TENDER

FOR

DESIGN AND CONSTRUCTION OF BSL-3

LABORATORY

AND ASSOCIATED WORK AT

ALL INDIA INSTITUTE OF SCIENCES AT JODHPUR

ON TURNKEY BASIS

NIT Issue Date	**:**	**22nd July, 2019**
NIT No.	**:**	**Admn/Tender/24/2019-AIIMS.JDH**
Pre-Bid Meeting	**:**	**01st August, 2019 at 03:00 PM**
Last Date of Submission	**:**	**21st August, 2019 at 03:00 PM**
Bid opening	**:**	**22nd August, 2019 at 03:15 P.M**

Tender documents may be downloaded from institute's web site www.aiimsjodhpur.edu.in (for reference only) and CPPP site https://eprocure.gov.in/eprocure/app

All India Institute of Medical Sciences, Jodhpur

Basni Phase - II, Jodhpur, Rajasthan-342005.
Telephone: 0291- 2740741, email: aoadmin@aiimsjodhpur.edu.in
www.aiimsjodhpur.edu.in

CONTENTS

SECTION - I

EXPERIENCE AND OTHER PREQUALIFICATION CRITERIA REQUIREMENTS

INSTRUCTIONS TO BIDDERS

CONDITIONS OF CONTRACT

The Director, AIIMS Jodhpur, invites application and Bids/Tender/Offer from competent and experienced agencies having sound technical knowledge, expertise and experience of establishing High Containment Laboratories for Design and Construction of BSL-3 at AIIMS Jodhpur

1.0 EXPERIENCE AND OTHER PRE-QUALIFICATION CRITERIA REQUIREMENTS

The Bidder shall meet the following Experience and other Prequalification Criteria:

a) The Bidder shall have satisfactorily completed the works as mentioned below during the **last SEVEN YEARS** ending previous day of last date of submission of tender.

(i) Three similar works each costing not less than **Rs. 100.00 Lakhs.**

or

Two similar works each costing not less than **Rs. 150.00 Lakhs.**

or

One similar work costing not less than **Rs. 200.00 Lakhs.**

"Similar Works" shall mean Successful Construction, Testing, Commissioning and Validation of Bio-Safety Level-3 or Higher Containment Laboratory (BSL-3/BSL-4) including Civil and Internal Construction Works, Electrical works, HVAC works, BMS, Autoclave, BSC, Effluent Decontamination System, Access Control System and other associated equipment and system works executed under one composite contract agreement."

(ii) A certificate from client for completion of similar works must be submitted by the bidder for each work order along with the application. Own works/ work under the same management/ own certification of the bidders shall not be accepted and considered for prequalification.

(iii) The experience of completed works shall be in the name of Bidder Company. Experience of completed works in Subsidiary/Group Company, Joint Venture Company or as sub-contractor shall not be considered and accepted.

(iv) The value of executed works shall be brought to current costing level by enhancing the actual value of work at simple rate of 7% per annum; calculated from the date of completion to previous day of last date of submission of tenders.

b) The Bidder shall have had average Annual Financial Turnover of Rs. 250.00 Lakhs in the immediate last three financial years ending 31st March' 2018.

c) The Bidder shall not have incurred any loss (profit after tax should be positive) in more than two years in the last five consecutive years ending 31st March' 2018.

d) The Bidder shall have a solvency of 100.00 Lakhs certified by his Banker**.** The solvency certificate shall not be more than 1 month old from the date of submission of Bids.

e) The Bidder shall have experience of providing Operation and Maintenance Services for minimum BSL-3 laboratory and shall have at least one on-going AMC contract at the time of submission of Bid.

The Bidder shall meet all the above qualification criteria requirements. Bidder Firm not meeting the above requirements shall be disqualified and his Bid/Tender/Offer shall not be considered for further evaluation.

2.0 GENERAL INFORMATION AND DETAILS

2.1 Joint Venture Bids are not permitted and shall not be accepted or considered and shall be summarily rejected.

2.2 The Bidder shall provide and submit information and details regarding litigation/ Arbitration cases, if any, for the last five years.

2.3 The Bidder shall provide and submit information about projects of similar nature (Biosafety Laboratory Project Works) executed and completed during the last 7 years indicating the name of work, Total Value of the Project, Date of Completion, Time Overrun & Cost overrun (if any) with reasons and name and contact number of officer/s where reference can be made.

