TIME:

If the contractor shall desire an extension of time for completion of the work on the grounds of his having been unavoidably hindered by such causes as (a) force majeure or (b) any exceptional inclement weather or (c) proceedings taken or threatened by or dispute with adjoining or neighboring owners or public authorities arising otherwise than through the contractor's own defaults or (d) the work or delays of other contractors or tradesmen engaged or nominated by the Employer and not referred to in the schedule of quantities and or specification or (e) strike or lockout affecting any of the building trades or directly the work or (f) delays in the supply of materials stipulated to be supplied by the Employer, or any other ground that may reasonably be held to be valid by the Employer, he shall apply in writing to the Employer within 15 days of the date of such hindrance on account of which he desires such extension as aforesaid and the Employer, if in his opinion reasonable grounds have been shown therefor, may with the previous approval in writing of the Employer make a fair and reasonable extension of time for completion of the contract works, but the contractor shall nevertheless constantly use his endeavors to prevent delay and shall do all that may reasonably be required of him to proceed with the work expeditiously provided.

- That the contractor shall have no claim whatever other than extension of time for the delay in completion of the work due to such hindrance and

- That the contractor shall suspend the works whenever called upon to do so in writing by the Employer and shall be allowed reasonable extension of time for completion of work due to such suspension of work and nothing else.

2.29 TERMINATION OF CONTRACT BY EMPLOYER:

If the contractor being an individual or a firm commits any "Act of Insolvency", or shall be adjudged an insolvent or being an Incorporated Company shall have an order for compulsory winding up made against it or pass an effective resolution for winding up voluntarily or be subject to the supervisor of the court and of official assignee or the Liquidate in such acts of insolvency or winding up, as the case may be, and shall be unable within 7 days after notice to him requiring him to

do so, to show to the reasonable satisfaction of the Consultant that he is able to carry out and fulfil the contract and to give security thereof if so required by the Employer:

OR if the contractor (whether an individual, firm or incorporated company) shall suffer execution to be issued:

OR shall suffer any payment under this contract to be attached by or on behalf of any of the creditors of the contractor;

OR shall assign or sublet this contract without the consent in writing of the Employer first obtained;

OR shall charge or encumber this contract or any payments due or which may become due to the contractor there under;

OR if the Employer notices:

i.) has abandoned the contract, or
ii) has failed to commence the work, or has without any lawful excuse under these conditions suspended the progress of the works for 14 days after receiving the Employer's notice to proceed. Or
iii) has failed to proceed 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 the materials from the site or to pull down and replace work for seven days after receiving from the Employer's written notice that the said materials or work were not approved and were rejected by the Employer 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 for seven days after written notice shall have been given to the contractor requiring him (the contractor) to observe or perform the same, or
vi)has to the detriment of good workmanship or without the consent in writing of the Employer sublet any part of the contract.

Then and in any of the said cases the employer may notwithstanding any previous waiver, after giving seven day's notice in writing to the contractor, determine the contract, but without thereby affecting the powers of the Employer or the obligations and liabilities of the contractor the whole of which shall continue to be 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. And further the Employer by his agents or servants may enter upon and take possession of the works and all plant, tools, scaffoldings, sheds, machinery, steam or other power utensils and materials lying upon the premises or the adjoining land or roads, and use the same as his own property or may deploy the same by means of his own servants and workmen in carrying on and completing the works or by employing other contractor or person or persons to complete the work and the contractor's shall not in any way interrupt or do any act, matter, or thing to prevent or hinder such other contractor's or other person or persons employed for completing and finishing or using the materials and plant for the works. When the work shall be completed or as soon thereafter as convenient the Consultant shall give notice in writing to the contractor to remove his surplus materials and plant and should be contractor fail to do so within a period of 14 days after receipt of such notice by him the Employer shall be entitled to sell the same by public action and give credit to the contractor for the amount realized.

The contractors' account shall also be credited with the amount that would have been payable to him, for the uncompleted work (completed by the Employer through other contractor's or person or persons are aforesaid) in terms of his agreement as if the contract had not been determined and he (the contractor) had continued to execute the work to its completion. The actual gross expense to the Employer including incidental charges in completing the uncompleted work through other contractors' or persons or persons shall be debited to the contractor's account if it be not less than the credit for the uncompleted work as above referred; if however, the said debit to be made be less than the said credit, then the amount to be debited shall be equal to the value of the credit given as above referred.

The Employer shall thereafter ascertain and certify in writing what (if anything) in final accounting is due to be payable to the contractor by the Employer or to the Employer by the contractor for the sale of surplus materials and plant and loss the Employer shall have been put to in procuring the works to be completed. The amount, if any, owing to the contractor and which shall be so certified shall thereupon be paid by the Employer to the contractor and vice-versa; and the certificate of the Employer in this regard shall be final and conclusive between the parties.

2.30 TERMINATION OF THE CONTRACT BY THE CONTRACTOR:

If payment of the amount payable by the Employer shall be in arrears and unpaid for thirty days after notice in writing requiring payment of the amount as aforesaid shall have been given by the contractor to the employer, or if the Employer

interferes with or obstructs the issue of any such certificate, or the Employer commits any "act of insolvency" or if the Employer (being an individual or Firm) shall be adjudged an insolvent, or (being an incorporated company) shall have an order made against him or pass an effective Resolution for winding up, either compulsory or subject to the suppression of the Court or Voluntarily, or if the official assignee or the employer shall repudiate the contact, or if the Official Assignee or the Liquidator in any such winding up shall be unable within fifteen days after notice to him requiring him to do so to show to the reasonable satisfaction of the contractor that he is able to carry out and fulfil the contract and to make all payments due, and to become due thereunder, and if required by the contractor, to give security for the same, or if the works be stopped for three months under the order of the Consultant or the employer or by an injunction or other order of any Court of Law, then and in any of the said cases the contractor shall be at liberty to determine the contract by notice in writing to the Employer, and he shall be entitled to recover from the Employer, payment for all works executed in terms of the contract and for any loss he may sustain upon any plant or materials supplied or purchased or prepared for the purpose of the contract.

In arriving at the amount of such payment the net rates contained in the contractor's original tender shall be followed or where the same may not apply, valuation shall be made in accordance with other provisions hereinbefore.

2.31 CERTIFICATE & PAYMENT:

A bill in triplicate shall be submitted by the contractor, each month on or before the date fixed by the Employer, or if no date be so fixed, by the 15th of the month, along with detailed measurements, neatly recorded by him in an approved form of measurement book, also in triplicate for the work executed in the previous month, and the Employer shall, consistent with the stipulation in the specification regarding "value of work for Interim Certificates" (or at closer intervals at his discretion), check/take the measurements or cause the measurements to be checked/taken for the purpose of having the same to be verified and to the extent work has been executed in accordance with the contract, issue interim certificate, and the Employer, after technical scrutiny of the bill, shall make payment to the contractor on the basis of such certificates , subject to retention of such sums at the percentage specified till the whole of the retention money (part of security deposit) is collected wherefor the installments (interim payments) shall be upto the full value of the work subsequently so executed and fixed.

The Employer may in his discretion include in the interim certificate such amount as he may consider proper on account of any materials which are in his opinion non-perishable and are in accordance with the contract and which have been brought on the site (but not prematurely) in connection therewith and adequately stored and/or protected against damage by weather or other cause but which have not at the time of advance been incorporated in the work, 75% of their purchase value on production of vouchers for the same subject to a maximum of basic prices. When materials on account of which such advance has been made under this sub-clause are incorporated in the work the amount of the advance shall be deducted from the next payment made under any of the Clauses of this contract, and in any case within 3 months of the date of payment of each advance.

All interim payments aforesaid 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 powers of the Employer 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.

And when the works have been virtually completed and the Employer shall have issued the completion certificate in accordance with the specification, the contractor shall submit the final bill in respect of the contract works within one month thereafter and the Employer, shall duly check/verify the measurements of the work done, and to the extent work has been carried out in accordance with the contract, issue the certificate on the final bill. The Employer shall make payment to the contractor on this final bill certificate within 3 (three) months, subject to retention of such sums at the percentage specified. Final payment comprising the return of all retention amounts shall be made by the Employer to the contractor on the basis of the final certificate thereof to be issued in writing by the Employer after the expiration of the period referred to as "Defects Liability Period" from the date of virtual completion of the work or as soon after the expiration of such period as all the work has been finally completed and after all defects have been made good by the contractor in accordance with the true intent and meaning of the contract whichever shall last happen.

Provided always that the issue by the Consultant of any certificate during the progress of the works or at or after their completion shall not relieve the contractor of his liabilities of this specification nor relieve him of 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 the case of all defects and insufficiencies in the works or materials which a reasonable examination would not have disclosed. Non certificate of the Consultant shall by itself be conclusive evidence that any work or materials to which it

relates are in accordance with the contract neither will the contractor have a claim for any amounts that might have certified in any INTERIM/PREFINAL BILL and paid by the Employer and which might subsequently be discovered as not respect the employer's decision shall be final and binding.

The Employer shall have power to withhold any certificate if the works or any parts thereof are not being carried out to his satisfaction.

2.32 EMD/ RETENTION AMOUNT CARRY NO INTEREST :

Earnest/ Retention money, or the balance of it available with the Employer, shall be refunded to the contractor in the manner specified and shall bear no interest whatsoever until the date of its return, unless otherwise provided for in this contract.

2.33 SETTLEMENT OF DISPUTES:

Except where provided in the Contract, all questions and disputes relating to the meaning of the specifications, design, drawings and instructions herein before mentioned and as to the quality of workmanships or materials used on the work or as to any other question, claim, right, matter or thing whatsoever in any way arising out of or relating to the Contract, design, drawings, specifications, estimates, instructions, orders of these conditions or otherwise concerning the work or the execution or failure to execute the same whether arising during the progress of works, or after the cancellation, termination, completion or abandonment thereof shall be dealt with as mentioned hereunder:

v) If the Contractor consider that he is entitled to any extra payment or compensation in respect of the works over and above the amount admitted as payable by the Consultant/ Employer or in the case of Contractor wants to dispute the validity of any deductions of recoveries made or proposed to be made from the contract or raise any dispute, the contractor shall forthwith give notice in writing of his claim, or disputes to the Employer and endorse a copy of the same to the Consultant within 30 days from the date of disallowance thereof or the date of deduction or recovery. The said notice shall give full particulars of the claim, grounds on which it is based and detailed calculations of the amount claimed and the contractor shall not be entitled to raise any claim nor shall the Employer be in any way liable in respect of any claim by the contractor unless notice of such claim shall have been given by the contractor. The contractor shall be deemed to have waived and extinguished all his rights in respect of any claim not notified to the Employer in writing in the manner and within the time aforesaid.

vi) The Employer shall give his decision in writing on the claims notified by the contractor. The contractor may, within 30 days of the receipt of the decision of the Employer submit his claims to the Employer.

vii) If the conciliation proceedings are terminated without settlement of the disputes, within a period of 30 days of termination.

viii) It is a term of this contract that the party invoking arbitration shall give a list of disputes with amounts claimed in respect of each dispute along with the notice for appointment of the arbitrator.

The conciliation and arbitration shall be conducted in accordance with the provisions of the Arbitration & Conciliation Act 1996 or any statutory modification or reenactment thereof and the rules made thereunder.

It is also a term of the contract that the arbitrator shall be deemed to have entered on the reference on the date he issues notice to both the parties calling them to submit their statement of claims and counter statement of claims. The venue of the arbitration shall be such place as may be fixed by the arbitrator in his sole discretion.

2.34 EMPLOYER ENTITLED TO RECOVER COMPENSATION PAID TO WORKMEN:

If, for any reason the Employer is obliged, by virtue of the provisions of sub-section (I) of Section 12 of the workmen's compensation Act 1923, to pay compensation to a workman employed by the contractor, in the execution of the works, the Employer will recover from the contractor the amount of compensation so paid, and without prejudice to the rights of the Employer will be at liberty to recover such amount or any part thereof by deducting it from the security deposit or from any sum due by the Employer to the contractor under this contract or otherwise. The Employer shall not be bound to contest any claim made against him under sub-section (1) of Section 12, of the said Act, except on the written request of the contractor and upon his giving to the Employer full security for all costs for which the employer might become liable in consequence of contesting such claim.

2.35 LABOUR LAWS/REGULATIONS:

5. The contractor shall employ labour in sufficient numbers directly or through sub-contractor to maintain throughout the period of the contract the rate of progress required according to the approved program of work and of quality to ensure proper workmanship in accordance with the specifications and drawings and the Consultant's instructions.

6. The contractor will comply with the provisions of all Acts of Government relating to labour and the rules and regulations made thereunder from time to time including the Payment of wages Act, the Employer's Liability Act, Workmen's compensation Act, and Contract Labour/Regulation and Abolition Act, 1970 and Central Rules, 1971. He shall also submit at the proper times all particulars and statements required to be furnished to the Labour Authorities on being directed to do so.

7. The contractor shall register and obtain necessary licenses, maintain all registers, records, notices and documents and submit returns as prescribed by various enactment's required under various statutes including the Contract Labour (Regulation and abolition) Act 1970 and Rules made thereunder as applicable to the Contractor and ensure compliance of all statutory regulations that are in force and that may become applicable in future from time to time in all matters concerning this contract.

8. The contractor shall indemnify the employer against any liability that may arise due to the non-compliance of any provision under the said Contract labour (Abolition Regulation)Act. 1970 or any enactment affecting the work contemplated under this contract.

2.36 GENERAL INDEMNITY:

"The contractor shall indemnify the employer from and against all claims, demands, proceedings, damages, costs and expense which it may be put by reason of the contractor not conforming to or complying with any of the provisions or requirements of any Act or Statute, Central or State, Rules, Regulations, Bye-laws of local Authorities, Panchayat, Collector or any Companies relating to or in connection with the works or to labour or for supply of water, light or other amenities at the site".

TECHNICAL SPECIFICATION:

1.1.0 SCOPE OF THE SPECIFICATION:

An office cum lab is planned at IIT Madras Research Park for Incent. The main building has a central hydrant system. For this INCENT office and lab area, we will be tapping from the central system and providing distribution within the office. We will be providing fire sprinklers and addressable fire alarm system.

The following specifications highlight the technical requirements of the above system.

2.0.0 GENERAL TECHNICAL REQUIREMENTS:

2.0.2 SPRINKLER SYSTEM:

It is proposed to provide a sprinkler system for the entire new and old hospital block complete with riser piping, Flow Switches, Isolation Valves, sprinklers and connected piping net work. The pumping system will be common with the Hydrant System.

We propose to provide fire alarm system as under for this building:

- Micro-processor based addressable digital fire alarm panel.
- Multicriteria detectors, for detecting fire below & above false ceiling.
- Response indicators to indicate the activated detector above false ceiling.

- Manual call points near exits.
- Dual tone electronic hooters.

3.2.0 GENERAL TECHNICAL REQUIREMENTS:

3.1.19 SCOPE OF WORK

The general scope of work to be carried out under this contract is illustrated in Drawings, Specifications and the schedule of quantities. Not withstanding any thing contained in this, the tenderer is to offer a proven and approved system/ equipment to meet the requirements of this specification.

3.1.20 ASSOCIATED WORKS

The purchaser will arrange to provide the following:

c. False ceilings.
d. Foundations for pumps.
e. Incoming power supply to the electrical switch board

The fire protection contractor shall provide all other works, including making openings in walls/floor for taking piping, wiring etc, and digging and refilling of trenches for buried piping . All openings made for the above purposes shall be finished neatly with cement plastering etc.

3.1.21 BYE LAWS AND REGULATIONS

The installation shall be in conformity with the Bye Laws, Regulations and Standards of the local fire authorities concerned in so far as these become applicable to the installation.

If the Drawings or Specifications require something which violates the Bye Laws and Regulations, then the Bye Laws and Regulations shall govern the requirement of this installation.

3.1.22 WORKING PERMITS AND INSURANCE :

The Contractor shall obtain all work permits/ licenses required for the personnel employed at the work site and shall strictly adhere to all the rules & regulations of the purchaser. All statutory rules like PF, minimum wages etc., are to be followed strictly and registers as required by the law are to be maintained at site.

The contractor shall also fully cover the personnel employed and the materials used under comprehensive insurance, valid upto the duration of the contract plus 3 months.

3.1.23 DRAWINGS

The Contractor shall follow the tender drawings in preparation of his shop drawings and for subsequent installation work. He shall check the drawings of other agencies to verify spaces in which his work will be installed.

Maximum headroom and maintenance shall be maintained at all points. Where headroom appears inadequate, the contractor shall notify the purchaser before proceeding with the installation.

The Contractor shall examine all architectural, structural, plumbing, electrical and other service drawings before starting the work and report to the purchaser any discrepancies, coordinate installation of this work with other services and agencies.

3.1.24 TECHNICAL DATA

The tenderer must submit the technical data for all the items quoted quantity alongwith their tenders. Failure to furnish technical data with tender may result in rejection of tenders.

3.1.25 SHOP DRAWINGS

Within one week after the award of the contract, the contractor shall furnish, for the approval of the purchaser, two sets of detailed shop drawings of all equipment and materials including pump room layout, piping and control wiring layouts required to complete the project as per specification and as required by the purchaser. These drawings shall contain details of construction, size, and arrangement, operating clearance, performance characteristics and capacity of all items of equipment, also the details of all related items of work by other contractors. Each item of equipment proposed shall be a standard catalog product of an established manufacturer as per specifications.

After final approval has been obtained from the purchaser, the contractor shall submit a further six sets of shop drawings. No material or equipment shall be supplied for installation at the site until the contractor has in his possession, the approved shop drawings for the particular material or equipment.

The shop drawings shall be submitted for approval sufficiently in advance of planned delivery and installation of any materials, to allow the purchaser ample time for scrutiny. No claims for extension of time shall be entertained because of any delay in the work due to his failure to produce shop drawings at the right time, in accordance with the approved program.

Approval of shop drawings shall not be considered as a guarantee of measurements or of building dimension. Where drawings are approved, said approval does not mean that drawings have been checked in detail nor does it in any way relieve the contractor of the responsibility or requirement to furnish material or perform work as required by the contract.