2.4 Details of key management and technical personnel available with the firm specifying their qualification and work experiences hall be submitted. The proposed project organization chart for the project work shall be submitted clearly specifying the roles and responsibilities of each personnel.

2.5 The Bidder shall submit details of manufacturing setup/facility, if any, owned by the firm. List of items and components manufactured by the Bidder and proposed to be used for the work shall be submitted, indicating BSL-3 laboratories where these items and components have been supplied and installed.

2.6 If the bidder has submitted any false/misleading information or if any information furnished by the Bidder is found to be incorrect at any stage, the submitted Bid shall be rejected and the Bidder shall be liable to be debarred from participating in tendering processes in future in AIIMS Jodhpur.

2.7 Even through the bidders may satisfy the above requirements they are subject to be disqualified, if they have:

a. Made misleading or false representation in the statements and enclosures required in the "Bid Document"
b. Been blacklisted or debarred by any State/Central Government Department or any PSU.
c. Any other reason as per the decision of the Employer/Bid Evaluation Committee, which shall be final and binding on the Bidder.

2.8 Director AIIMS Jodhpur the right to accept or reject any Bidder or cancel the Bidding Process without assigning any reason and liability, whatsoever.

3.0 The Firms are advised to read the Bid documents carefully and visit the site, at their own cost, to understand the site and to assess the work requirement and scope on any working day between 22nd July 2019 to 21st August 2019.

4.0 Bids shall be submitted online only at CPPP website: https://eprocure.gov.in/eprocure/app.

5.0 The complete bidding process is online. Bidders should be possession of valid digital Signature Certificate (DSC) of class III for online submission of bids. Prior to bidding DSC need to be registered on the website mentioned above. For any assistance for e-bidding process, if required, bidder may contact to the helpdesk at 0291-2740741.

6.0 Bidder/Service Provider are advised to follow the instructions given in the Bid documents for the e-submission of bids online through the Central Public Procurement Portal for e-Procurement at https://eprocure.gov.in/eprocure/app'. Bid documents may be scanned with 100 dpi with black and white option which helps in reducing size of the scanned document.

7.0 The Hard Copy of original instruments in respect of earnest money deposit (EMD) and Bid processing fees must be delivered to the AIIMS, Jodhpur on or before last date/time of Bid Submission of Bids as mentioned above, failing which the Bid will be summarily rejected.

8.0 The completed Bid shall be submitted, on or before the stipulated deadline. Bids received after due date and time shall not be entertained.

FORM-1

LETTER OF APPLICATION

(On Bidder's letterhead)

Date: _____

To,
THE DIRECTOR
AIIMS Jodhpur,

Sir,

1. Being duly authorized to represent and act on behalf of _____(hereinafter referred to as "the BIDDER") and having reviewed and fully understood all the pre-qualification requirement and Tender Conditions, we hereby apply to be qualified as a bidder for the ***Design and Construction of BSL-3 Laboratory at AIIMS Jodhpur*.**

2. Your Department/Institute and its authorized representatives are hereby authorized to conduct any inquiries or investigations to verify the statements, documents and information submitted in connection with this application, and to seek clarification from our bankers and clients regarding any financial and technical aspects. This letter of application will also serve as authorization or any individual or authorized representative or any institution referred to in the supporting information, to provide such information deemed necessary and requested by yourself to verify statements and information provided in this application, or with regard to the resources, experience, and competence of the Bidder.

3. Your Department/Institute and its authorized representatives may contact the following persons for any clarification or further information:

Contact 1 :	Telephone 1 :
Contact 2 :	Telephone 2 :

4. This application is made in the full understanding that :
   (a) Bids submitted by us will be subject to verification of all information submitted at the time of bidding
   (b) Your Department/Institute reserves the right to reject or accept any Bid, cancel the tendering process, and reject any or all the Bids without assigning reasons or incurring any liability thereof ; and
   (c) Your Department/Institute shall not be liable for any such actions and shall be under no obligation to inform the Bidder

5. The undersigned declare that statements made and the information provided in the duly completed application are, true and correct in every detail.