Where the work of the contractor has to be installed will interfere with work of other agencies, he shall assist in working out space conditions to make a satisfactory adjustment. If so directed by the purchaser, the contractor shall prepare composite working drawings and sections at a suitable scale clearly showing how his work is to be installed in relation to the work of other agencies. If the contractor installs his work before coordinating with other trades, he shall make all the necessary changes without extra cost to the purchaser.

3.1.26 QUIET OPERATION AND VIBRATION ISOLATION

All equipment shall operate under all conditions of load without any sound or vibration which is objectionable in the opinion of the purchaser. In case of rotating machinery sound or vibration noticeable outside the room in which it is installed, shall be considered objectionable. Such conditions shall be corrected by the contractor at his own expense. The maximum sound within 1M of the equipments shall not exceed 60 dB.

3.1.27 ACCESSIBILITY

The contractor shall verify the sufficiency of the size of the shafts and openings, clearance in cavity walls and piping. His failure to communicate insufficiency of any of the above shall constitute his acceptance of

sufficiency of the same. The contractor shall locate all equipments which must be serviced, operated or maintained in fully accessible positions. The exact location and size of all access panels, required for each concealed control damper, valve or other devices requiring attendance, shall be finalized and communicated in sufficient time, to be provided in the normal course of work, failing which the contractor shall make all the necessary repairs and changes at his own expenses.

3.1.28 ELECTRICAL INSTALLATION

It is to be clearly understood that the final responsibility for the sufficiency, adequacy and conformity to the contract requirements, of the electrical installation work for the fire protection services, lies solely with the contractor.

All statutory approvals for installation under the scope of this tender like fire service department's approvals etc., shall be obtained out by the contractor. The required fees shall be paid by the purchaser but all other incidental expenses in connection with the inspection/ approval etc., shall be borne by the contractor.

3.1.29 MATERIALS AND EQUIPMENT

All materials and equipment shall conform to the relevant Indian Standards and shall be of the approved make and design. General specifications for the various equipments / works are enclosed. Wherever these are not totally clarified, the construction shall be carried out as per the relevant IS specifications.

3.1.30 MANUFACTURER'S INSTRUCTION

Where manufacturers have furnished specific instructions, relating to the material and equipment used in this job, covering points not specifically mentioned in these documents, such instructions shall be followed in all cases.

3.1.31 INSPECTION & TESTING

The purchaser's authorized representative shall have full powers to inspect any portion of the work, examine the materials, workmanship and getting the materials / equipments tested at the contractor's works or at any other place from where equipments/ materials are procured. These examinations will not relieve the contractor any of his responsibility for meeting the requirements of the specifications and it will be the contractor's responsibility to rectify/ replace such works/ equipments not found in accordance at his cost.

All the testing and measuring instruments and labour required shall be provided by the contractor at his cost. The contractor shall also calibrate the instruments used for testing at reputed calibration centers.

3.1.32 REJECTION OF DEFECTIVE PLANTS/EQIPMENTS:

If the completed works or equipment or any portion there of taken over is found to be defective, or fail to fulfil any specification requirements, the contractor shall, on receipt of written notice, shall make good the defective works at his cost within a stipulated time frame. The purchaser shall have full powers to carry out such repair works at the risk and cost of the contractor, in case the contractor fail to carry out this within the stipulated time.

The purchaser shall have the right to operate the plant whether or not such equipments have been accepted.

3.1.33 BALANCING, TESTING AND COMMISSIONING

Balancing of the water systems and all tests as called for in the specifications shall be carried out by the contractor in accordance with the specifications and relevant local codes.

The results of these testing shall be submitted for scrutiny. Four copies of the certified manufacturer's performance readings for each piece of equipment shall be submitted along with the test results.

The Contractor shall arrange all necessary balancing and testing equipment, instruments, materials, accessories and the requisite labor. Any defects in materials and / or in workmanship detected in the course of testing shall be rectified by the contractor entirely at his own cost, to the satisfaction of the purchaser. The installation shall be tested again after removal of defects and shall be commissioned only after approval of the purchaser. All tests shall be carried out in the presence of purchaser's representative.

3.1.34 COMPLETION DRAWINGS

On completion of the work in all respects, the contractor shall supply six (6) complete sets of drawings, on approved scale, indicating the work as installed. These drawings shall clearly indicate the complete pump room layout, piping layouts, location of all concealed piping, valves, controls, wiring and other services. The contractor shall also submit six (6) sets of consolidated control diagrams, technical literature of all equipment and materials.

3.1.35 GUARANTEE AND DEFECTS LIABILITY PERIOD

The contractor shall guarantee that all equipments shall be free of any defects due to defective materials and bad workmanship and the equipment shall operate satisfactorily with the performance & efficiencies not less than the guaranteed values. The guarantee period shall be valid for a period of twelve (12) months after successful completion of the performance tests.

4.1.0 TECHNICAL SPECIFICATIONS:

4.3.0 PIPING

Acceptable makes of pipe: BST/GST/Jindal/ TATA
Acceptable make of valves: Slim seal butterfly type of Audco.
Acceptable make of NRV: Intervalve/Leader
Air Vent valve: Bronze/ Gun metal of Leader make.

Pipe sizes shall be as required for the individual fluid flows.

a) All water pipes shall be MS class 'C' (Heavy class) upto 150mm dia as per I S 1239 and 6 mm thick above 150mm diameter as per IS 3589. All jointing in the pipe system shall be by welding, or as directed at site. All welding shall be done by qualified welders and shall strictly conform to Indian standards code of procedure for manual metal arc welding of mild steel.

b) Pipe for the sprinkler system shall be GI Class B with welded joints.

c) All pipes and their steel supports shall be thoroughly cleaned and given one primary coat of red oxide paint before being installed. All welding methods shall be subject to the approval.

d) Fittings shall be of heavy class of pressure rating suitable for the piping system. Fitting used on welded piping shall be of weldable type.

e) Tee off connections shall be through equal / reducing tees. Drilling and tapping of the walls of the main pipe shall not be resorted to for piping upto 150mm dia.

f) Gate valves shall be Audco butterfly type as per sizes specified and shall be suitable for not less than 14 kg per sq.cm. working pressure. The body shall be cast iron/ cast steel and the gate shall be SS 304.

g) Flanges of approved make and thickness as per IS codes shall be provided at required intervals and at connections to the equipments. Suitable asbestos fibre / rubber insertion gaskets (minimum 3mm thick) shall be provided.

h) Non return (check) valves shall be of slim seal type of Intervalve make. The body shall be CI and the gate shall be SS 304. This shall be designed for an internal pressure of 14 kg / sq.cm.

i) Strainers shall be Y type or pot type indicated with MS construction designed shall have 2mm thick stainless steel screen with 6mm perforations. Screen shall be removable and replaceable without disconnection of the main pipes.

j) After water pipes has been installed and tested, all exposed piping shall be given two finish coats, of approved paint, conforming to relevant ISI codes.

k) Pipes shall be properly supported on suitable MS supports as per the instructions. The contractor shall adequately design all the brackets, saddles, anchors, clamps and hangers and be responsible for their structural sufficiency.

l) Pipe supports shall be of steel adjustable for height and primer coated with rust preventive paint and finish coated with black paint.

m) Vertical riser shall be parallel to walls and column lines and shall straight and plumb, risers passing from floor to floor shall be supported at each floor slab by clamps attached to pipe and with a 15 mm thick rubber pad. Where pipes pass through the terrace floor, suitable flashing shall be provided to prevent water leakage.

n) Pipe sleeves, 50mm larger diameter than pipes, shall be provided wherever pipes through wall slabs and annualar space filled with fibreglass.

o) All pipes shall be tested to hydrostatic test pressure of 15 kg per. Sq.cm. gauge for a period of not less than 8 hours. All leaks and defects in joints revealed during the testing shall be rectified and got approved at site.

p) Piping repaired subsequent to the above pressure test shall be re tested in the same manner.

q) Isolating valves shall be provided at all required points. The valves provided for the underground mains shall have valve chambers with CI covers.

r) After pressure testing, the pipes shall be painted with approved color code.

s) Underground piping shall be covered with a layer of jute hessian, dipped in bitumen as corrosion prevention.

t) The contractor shall provide all materials, tools, equipment, instruments, and labour required to perform the test and to remove water resulting from cleaning and after testing.

u) All scaffolding required for erection/ testing of pipelines shall be arranged by the contractor at his cost.

VALVES

1. SLUICE VALVES

i. Gate/Sluice valve shall be as per IS : 778 class II for sizes upto 40 mm IS:780, PN 1.6, for sizes above 40 mm &upto 300 mm and IS: 2906 PN 1.0 for sizes above 300 mm Sluice valves shall be of non-rising bronze spindle type.

ii. The sluice valves shall be provided with hand wheel, position indicator and locking facility.

iii. Sluice valves shall be provided with back seating bush to facilitate gland renewal during full open condition.

iv. Sluice valves shall be with IS mark.

2 NON-RETURN VALVES

The Non-return valve shall be of CI body with ball & socket type.

3 BUTTERFLY VALVES

Butterfly valves shall be slim seal type with an integrally molded elastomer body liner. The valve shall be designed to outperform loose liners; the elastomer line is molded directly in the body bore and vulcanized in-site, making it last the entire life of the valve. The slim seal is available in different combinations of body, liner and disc material to suit a wide of line fluids, a size range of 50 to 600 mm and a pressure rating up to PN 1:6.

INSTRUMENTATION:

PRESSURE GAUGE:

i. Pressure gauge sensing elements shall be of continuous 'C' bourdon type.
ii. Gauges shall be of 150 mm diameter dial stored enamel black finish case.
iii. Normal process pressure shall be gauged within 70% of full-scale reading of the scale range.
iv. Accuracy shall be within 1.0% of full-scale range.
v. Gauges shall have internal and external stop pegs for cover range protection of 125% of maximum range and zero point respectively.
vi. All gauges shall have bottom connection for local mounting.

PRESSUE SWITCH:
Pressure Switches shall be used to control the operation of the main fire pump and the jockey pump. The pressure Switches shall be of bellows type with required differential as per the system (Schematic Offered and the range shall be adjustable and suitable for the operation of the pumps).

VALVE CHAMBER:

The internal dimensions of the valve chamber shall be 1 m X 12 m X 1.2 m depth. Adequate PCC's shall be provided and then valve chamber shall be constructed with brickwork of 9 inches thick. The cover slab shall be of RCC with CI cover of heavy duty. Adequate1 rungs shall be provided for getting down into the valve chamber.

All scaffolding required for erection/ testing of pipelines shall be arranged by the contractor at his cost.

4.6.0 MAIN FIRE FIGHTING CONTROL PANEL

A fire fighting control panel shall be provided for controlling the operations of the main pump, diesel pump and the jockey pump.

- The panel shall be fabricated with 1.6 mm CRCA sheet and duly powder coated on both inside and outside.
- The bus bar shall be with suitably rated copper along with the neutral bus.
- The panel shall be free standing floor mounted type with cable entry from the top.
- The panel shall be provided with incomer switch (TPN SFU), outgoing switches (TPN SFU) for the main pump and the jockey pump.
- The panel shall also house the diesel engine controllers.
- Digital type voltmeter and ammeter, LED indicating lamps, ON OFF switches, star delta starter for the main pumps and DOL starter for the jocket pumps, etc shall be provided in this panel.
- In case of terrace pump only, the above panel shall have only incomings and outgoings for the terrace pump including the starter. All other specifications given above are applicable for this panel also as required.

5.1 MAIN FIRE ALARM PANEL:

a. The fire alarm panel shall be fully automatic micro processor based addressable type and shall comply with the requirement of BS 5839, Part IV (Latest).
b. The main fire alarm panel will be wall/floor mounted type and shall have the following:

- Loop cards.
- Annunciation windows.
- Test/ Accept and reset buttons.
- Hooter.
- Battery back up with automatic charging facilities.

c. The main fire alarm panel will be connected to the various detectors by means of armored copper wires. A group of detectors will be conveniently looped and the activated zone will be displayed in the main fire alarm panel. A hooter will also sound to warn the people.
d. The system shall have self test routine facilities and shall also have automatic supervision of all the sensors. Any defect in the system shall be displayed audio visually.
e. The control panel shall monitor the lines against any fault like open or short circuit and such faults shall be displayed audio visually.
f. Under normal conditions, the system ON led will remain ON. In the event of supply fails, AC FAIL LED shall come ON.
g. LEDs for DC blown fuse, hooter fuse blown, battery fuse blown shall also be provided.
h. A maintenance free battery back up will be provided for safe guarding against power failures. The back up provided will be for about 8 hours of operation with about 30% of the sensors under detected conditions. The battery shall always be kept charged and LED indications for Low Charge, Reverse Polarity, and Battery Disconnected shall be provided.
i. Isolation of any one of the zones shall not deactivate the other zones, which shall continue to detect fire.
j. The panel shall be wall/floor mounted, constructed with 16 G CRCA sheet, duly painted inside and outside with approved color shade. The hooter provided in the panel shall be of dual tone, to distinguish the fire and fault conditions. The panel shall be dust and vermin proof with glass front and shall provide a very neat aesthetic appearance.
k. All PCBs in the panel shall be of very high quality epoxy silver plated, suitable for long and trouble free operation.
l. Only the ACCEPT & RESET button of the hooter shall be kept outside the panel for regular use without opening the door of the panel.
m. The main fire alarm panel shall be of sufficient number of zones as indicated in the schedule of quantities, and expandable with two/three more zones.
n. The system shall perform the fire pattern recognition. For this purpose, it shall have the following features:

- Smoke entering the detector for a short duration like cigarette smoke shall not cause any alarm.
- A fast build up of smoke shall result in quick alarm generation.

- A gradual built up of smoke shall be detected early by reducing the pre warning limit automatically.
- A slow built up of dirt shall be recognized and the alarm level shall be suitably modified without generating any fault alarms.

5.2 MULTICRITERIA DETECTORS BELOW FALSE CEILING:

These detectors will be provided on the false ceiling for detecting fires below the false ceilings or in rooms where there are no false ceiling. These detectors work on the principle of ionization, when smoke particles enter the ionization chamber. A red LED will flash once in every 30 seconds to indicate the healthiness of the detectors. In case of detection of fire, the LED will glow continuously and the alarm will be sounded in the main fire alarm panel.

a. The ionization smoke detectors shall be suitable for detecting invisible products of combustion as well as smoke and be of dual chamber, single source type.
b. The device shall have been certified by the concerned radio active protection board or similar bodies.
c. An indicating LED shall be provided which lights up when the detector has reached a pre set alarm level. Provision shall also be available for connecting an external device like response indicator etc.
d. The construction of the detectors shall be in self extinguishing poly carbonate plastic and the circuitry protected against moisture and fungus. Smoke entry points must be protected against dust/insect ingress.
e. The detector shall be capable of operating under the following conditions:
   - Temperature range from 0 to 60 deg C.
   - Humidity range from 0 to 95% RH.
f. It shall be possible to re calibrate the sensitivity at site.
g. Reversed polarity or faulty wiring shall not cause damage to the detectors.
h. The circuitry shall be protected against the usual electrical transients and electromagnetic interferences.

5.3 MULTICRITERIA DETECTORS ABOVE FALSE CEILING:

These detectors will sense smoke particles above the false ceiling and will give the alarm in the main fire alarm panel. These detectors will also be basically operate as per the same principle of Ionisation Smoke detector, with the additional feature of sensing the fall in intensity of light when thick smoke engulf the space over false ceiling.

a. The optical smoke detector shall respond predominantly to light weight smoke.
b. The light source intensity shall automatically adjust to compensate for possible effects of dirt/dust accumulation.
c. An indicating LED shall be provided which lights up when the detector has reached a pre set alarm level. Provision shall also be available for connecting an external device like response indicator etc.
d. The construction of the detectors shall be in self extinguishing poly carbonate plastic and the circuitry protected against moisture and fungus. Smoke entry points must be protected against dust/insect ingress.
e. The detector shall be capable of operating under the following conditions:
   - Temperature range from 0 to 60 deg C.
   - Humidity range from 0 to 95% RH.
f. It shall be possible to re calibrate the sensitivity at site.
g. Reversed polarity or faulty wiring shall not cause damage to the detectors.
h. The circuitry shall be protected against the usual electrical transients and electromagnetic interferences.
i. Smoke density in the chamber shall be measured by a symmetrical optical system and shall employ a multiple light pulse coincidence circuit to prevent false alarms.

5.4 MANUAL CALL POINTS:

These manual call points will be provided near the exits from the floors. These are to be operated manually by pressing a push button, which will initiate the alarm in the main fire alarm panel.

a. The manual call point shall be compatible with the proposed detection system.
b. This shall have a pleasant streamlined and flat appearance permitting flush mounting.
c. The cover must be secured against removal and the removal shall cause an alarm in the panel.
d. All inscriptions, texts and marks shall be on the front plate and not on the glass.
e. A build in LED shall be provided, which shall light up upon activation.

5.5 DUAL TONE HOOTERS:

These hooters will be provided at every floor near the exits to warn the occupants of the floor about the occurrence of any fire.

5.6 RESPONSE INDICATORS:

This will indicate the location of the detector above the false ceiling, which detect the fire.