Authorized Signatory :
Name :
For and on behalf of the Bidder :

FORM-2

BID FORM

(On Rs. 100/- stamp paper)

Name of Work: ***Design and Construction of BSL-3 Laboratory at AIIMS Jodhpur.***

1. Having examined the Conditions of Contract, Specifications, Drawings, and schedule of requirements for the execution of the above works, we offer to execute and complete the works in conformity with the Contents of Bid Documents, Scope of Work, Specifications, Drawings and Contents of the Bid Document.
2. We acknowledge that the Appended forms are part of tender.
3. We undertake that if our tender is accepted, we will commence the works within two weeks from the date of issue of Letter of Acceptance/Award, and will complete the whole of the works within the time stated in the tender document.
4. We agree to abide by this tender for the period of 90 days from the date fixed for receiving the same, and it shall remain binding upon us and may be accepted at any time before the expiration of that period.
5. We agree to treat the tender documents, other documents and records connected with the works as confidential documents and shall not communicate information described therein to any person other than the person authorized by you, or use the information in any manner prejudicial to the safety of the works.
6. Unless and until a formal Agreement is prepared and executed for this tender, subject to your written acceptance of our bid thereof, this Bid Form shall constitute a binding contract between us.
7. We undertake and confirm to agree and accept all the terms and conditions, specifications and contents given in the tender documents without any deviation or reservation.
8. We understand that you are not bound to accept the lowest or any tender you may receive.

Dated this _____ day of _____ 201_

Signature _____ in the capacity of _____ duly authorized to sign Bid for

and on behalf of _____.

Name of Bidder : _____

Address _____

(Signed & Sealed of Bidder Firm)

FORM-3

STRUCTURE & ORGANIZATION

01.	Name & Address of the Bidder	
02.	Telephone No. / Telex / Fax No.	
03.	Legal status of the applicant (attach copies of original document defining the legal status)	
	a) An Individual	
	b) A proprietary firm	
	c) A firm in partnership	
	d) A limited company or Corporation	
04.	Particulars of registration with various Government bodies (*attach attested photocopy*)	
	Organization / Place of Registration :	
	1.	
	2.	
	3.	
05.	Names and Titles of Directors & Officers with designation to be concerned with this work	
06.	Designation of individuals authorized to act for the organization.	
07.	Has the bidder, or any constituent partner in case of partnership firm Limited Company/ Joint Venture, ever been convicted by the court of law? If so, give details.	
08.	Any other information considered necessary but not include above.	

SIGNATURE OF BIDDER WITH STAMP

FORM-4

FORMAT FOR SUBMITING FINANCIAL INFORMATION

Name of Bidder Firm/Company: M/s _____

i) **Financial Analysis**- Details to be furnished duly supported by figures in balance sheet/ profit & loss account for the last five years duly as submitted by the applicant to the Income tax Department (Copies to be attached) and duly certified by the Chartered Accountant mentioning the membership number issued by ICAI along with the full address.

,. **ii)** **Gross Annual Turnover** for last three years ending **31.03.2018**

Financial Year	Annual Turn Over in Indian Rupees (or equivalent to Indian Rupees) as per Audited Balance Sheet
2015-2016	Rs.
2016-2017	Rs.
2017-2018	Rs.
Average Annual Turnover over the past three years	Rs.

iii) **Profit / Loss** for last Five years ending **31.03.2017**

Financial Information in Rs. Equivalent	For year 2013-2014	For year 2014-2015	For year 2015-2016	For year 2016-2017	For year 2017-2018
1. Total Assets					
2. Current Assets					
3. Total Liabilities					
4. Current Liabilities					
5. Profit before Tax					
6. Profit after Tax					
7. Net Worth					

Signature of Chartered

Accountant with Seal

SIGNATURE OF BIDDER

FORM-5

FORMAT FOR SOLVENCY CERTIFICATE

FORM OF BANKERS' SOLVENCY CERTIFICATE FROM A SCHEDULED BANK

This is to certify that to the best of our knowledge and information that M/s./Shri …… having marginally noted address, a customer of our bank are/is respectable and can be treated as good for any engagement upto a limit of Rs. …….(Rupees…….....……).

This certificate is issued without any guarantee or responsibility on the bank or any of the officers.

(Signature)

For the Bank with Seal

NOTE (1) Bankers certificates should be on letter head of the Bank, sealed in cover addressed to the Tendering Authority.

(2) In case of partnership firm, certificate should include names of all partners as recorded with the bank.

(3) The certificate should not be more than 6 months old from the original date of submission of tender

FORM-6

DETAILS OF WORKS OF SIMILAR NATURE COMPLETED DURING THE LAST SEVEN YEARS ENDING PREVIOUS DAY OF THE LAST DATE OF SUBMISSION OF BIDS

Name of Bidder Firm/Company: M/s _____

Sl. No	**Name of Work/ Project & location**	**Owner of sponsoring Organization**	**Cost of work (In Lakh)**	**Date of Commencement As per contract**	**Stipulated Date of completion**	**Actual date of completion**	**Litigation/Arbitration Pending/ in Progress with details***	**Name & address/ Telephone No. of officer to whom reference may be made**	**Whether the work was completed as primary contractor or on back-to-back basis. Also indicate all component of works as per requirement of similar nature of work executed or not.**
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)

* indicate gross amount claimed and amount awarded by the Arbitrator.

Copy of completion certificate/s shall be submitted in support of above information/details

SIGNATURE OF BIDDER
WITH STAMP

FORM-7

AFFIDAVIT
(on non-judicial stamp paper of Rs. 100/-)

I/we undertake and confirm that our firm/partnership firm has not been blacklisted by any State/Central Departments/PSUs/Autonomous bodies during the last 7 years. Further that, if such an information comes to the notice of the department then I/we shall be debarred for bidding in AIIMS Jodhpur in future. Also, if such an information comes to the notice of department on any day before or after the date of start of the work, the Employer shall be free to cancel the agreement and to forfeit the entire amount of Earnest Money Deposit/Performance Guarantee

(Scanned copy of this notarized affidavit to be uploaded at the time of submission of bid) and original to be submitted before the date and time of Bid submission)

SIGNATURE OF BIDDER WITH STAMP

SIGNATURE OF NOTARY
WITH SEAL

INSTRUCTIONS TO BIDDERS

1.0 GENERAL

1.1 **Scope of Work**

The Scope of work is ***'Design and Construction of BSL-3 Laboratory and Associated Works at AIIMS Jodhpur on 'Turnkey Basis'***.

1.2 **THE EMPLOYER**

The Director, AIIMS Jodhpur, shall be the Employer/Owner for the subject work. *The Employer shall be represented by the* ***_____, or any other person nominated by him to act as the Employer***.

In these documents wherever the word tender/ tenderer/tendering has been used the same may be considered synonymous with bid/ bidder/ bidding.

2.0 TIME FOR COMPLETION

The successful bidder shall complete the works in **06(Six) C*alendar months*** from the date of Award of Work, as per the following milestone targets:

3.0 INFORMATION TO BE SUBMITTED ALONG WITH BID

3.1 Bids submitted shall include the following information:

(a) Copy of documents defining the constitution, legal status, place of registration and principal place of business of the company or firm.

(b) A work plan/Program clearly bringing out how the bidder proposes to carry out the work to achieve the quality and the time schedule.

4.0 COST OF BIDDING

The bidder shall bear all the costs and expenses associated with the preparation and submission of his bids and "The Employer" will in no case be responsible or shall have any liability such costs or expenses, regardless of the conduct or outcome of the bidding process.

5.0 SITE VISIT

5.1 The bidder is advised to acquaint himself with the work involved, visit the Site and examine site conditions, assess the site preparatory works required to be carried out, the requirement and availability of space for erection of AC plant, air handling units, exhaust blowers, chillers, shower tank, electrical panel etc., The bidder shall also examine the climatic conditions, availability of labour, power, water, material, local transportation, communication facilities, environmental regulations, laws and bye-laws of statutory bodies, and collect all information that will be necessary for preparing the bid and, if awarded the work, entering into a contract for successful execution and completion of the work.

The cost of visiting the Site and collecting information for the purpose of submission of the bid shall be borne by the bidder. The site shall be handed over in its present existing condition, to the successful bidder for execution of the works. Any existing fittings/fixtures and items to be dismantled shall be handed over to AIIMS Jodhpur.

5.2 The bidder and any of his personnel or agents will be granted permission by the Employer to enter upon the site for the purpose of such inspection, but only upon the condition that the bidder, his personnel or agents will release and indemnify the Employer and Employer's Personnel from and against all liability in respect thereof for personnel injury (Whether fatal or otherwise), damage, loss, costs and expense however caused, to the bidder, his personnel or agents.