ANNEXURE - 2

Development of Interior works for INCENT LGD at IIT-M Research park
Tender Ref No : PY/MSR/135/2023/LGDINTERIORS

TECHNICAL BID COMPLIANCE STATEMENT

(A) PRE-QUALIFICATION CRITERIA

Sl.No.	Description	Complied/ Not Complied	Ref. Page No.
I	**Bidder Eligibility Criteria I:**		
1	Only 'Class-I local suppliers' and 'Class-II local suppliers', as defined under DIPP, MoCI Order No. P-45021/2/2017-PP (BE II) dated 16th September 2020 and other subsequent orders issued therein, shall be eligible to bid in this tender. Declaration for Class-I and Class-II local suppliers should be submitted in the prescribed proforma format as per Annexure-4		
2	Bidder should confirm their acceptance that they comply with the provisions with report to "Guidelines for eligibility of a bidder from a country which shares a land border with India as detailed at Annexure-5. The bidder should submit Certificate for "Bidder from/ Not from Country sharing Land border with India & Registration of Bidder with Competent Authority" as per Order of DoE F.No.6/18/2019-PPD dated 23.07.2020 as mentioned.		
II	**Bidder Eligibility Criteria II:**		
1	The firm should not have been blacklisted / debarred by any Government/ regulatory bodies of India In last 3 Years . A self-declaration format given in Annexure – 6		

2	The Bidder Firms shall be of National reputation having past experience of executing “similar works” (Civil, Interior finishes, Furniture, Furnishings and Electrical & Mechanical Works, HVAC etc. for Multi-storeyed Institutional Buildings / Corporate Offices / Hotels / Super Speciality Hospitals) during the last three years ending 31st December 2022. IIT Madras reserves its right to verify the claims at its own discretion and may seek opinion of the customer, based on which the vendor’s offer may be accepted or rejected. Should submit satisfactorily completed work details as per following during the last three years ending 31st December 2022: i) Three similar works as prime Interior Contractor each costing Rs 60,00,000/- or ii) Two similar works as prime Interior Contractor each costing Rs 80,00,000/- or iii) One similar work as prime Interior Contractor each costing Rs 1,00,00,000/- And The Contractor should have executed at least 1 similar work costing Rs. 60,000,00/- with central government department /Autonomous Bodies/ Central Public Sector Undertakings.. .Note: The word similar completed works means Civil & Interior finishes, including Electrical & Mechanical Works for Multi-storeyed Institutional Buildings / Corporate Offices / Hotels / Super Speciality Hospitals (Individually / aggregate of number of works mentioned in each criteria) and should consist of Civil, structural, Interior Finishing / furnishings, including E&M Systems, etc. incorporating advanced Architectural & E&M design concepts with all modern services /		
3	The bidder Should have had an average annual turnover of Rs 1,00,00,000/- on construction works during the last three years ending 31st March 2023. (Financial statements / certificates issued by Chartered Accountant should be submitted as proof).		
4	For Electrical Works, the contractor should have valid ESB license.		

List of Materials

Proposed Office & Lab Interiors For Incent LGD	
1. List of materials for Civil & Interiors	
Sl.No	**Name of Material**
1.0	Hollow Terracotta block
2.0	Cement PPC
3.0	AAC Block
4.0	Brick Tile
5.0	Aluminium Frame
6.0	MDF board
7.0	Laminate sheet
8.0	Veneer Finish
9.0	Acoustic Partition
10.0	Glass Partition
11.0	Glass
12.0	Clean room Partitions
13.0	Clean room Partitions
14.0	Clean room Doors
15.0	Acoustic Insulation
16.0	Acoustic Finish
17.0	Lacquered Glass
18.0	Emulsion Paint
19.0	Wall Papers
20.0	Vitrified Flooring Tile
21.0	Vitrified Wall Tile
22.0	Laminated wooden Flooring
23.0	Raised access Flooring
24.0	ESD Flooring – Epoxy
25.0	ESD Flooring – Vinyl
26.0	Glass wool
27.0	Gypsum False ceiling
28.0	Mineral Fibre
29.0	Stretch False Ceiling
30.0	Clean room False ceiling
31.0	Acoustic suspended false ceiling panels
32.0	Acrylic Emulsion
33.0	Acrylic Sheet
34.0	Patch Fitting Door
35.0	Manual Sliding Glass Door
36.0	Sliding Clean room Door
37.0	Work station
38.0	Furniture
39.0	Chairs
40.0	Dustbin
41.0	Roller Blinds

42.0	Clear Glass / Tinted Glass
43.0	Compactors
44.0	Frosted Film
45.0	Reinforcement Steel
46.0	Tile Fixing adhesive
47.0	Sofa
48.0	Locker
49.0	Iron Mongeries
50.0	SS Sink
51.0	CP Sink Cock
52.0	Angle Stop Cock
53.0	UPVC Pipe
54.0	PVC Pipe
55.0	Floor Trap
56.0	Motor
2. List of materials for Electrical works	
1.0	FRLS copper wire
2.0	Modular switches and sockets
3.0	MCBs and DBs
4.0	UG cables (1.1)
5.0	Tel cable/LAN/CCTV
6.0	MCCB
7.0	PVC conduits (ISI)
8.0	MS conduits (ISI)
9.0	Krone block housing
10.0	Capacitors
11.0	Timers
12.0	Contactors
13.0	Speaker
14.0	Music system cable
15.0	APFC/Harmonic panel
16.0	Change over switch
17.0	Multi function meter
18.0	Exhaust fan& ceiling fan
19.0	Light fittings
20.0	Camera
21.0	Dvr
22.0	Hard disc
23.0	Power supply unit
24.0	TV
3. List of materials for Fire alarm works	
1.0	Detectors
2.0	Cable
3.0	Fire alarm panel

4.0	Hooter
5.0	Response indicator
6.0	Manual call point
4. List of materials for HVAC works	
1.0	Motor
2.0	Starters
3.0	Exhaust Fans
4.0	AHUs
5.0	Cables(power)
6.0	Cables (control)
7.0	Grills/ Diffusers
8.0	G I Sheets
9.0	Wall mounted fans
10.0	Nitrile rubber
11.0	UV lamp
12.0	VFD Starter Panel
13.0	3 way mixing valve

b) Technical specification

PROPOSED INTERIOR BOQ FOR INCENT LGD,IITM RESEARCH PARK				
S. NO	**ITEM DESCRIPTION**	**QTY**	**UNIT**	**Complied/ Not Complied**
1.0	**CIVIL WORKS**			
1.1	**200MM THICK HOLLOW TERRACOTA BLOCKS**			
	Providing and laying Block work 400X200X200 with adhesive mixed as per Manufacturer specification with waterproofing compound Dr.Fixit or equivalent approved by architects in superstructure at all heights The rate to be quoted will include cost of scaffolding and to include all tools and plants, materials all required for first quality work and all external wall surface to be exposed and to be finished as directed by the architect.	41.00	Cum	
1.2	**150MM THICK HOLLOW TERRACOTA BLOCKS**			
	Providing and laying Block work 400X150X200 with adhesive mixed as per Manufacturer specification with waterproofing compound Dr.Fixit or equivalent approved by architects in superstructure at all heights The rate to be quoted will include cost of scaffolding and to include all tools and plants, materials all required for first quality work and all external wall surface to be exposed and to be finished as directed by the architect.	5.00	Cum	
1.3	**SCREED CONCRETE**			
	Providing and laying in position cement concrete of specified grade including the cost of shuttering-at all floors. The ratio of CM 1:2:4 (1 cement : 2 sand : 4 graded stone aggregate 6mm size blue metal – upto varying thickness 40mm to 75mm. All areas to be finished with same level as per Engineer-in-Charge.	58.00	Cum	
1.4	**WALL PLASTERING**			
	Prepare surface and plaster the inner surfaces of walls, R.C.C surfaces contiguous to masonry with cement mortar 1 : 4, 12mm thick using good river sand, including patch plaster etc. The rate to include apart from the above the cost of scaffolding, curing, tools and plants etc. Complete. - At all levels	50.00	Sq. m	
1.5	**AAC BLOCKS 200 MM THICK**			

	AUTOCLAVED AERATED CONCRETE BLOCKS - Providing and laying autoclaved aerated cement blocks masonry with 200 mm thick AAC blocks in super structure above plinth level up to floor V level in cement mortar 1:4 (1 cement : 4 sand).	5.00	Cu m	
1.6	**AAC BLOCKS 150MM THICK**			
	AUTOCLAVED AERATED CONCRETE BLOCKS - Providing and laying autoclaved aerated cement blocks masonry with 150 mm thick AAC blocks in super structure above plinth level up to floor V level in cement mortar 1:4 (1 cement : 4 sand). The rate includes providing and placing in position 2 Nos 6 mm dia M.S. bars at every third course of masonry work	5.00	Cu m	
1.7	**BRICK TILE CLADDING**			
	Supplying & Laying of 230x75x20mm using Suitable adhesive .The rate to include apart from the above the cost of scaffolding, curing, tools and plants etc. Complete. - At all levels	5.00	Sq m	
2.0	**INTERIOR WORKS**			
2.1	**PARTITIONS / PANELING WORKS**			
2.1.1	**SOLID PARTITION**			
	Providing and fixing rigidly in position a partition using 50 x 50mm x 1.5mm Aluminium framework running both horizontally and vertically at not more than 600mm c/c both ways. The framework alternative vertical member to touch the true ceiling height from the finished floor level and fixed rigidly to the ceiling, flooring, walls or partitions. All vertical framework members shall be of a single piece without any joint as directed by the Architects The framework to be concealed with 12 mm thick MDF Board. The MDF Board will be camouflaged with 1.0mm thick laminate of approved colour and make and shade and make and grooves to be provided as shown in the drawing. MDF to Extend 100mm above the False ceiling Level. Measurement for Billing will be taken from FFL to bottom of False Ceiling Level. The rate quoted to include grouting and fixing and making up the flooring to its original condition as well as making provisions for laying conduits, switch boxes and light fittings etc.	277.00	Sq. m	
2.1.2	**SINGLE GLAZED TOUGHENED GLASS PARTITIONS**			
	Supply and Fixing of Slim Glass partition of 10mm Toughened Glass using DORMAKABA Alterra Lite System-45 Frames OR EQUIVALENT to a height of maximum 3m or as per drawing. The Fixed glass to be fixed using DORMAKABA Alterra Lite BP45 OR EQUIVALENT Profiles at Top & Bottom & Alterra Lite SP45 OR EQUIVALENT at sides. The profile size to be 45x25MM to be fixed on to the floor/wall/ ceiling as per the architect design. DORMAKABA Alterra Lite H Junction OR EQUIVALENT profile to be used at all Glass to Glass vertical joints, 90 Deg L Junction Profiles and T Junction profiles necessary as per design. In case of Glass overall panel Alterra Lite MP45 & BP45 Overpanel OR EQUIVALENT Profile to be used. In case of Open glass edges EP45 OR EQUIVALENT End Profile to be used. The Alterra Lite profiles shall be suitable for Glass thickness of 10/12/13.52mm.The Profile shall be matt natural anodized, the Profile Manufacturer to supply all the necessary clips, seals and fixing accessories for the system. All Profiles to be with 2 mm Gauge thickness Excluding 20 Micron of Anodizing. The glazing will be taped with 3M Scotchcal 7725SE-324 Frosted crystal film OR EQUIVALENT the details shown in the relevant drawings. The Frosted crystal film is to be supplied to the correct size and shape as indicated in the relevant drawing and the film is to be precut digitally with a plotter, brought to site and pasted over the glass. Any additional details required for shaping the film is to be obtained from the Architects in advance before precut the film. Measurement for Billing will be taken from FFL to bottom of False Ceiling Level.	78.00	Sq. m	
2.1.3	**CLEAN ROOM GLASS PARTITION**			

	Supplying & Fixing of Progressive type Double Glazed Clean Room Partition with 5mm thk toughened Glass and Frame in Powder Coated Finish on G.I Sheet and necessary arrangements as per manufacture specifications for clean room applications. Measurement for Billing will be taken from FFL to bottom of False Ceiling Level.	40.00	Sq. m	
2.1.4	**COLUMN PANELLING**			
	Providing and fixing in position of the column panelling in a rectangular shape, circumscribing the R.C.C. Column with 50 x 50mm x 1.5mm aluminium framework as per the pattern shown in the drawing and embedded in the RCC Column. The framework is concealed with 12mm thick MDF board and camouflaged with 1.0mm thick laminate of approved shade and brand and grooves. The size and shape of the panelling as per the drawing given.The top and bottom portion of the column panelling abutting the false ceiling and flooring. The concealed faces of the MDF board is to be treated against borer / termite / deterioration and painted with one coat of primer and two coats of paint. The work is to be carried out in a first class workmanship manner all as per details shown in the drawing and as directed at site etc., complete. The rate quoted to include all the above apart from all leads lifts, transport and scaffolding etc. complete and as directed by the Engineer at site. The work is to be carried out in a first class workmanship manner all as per details shown in the drawing and as directed at site etc., complete.	147.00	Sq. m	
2.1.5	**WALL PANELING**			
	Providing and fixing of laminate paneling in walls as per the following:The Aluminium frame work comprising 50x25x1.5mm frame work at 600mm c/c in both ways on the wall(after drilling with pneumatic driller)at required locations.12mm thick MDF board is fixed to the framework as specified above and the MDF is camouflaged with 1.0 mm thick laminate of approved shade and all as per the drawing. The rate quoted to include all the above apart from all leads lifts,transport and scaffolding etc.,completed and as per directed by the Engineer at site. The work is to be carried out in a first class workman ship manner all as per details shown in the drawing and as directed at site etc., Measurement for Billing will be taken from FFL to bottom of False Ceiling Level.	5.00	Sq. m	
2.1.6	**CLEAN ROOM PARTITION & PANELING**			
	Supplying & Fixing of Progressive type Double skin modular 75mm thick Solid wall panel for partitions and wall paneling, made of 0.5 mm thick Powder coated sheets on both sides with PUF as infill of density 40 ± 2 kg /m3, GI Profiles for reinforcement along the periphery with bottom track, and necessary arrangements, All Joints shall be sealed with cleanroom compatible Neutral Grade Silicon Sealant. Measurement for Billing will be taken from FFL to bottom of False Ceiling Level	274.00	Sq. m	
2.1.7	**ACOUSTIC WALL PANELING**			
	Supply and installation of Anutone Synth Slim or Equivalent, polyfibre panels, core-pigmented, high-density, SynthPF or Equivalent rigid panels of size 1200x2400x9mm thk, volume density 210 - 230kg/m3, weight 1.9 - 2.1kg/m2. Prior to installation, ensure wall or surface behind are flat, dry and free from dust or other contaminants and leveled. Panels are then adhered to wall or surface behind with stick S7 adhesive. Technical Parameters Fire (Class) – B, Acoustics – NRC 0.4 (For A mounting), Thermal conductivity (W/mk)– na, Climate (°C, RH) – 50, 99, Light reflectance (%) – Colour Dependant,Green (VoC, RC %) – Nil, 30. Colour as Selected by Architects/EIC. Measurement for Billing will be taken from FFL to bottom of False Ceiling Level	65.00	Sq. m	
2.2	**ACOUSTIC INSULATION IN SOLID PARTITIONS**			
	Acoustic Insulation Using Anutone Synth PF or Equivalent having thickness 50mm, width 600mm, density 1000gsm filled between the aluminium framework and held in position by using chicken wire mesh/cross bracings/pasting on one side of the boards. Measurement for Billing will be taken from FFL to bottom of False Ceiling Level	291.00	Sq. m	

2.3	**VITRIFIED TILE WALL DADO (Above Counter Slab)**			
	Providing and fixing Ist quality Vitrified glazed wall tiles conforming to IS: 15622 (thickness to be specified by the manufacturer), of approved make fixing using Approved Tile Adhesive , in all colours, shades as approved by Architect. (The tile to be pasted on MDF partition wall)	9.00	Sq. m	
2.4	**LACQUERED GLASS SOLID PARTITION/ WALL PANELLING**			
	Lacquered Glass - Directly fixed over Solid partition. Providing & fixing Wall Panelling as per Drawings, in general, with 6mmthick lacquered glass of approved make and shade as per pattern and details given in drawing directly over the MDF partition. The lacquered glass shall be fixed using 3M or Equivalent double-sided tape / clear neutral Silicone sealant /SS Stud as per architectural drawing. The edges shall be chamfered so as to get 'V'-Groove with the adjoining glass panel. The panelling with the required cut-outs for the electrical switchplates and LCD TV, etc all complete as directed and to the satisfaction of the Architect / Client. Rate to include all wastages, hardware, necessary supports & backing to ensure rigidity, levels & plumb, etc complete.	15.00	Sq. m	
2.5	**INTERIOR EMULSION PAINT**			
	Preparing the surface and applying POP Punning using Birla Putty or equivalent make approved by Architect Wall painting with acrylic emulsion paint, having VOC (Volatile Organic Compound) content less than 50 grams/ litre, of approved brand and manufacture, including applying additional coats wherever required, to achieve even shade and colour Two coats including primer 1 coat .	205.00	Sq. m	
2.6	**MELAMINE POLISH**			
	Sand papering the surface with specified quality sand paper, applying 2 coats of sealer and applying 3 coats of glossy / matt finish melamine polish in required shade by spray for new work including rubbing with wax to desired finish.	5.00	Sq. m	
2.7	**VENEER FINISH**			
	CARPENTRY PROVIDING AND FIXING VENEER . Providing and fixing 4mm thick veneer of approved make including making grooves as per the design, necessary hardware, adhesives etc. complete.	5.00	Sq. m	
2.8	**LAMINATE FINISH**			
	CARPENTRY LAMINATE Providing and fixing laminate of approved make, colour and pattern as directed using approved adhesive. Item includes surface preparation by scrapping and removing existing paint, if any. 1.0 mm thickness.	5.00	Sq. m	
2.9	**WALL PAPER**			
	Providing and fixing wall paper of approved make, shade, texture as directed. 100% washable, scratch resistance, peel proof, and fire retardant properties fixed with adhesive as per manufacturers specification. The wall paper should give a seamless finish.	5.00	Sq. m	
2.10	**FLOORING**			
2.10 .1	**VITRIFIED TILE FLOORING**			
	Providing and laying Glazed Vitrified floor tiles in different sizes (Minimum thickness of tile 10mm) with water absorption less than 0.08% and conforming to IS : 15622, of approved make, in all colours and shades, laid on 20mm thick cement mortar 1:4 (1 cement : 4 sand), including grouting the joints with white cement and matching pigments etc., complete with spacer of 5mm. Supply and lay one coat of First quality POP layer over plastic sheet. for protecting the tiles from scratches and oil stains etc complete as directed. And same removing before handing over the work.	208.00	Sq. m	
2.10 .2	**LAMINATED WOODEN FLOORING**			