6.0 BID DOCUMENTS

The Bid Documents comprise the following: -

Section – I : Experience and Other Prequalification Criteria Requirement
Instructions to Bidders
Conditions of Contract
Section - II **:** Scope of Work and Technical Specifications
Section – III **:** Price Bid, bidder must submit financial bid in .xls (Excel workbook 97-2003 workbook) only
Section - IV **:** Tender Drawings

The bidder shall examine carefully all instructions, conditions, forms, terms and specifications etc. given in the Bid documents. Bids which are not substantially responsive to the requirements of the Bid Documents will be rejected.

7.0 CLARIFICATION ON BID DOCUMENTS

A prospective bidder requiring any clarifications on the Bid Documents may notify the Employer in writing, at the Employer's mailing address indicated in the Bid Documents, so as to reach the Employer at least one week before the date of Bid submission on.

8.0 AMENDMENT OF BID DOCUMENTS

8.1 At any time prior to the dead line for submission of bids, the Employer may for any reason, whether at his own initiative or in response to a clarification requested by prospective bidder, modify the Bid Documents by issuing amendment.

9.0 LANGUAGE OF BIDS

The bid prepared by the bidders and all correspondence and documents relating to the bid, exchanged by the bidder and the Employer, shall be written in the ENGLISH Language.

10.0 BID PRICE

10.1 The quoted price in Financial Price Bid shall be in Indian Rupees only and shall include cost of the materials, equipment/item, stores, freight, insurance, transit insurance, packing & forwarding, applicable GST, customs duty and clearance charges for imported goods, inspection/inspective certificate charges etc. and including all other incidental charges whichever is applicable for the equipment/item supply, erection, installation, testing and commissioning with all men, material, tools & tackles complete in all respect.

10.2 The price should be given both in figures and words. The rates quoted in ambiguous terms such as ‘freight on actual basis’ or ‘taxes as applicable extra’ or ‘packing forwarding extra’ or offers with price variation clause will not be accepted, and such Bids shall be summarily rejected.

10.3 The price quoted in the Financial Price Bid shall remain firm and fixed during the entire contract period, including the extended work completion period, if any.

11.0 BID VALIDITY

11.1 The bid shall remain valid and open for acceptance for a period of ***90 days*** from the date of submission of Bid.

12.0 EMD/BID SECURITY

12.1 The bidder shall be required to submit the Earnest Money Deposit (EMD) for an amount of **Rs. 5,00,000/- (Rupees Five Lac only)** by way of demand drafts or Bank Guarantee only. The Demand Drafts or Bank Guarantee shall be drawn in favour of "All India Institute of Medical Sciences, Jodhpur". The EMD of the successful bidder shall be returned after the successful submission of Bank Guarantee/ Security Deposit and for unsuccessful bidder(s) it would be returned after award of the contract. **The original demand drafts or Bank Guarantee for EMD must be delivered to AIIMS, Jodhpur on the Date & Time of Bid Opening.**

12.2 The Firm who are registered with National Small Industries Corporation (NSIC) / OR Small Scale Industries (SSI) are exempted to submit the EMD only (Copy of registration must be provide along with technical bid) other conditions for eligibility should be as per tender conditions.

12.3 No interest will be payable by AIIMS, Jodhpur on the EMD.

12.4 The bid security may be forfeited:

a) If a bidder withdraws his bid during the period of bid validity.
b) In the case of successful bidder, if he fails to: -
   i) Enter into the contract with Employer, or
   ii) Furnish the necessary performance security

13.0 FORMAT AND SIGNING OF BID

13.1 The bid shall be typed and signed by a person or persons duly authorised to sign the bid and enter into the contract. **Authorization shall be furnished in the form of Notarized Power of Attorney which shall be submitted with the bid.**

13.2 All pages of the bid shall be digitally signed by the authorized person/s signing the bid, including where entries or amendments have been made.

13.3 The complete bid shall be without alterations, interlining and erasures except those to accord with instruction issued by the Employer or as necessary to correct errors made by the bidder in which case such correction shall be initialled by authorized person/s signing the bid.

14.0 SUBMISSION OF BID

14.1 **Bidders shall furnish the following information along with technical tender (in pdf format) - Technical Bid (ONLY ONLINE SUBMISSION of all documents):**

(i) Copy of Earnest money has to be furnished or claiming exemption from payment of earnest money in accordance with Bid conditions.
(ii) Letter of Application (Form-1)
(iii) Bid Form (Form-2)
(iv) Details of Structure and Organization (Form-3)
(v) Financial Information (Form-4)

(vi) Copy of Solvency Certificate (Form-5)
(vii) Performance Statement indicating similar works completed during last seven years, along with relevant copies of orders and completion certificate (Form-6)
(viii) Copy of Notarized Affidavit (Form-7)
(ix) Documentary evidence, as necessary in terms of Eligibility and Prequalification requirements under clause 1 to 7 and other information details.
(x) Power of Attorney issued by Competent Authority in favour of the person, who is digitally signing/uploading the tender(s).
(xi) Documents and relevant details to establish that the equipments, items and works to be executed by the tenderer conform to the requirement of the technical specifications given in the Bid documents.
(xii) Certificate of Incorporation.
(xiii) Details of manufacturing capabilities indicating the equipments and items proposed to be installed in the subject works and similar facilities where these equipments and items have been installed
(xiv) Certificate of GST registration, ESIC & PF Registration and PAN Number
(xv) Product catalogues for equipments like Air-conditioning Plant, Air handling units, HEPA filters, Containment housing, biosafety cabinets, Autoclave, Pass Box, Prefabricated wall and ceiling panels, doors, liquid effluent decontamination system, light fixtures, switches and sockets etc.
(xvi) Complete set of Bid Documents (all volumes), without indicating price

14.2 **PRICE BID (ONLY ONLINE):**

a) The tenderer must ensure that they submit the Price Bid in prescribed format uploaded along with the tender enquiry. It is the responsibility of the bidder **(Bidder must submit financial bid in .xls (Excel workbook 97-2003 workbook) only)** to ensure that the contents of the format are not tampered on **CPP Portal**.
b) The tenderer must ensure that they submit the on-line tenders not later than the closing time and date specified for submission of tenders **CPP Portal.**
c) Prices must be quoted as per the Price Bid format given in Volume-III only

14.3 All the submissions made by the Bidder shall be signed by the authorized signatory using Digital Signature

14.4 A person signing (manually or digitally) the tender form or any documents forming part of the contract on behalf of another shall be deemed to warrant that he has authority to bind such other persons and if, on enquiry, it appears that the persons so signing had no authority to do so, the purchaser may, without prejudice to other civil and criminal remedies, cancel the contract and hold the signatory liable for all cost and damages.

14.5 A tenderer, who does not fulfill any of the above requirements and/or give evasive information/reply against any such requirement, shall be liable to be ignored.

14.6 Alternate Price Bids shall not be accepted and considered and such Bids shall be summarily rejected.

14.7 The price should not be indicated in any of the documents submitted as part Of Technical Bid. Non-compliance shall entail rejection of the bid.

14.8 A Bidder Firm shall submit only one bid for the work, as given above. If a Bidding firm submits more than one Bid, all the submitted bids of the Bidding firm shall be rejected.

14.9 Original EMD, Tender processing Fee, Affidavit, Solvency Certificate and Power of Attorney shall be physically delivered and submitted at AIIMS Jodhpur, before the date and time of submission of Bid. If the Bidder fails to do so, the Bid shall be summarily rejected.

15.0 DEADLINE FOR SUBMISSION OF BIDS

15.1 **Bids must be submitted online, not later than the prescribed date and time.**

15.2 The Employer may, at his discretion, extend the deadline for submission of bids through the issuance of an amendment in accordance with Clause 8.0

16.0 LATE BIDS

16.1 Any bid received by the Employer after the prescribed deadline for submission will not be considered and opened.

17.0 MODIFICATION AND WITHDRAWAL OF BIDS

17.1 The bidder may modify or withdraw his bid after bid submission, provided that modification or notice of withdrawal is received in writing by the Employer prior to the prescribed deadline for submission of bids.

17.2 No bid shall be allowed to be modified subsequent to the dead line for submission of bids. No bid shall be allowed to be withdrawn in the period between the deadline for submission of bids and the expiration of the period of validity of the bid specified. Withdrawal of a bid during this period may result in the forfeiture of the bid security.