	Providing and fixing of minimum 8mm thick Laminated wooden flooring, with surface finish with class AC4 (average 4550 cycles), impact resistance of 9N ,resistance to cigarette burn with a rating of 4(EN 438-2:05), swelling after 24 hrs in water of 8.22%, Modulus of rupture of 53.3 Newton/mm2, Internal bond 1.78 newton/mm2, surface soundness 2.0 newton/mm2(EN 13329:2000) with a 0.2 mm thick wear layer on top of a High Density Fiber-substrate core (density ~ 948.3 Kgs/M3) of plank size 1214 mm X 141.5 mm having locking arrangement (lock strength > 670 lbs/ft) with an underlayment made of natural colour foam , with accessories like End profile, Transition profile etc. complete. It is important to ensure the sub floor on which the laminate is being laid is smooth, flat & hard & free from moisture, grease, etc. In case of uneven sub floor the same should be leveled by self leveling compound. The moisture level present in the sub floor should be less than 8% before installation of the floor. The laminate shall have Armalock locking system. It is recommended to use a water barrier of minimum of 250 microns and 2mm polyethylene foam under the planks. The installation shall be undertaken as per the manufacturers installation instructions. The work should be carried out as per patterns / design all as shown in the relevant drawings. The rate to include the cost of all leads, lifts, wastages, tools and plants, design pattern etc complete as directed by the Architects.	31.00	Sq. m	
2.10.3	**PATTERNED POLISHED GRANITE FLOORING**			
	Providing and laying 20mm thick polished Granite slab as per architectural design over cement mortar 1:4 using one part of cement and four parts of sand, joints are mitrated, the quality of stoned should be approved by the engineer in charge of the work. The rate to include the cost of all leads, lifts, wastages, tools and plants, curing, transport, taxes necessary bull nosing, 3M anti-skid tape for steps, grooves etc complete as directed by the engineer-in-charge.	115.00	Sq. m	
2.10.4	**GRANITE COUNTER TOP**			
	GRANITE WORK FIXING Mirror polished, 18 mm Providing and fixing 18 mm thick gang saw cut mirror polished (pre-moulded and pre polished);machine cut for dry pantry counter and similar locations of required size of approved shade; colour and texture laid using suitable Tile adhesive including moulding and polishing to edge to give high gloss finish etc. complete at all levels. Granite of any color and shade, upto 0.5 sqm. Job to be done as per specifications and directions of site engineer.	2.00	Sq. m	
2.10.5	**FOR WET LAB COUNTER**			
	- Providing and fixing of Custom Built lab table 600mm width and 760mm Height of varying Length as per the site requirements. Unit to be made of 18mm thick MDF board for all vertical and horizontal members inclusive of the openable shutters except the rear vertical surface which is of 6mm thickness. All exposed MDF board surfaces to be finished in 1.0mm thk Laminate of approved colour and shade. Rear external surfaces of unit to be finished in 1.0mm thk Laminate so as the internal surfaces of the storage unit. All inside faces are to be finished with 0.8mm thk Laminate . All exposed MDF board edges to be finished with PVC edge banding. Unit to have necessary locking arrangements (efficient gadgets or equivalent) handles, hardwares, tower bolt, hinges etc.	5.00	Sq. m	
	GRANITE TOP FIXING Over MDF Surfaces – Mirror polished, 18 mm Providing and fixing 18 mm thick gang saw cut mirror polished (pre-moulded and pre polished);machine cut for kitchen platforms; vanity counters, window sills, facia sand similar locations of required size of approved shade; colour and texture laid using Suitable Tile Adhesive including moulding and polishing to edge to give high gloss finish etc. complete at all levels. Granite of any color and shade, upto 0.5 sqm. Job to be done as per specifications and directions of site engineer.			
2.10.6	**RAISED ACCESS FLOORING IN SERVER ROOM**			

	Uniformly distributed load - Panels shall be able to withstand Uniformly Distributed Load of 1350 Kg/sqm with capability to carry a uniform load of 200Kg on one square feet area at any location of the panel with maximum top surface deflection of 1.5mm. Permanent deformation of the panel should not exceed 0.25 after removal of load. **Concentrated load -** Panels shall be able to withstand Concentrated load of 450 Kgs placed on one square inch area using a round or square indentor at any location on the panel. Maximum top surface deflection not to exceed 2.54mm and permanent deformation not to exceed 0.25mm after removal of load. The panel shall be capable of withstanding the same concentrated load with maximum panel cutout of size 200mm dia. **Ultimate load** - Panel shall be capable of withstanding a concentrated load of 1500Kgs applied to one square inch at any location on the panel without failure.	6.00	Sq. m	
2.10.7	**ELECTRO STATIC DISCHARGE EPOXY FLOORING**			
	Substrate Requirements : Concrete or screed substrate should be a minimum of 25N/ mm2, free from laitance, dust and other contamination. The substrate should be dry upto 75% RH, as per BS8204 and free from rising damp and ground water pressure.			
	Surface preparation : Removing the existing ESD Vinyl Sheet/flooring, followed by grinding the adhesive layer and ensure the concrete surface is exposed before the commencement of ANTISTATIC ESD FLOORING.			
	Antistatic System Application sequences :			
	1st Stage - Providing mixing and applying one coat of a Flowprime or Equivalent to seal the pin hole and to received the Scratch Coat / Underlay.			
	2nd Stage - Providing mixing and laying Epoxy Underlay with Flowshield SL UL or Equivalent at **2.0 mm thick** to receive the subsequent tape and the conductive primer.			
	3rd Stage - Fixing the Copper tape of 12 mm wide, self-adhesive, conductive copper tape is always recommended in combination with any Flowcrete antistatic flooring system. The copper tape must be applied directly onto the cured Flowprime / Scratch Coat/Underlay, maximum 1 metre in from the perimeter of the application. Further, strips of tape should be applied within this area every 3 metres. Special attention should be paid to tape areas passing over expansion or bay joints to ensure permanent electrical continuity. The applied tape should be secure and fully bonded to a confirmed earth point. or as per the consultant requirement.(Under Civil Contrator scope)			
	4th Stage - Providing mixing and applying a conductive primer with Flowprime ESD Conductive or Equivalent prior to the commencement of the Epoxy Topping of Flowshield or Equivalent EDS SL 1000 Conductive.			
	5th Stage - Providing mixing and laying an ESD epoxy topping with Flowshield ESD SL 1000 Conductive or Equivalent**,** the ESD system is an Antistatic Epoxy Resin topping a hard-wearing, self-smoothing epoxy resin floor finish that complies with BS2050. finishing flooring using appropriate notch and spike roller to release the entraped air, the cured ESD topping shall exbihit the following properties ,following manufacturer's methodology and complete.			
	Typical properties			

	Fire Resistance EN 13501-1 Bfl - s1 Slip Resistance Dry>40, Wet depends on specification (in accordance with HSE and UKSRG guidelines). Temperature Resistance : Softens over 60 degree celcius Water Permeability Nil – Karsten test (impermeable) Hardness : 70 (Shore D) Abrasion Resistance Taber Abrader: 80 mg loss per 1000 cycles (1 kg load using CS17 wheels) Compressive Strength : 60 N/mm2 (BS6319) Flexural Strength : 40 N/mm2 (BS6319) Tensile Strength : 25 N/mm2 (BS6319) Bond Strength : Greater than cohesive strength of 25 N/mm2 concrete. >1.5MPa. Electrical Resistance :5.0 x 10^4 – 1.0 x 10^8 Ohms (BS2050	10.00	Sq.m	
2.10.8	**ELECTRO STATIC DISCHARGE VINYL TILE FLOORING**			
	Supply & Installation of ESD Floors – PVC 2mm thick and the electro static dissipative will be homogeneous constructed product sliced from a pressed vinyl block to assure a highly flexible tile of dense construction, dimensionally stable, extremely hard wearing, with a completely non-directional pattern. Copper tape shall be layed at 900 mm grids. Copper strip grid to be formed in wall and floor at 900mm c/c bothways the joints to be rivited and connected to the earth strip & earthing. (Earthstrip paid separately)	393.00	Sq.m	
2.10.9	**COVING**			
	Construction of Coving 75x75mm radial dimensions,Layering of the coving with resin rich putty. Over coated with recommended Epoxy Coating to match the floor finish all material and labour complete.	300.00	Rm	
2.10.10	**SS SHEETING - GROUND PLANE & WALL PLANE (EMI LAB)**			
	Supply & Installation of minimum 2mm thick Stainless Steel material all as per technical requirement and manufacturer specification. The rates are inclusive of 2" floor to be raised with wooden platform required. Copper strip grid to be formed in wall and floor at 900mm c/c bothways the joints to be rivited with SS sheeting and connected to the earth strip & earthing. (Earthstrip paid separately)	35.00	Sq.m	
2.10.11	**FARADAY CAGE - WALL PLANE (RF LAB)**			
	Supply & Installation of 2mm thick Aluminium Grade sheet for wall Cladding as per Faraday cage technical requirement manufacturer specification and to provide faraday cage required specification. Copper strip grid to be formed in wall at 900mm c/c bothways the joints to be rivited and connected to the earth strip & earthing. (Earthstrip paid separately)	18.00	Sq.m	
2.11	**FALSE CEILING**			
2.11.1	**GYPSUM BOARD FALSE CEILING**			

	CARPENTRY FALSE CEILING/ CORNICE Providing and fixing false-ceiling P/F gypsum false ceiling system using 12.5mm thick gypsum board and GI framework suspension system as per detailed specifications given below Providing and fixing seamless ceiling with gyp board of 12.5 mm thick, fixed to the underside of the suspended grid formed of GI ceiling section of 80 x 26 x 51 mm, perimeter channel of size 20 x 28 x 30 mm fixed along the wall by using wood screws and metal expansion rawl plugs. The GI intermediate channel of size 45 x 15 x 15 mm shall be fixed to the suspended strap hanger / GI ceiling angle at intervals not more than 1200 mm. The suspended GI ceiling angle / Strap hanger is tobe connected with GI soffit cleat and it should be fixed on the roof slab / beam, by using metal expansion fasteners (wt. Type) of approx.12.5 mm dia. The gyp board shall be fixed to the under side of the suspended grid by using 25 mm long dry wall screws. The joints shall be finished with joint fiber tape by using jointing compound as per manufacturers specification and applying over it 3 layers of the filler compound to provide a smooth surface. The ceiling surface shall be finished with one coat of primer, 2 coats of putty, three coats of acrylic emulsion etc. complete. The final coat shall be with roller finish. The rate shall include making cutouts for tube lights, spot lights, duct doors, for specified size, grills etc. for which no extra will be paid separately. Rate shall include providing additional trimming around cutouts for light fittings etc. and grills also for providing additional supports from ceiling where main / cross members are cut for light fittings etc. Rate shall include vertical as well as horizontal surfaces as per detailed drawing. Measurements shall be made on the basis of area calculated as per OBSERVABLE plan surface (horizontal or vertical). The finishes to the requirement of Tender Drawings / As per the approvals of BPCL Officer In-charge. Rate includes of necessaries hardwares , accessories, transportation, labour etc.,	93.00	Sq. m	
2.11.2	**MINERAL FIBRE BOARD FALSE CEILING**			
	Providing & Fixing of Mineral Fibre Acoustical Suspended Ceiling System or Equivalent with Armstrong Dune Edge Tiles With Armstrong 15mm Exposed GRID. The tiles should have Humidity Resistance (RH) of 99%, NRC 0.5, Light Reflectance ≥85%, Thermal Conductivity k = 0.052 - 0.057 W/mK Colour White, Fire Performance Euro Class 0/ Class 1 as per BS 476 Pt - 6 & 7 Class A as per ASTM E-84 in module size of 600 x 600 x 15mm , suitable for Green Building application, with Recycled content of 38%. The tile shall be laid on Knauf(Armstrong) Silhouette profile grid system with 15mm white flanges incorporating a 6mm central reveal in black colour and with a web height of 38mm and a load carrying capacity of minimum 11.25 Kgs/M2 & pull out strength of 100kgs.. Silhouette, Main Runners & Cross Tees to have mitred ends & “birdsmouth” notches to provide mitred cruciform junctions. The T Sections have a Galvanizing of 90 grams per M2 and need to be installed with suspension system of Knauf(Armstrong) make. The Tile & Grid system used together should carry a 30 year warranty.INSTALLATION: To comprise main runner spaced at 1200mm centres securely fixed to the structural soffit using Commercial suspension system (specifications below) at 1200mm maximum centre. The First/Last Commercial suspension system at the end of each main runner should not be greater than 450mm from the adjacent wall.Flush fitting 1200mm long cross tees to be interlocked between main runners at 600mm centre to form 1200 x 600 mm module. Cut cross tees longer than 600mm require independent support. 600 x 600mm module to be formed by fitting 600mm long flush fitting cross tees centrally between the 1200 mm cross tees.Perimeter trim to be Knauf (Armstrong) wall angles of size 3000x19x19mm, secured to walls at 450 mm maximum centres.Commercial SUSPENSION SYSTEM - 2.5mm dia Gi wire for suspending, 6mm tie anchor & J hook waser nut level Adjusting. The measurement will be taken in flat / horizontal / linear alignment.	140.00	Sq. m	
2.11.3	**FALSE CEILING BOXING**			

	Providing and fixing of 12mm thick MDF with 1mm thick Laminate of approved patterns and grooves as per the drawing over the ceiling grids (beam soffits & sides) sturdly fixed to RCC beams with necessary suitable size screws and as directed by Engineer-in charge.	5.00	Sq. m	
2.11.4	**CLEAN ROOM CEILING**			
	Supplying & Fixing of Progressive type Double skin modular 50 mm thick Ceiling wall panel made of 0.5 mm thick Powder coated sheets on both sides with PUF as infill of density 40 ± 2 kg /m3, GI Profiles for reinforcement along the periphery with bottom Aluminium track, and necessary arrangements, All Joints shall be sealed with clean room compatible Neutral Grade Silicon Sealant.	387.00	Sq. m	
2.11.5	**STRETCH FALSE CEILING**			
	Providing and fixing of approved make demountable curved/flat false ceiling made of Polyester knitted fabric coated with polyurethane 309 T Translucent white with printing as per Architect design, Weight: From 200g to 250g / m2. Fire Rating:B s1 d0 (Ex M1) / Flame retardant. Fabric has trans lucid fabric for back lighting purpose with CE (Complies with European Union norms), stretch on self supporting frame Profile. The rates should be inclusive with the necessary frame works for the fixing arrangement of approved make stretched fabric panels and the LED Light. The Shop Drawing to be submitted by the Contractor for approval.	90.00	Sq. m	
2.11.6	**ACOUSTIC SUSPENDED FALSE CEILING PANELS**			
	Supply and installation of Anutone Subtex Shapes or Equivalent 30mm thk of 1200mm diameter,which are having glassfibre core, textured finish and are fully encapsulated. Panels are having density 100-120 kgs/m3 and weight 3-3.6kg/m2. Each panel is provided with 4 sets of accessories containing spring hooks, levelling clip and hanger wires. Springs to be rotated and anchored at back of each panel at four points to hold the panel stable. Supplied hanger wires to be first dropped from the beam/slab/truss to desired height with suitable cleats/anchor bolts. Anutone Subtex Shapes Hexagonal Nubby panels are then suspended using spring hooks and hanger wires and levelled into position with supplied levelling clips. The rate to include Cleats and anchor bolts. Technical Parameters: Fire (Class) – 1 & P, Acoustics – NRC upto 0.9, Thermal conductivity (W/mk)– 0.07, Climate (°C, RH) – 45, 95, Light reflectance (%) – 85, Green (VoC, RC %) – Low, 35.	12.00	NOS	
2.11.7	**CEILING PAINT**			
	Providing and applying of Acrylic Emulsion paint on ceiling. Rate to include one coat of primer and 2 coats of black paint of approved shade.	93.00	Sq. m	
3.0	**JOINERIES**			
3.1	**PATCH FITTING GLASS DOOR**			

	Providing and fixing of fixed glass door with openable shutters using 12mm thick toughened glass. The fixed glass shall be fixed in position using PT patch fittings like PT 90/ PT 92 of Dorma make. The openable doors shall be fixed using top pivot PT 24, Top patch PT 20, bottom patch PT 10, corner lock US 10 with SS cover plates. The doors shall be fixed on floor spring model BTS 75V with SS cover plate. Pull handle shall be of size 600mm height x 32mm dia TGDI H 600. Necessary holes cutouts. etc to be provided as required. Cost to include drilling, cutting, necessary sealants, transportation etc in complete. The rate to be quoted will be inclusive of all the above including the cost of scaffolding, cost of floor springs and fixing cost for supply and erection of all hardware fittings such as S.S. handle two pairs, Equivalent for each door, all as directed by the Engineer in charge of the work and concreted civil works including chipping the floor, fixing the floor springs, making good the disturbed floor, all leads and lifts transport etc., complete. The glazing will be taped with 3M Scotchcal 7725SE-324 Frosted crystal film the details shown in the relevant drawings. The Frosted crystal film is to be supplied to the correct size and shape as indicated in the relevant drawing and the film is to be precut digitally with a plotter, brought to site and pasted over the glass. Any additional details required for shaping the film is to be obtained from the Architects in advance before precut the film.	28.00	Sq. m	
3.2	**SOLID FLUSH DOOR WITH VISION PANELS**			
	Flush Doors With Vision Panel Providing and fixing in position Factory-finished Flush Doors of size as per Drawing with WALL LINE / approved equivalent make of Aluminium door frames of size 40x92mm. The frame finish shall be natural Anodized of 20 microns. Rate shall be inclusive of providing and fixing 35mm thick Factory-made Flush Door Shutters single leaf or two leaves solid core bonded with phenol formaldehyde synthetic resin thermo pressed with 8mm thick teak wood external lipping. The construction procedure of the shutter should be as per clause no.6 of IS 2202 (latest issue). The shutter shall be shop prepared for taking mortice lock or latches. Suitable lock block of wood may be provided for fixing the hardware. The size of block, shall perfectly correspond to the maximum size of lock covered in IS 2209 (latest issue). All the four edges of the door shutter shall be square. The shutter shall be free from twist or warp in its plane and of required size etc. complete as directed. Shutter to be finished with 1mm laminate of approved shade on both sides.The shutter will have vision panel of 8mm thick toughened glass of size, shape shown in the drawing will be fixed to the shutter frames and sides with 10 x 10mm wooden beading on all the sides as per shown in the drawing in required door Door shutters are to be fitted with the following hardware:- * 3 Nos. of S.S butt hinges - 125 mm * Door set mortice lock with S.S plate - 6 levers - 1 No. * Nylon door buffer of 35 mm dia - 1 No. * S.S 'H' handle of 600 mm height - 1 No. * S.S Door closer - 1 No. (slim pelmet arm type and of suitable load capacity)	**22.00**	Sq. m	
3.3	**MANUAL SLIDING GLASS DOOR**			
	Supply and Installation of Manual Sliding Frameless glass door, MUTO Comfort L80 or Equivalent -Track with Wall Fixing having a Length of 3 mtr, Finish 157 - 1 PCE, MUTO Comfort L80 Cover Profile 3M,Finish 157 - 1 PCE, MUTO Comfort L80 M+L Cover Clip, 10 PC - 1 SET, MUTO Comfort L 80, set end caps, Finish 157 - 2 NOS., MUTO Comfort L 80, accessory set, Finish 157 - 1 SET, Flush Pull Knob for 8/10/12mm glass thickness-Finish : EV1- 1 PCE. Dimensions: Track width= 71mm, Track height= 58mm. Maximum door height is 3000mm. Maximum width is 1500mm. Class 4 Corrosion resistant according to EN 1670. Tested for 100,000 cycles. Compliant to DIN EN 1527. Max. door weight/double door is 80kg. Make : Dormakaba or Equivalent.Supply and Installation of Manual Single Sliding Frameless Glass Door MUTO comfort L80 with Door width of 1 mtr and Height of 2.4 mtr with a Glass thickness of 10mm	1.00	NOS	

3.4	**SLIDING CLEAN ROOM DOOR**			
	Supply & Fixing of 60mm jam, Sliding door to fit flush into the blockwall/partition on both sides . Shutter sheet thk shall be 0.8mm and frame thk shall be 1.2 mm .Shutter with GI Sheet on both sides with powder coatinng in approved color with PUF as infill. Hardware include are Double Glazed view glass 300*300,Roller,lock,Sliding Rail, Guiding Pin ,Flush Handle.			
	1000x2400mm	1.00	NOS	
	1500x2400mm	1.00	NOS	
	1800x2400mm	1.00	NOS	
3.5	**CLEAN ROOM DOORS**			
	Non-fire rated clean room doors Non Fire rated Clean Room Doors are made up of 0.8 mm sheet thickness for leaf and frame sheet thickness will be 1.2mm. Leaf thickness will be 40mm. Insulating material will be Honeycomb. Finish will be GI Powder Coated of approved colour. Jamb size will be 50-100 MM. The rate to include SS Hinges,Door Closer STD Arm,Dead Lock,B To B Handle Or Push Plate One Side,Drop Seal,Flush Bolt for Double Door only,Double Glazed Vision of Toughened Glass (5mm) Size (350x700 mm) with Black Ceramic Border with all fixing Accessories,Kick Plate - One sided(Made from SS-304, provided with all fixing Accessories)			
3.5.1	Double Door (1800x2400)	2.00	No.s	
3.5.2	Double Door (1500x2400)	4.00	No.s	
3.5.3	Single Door (1000x2400)	2.00	No.s	
3.5.4	Single Door (1200x2400)	1.00	No.s	
3.6	**FALSE CEILING TRAP DOORS**			
	Providing and Fixing trap Doors for accessing the services and utilities in marine plywood 12 mm thick, with necessary sized Al/Hardwood framework, suspended from true ceiling bolted by anchor fasteners. Doors to be finished with 1 mm thick laminate/ paint as per site on both sides, edged with PVC transparent seal to prevent smells being sucked into the trap door space. The trap doors to be locked with Allen Keylocks with safety chain stays as directed complete Details, Design, Color, location & Pattern will as per the Architect Drawing/Engineer in Charge. Size as per site needs.	30.00	Sqm	
4.0	**MODULAR FURNITURE**			
4.1	**WORKSTATION LINEAR TABLE – TYPE A**			

	Supply and Erection of Linear Workstation Dimension : 1200mm x 600mm x750mm Model No: Feather lite-Synergy or Equivalent Linear workstation Size: 1200 x 600D x 750Ht mm System: Desking - Synergy Specification Table top : 25mm thick Pre-laminate particle board E1 norms finished with 2mm PVC edge banding. Main Screen : 1050L x 450HT - 8mm thick Colored Glass Screen supported on studs Return Screen : 525L X 450HT - 8mm thick Colored Glass Screen supported on studs. Modesty : Considered SQ Perforated Metal modesty of 450mm HT only for End Legs for open passage areas and not for wall areas. Under-structure : Supported on MS powder coated Colors leg with supporting beams. Wire Management : 250mm Ht Raceway with 65mm Dia Wire Manager Grommet Specifications Vertical Raceway with built in separator for power and data of size 250H X 70mm thick with provision to mount switches and sockets on laminate facia with Vertical Wire Entry cover for wire uptake from floor to raceway with 65mm Dia Wire Manager Grommet. PEDESTAL (2D+1F) SIZE: 400L X 450D X 600HT Specifications: Table Top: 18mm thick pre laminated particle board ,Shutters: 18mm thick pre laminated particle board Edge: All exposed area with 2mm thick PVC edge lipping Handle: Finger groove handle Lock: Regular lock * CPU trolley *ABS keyboard tray with mouse pad	43.00	NOS	
4.2	**WORKSTATION -TYPE B (L TYPE)**			
	Supply and Erection of Linear Workstation Dimension : 1500mm x 1200mm x750mm Model No: Feather lite-Synergy or Equivalent Partition : Height – 1200mm frame with to pand sides in Aluminium trims and junctions with diecast caps. Table Top: 25mm thick Pre laminate particle board with 2mm PVC edge lipping on all exposed edges. Support: 18mm thick pre laminated gable ends. Wiremanagement: One metal raceway tile to mount switches below table top level for power and skirting tile for data Tile Finishes : Above table top Level: Fabric Tiles, one glass marker tile & one magnetic tile per workstation. Below table Top level: Pre-Laminated tiles and metal skirting tile on Main spine towards user.	3.00	NOS	
4.3	**CABIN TABLE – TYPE A**			
	Supply and Erection of Cabin Table Dimension : 1500mm x 1500mm x750mm Model No: Featherlite -Senate HT -528 or Equivalent Specifications Table Top: 40mm to 50mm thick pre laminated particle board Modesty storage panel 18mm thick Shutters: 18mm thick pre laminated particle board Edge: 40mm to 50mm gable end Handle: in built handle Lock: Regular lock	5.00	NOS	
4.4	**CABIN TABLE – TYPE B**			

	Supply and Erection of Cabin Table Dimension : 2100mm x 750mm x750mm Specifications Table Top : 25mm thick pre laminated particle board with 2mm PVC edge lipping in all exposed edges. Support : End Legs : MS powder Coated 50*50 PERFORM Legs Intermediate Legs : MS powder coated 60x40 mm legs and supporting MS Cross Beams (40x20mm) Wire management : * Continuous PVC Cable tray with provision to mount sockets & switches as per client requirement. * Vertical wire entry cover for wire uotake from floor to cable tray and 450mm Aluminium Flip up for switch access.	1.00	NOS	
4.5	**DISCUSSION TABLE – TYPE A**			
	Supply,Fabrication & Fixing of 1500x750x900mm Discussion Table as per Architects Design. The 12mm thk Acrylic table top to be laid over 25mm MDF board with 6mm thk thermoformed acrylic drops over MDF backing. The table to be fixed onto wall/Partition on side. V shape Vertical Support to be fabricated from SS304 in the shape indicated by architectural Drawing. The rate to include snake wire manager,pop-up switch box and other accessories **(SOLID ACRYLIC MAKE: CORIAN / MERINO HANEX/ LG HAUSYS)**	1.00	NOS	
4.6	**DISCUSSION TABLE – TYPE B**			
	Supply,Fabrication & Fixing of 1500x600x750mm Discussion Table as per Architects Design. The 12mm thk Acrylic table top to be laid over 25mm MDF board with 6mm thk thermoformed acrylic drops over MDF backing. The table to be fixed onto wall/Partition on side. V shape Vertical Support to be fabricated from SS304 in the shape indicated by architectural Drawing. The rate to include snake wire manager,pop-up switch box and other accessories **(SOLID ACRYLIC MAKE: CORIAN / MERINO HANEX/ LG HAUSYS)**	2.00	NOS	
4.7	**COFFEE TABLE**			
	Providing and fixing Coffee table of size as per the drawing			
	The Table height will be 900mm as per the drawing. The table top and support to the table will be of 18mm thick MDF board finished with 12mm thick solid acrylic top of approved colour and shade. The Vertical Support and edges of the table will be 6mm thk Solid acrylic Surface with 3x6mm thk flexiply backing all as per the drawing and manufacturer specification for fixing. Additional support to be provided if required. The table will also have SS supports and snake wire manager to be provided as per the drawing. The rates are inclusive of Thermoforming application and necessary fittings etc., **(SOLID ACRYLIC MAKE: CORIAN / MERINO HANEX/ LG HAUSYS)** **BASIC COST OF ACRYLIC SHEET- 6500/SQM**	1.00	NOS	
4.8	**RECEPTION TABLE**			
	Providing and fixing Reception table as per shape and size as shown in drawing. The Reception table top will be 18mm thick MDF finished with 1.0mm thick laminate and table will be made of 12mm toughened glass with bevelled edges and vertical support with 18mm thick MDF finished with 1.0mm thick laminate. The curved portion of the support will have 3 layers of 6mm thick flexible MDF finished with 1.0mm thick laminate as per size and shape etc. complete as per drawing. The table will have 12mm thick frosted glass fixed over the table fixed using 25mm dia SS Studs as shown in the drawing.	1.00	NOS	

	The table will also have wire manager. (basic cost Rs. 150 per each).The table is provided with storage unit of size 400 x 450 x 600mm height made out of 12mm & 18mm thick MDF and finished with necessary PVC banding, telescopic drawer sides, locking arrangement, 100mm long brush finish SS handles, rollers etc. complete all as per drawing. A trunking box and footrest to be provided made of 18mm thick MDF board as per the drawing to allow electrical and data cable to be concealed within.			
	All the exposed faces of the MDF finished with 1.0mm thick laminate**.** The concealed faces of the MDF is to be finished with 0.80mm thick laminate. The work is to be carried out in a first class workmanship manner all as per details shown in the drawing and as directed at site etc., complete. The rate to be include all the above. **Note:** All exposed MDF edges to be finished in PVC Edge banding as shown in the drawing. All steam beach timber members to be polished and finished in melamine. *The rate to include the cost of back lighting for the Reception table.* ***(Make for strip light: Philips, Sky cove)*** *Samples of the Studs, SS Handles to be submitted for approval by Contractor.* ***(Make for Laminate: Greenlam)*** ***(Make of sliders/ handles : Godrej/ EBCO/ Haffle)***			
4.9	**CHAIRS**			
4.9.1	**HIGH BACK CHAIR**			
	High back chairs with synchronized tilt mechanism,gas lift,high back with fabricated tubular frame,powder coated and upholstered with "Flex XS" mesh fabric and cushion seat with two way adjustable arms,5prongs pedestal assembly of chrome base, twin wheel caster with nylon and seat finished with approved fabric Model: Featherlite - Astro HB or Equivalent ASTRO MBGS ADJ ARMS WITH HEADREST * Astro Medium Back Mesh Chair * Headrest * AC 60 Mesh * Fabric Upholstered Cushion Seat * Single Lock Synchro Mechanism * Adjustable Lumbar Support * One Way Adjustable Arms (Height) * Nylon Base	***5.00***	NOS	
4.9.2	**MEDIUM BACK CHAIR**			
	Medium back chairs with synchronized tilt mechanism,gas lift,medium back with fabricated tubular frame,powder coated and up-holstered with "Flex XS" mesh fabric and cushion seat with two way adjustable arms,5prongs pedestal assembly, twin caster with nylon. * Contact Project Medium Mesh Back Chair * AN 70 Mesh * Fabric Upholstered Cushion Seat * Single Lock Synchro Mechanism * Adjustable Lumbar Support * One Way Adjustable Arms (Height) * Nylon Base	106.00	NOS	
4.10	**SOFA**			
	Providing of 1 Seater Sofa of approved type and size all as Directed by the Engineer-in-Charge. Single Seater sofa Pearl - Single seater sofa * Leatherette/ Fabric	4.00	NOS	
4.11	**LOW HEIGHT STORAGE**			

	Supply and Erection of Low Height Storage Unit Model No: Featherlite – Executive serious SC-3 or Equivalent PRODUCT: Low Height Storage with Openable Shutter Specifications: 900x450x750mm Table Top: 18mm Thk pre laminated particle board Back: 9mm Thk pre laminated particle board with 2mm PVC edge lipping Shutters: 18mm Thk pre laminated particle board Edge: All exposed edges with 2mm thick PVC edge lipping Handle: Finger groove handle Lock: Regular lock	4.00	NOS	
4.12	**MEDIUM HEIGHT STORAGE**			
	Supply and Erection of Medium Height Storage Unit Model No: Featherlite – Executive serious SC-3 or Equivalent PRODUCT: Medium Height Storage with Openable Shutter Specifications: 900x450x1200 Table Top: 18mm Thk pre laminated particle board Back: 9mm Thk pre laminated particle board with 2mm PVC edge lipping Shutters: 18mm Thk pre laminated particle board Edge: All exposed edges with 2mm thick PVC edge lipping Handle: Finger groove handle Lock: Regular lock	7.00	NOS	
4.13	**FULL HEIGHT STORAGE -TYPE 1**			
	Supply and Erection of Full Height Storage Unit Dimension : 750*450*2100mm Model No: Featherlite – Executive serious SC-3 or Equivalent PRODUCT: Full Height Storage with Openable Shutter Specifications: 750x450x2100 Table Top: 18mm Thk pre laminated particle board Back: 9mm Thk pre laminated particle board with 2mm PVC edge lipping Shutters: 18mm Thk pre laminated particle board Edge: All exposed edges with 2mm thick PVC edge lipping Handle: Finger groove handle Lock: Regular lock	20.00	NOS	
4.14	**FULL HEIGHT STORAGE -TYPE 2**			
	Supply and Erection of Full Height Storage Unit Dimension : 750*450*2100mm Model No: Featherlite – Executive serious SC-3 or Equivalent PRODUCT: Full Height Storage with Openable Shutter Specifications: 750x450x2100 Table Top: 18mm Thk pre laminated particle board Back: 9mm Thk pre laminated particle board with 2mm PVC edge lipping Shutters: 18mm Thk pre laminated particle board Edge: All exposed area with 2mm thick PVC edge lipping Handle: Finger groove handle Lock: Regular lock	1.00	NOS	
4.15	**OVER HEAD STORAGE**			
	Providing and fixing Over Head storage to detail of drawing about 450mm wide and 600mm high comprising.			
	18mm thick MDF board fixed at top, rear sides and bottom at 75mm and one intermediate with necessary TW reepers and 10 x 37 mm steam beach moulding,along the edges.			
	Side hung shutters in 2 leaves with 18mm thick MDF board and on top finished with 1mm thick laminate of approved colour and shade,including necessary grooves, box type hinges,locking arrangements,100mm long S.S brush finish handles, Tower bolt, Ball catch etc. Complete.			