18.0 BID OPENING AND EVALUATION

18.1 **Bid Opening**

i. The Bids will be opened in the presence of Bidders or their authorized representatives who may choose to attend on date & time as mentioned in Notice Inviting Bids. If such nominated date for opening of Bid is subsequently declared as a public holiday, the next official working day shall be deemed as the date of opening of the Bid.
ii. Bids for which an acceptable notice of withdrawal has been submitted shall not be opened.
iii. Bids which have not complied with one or more of the foregoing instructions may not be considered.
iv. On opening of the Bid, it will be checked if they contain Technical & Financial Bids and EMD/ Bid Security as detailed above.
v. Technical Package of the Bids will be opened first. They will be checked for completeness and confirmation of submission of the requisite Bid Security. If the documents do not meet the requirements of the Tender, a note will be recorded.
vi. The Bidders name, the presence or absence of the requisite Bid Security and any other details as the Tendering Authority or their authorized representative, may consider appropriate will be announced at the time of Bid opening.
vii. Technical Bids of only the bidders whose Bid Securities and Cost of Bid Document are found in order will be evaluated
viii. Financial Package of the bidders whose Technical Bids are found responsive after Technical evaluation will be opened at a later date.

18.2. The Employer will examine the complete bid to determine whether they are complete, whether the requisite bid securities have been furnished, whether the bids have been properly signed and stamped, whether the bidders meet the laid down Experience and other Criteria requirements, whether the bidder meets the Technical requirements and

whether the bids are generally in order. Bids of parties who do not accept the conditions laid down in the bid documents are also liable to be rejected.

18.3 Telegraphic/ Fax offer will be treated as defective, invalid and rejected. Only detailed complete bids received prior to the closing time and date of the bids will be considered as valid.

18.4 The Bids shall be checked, evaluated and assessed on their merits in four stage Evaluation Procedure

.

a. The first stage shall be checking of '**Bid Security'.** If the Bid security is not in order, the Bid shall be summarily rejected.
b. The second stage will be evaluation of '**Experience and other Criteria Requirements**'
c. The third stage will be evaluation of '**Technical Bids**'
d. The fourth stage will be '**Price Bid Evaluation** 'of only the technically qualified parties.

18.5 The Evaluation of Bids will be based on the details and information submitted by the Bidder and the Compliance and conformance of their Technical Bid to the Technical Requirements and Specifications given in the Bid Documents. It may be noted that merely copying the Tender Specifications as compliance shall not be accepted.

18.6 The Bidder shall submit details of compliance of their bid to the Technical Requirements, Specifications& Drawings given in the Tender documents by submitting their offered equipments and items like wall & ceiling panels, doors, view panels, biosafety cabinets, autoclave, pass box & dunk tank, effluent decontamination system with steam boiler, shower system, electrical switches & sockets, light fixtures, cctv, access control, chiller, air handling units, exhaust blower, containment housing, HEPA filters, ventilated garment cabinet etc. along with catalogues/brochures/drawings and giving reference to BSL-3 laboratory facilities where similar items have been provided and installed by the bidder. Wherever required, references and enquiries shall be made by the Bid evaluation committee of AIIMS Jodhpur.

18.7 If required, the Bidders may be called for a detailed explanation of their submitted Technical Bid or for a Technical Presentation to demonstrate the compliance of their Bid to the Technical Requirements and Specifications given in the Bid Documents.

18.8 '**Financial Price Bids'** of only those bidders shall be considered for evaluation, whose Bid shall meet the Technical Requirements and Specifications given in the Bid Documents, shall have the capacity and capability to execute and complete the Contract. The Decision of the Employer in this regard shall be final and binding on the Bidders.

18.9 The Bidder offering the Best Technical and Price offer and whose offer is responsive and meets the Bid Requirement, shall be considered for Award of Work.

19.0 PROCESS TO BE CONFIDENTIAL

19.1 After the opening of bids, information relating to the examination, clarification, evaluation and comparisons of bids and recommendations concerning the award of contract shall not be disclosed to any bidder or other persons not officially concerned with such process. Any disclosure or declaration in this regard shall be at the sole discretion of the Employer.

19.2 Any effort by the Bidder to influence the Employer in the process of examination, clarification, evaluation and comparison of bids and decision concerning award of contract may result in the rejection of the bidder's bid.