	Exposed faces of MDF board at top and sides of unit,finished with 1mm laminate of approved colour and shade.			
	All concealed faces of MDF board finished with 0.8mm thick laminate . All Exposed Edges to be finished with 2mm thick PVC Edge banding with suitable adhesive to the satisfaction of the client / Architect.	33.00	Sqm	
4.16	**CROSSOVER BENCH**			
	Supply,Fabrication & Fixing of Cross Over Bench of Dimension 1825x300x450mm. The Cross over Bench Will Be Finished with 1.50 mm thk Stainless Steel 304 Grade Sheet on all sides over MS Frame. The Cross Over table to Comply with relevant Clean room standards.	2.00	NOS	
4.17	**BOX FILE COMPACTOR(MOBILE SHELVING SYSTEM)**			
	Manually operated and mechanically assisted mobile storage unit sliding smoothly & effortlessly on a pair of rails and providing maximum storage by compaction. Base Frame (Trolley) fabricated in channel type in 3 mm thick M.S. Sheet. **TRACK:** Trolley seating upon 30 mm square bar placed on 1.6mm thick M.S. plate which will be above the floor with multiples bends. For Five bay Three track. **GUIDE RAILS:** For movable unit we are providing guiderail bearing on base frame which closely move with trolley and the track as per the international standard of safety. **SUPER STRUCTURE:** Super structure of mobile storage systems 0.8mm thick C.R.C.A made **TATA JSW**. prime quality consist of knock down type panels. All the components such as shelves, front panel, end panel, vertical rear panel, centre partition etc., will act as an integral member of the unit. **SHELVES:** Shelves made of 0.8mm thick prime quality C.R.C.A having 8 folds each will be provided each design to carry a U.D.L. of 80-100 kgs and providing stiffener at the bottom of the each shelves. DRIVER COVER PANEL: Made out of 0.8mm C.R.C.A. thick prime quality cover the entire drive mechanism.			
	DRIVE MECHANISM AND HANDLE: Drive mechanism will be provided externally supported on special grade anti-friction bearing to have smooth and effortless movement. Entire mechanism or gear & sprockets (1/2'') shall be incorporated within the front panel provided in the front of the unit. We are providing three spoke drive handles. POWDER COATING: Seven tank process powder coated, finishing up to 60 microns. Colour customized Standard colour RAL 7035 Structure. WHEEL: Made by MS Iron wheel OD 100MM.			
	Accounts room (1500x1680x2100)	1.00	UNIT	
4.18	**CENTER TABLE FOR RECEPTION AREA– 550mmx550mm**			
	Central Table with 18mm PLB Top and PC Swage Leg			
	Size : 550L x 550B			
	1. Everest White 2. Graphite Grey 3. Thanasu Maple 4. Classic Walnut	2.00	NOS	
4.19	**LOCKER**			
	Providing of Lockers of compartment sizes 300x450x1200 (2 Compartments)			

	The lockers will be fully welded single unit of 18 gauge G.I Construction. The G.I. Sheets (TATA/JSW/ Equivalent) should have 120 gsm of Zinc coating and powder coating thickness should be minimum 80-100 microns. The cabinets must be completely welded for better strength & load bearing capacity. The loading partitions should be 16 gauge G.I. construction, welded to the carcass & should have necessary stiffeners.			
	The shutters & Drawers fronts will be made out of 18 gauge electro galvanized sheet with epoxy polyester powder coating. The G.I. sheets(TATA/JSW) should have 120 gsm of Zinc coating and powder coating thickness should be minimum 80-100 microns. The shutters & drawer fronts will have half round radius profile in order to avoid sharp edges			
	SPECIFICATION OF HARDWARE FITTING **A) HINGES** The hinges will be of nickel coated, self closing type with opening angle upto 90 degree, (Hettich / Hafele / Equivalent) fitted to the shutter with stainless steel screws/nuts & bolts.Special coating for hinges: The hinges will be of CED finish (Cathode Electrode Deposition) for enhanced chemical resistance.			
	B) ROLLER CATCH: A two-piece chemically inert nylon roller catch shall be provided on all base cupboard doors and shall be positioned near the pivoting edge of door to provide a clean unobstructed opening. Main body of the catch shall be confined within an integral cabinet divider rail, while latching post shall be mounted on the hinge side of door.			
	D) LOCKS : Square type multipurpose locks with 2 sets of keys, will be provided (Godrej/Equivalent)	14.00	Nos	
5.0	**Aluminium Skirting:** providing and fixing aluminium skirting 100mm high and 1mm thick of approved make aluminium profile with natural color anodizing fixing at bottom of the partition (Approved Make : Wall line / Bottomline)	210.00	Rm	
6.0	**PELMET** for glazing & pull down screen: Fabricating and installing the pelmet made out of 18MM thk plywood as per the required size and in line with external glazing as per architect's detail. Rates to include finishing exposed surfaces of the pelmet with enamel paint of approved shade and providing 50mm dia drills in the pelmet for return air if required. Pelmets should be ready to receive the Blinds.	45.00	Rm	
7.0	Providing and fixing of 18 mm thick MDF MR 303 Ledge onto wall/Partition .Top & Sides of the Ledge to be Finished with 1.0mm thick laminate.	5.00	Rm	
8.0	**MISCELLANEOUS**			
8.1	**PINUP BOARDS**			
	Providing & fixing Fabric paneling or Soft boards with 12 mm MDF backing with P.E. Foam 2-4mm thick. Soft board to be provided with TW lipping. Soft board is covered with fabric of approved make, shade and then is fixed over the MDF board using headless nails as directed.	55.00	Sqm	
8.2	**VINYL WALL GRAPHICS**			
	Providing and fixing graphic vinyl complete with lamination to be applied on walls / partitions, of 3M/LG make (Code No. 180X series or approved equivalent) as per approved design and at specified locations as directed by Architect / Client. The rate shall be inclusive of preparing the base surface with 2 coats putty, and 1 coat oil primer with smooth finish, all complete and as directed. Rate shall be inclusive of all wastages, etc. Rate shall be inclusive of all wastages , Artwork design, download charges etc. Note : Only the actual installed area shall be measured for payment. Note:including image cost	75.00	Sqm	
8.3	**DRY PANTRY COUNTER**			

	Pantry Counter: providing and fixing of 12mm thick BWR plywood finished all as per the drawing. The rate to include the cost of opening for 6 Module flip up box(basic cost will be 700 each) as shown in the drawing. The shades & Sizes as mentioned in the Architectural drawing as approved by the Architect-in-charge.	2.00	Sqm	
8.4	**FROSTED FILM FOR GLASS PARTITIONS/DOORS**			
	Providing and Fixing of 3M Transparent Vinyl Film (optically cleared)/3M 1 Way Mesh Vinyl (with 3M Edge Sealer)/ 3 Frosted Vinyl printed with Colour Digital Print with UV Inks of approved shade and design.	35.00	Sqm	
8.5	**FLOOR MATS: Main Entrance**			
	Providing and Fixing of Floor Mats at Main reception entrance of 3M Heavy Duty Nomad or approved equivalent.	3.00	Sqm	
8.6	Supply and installation of Wall clocks digital/ analogue of designer series.	5.00	NOS	
8.7	**PLANTER BOX**			
	Providing & Fixing of 18mm thick MDF board finished with 1mm thick Laminate finish of Approved colour and Shade. The size and shape of the Planter Box as per architectural drawing.	12.00	NOS	
8.8	**Plant Pot** : Pot made up of clay/ceramic along with the fertile sand/pebbles as per requirement of the BPCL in-charge	12.00	NOS	
8.9	**Natural Plants** Supply & installation of Natural Indoor plants of approved species selection suitable for indoor applications, inclusive of suitable light-weight soil mixture, etc complete and as directed.	12.00	NOS	
8.10	**Artificial Plants** Supply & installation of Artificial Indoor plants of approved design, inclusive of suitable light-weight soil mixture / equivalent medium to fix the same, etc complete and as directed.	3.00	NOS	
8.11	**Dust bins :** Supply of 10 ltrs capacity perforated stainless steel dust bins for staffs . Make : Godrej, Nilkamal or approved make and specification.	17.00	NOS	
8.12	**Roller Blinds**			
	Supplying & fixing approved shade and make Effective Optimized System Roller blinds Shade consists of sanitized treated, resilient and approved sample color polyester base fabric with high tear strength, Roller Tube, Control Chain, Control Set Left Hand, Control Set Right Hand, Bracket Cover, Chain Connector, O-C Bottom Rail String for conversion Spring, Bottom End Plug, Bottom End Plug Circular, Open Bottom Rail, Tube Bearing Plug etc.	132.00	Sqm	
8.13	**Bunk Beds**			
	Fabrication,Supply & Fixing of 950mm x 3785mm Bunk Bed over Workstations. Vertical Support will be fabricated with MS Pipe Supports from Floor & wall. 18mm MDF Board Finish with 1mm thick laminate to be laid over Horizontal MS Frame. Guard rail of 200mm Height to be provided. Additional Bracing to be provided as required. Rate to include: 1. Epoxy Painting on all the MS Sections. 2. Telescopic /Foldable Aluminium ladder.	1.00	NOS	
	Note :			
	1. All concealed faces of MDF board finished with 0.8mm thick laminate .			
	2. All Exposed Edges to be finished with 2mm thick PVC Edge banding with suitable adhesive to the satisfaction of the client / Architect.			

2.0	**PLUMBING WORKS**			
PART A: SANITARY FIXTURES AND CP FITTINGS				
1	**SS Sink with single bowl & Drain Board:** Providing and fixing of **Stainless steel sink**(in weight) i/c waste pipe/bent etc. Complete with all respect. Make : Nirali/Franke or equivalent.	1.00	Nos	
2	**CP Sink Cock:** Supplying and fixing of 15mm dia 'J' type CP sink cock with swinging spout (wall mounted model) for kitchen sink with CP wall flange etc. Notes: Conditions mentioned in item no.1 shall be applicable. Make : Kohler or Equivalent	1.00	Nos	
3	**Angle Stop Cock:** Supplying and fixing of 15mm dia CP angle stop cock with wall flange etc.(for aqua guard point in Kitchen) Make : Kohler or Equivalent	1.00	Nos	
PART B: UPVC PIPES AND FITTNGS (INTERNAL WATER SUPPLY):				
1	Providing & fixing of UPVC schdule-40 pipes confirming to ASTM standard including all UPVC fittings like tees, elbows, bends, unions, coupling, reducer tees, collars etc. The work shall include cutting jointing with solvent cement pressure testing the joints / pipeline for 10 kg/sq.cm hydraulic pressure, for 2 hours hours etc., fixed on to the wall in vertical shafts / terrace with fabricated MS brackets of suitable size with GI 'U' clamps, bolts, nuts and GI washers including MS brackets including making good the walls and floors.	30.00	Rmt	
	25mm dia			
PART – C: PVC SOIL,WASTE,VENT PIPES AND FITTINGS (INTERNAL)				
1	Providing, fixing, testing and commissioning of PVC soil, waste and vent pipe confirming to IS 13592 of SWR quality(Type - B) or 6 kg / sq.cm pressure rated including all fittings, like Bends, Tees, Elbows, Collars, junction, offsets, access pipes, jointing with solvent cement followed by application of leak proof adhesive like FRP paste & laid as ceiling hung system of inside the toilets, kitchen and utility to the required slope including necessary Clamp support & making necessary bores in walls as applicable, making good the bores with CM 1:3 or cement concrete as applicable, curing etc., complete.-75mm dia (6kg/sq.cm)	30.00	Rmt	

2	Providing, fixing, testing and commissioning of **PVC Floor Trap** of self cleansing design moulded or fabricated, if not available in size mentioned below, with or without vent arm jointing with rubber ring / solvent cement followed by application of leak proof adhesive like FRP paste including PVC extension pipe for PVC / floor trap for with surface preparation with finishing etc., complete size: 100 mm dia x 400 mm length. Making good the floors.			
	Note: Rate is inclusive of bore hole packing and necessary support for the floor trap.			
	110mm dia x 75mm dia	2.00	No	
3	Supply and fixing of 1 Hp motor for water supply . Rates are inclusive of testing & commissioning of motor	1.00	No	
3.0	**ELECTRICAL WORKS**			
1	**Wiring of light, fan, 6A sockets and exhaust fan points**			
	-			
	Supply and wiring for light points with 2 runs of 1.5 Sqmm FRLS, single core, multistrand copper wire (For phase and neutral) with one run of 1.5 Sqmm PVC insulated, single core, stranded, copper wire for earthing (green colour) in 20mm dia MS conduit, 16 Swg thick (ISI marked) with necessary accessories including supplying and fixing 6A single pole modular switch housed in manufacturers zinc passivated MS box with cover plate.			
1.1	1 light controlled by 1 switch	55.00	No	
1.2	2 lights controlled by 1 switch	100.00	No	
1.3	3 lights controlled by one switch+external light points	36.00	No	
1.4	Same item 1.1, but for 6A switched sockets including supply and fixing of switched sockets in independent locations (Raw power), excluding the work stations	30.00	No	
1.5	Same as item no1.4, but socket and switch mounted in light control switch box	30.00	No	
1.6	Call bell point with call button, rest button, buzzer and display	3.00	No	
1.7	Supply and laying of 3 R 2.5 Sqmm FRLS stranded copper wire (one for earth, green colour) in 20mm dia MS conduit, 16 Swg thick (ISI marked) concealed in wall by chase cutting for circuit mains from LDBs to switch boxes	1,100.00	Mt	
1.7 A	Supply and laying of 3 R 2.5 Sqmm FRLS stranded copper wire (one for earth, green colour) in 20mm dia MS conduit, 16 Swg thick (ISI marked) concealed in wall by chase cutting for circuit mains from ELDB 1,2 to Emergency switch boxes	750.00	Mt	
2	**Wiring for UPS sockets**			
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2.1	Supply and laying of 3 R 2.5 Sqmm FRLS stranded copper wire (one for earth, green colour) in 20mm dia MS conduit, 16 Swg thick (ISI marked) concealed in wall by chase cutting and laying through partitions for UPS power sockets complete with all accessories (3 set of 3 nos 6A sockets to be connected to one circuit)	800.00	Mt	
2.2	Supply and installation of 4 nos 6A switched sockets ,modular type housed in a single manufacturers zinc passivated MS box with cover plates. The boxes to be fixed either in wall or partitions/ work stations	52.00	No	
2.3	Supply and laying of 3 R 4 Sqmm FRLS stranded copper wire (one for earth, green colour) in 20mm dia MS conduit, 16 Swg thick (ISI marked) concealed in wall by chase cutting and laying through partitions for UPS power sockets complete with all accessories (1 set of 2 nos 16A switched sockets to be connected to one circuit)	40.00	Mt	
2.4	Supply and installation of 2 nos 6/16A switched sockets ,modular type housed in a single manufacturers zinc passivated MS box with cover plates. The boxes to be fixed either in wall or partitions/ work stations	1.00	No	
2.5	Supply and installation of 16A DP switch housed in manufactures zinc passivated MS box (Work station master control) to be fixed in partitions for group control of 4 nos 6A switched sockets	50.00	No	
2.6	Supply and installation of 1 nos 6/16A switched sockets ,modular type housed in a single manufacturers zinc passivated MS box with cover plates. The boxes to be fixed either in wall or partitions/ work stations	1.00	No	
2.7	Supply and laying of 3 R 2.5 Sqmm FRLS stranded copper wire (one for earth, green colour) in 20mm dia MS conduit, 16 Swg thick (ISI marked) concealed in wall by chase cutting and laying through partitions for UPS power sockets complete with all accessories (1 set of 1 nos 16A switched sockets to be connected to one circuit)	40.00	Mt	
2.8	Supply and laying of 3 R 4 Sqmm FRLS stranded copper wire (one for earth, green colour) in 20mm dia MS conduit, 16 Swg thick (ISI marked) concealed in wall by chase cutting and laying through partitions for UPS power sockets complete with all accessories (1 set of 5 nos 16A Combo switched sockets to be connected to one circuit)	1,000.00	Mt	
2.9	Same as item no 2.2, but 5 nos 6/16A combo plug sockets ,modular type housed in a single manufacturers zinc passivated MS box with cover plates. The boxes to be fixed either in wall or partitions/ work stations	25.00	No	
3	**Raw power socket wiring**			

3.1	Supply and laying of 3 R 2.5 Sqmm FRLS stranded copper wire (one for earth, green colour) in 20mm dia MS conduit, 16 Swg thick (ISI marked) concealed in wall by chase cutting and laying through partitions for Raw power sockets complete with all accessories (4 or 5 set of 1 no 6A socket to be connected to one circuit)- For work stations	1,100.00	Mt	
3.2	Supply and installation of 1 no 6A switched socket modular type housed in a single manufacturers zinc passivated MS box with cover plates. The boxes to be fixed either in wall or partitions/ work stations	80.00	No	
3.3	Supply and laying of 3 R 4 Sqmm FRLS stranded copper wire (one for earth, green colour) in 20mm dia MS conduit, 16 Swg thick (ISI marked) concealed in wall by chase cutting and laying through partitions for UPS power sockets complete with all accessories (1 set of 4 nos 16A Combo switched sockets to be connected to one circuit)	700.00	Mt	
3.4	Same as item no 2.2, but 4 nos 6/16A combo switched sockets ,modular type housed in a single manufacturers zinc passivated MS box with cover plates. The boxes to be fixed either in wall or partitions/ work stations	15.00	No	
3.5	Supply and installation of 63A 4P mcb 10KA, for IEC connector with M.S enclosure	3.00	No	
3.6	Supply and installation of 40A 4P mcb 10KA, for IEC connector with M.S enclosure	9.00	No	
3.6	Supply and installation of 63A 3PH Meta clad socket with 63A 4P mcb 10KA, with M.S enclosure for SEM	1.00	No	
4	**Telephone / Data cables/ WIFI**			
	-			
4.1	Supply and installation of 25 mm dia PVC conduit, ISI marked medium grade to be laid on wall, and partitions from main Hub to all work stations as marked in the drawing.	700.00	Mt	
4.2	Supply and installation of 20 mm dia PVC conduit, ISI marked medium grade to be laid on wall, and partitions from main Hub to all work stations as marked in the drawing.	250.00	Mt	
4.3	Supply and installation of 25 mm dia PVC conduit, ISI marked medium grade to be laid on wall, and partitions from main tel junction to all work stations as marked in the drawing.	700.00	Mt	
4.4	Supply and installation of 20 mm dia PVC conduit, ISI marked medium grade to be laid on wall, and partitions from main tel junction to all work stations as marked in the drawing.	250.00	Mt	
4.5	Supply and installation of 2-pair telephone tinned copper cable 0.5mm dia copper conductor PVC insulated through the above mentioned conduit and terminations at both ends	1,500.00	Mt	

4.6	Supply and installation of RJ-11 telephone socket mounted in manufacturers zinc passivated MS box	70.00	No	
4.7	Supply and installation of 2xRJ-11 telephone socket mounted in manufacturers zinc passivated MS box	1.00	No	
4.8	Supply and installation of 100-pair tel krone block housed in engineering plastic box with hinged and lockable transparent cover	1.00	No	
4.9	Supply and installation of RJ-45 data socket mounted in GI anodized enclosure with cover plates	80	No	
4.9.1	Supply and installation of Ee cat-6 network cable	7000	Mt	
4.9.2	Supply and installation of 24 port hub switch	4	No	
4.8	Supply and installation of 24 port jack panel	4	No	
4.9	Supply and installation of cat -6 1 mtr fly lead	80	No	
4.9a	Supply and installation of cat -6 2 mtr fly lead	80	No	
4.9b	Supply and installation of 24U hub rack-Floor mounted	1	No	
4.9c	I/O Point with box	80	No	
4.9d	Supply and wifi router with two LAN output with antenna type	30	No	
4.9e	Supply of 4 port 10/100/1000 gigabit switch with 2 unink output	30	No	
5	**Light fittings**			
5.1	Supply , Installation including assembling, testing and commissioning of 600x600mm modular recess mounted with 38W LED (PHILIPS (PHILIPS RC380 LED 34S6500L60 PSU ODS1) and suspended from ceiling either with 20mm dia 16 Swg thick MS conduit (ISI marked) down rods(0.8mt long approx:) and heavy duty ball and sockets, sealing plate, check nuts etc or with 8 Swg GI chain and giving connections	115.00	No	
5.2	Supply,Installation testing and commissioning of 15W LED down lighter (PHILIPS DN192B LED 95-6500PSU) to be mounted on false ceiling	230.00	No	
5.3	Supply , Installation including assembling, testing and commissioning of LED STRIP LIGHT-Phiips make	150.00	Mtr	
6	**M.S Fabrication metrials**			

6.1	Supply and Erection of MS metrials			
	of cable tray supports,panel,etc	1	Ton	
7	**Distribution Boards**			
	-			
7.1	LDB -1,2, ELDB-1 & ELDB-2			
	Supply and installation of double door IP:43 6-way TPN MCB 7 segment type DB with following. The same shall be concealed to the wall			
	1 no main incomer feeder fitted with 40 A 4-pole MCB,10ka			
	3 nos incomer feeder fitted with 40 A 2-pole RCBO with 30ma sensitivity for phase incomer			
	18 nos of 6 A ,10kA SP MCBs as outgoing feeders (6 nos per phase)	4.00	No	
7.2	PDB-1,2			
	Supply and installation of double door IP:43 6-way TPN MCB 7 segment type DB with following. The same shall be concealed to the wall			
	1 no main incomer feeder fitted with 63 A 4-pole MCB,10 Ka			
	3 nos incomer feeder fitted with 63 A 2-pole RCBO with 100mA sensitivity for phase incomer			
	18 nos of 16/20 A (6 nos per phase) SP MCBs as outgoing feedrs	2.00	No	
7.3	UPS DB-1,2			
	Supply and installation of double door IP:43 8-way TPN MCB 7 segment type DB with following. The same shall be concealed to the wall			
	1 no main incomer feeder fitted with 63 A 4-pole MCB,10 KA			
	3 nos incomer feeder fitted with 63 A 2-pole RCBO with 100mA sensitivity for phase incomer			
	18 nos of 20/16 A,10 KA (8 nos per phase) SP MCBs as outgoing feedrs	2.00	No	
7.4.1	Supply and installation of 40A FP MCB, 10 KA with M.S enclosure	20.00	No	
7.4.2	Supply and installation of 63A FP MCB, 10 KA with M.S enclosure	3.00	No	
7.4.3	Supply and installation of 125A TPN MCCB ,25 KA with M.S enclosure for UPS unit control	2.00	No	
7.4.4	Supply and installation of 20A FP MCB 10 ka and DOL startor with M.S enclosure for Exhaust motor unit control	2.00	No	
7.4.5	Supply and installation of 20A FP MCB, 10 KA with M.S enclosure	4.00	No	

7.4.6	Supply and installation of 320A TPN MCCB ,25 KA with M.S enclosure for UPS unit control	2.00	No	
8	**Switch boards**			
8.1	MSB			
	Supply, erection, testing and commissioing of cubicle type switch board Floor mounted, fabricted with 16 Swg CRCA sheets with the following			
	Bus bar chamber consisting of 630A electrolytic quality CU busbars supported on SMC for phases and 400A for neutral. The busbars shall have colour coded PVC sleeving.The fault level shall be 36 Ka for 1 second.			
	Metering cubicle consisting of 1 no microprocessor controlled meter for reading all the electrical parameters like voltage, current, Kw, etc (Socomec EM-VIFP), LED type RYB indication lamps, 3 nos of resin cast CTs of ratio 630/5A class-1, 15 Va			
	1 no incomer feeder fitted with 1 no 630 A TP+N MCCB, 36 ka			
	1 no400A , 2nos 320 1no 160A TP+N MCCB, 25 KA, 3 no 125 A TP+N MCCB 25 ka as outgoing feeders			
	Panel will have a ring main earth bus with copper strip of size 25x3mm. All the switch frames and cubicles shall be connected to this earth which will be finally interconnected to external earth grid. .The panel shall be powder coated to siemens grey shade. .All internal wiring shall be carried out with adequate size copper wires.A detachable gland plate shall be fixed on the top of the cable alley for cable terminations. All MCCBs shall be fitted with front operating handle with door interlock	1.00	No	
8.2	SSB-1			
	Supply, erection, testing and commissioing of cubicle type switch board Floor mounted, fabricted with 16 Swg CRCA sheets with the following			
	Bus bar chamber consisting of 160A electrolytic quality CU busbars supported on SMC for phases and 100A for neutral. The busbars shall have colour coded PVC sleeving.The fault level shall be 25 Ka for 1 second.			
	Metering cubicle consisting of 1 no microprocessor controlled meter for reading all the electrical parameters like voltage, current, Kw, etc (Socomec EM-VIFP), LED type RYB indication lamps, 3 nos of resin cast CTs of ratio 160/5A class-1, 15 Va			
	1 no incomer feeder fitted with 1 no 160 A TP+N MCCB, 25 ka			
	5 nos 63 A, 3 nos 40 A ,6 no 32A TP+N MCCB 25 ka as outgoing feeders			
	Panel will have a ring main earth bus with copper strip of size 25x3mm. All the switch frames and cubicles shall be connected to this earth which will be finally interconnected to external earth grid. .The panel shall be powder coated to siemens grey shade. .All internal wiring shall be carried out with adequate size copper wires.A detachable gland plate shall be fixed on the top of the cable alley for cable terminations. All MCCBs shall be fitted with front operating handle with door interlock	1.00	No	
8.3	SSB-2			

	Supply, erection, testing and commissioing of cubicle type switch board Floor mounted, fabricted with 16 Swg CRCA sheets with the following			
	Bus bar chamber consisting of 400A electrolytic quality CU busbars supported on SMC for phases and 200A for neutral. The busbars shall have colour coded PVC sleeving.The fault level shall be 36 Ka for 1 second.			
	Metering cubicle consisting of 1 no microprocessor controlled meter for reading all the electrical parameters like voltage, current, Kw, etc (Socomec EM-VIFP), LED type RYB indication lamps, 3 nos of resin cast CTs of ratio 400/5A class-1, 15 Va			
	1 no incomer feeder fitted with 1 no 400 A TP+N MCCB, 25 ka			
	2 nos 125A ,3 nos 63A ,11 nos 40A TP+N MCCB 25 ka as outgoing feeders			
	Panel will have a ring main earth bus with copper strip of size 25x3mm. All the switch frames and cubicles shall be connected to this earth which will be finally interconnected to external earth grid. .The panel shall be powder coated to siemens grey shade. .All internal wiring shall be carried out with adequate size copper wires.A detachable gland plate shall be fixed on the top of the cable alley for cable terminations. All MCCBs shall be fitted with front operating handle with door interlock	1.00	No	
8.4	UPS MAIN PANEL-1			
	Supply, erection, testing and commissioing of cubicle type switch board Floor mounted, fabricted with 16 Swg CRCA sheets with the following			
	Bus bar chamber consisting of 125A electrolytic quality CU busbars supported on SMC for phases and 100A for neutral. The busbars shall have colour coded PVC sleeving.The fault level shall be 25 Ka for 1 second.			
	Metering cubicle consisting of 1 no microprocessor controlled meter for reading all the electrical parameters like voltage, current, Kw, etc (Socomec EM-VIFP), LED type RYB indication lamps, 3 nos of resin cast CTs of ratio 125/5A class-1, 15 Va			
	1 no incomer feeder fitted with 1 no 125 A TP+N MCCB, 25 ka			
	6 nos 63 A TP+N MCCB 25 ka as outgoing feeders			
	Panel will have a ring main earth bus with copper strip of size 25x3mm. All the switch frames and cubicles shall be connected to this earth which will be finally interconnected to external earth grid. .The panel shall be powder coated to siemens grey shade. .All internal wiring shall be carried out with adequate size copper wires.A detachable gland plate shall be fixed on the top of the cable alley for cable terminations. All MCCBs shall be fitted with front operating handle with door interlock	1.00	No	
8.4	UPS MAIN PANEL-2			
	Supply, erection, testing and commissioing of cubicle type switch board Floor mounted, fabricted with 16 Swg CRCA sheets with the following			
	Bus bar chamber consisting of 320A electrolytic quality CU busbars supported on SMC for phases and 200A for neutral. The busbars shall have colour coded PVC sleeving.The fault level shall be 25 Ka for 1 second.			
	Metering cubicle consisting of 1 no microprocessor controlled meter for reading all the electrical parameters like voltage, current, Kw, etc (Socomec EM-VIFP), LED type RYB indication lamps, 3 nos of resin cast CTs of ratio 320/5A class-1, 15 Va			
	1 no incomer feeder fitted with 1 no 320 A TP+N MCCB, 25 ka			

	10 nos 63 A TP+N MCCB 25 ka as outgoing feeders			
	Panel will have a ring main earth bus with copper strip of size 25x3mm. All the switch frames and cubicles shall be connected to this earth which will be finally interconnected to external earth grid. .The panel shall be powder coated to siemens grey shade. .All internal wiring shall be carried out with adequate size copper wires.A detachable gland plate shall be fixed on the top of the cable alley for cable terminations. All MCCBs shall be fitted with front operating handle with door interlock	1.00	No	
9	**UPS Main wiring**			
9.1	Supply, installation, testing and commissioining of 4R 35 Sqmm FRLS multistranded copper wire in 40mm dia 16 swg thick MS conduit (ISI marked) from ups , to ups interlocking panel	25.00	Mt	
9.1	Supply, installation, testing and commissioining of 4R 150 Sqmm FRLS multistranded copper wire in 4R 50MM mm dia 16 swg thick MS conduit (ISI marked) from ups , to ups interlocking panel	25.00	Mt	
10	**Power wiring**			
10.1	Supply and installation of 6/16A modular type switched socket housed in manufacturers zinc passivated MS box to be concealed on the wall	15.00	No	
10.2	Supply, installation, testing and commissioining of 3R 2.5 Sqmm FRLS multistranded copper wire in 20mm dia 16 swg thick MS conduit (ISI marked) from PDB and UPS DB , to 16A switched socket power circuits	450.00	Mt	
10.3	Supply and installation of 20A Metal Clad socket housed in manufacturers zinc passivated MS box to be concealed on the wall	2.00	No	
10.4	Supply, installation, testing and commissioining of 3R 4 Sqmm FRLS multistranded copper wire in 20mm dia 16 swg thick MS conduit (ISI marked) from PDB a/c power circuits for server room	80.00	Mt	
11	**UG cable**			
11.1	Supply and laying of 3.5x 300 Sqmm AL AR XLPE cable to be clamped on wall with GI clamps/ laid in excavated trenches etc (Main cable for MSB and ups panel -2)	110.00	Mt	
11.2	Supply and laying of 3.5x 150 Sqmm AL AR XLPE cable to be clamped on wall with GI clamps/ laid in excavated trenches etc (Main cable for UPS PANEL-2)	25.00	Mt	
11.3	Supply and laying of 3.5 x 95 Sqmm AL AR cable to be clamped on wall with GI clamps/ laid in excavated trenches etc (for SSB-1)	20.00	Mt	
11.4	Supply and laying of 3.5 x 70 Sqmm AL AR cable to be clamped on wall with GI clamps/ laid in excavated trenches etc (for CHILLER)	40.00	Mt	

11.5	Same as item no 11.1, but 4x10 Sqmm CU AR cable along with 2R 10 SWG copper wire	200.00	Mt	
11.6	Same as item no 11.1, but 3x6 Sqmm CU AR cable	45.00	Mt	
11.7	Same as item no 11.1, but 4x6 Sqmm CU AR cable along with 2R 10 SWG copper wire	1,100.00	Mt	
11.6	Same as item no 11.1, but 4x4 Sqmm CU AR cable along with 2R 12 SWG copper wire	380.00	Mt	
11.7	Terminations of following cable with SIBG glands and copper crimping sockets and earthing of glands with copper clip and connecting the same to earth grid with 14 Swg copper wire			
11.7.1	3.5x300 Sqmm	8.00	No	
11.7.1	3.5x150 Sqmm	4.00	No	
11.7.2	3.5x95 Sqmm	2.00	No	
11.7.3	3.5x70 Sqmm	11.00	No	
11.7.4	4x10 Sqmm	24.00	No	
11.7.5	4x6 Sqmm	100.00	No	
11.6.5	4x4 Sqmm	24.00	No	
12	**Earthing**			
12.1	Supply, installation, testing and commissioing of CU pipe electrode 40mm dia 3 Mt long, 3MM Thick as per IS-3043 complete with all accessories like watering funnel, clamps etc.The same to be installed in a pit 3 Mt deep and filled with alternate layers of charcoal, salt mixed with river sand. A brick work masonary shall be constructed of size 450x450x150mm and cement plasted at both inside and outside walls. A 3mm thick cast iron plate with frame work shall be placed over the chamber (12 nos for general earthing)	12.00	No	
12.3	Supply and installation of 25x3 mm copper strip to interconnect the earth pits with SSB and other equipments	100.00	Mt	

12.2	Supply and installation of 10 Sqmm multi strand copper wire FRLS insulated to be drawn in 25mm dia PVC conduit 2mm thick and to be clamped partially on wall with GI clamps and partially burried in ground and terminations at both ends with copper crimping sockets (For lab earthing)	700.00	Mt	
13	**Public address system wiring**			
13.1	Supply and installation of 2 core 24/0.2mm dia twin twisted copper conductor PVC insulated cable drawn in 20mm dia medium grade PVC conduit (ISI marked) including clamping the same with GI clamps on ceiling, wall, through partitions etc and chase cutting of wall wherever required	1,400.00	Mt	
13.2	Supply and installation of 6W ceiling mounted ring speaker in plastic mould with built in transformer	30.00	No	
13.3	Supply and installation of volume control housed in GI box	20.00	No	
14	**CCTV Cables & Camera**			
	-			
14.1	Supply and installation of 25 mm dia PVC conduit, ISI marked medium grade to be laid on wall, and partitions	500.00	Mt	
14.2	Supply and installation of 20 mm dia PVC conduit, ISI marked medium grade to be laid on wall, and partitions	100.00	Mt	
14.3	Supply and installation of 16 channel DVR TURBO(Hikvision)	2.00	No	
14.4	Supply and installation of 2 MP Camera Bult TURBO (Hikvision)	2.00	No	
14.5	Supply and installation of 2 MP Dome TURBO (Hikvision)	24.00	No	
14.7	Supply and installation of 8 channel Adapter	2.00	No	
14.8	Supply and installation of 1 TB Hard disk (seagate/wd)	6.00	No	
14.9	Supply and installation of 1+3 CCTV cable	1,500.00	Mt	
14.9A	Supply and installation of 2U Rack	2.00	No	
14.9B	Supply and installation of BNC Enclosure (pvc box) & INC	26.00	No	
14.9C	Supply and installation of 24" Monitor	2.00	No	

14.9 D	Supply and installation of 42" TV	2.00	No	
15	**Safety Items**			
15.1	Supply and installation of 2.5 Kg capacity dry powder filled fire extinguisher to be mounted on wall with suitable supports (UPS room and panel room)	2	No	
15.2	Supply and installation of enamelled type danger board	1	No	
15.3	Supply and installation of fire buckets complete with floor mounting stand (2 buckets in one stand) buckets to be filled with dry sand (1 no in panel room)	1	Set	
15.4	Supply and installation of shock treatment chart with glass frame to be mounted on wall (panel room and kitchen)	2	No	
15.5	Supply and installation of 1200 mmx600mmx10mm size corrugated rubber mat to be spread in front of all ,LT panels and the same shall be tested for 1.1 Kv voltage.	5	No	
15.6	Rubber hand gloves tested for 12 Kv	2	Pair	
15.7	First aid box with necessary medicines, bandages, cotton etc	2	No	
16	**Cable tray**			
	GI perforated tray-jindal / tata. (all accessories is your scope)			
16.1	Supply, installation, testing and commissioing of GI perforated tray width-600mm hight-50mm	80	Mtr	
16.2	Supply, installation, testing and commissioing of GI perforated tray width-450mm hight-50mm	100	Mtr	
16.3	Supply, installation, testing and commissioing of GI perforated tray width-300mm hight-50mm	80	Mtr	
16.4	Supply, installation, testing and commissioing of GI perforated tray width-100mm hight-50mm	80	Mtr	
17	**CEIG Inspection**			
17.1	Preparation of CEIG dwg and arranging electrical inspection for internal work only	1	Lot	
4.0	**HVAC SYSTEM**			
1.a	Supply, Installation, Testing and Commissioning of AHU ceiling suspended AHU as under:			

	- Modular AHU panels with GI sheet of 0.60 mm thick for both inner & outer casing with 25 mm insulation sand witched in between. The outer panel shall have pre coating for corrosion resistance as also to provide a very good finish.			
	- Blower section with forward curved centrifugal fan with TEFC motor (IP 55 and Class F insulation).			
	- Drain section with 1.2mm SS drain pan.			
	- Coil section with 6 row chilled water coil, Slimseal BF valves at inlet/ outlet, drain and purge connections.			
	a. Flexible connection the outlet.			
	b. AHU sub panel with isolator and starter (Star/ Delta) with lockable OFF pushbutton.			
	c. Fresh air cowl with screen and damper.			
	d. Masonry Blocks of 150 mm height placed below the AHUs.			
	e. Power wiring with 3 C x 16 sqmm. PVC armoured copper cable with end terminations and two runs of 6 SWG copper earth rods (approx length - 20 M)			
	f. Inlet and outlet isolating valves of 65 mm dia:			
	g. 3-way mixing valve with all connections and control wiring			
	h. Pressure gauges and thermometers at inlet and outlet			
	i. Dehumidification heater banks to be provided for RH control within range of 40-60% RH (for the 12 TR and 14 TR units)			
	NOTE: The AHU will be provided by the builder. Only the above mentioned accessories are to be provided by the successful bidder			
	Ceiling suspended AHU, 30 mm SP:			
	a. 7 TR CSU, 2800 CFM, 30 mm SP (with pre filter only) for the general office area:	1	no.	
	b. 12 TR CSU, 4800 CFM, 110 mm SP with pre and microvee filter for SSMG & Analytical lab. This will be connected to terminal hepa filter.	1	no.	
	c. 14 TR CSU, 5600 CFM, 110 mm SP with pre and microvee filter for RF and EMI lab. This will be connected to terminal hepa filter.	1	no.	
1.b	Accessories for floor mounted AHU Complete as under:			
	- Microvee filter section			
	- Flexible connection the outlet.			
	- VFD driven AHU panel controlled by the temperature and ON/OFF controller at each individual lab area			
	- Fresh air cowl with screen and damper.			
	- Differential pressure switch for indicating the hepa filter condition (one each for SSMG, Analytical, RF, EMI, Development room, MPCVD)			
	- One digital thermometer and humidity indicator for each lab (one each for SSMG, Analytical, RF, EMI, Development room, MPCVD)			
	- UV lamp			
	- Dehumidification heater banks to be provided for RH control within range of 40-60% RH			
	- Masonry Blocks of 150 mm height placed below the AHUs.			
	- 3-way mixing valve with all connections and control wiring			

	All the above and capacities as under:			
	Floor mounted AHU accessories for:			
	35 TR, 60 mm SP floor mounted AHU	1	nos.	
	NOTE: The above AHU will be connected to terminal fan filter unit for HEPA filtration in the development lab & MPCVD labs			
	NOTE: One floor mounted 35 TR, 14000 CFM floor mounted AHU compatible to VFD drive shall be provided by the building owner			
2	Supply, Laying, Pressure testing and insulating of chilled water piping, complete with fittings, supports and insulation. Insulation of 50 mm thick TF quality thermocole with 22 G Aluminium cladding. Insulations shall be as under/as per IS 1239, Mild Steel heavy (Class C) class pipe:			
	a. 100 mm dia:	15	M	
	a. 80 mm dia:	30	M	
	a. 65 mm dia:	RO	M	
	b. 50 mm dia:	60	M	
	Drain piping from the AHU with PVC piping and insulated as required:			
	- 50 mm dia:	RO	M	
	- 32 mm dia:	30	M	
	- 50 mm dia drain valve:		no.	
	- 32 mm dia drain valve:	5	nos.	
3.a	Supply and laying of **aluminium ducting**, complete with anchor fasteners and MS supports, angle bracings as required, nut, bolt & gasket etc			
	22 G ducting:	210	sqM	
	20 G ducting:	150	sqM	
3.b	Supply and laying of **galvanized sheet steel ducting** with class VIII quality of zinc coating, complete with anchor fasteners and MS supports, angle bracings as required, nut, bolt & gasket etc			
	etc.			
	a. 24 G ducting:	180	sqM.	
	b. 22 G ducting:	120	sqM.	
	c. 20 G ducting:	75	sqM.	

3.c	Supply and laying of **aluminium spiral ducting**, complete with anchor fasteners and MS supports, angle bracings as required, nut, bolt & gasket etc			
	22 G ducting:	30	sqM	
	20 G ducting:	50	sqM	
	Acceptable makes: GI sheets: Jindal/ Nippon/ SAIL/JS or equivalent			
3c.	Supply and fixing of volume control dampers			
	20G	3	sqM.	
	22G	3	sqM.	
4	Supply and installation of powder coated Al. Supply air grills and return air outlets:			
	a. Supply air grille with damper	4	sqM.	
	b. Return air grille w/o damper.	8	sqM.	
	c. Supply air diffuser with damper (circular/square)	2	sqM.	
	d. Return air diffuser without damper (circular/square)	4	sqM.	
	e. Ceiling suspended laminar flow SS plenum for labs comprising as standard feature with HEPA filter efficiency not less than 99.97% at 0.3 Microns (Factory DOP tested). with air flow at approx. 90-100 Fpm velocity. Each HEPA filter - 2 ft x 2 ft This is to be mounted only for the ceiling suspended units 14 TR and 12 TR for the RF/EMI & SSMG/Analytical labs	11	nos.	
	f. Ceiling suspended fan filter unit of SS construction complete with independent fan with HEPA filter efficiency not less than 99.97% at 0.3 Microns (Factory DOP tested). with air flow at approx. 90-100 Fpm velocity. Each HEPA filter to take care of 750 CFM capacity. These units are only for the development lab and MPCVD labs			
	Fan filter units, 750 CFM capacity	12	nos.	
	Acceptable makes: Air Master/ Air Breeze/System Air/AAF or equivalent.			
	g. Floor/wall mounted fan filter unit of SS construction complete with independent fan with HEPA filter efficiency not less than 99.97% at 0.3 Microns (Factory DOP tested). with air flow at approx. 90-100 Fpm velocity. Each HEPA filter to take care of 750 CFM capacity. These units are only for the development lab and MPCVD labs			
	Fan filter units, 750 CFM capacity	RO		
5	Supply and installation of fusible link type fire damper	3	sqM.	
7	Supply and laying of **thermal insulation** of ducting with 15 mm thick nitrile rubber, laminated with Aluminium foil	250	sqM.	
	Acceptable makes: Armaflex, Armacell, A-flex, k-flex or equivalent			

8	Supplying and installation of **acoustic insulation of ducting** with 19 mm thick armasound or equivalent material.	200	sqM.	
	Acceptable makes: Armasound or equivalent			
9	Supply and installation of **acoustic insulation for the walls of the AHU room** with 25 mm thick armasound or equivalent material.	RO	sqM.	
10	Charges for air balancing the system as per specification	2	times	
11	Individual temperature & ON/OFF controller in each lab which controls the VFD drive of the AHU. This is to be wall mounted and complete with control wiring to the damper & VFD control of the AHU.	6	sets	
12	VAV damper box with electric actuator controlled by the individual room thermostats	6	sets	
13	Pressure sensor - duct mounted	2	sets	
14	SITC of chilled water compact cassette unit (1 TR capacity) complete with all fittings and accessories for the UPS and server room with a 24 hour auto timer	2	sets	
15	**EXHAUST SYSTEM**			
a	SITC of 1000 CFM centrifugal online exhaust fan for the rework station to be connected to the toilet exhaust like. 20 mm SP complete with base frame, TEFC squirrel gauge class F IP 55 motor, drive set, inlet and outlet flexible connections, etc with DOL starter panel along with 3 C x 4 sqmm. PVC armoured copper power cabling Acceptable makeS: Almonard/Kruger/Nadi/Nicotra/Lau or equivalent	2	sets	
b	- Supply and laying of galvanized sheet steel ducting with class VIII quality of zinc coating, complete with anchor fasteners and MS supports, angle bracings as required, nut, bolt & gasket etc - 24 G for exhaust system Acceptable makes: GI sheets: Jindal/ Nippon/ SAIL/JS or equivalent	20	sqM.	
c	- Supply and installation of powder coated Al. exhaust air outlet grille without damper for exhaust system Acceptable makes: Air Master/ Air Breeze/System Air or equivalent	1	sqM.	
	NOTE:			
	a. The fan shall be selected for the lowest noise level among the various manufacturers, not exceeding 50 Db.			
	b. All fixing fasteners shall be of corrosion resistant material like brass/GI.			

5.0	**FIRE PROTECTION SYSTEM**			
	PART - A: SPRINKLER SYSTEM			
1	Providing and fixing of MS 'C' class heavy duty **sprinkler piping** with welded joints including all fittings, fixed on the ceiling with MS brackets at every 2500 mm. The entire piping system shall be pressure tested to a pressure of 15 Kg/ sq.cm and held for 4 hours. The pipe and supports, after pressure testing, are to be applied with one coat of zinc chromate primer paint and two coats of PO red synthetic enamel paint. The piping system shall be done as per the directions of engineer in charge.			
	a) 300 mm dia:	RO	Mtrs	
	b) 200 mm dia:	RO	Mtrs	
	c) 150 mm dia:	RO	Mtrs	
	d) 100 mm dia:	60	Mtrs	
	e) 80 mm dia:	30	Mtrs	
	f) 65 mm dia:	20	Mtrs	
	g) 50 mm dia:	30	Mtrs	
	h) 40 mm dia:	60	Mtrs	
	i) 32 mm dia:	40	Mtrs	
	j) 25 mm dia:	80	Mtrs	
2	Supply, erection and commissioning of brass, quick response sprinklers of 68 deg C fire rating, complete with fixing to the sprinkler pipe as under:			
	a. Pendant type sprinkler	120	Nos	
	b. Side wall sprinkler	RO	Nos	
3	Supply and laying of metallic flexible hose of suitable dia and about 1500 mm long for fixing the sprinklers to the main pipe wherever false ceilings are provided.	120	Nos	
4	Water flow switch	1	Nos	
5	SITC of water motor alarm gong complete with all isolation and drain valves with fittings	1	Sets	
6	Providing and fixing of heavy duty CI isolating valve for the sprinkler piping (without valve chamber)			
	150 mm	RO	sets	
	100 mm dia:	1	Sets	
	80 mm dia:		Sets	
	50 mm dia (Drain valve):	2	Sets	
	(Make of valve – Audco, butterfly type)			
7	Supply and fixing of GI perforated cable tray, size as under, for support/ concealment of small bore sprinkler pipes running in the hospital corridor and areas without false ceiling. The GI sheet shall be 1.5 mm thick and supported from the ceiling slab/ beam by means of GI threaded 12 mm rod at suitable intervals.			

	Size 300 mm:	RO	Mtrs	
	Size 450 mm:	RO	Mtrs	
8	Submission of drawings to the concerned Fire Officer for the entire fire system, getting approval for the drawings, arranging inspection and getting safety certificate for the entire installation from the concerned fire officer.	1	lot	
	PART B - Fire Extinguishers			
1	Supply and fixing of portable fire extinguishers manufactured as per IS with ISI marked suitable for wall mounting / floor mounting / trolley types with all accessories.			
a.	Fire extinguishers of DCP type 4.5 kgs	7	Nos	
b.	Fire extinguishers of CO2 type 4.5 kgs	7	Nos	
c.	Fire extinguishers of ABC type 4 kgs	7	Nos	
	2.0 FIRE ALARM SYSTEM			
1	Supply, Installation, Testing and Commissioning (SITC) of a Standalone micro processor based addressable type fire alarm panel, of 1 loop, complete with battery back up for 8 hours of operation of the panel with 30% of the detectors in operation.This panel is to be interlinked with the main building fire alarm panel	1	no.	
2	SITC of Multicriteria smoke cum heat detectors below the false ceiling	45	nos.	
3	SITC of Multicriteria smoke cum heat detectors above the false ceiling	45	nos.	
4	SITC of manual call point near exits	2	nos.	
5	SITC of dual tone electronic hooter	1	nos.	
6	SITC of 24 V power supply	1	nos.	
7	SITC of response indicators	45	nos.	
8	SITC of Heat Detector for electrical and communication rooms	1	nos.	
9	Supplying and laying of interconnecting copper cabling of 2 x 1.5 sqmm FRLS cable	1,200	M	
10	Other accessories like end of line resistance etc as required	1	LS	
11	Providing Air conditioning trip module within the panel as required	5	sets	
12	Perforated PVC trunking channel 25 mm x 25 mm for covering the electrical cable	RO	M	
13	Input module for flow switch	1	nos.	
14	Short circuit isolators	1	nos.	

ANNEXURE - 3

Development of Interior works for INCENT LGD at IIT-M Research park
Tender Ref No : PY/MSR/135/2023/LGDINTERIORS

PROFORMA FORMAT FOR FINANCIAL BID (BOQ) FORMAT

***All values should be in INR

It. No	Description of work	Quantity	Units	Basic Rate in INR	GST in Percentage	Total Amount with taxes in INR
1.	TOTAL CIVIL & INTERIOR WORKS	1	LS	INR		
2.	PLUMBING WORKS	1	LS	INR		
3.	ELECTRICAL WORKS	1	LS	INR		
4.	HVAC SYSTEM	1	LS	INR		
5.	FIRE PROTECTION SYSTEM	1	LS	INR		
	Grand Total					

***L s - Lump sum**

***Important Note:**

1. Please refer to the Annexure 2 for line item wise quantity details for quoting.

2. Bidders need to upload the BOQ summary as per above proforma in the CPP – E-procurement Portal.

3. Line item wise excel sheet will be shared with Technically qualified bidders after the opening the Financial bids online. Bidders need to submit the line item wise price details at the time of Financial Evaluation for committees review.

4. No change in the price summary will be entertained at the time of Financial Evaluation.

5. The summary price BOQ uploaded in the CPP portal is final and no deviations are acceptable.

6. The L1 will be arrived on the basis of Total value inclusive of all taxes and charges as per above summary.

ANNEXEUR: 4

FORMAT FOR AFFIDAVIT OF SELF-CERTIFICATION UNDER PREFERENCE TO MAKE IN INDIA – PER ITEM

Tender Reference Number:

Name of the item / Service:

Date: _____

I/We_____S/o, D/o, W/o, _____
Resident of

Hereby solemnly affirm and declare as under:

That I will agree to abide by the terms and conditions of the Public Procurement (Preference to Make in India) Policy vide GoI Order no. P-45021/2/2017-PP (B.E.-II) dated 15.06.2017 (subsequently revised vide orders dated 28.05.2018, 29.05.2019and 04.06.2020) MOCI order No. 45021/2/2017-PP (BE II) Dt.16th September 2020 & P-45021/102/2019-BE-II-Part (1) (E-50310) Dt.4th March 2021 and any subsequent modifications/Amendments, if any and

That the local content for all inputs which constitute the said item/service/work has been verified by me and I am responsible for the correctness of the claims made therein.

Tick (✓) and Fill the Appropriate Category	
	I/We_____[name of the supplier] hereby confirm in respect of quoted items thatLocal Content is equal to or more than 50% and come under **"Class-I Local Supplier"** category.
	I/We_____[name of the supplier] hereby confirm in respect of quoted items that Local Content is equal to 20% but less than 50% and come under **"Class-II Local Supplier"** category.

- The details of the location (s) at which the local value addition is made and the proportionate value of local content in percentage

Address _____ _____ __ Percentage of Local content: _____%
_____

For and on behalf of.....(Name of firm/entity)

Authorized signatory (To be duly authorized by the Board of Directors)

<Insert Name, Designation and Contact No.>

[Note: In case of procurement for a value in excess of Rs. 10 Crores, the bidders shall provide this certificate from statutory auditor or cost auditor of the company (in the case of companies) or from a practicing cost accountant or practicing chartered accountant (in respect of suppliers other than companies) giving the percentage of local content.]

This letter should be on the letterhead of the quoting firm and should be signed by a competent authority. Non-submission of this will lead to Disqualification of bids.

ANNEXEUR: 5

CERTIFICATE

(To be given on the letter head of the bidder)

No: Dated:

I have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India and hereby certify that I am not from such a country.

OR *(whichever is applicable)*

I have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India and hereby certify that I from_____(Name of Country) and has been registered with the Competent Authority. I also certify that I fulfil all the requirements in this regard and is eligible to be considered.

(Copy/ evidence of valid registration by the Competent Authority is to be attached)

Place: Signature of the Tenderer

Date: Name & Address of the

Tenderer with Office Stamp

ANNEXEUR: 6

Self-Declaration that the Service Provider has not been blacklisted

(To be given on the letter head of the bidder)

I……S/o……

R/o …… police station …… District …… …… Director

/ partner/ sole proprietor (Strike out whichever is not applicable) of ……

…… (Firm or Company) do hereby declare and solemnly affirm:

I. That the Firm …… …… has not been Blacklisted or declared insolvent by any of the Union or State Government / Organization in last 3 years.

II. That none of the individual / firm / Company Blacklisted or any partners or shareholder thereof has any connection directly or indirectly with or has any subsistence interest in the deponent business / firm company.

III. That neither the Firm nor any of its partner has been involved / convicted in any criminal case / economic offence nor any criminal case / economic offence is pending against firm or any partner of the Firm before any Court of Law / Police.

Place:
Date:

Signature of the Tenderer
Name & Address of the
Tenderer with Office Stamp

ANNEXEUR: 7

OEM CERTIFICATION FORM
(In Original Letter Head of OEM)

Tender No: ..... Dated: .....

We are Original Equipment Manufacturers (OEM) of..... (Name of the company) Ms..... (Name of the vendor) is one of our Distributors/Dealers/Resellers/Partners (tick one) for the ..... and is participating in the above-mentioned tender by offering our product model.....(Name of the product with model number).

..... is authorized to bid, sell and provide service support warranty for our product as mentioned above.

Name and Signature of the authorized
signatory of OEM along with
seal of the company with Date

ANNEXEUR: 8

CENTRE FOR INDUSTRIAL CONSULTANCY & SPONSORED RESEARCH (IC&SR)
INDIAN INSTITUTE OF TECHNOLOGY MADRAS
CHENNAI 600 036

ELECTRONIC CLEARING SERVICE (Credit Clearing) / REAL TIME GROSS SETTLEMENT (RTGS) FACILITY FOR RECEIVING PAYMENTS

A. Details of Account Holder

Name of the Institution	Indian Institute of Technology - Madras
Complete Contact Address	Industrial Consultancy and Sponsored Research Indian Institute of Technology-Madras, IIT- Madras Campus Post Office, Sardar Patel Road, Guindy, CHENNAI - 600 036
Telephone No./ Fax No.	Tel - 044-2257 8356
E- mail ID of the FO/AO/REG/DIR	dricsr@iitm.ac.in

B. Bank Account Details:

Institution Account Name (As per Bank Record)	The Registrar, Indian Institute of Technology - Madras
Account No.	2722101003872
Account Print Name	IIT F A/C , The Registrar IIT Madras
IFSC CODE	CNRB0002722
Bank Name (in full)	Canara Bank
Branch Name	IIT-Madras Branch
Complete Branch Address	Canara Bank, IIT-Madras Branch, IIT- Madras Campus Post Office, Sardar Patel Road, Guindy, CHENNAI - 600 036
MICR No.	600015085
Account Type	Savings Account

Certified that the Institute's account is in an RTGS enabled branch.
I hereby declare that the particulars given above are correct and complete.

Date: 19/10/2020

Signature of the Competent Authority
of the Institution with seal.