20.0 CLARIFICATION OF BIDS

20.1 To assist in the examination, evaluation and comparison of bids, the Employer may ask bidders individually for clarification of their bids or for Technical Presentation. The request for clarification and the response shall be in writing, but no change in the price or substance of the bid shall be sought, offered or permitted except as required to confirm the correction or arithmetical errors discovered by the Employer during the evaluation of the bids in accordance with Clause 23 hereof.

21.0 EVALUATION OF BIDS

The evaluation of Bids shall be strictly done in accordance with the procedure given in the Instructions to Bidders. The bids will be evaluated to assess their merits and compliance to the Technical Specifications and there Bid requirements. The evaluation will be based on the information and details furnished by the bidders, clarifications/presentation given by the bidders, the conformance of the

Bid to the Tender Requirements and Specifications, bidder’s similar experience and competency to execute and complete the work.

22.0 DETERMINATION OF ELIGIBILITY AND RESPONSIVENESS

22.1 The Employer will determine whether the bid is substantially responsive to the requirements of the Bid Documents.

For the purpose of this clause, a substantially responsive bid is one which shall conform to all the requirements, terms, conditions and technical specifications of the bid documents without any deviation or reservation and which fulfils and meets all the criteria and has the required experience, expertise, technical competency and resources to design and execute the project.

22.2 A bid which in relation to the cost estimate of the Employer is unrealistically priced and which cannot be substantiated satisfactorily by the bidder may be rejected as non-responsive.

23.0 CORRECTION OF ERRORS

23.1 Bids determined to be substantially responsive will be checked by the Employer for any arithmetical errors in computation and summation. Errors will be dealt by the Employer as follows: -

a) Where there is discrepancy between amounts in figures and in words, amount in words shall prevail.
b) Incorrectly added totals will be corrected.
c) In case there is any inconsistency between the rate and the value extended (after multiplication with the tender quantity), the unit rate quoted shall prevail.

23.2 If a bidder does not accept the correction of errors as outlined above, his bid will be rejected.

24.0 AWARD OF CONTRACT

The Employer will Award the Contract to the Bidder who's Bid has been determined to be eligible and to be substantially responsive to the Bid documents and who has offered the Best Technical and Financial/Price Offer.

25.0 EMPLOYERS RIGHT TO ACCEPT ANY BID OR REJECT ANY OR ALL BIDS

Notwithstanding Clause 24.0 above, the Employer reserves the right to accept or reject any Bid including the Lowest Bid and to annul the bidding process and reject all bids, at any time prior to award of contract, without thereby incurring any liability to the affected bidder or bidders or any obligations to inform the affected bidder or bidders of the reasons and grounds for the Employer's action. The Employer's decision in this regard shall be final and binding on the Bidders.

26.0 NOTIFICATION OF AWRAD

26.1 Prior to the expiration of the prescribed period of bid validity, the Employer will notify the successful bidder in writing that his bid has been accepted. The notification of award will constitute the formation of the Contract.

26.2 Upon the furnishing by the successful bidder of a performance security the Employer will promptly return the Bid Security of other bidders

27.0 SIGNING OF AGREEMENT

Upon the receipt of the notification of award by the successful bidder, the successful bidder shall fill the Agreement in accordance with form of Agreement included in the Bid Documents, on a Stamp Paper at his Cost, and submit the same to the Employer within two weeks of the date of receipt of notification of award.

28.0 PERFORMANCE SECURITY

28.1 Within 15 days of receipt of the notification of award from the Employer, the successful bidder shall furnish to the Employer a security in the form of an unconditional and irrevocable Bank Guarantee from Nationalized/Scheduled bank, for an amount of 10 percent (10%) of the Contract Price. The validity of the performance security shall cover the stipulated completion period for the works, the defects liability period and an additional claim period of three months.

28.2 Failure of the successful bidder to lodge the required bank guarantee shall constitute sufficient grounds for the annulment of the award and forfeiture of the Bid security, in which event the Employer may make the award to the next lowest evaluated eligible bidder or, call for fresh bids.

CONDITIONS OF CONTRACT

1.0 Definitions

In the Contract (as hereinafter defined) the following words and expressions shall have the meanings hereby assigned to them except where the context otherwise requires:

(a) i. "Principal Employer/Employer/Engineer" means The **DIRECTOR,** AIIMS Jodhpur or the legal successors in title to such person.

ii. "Employer's/Engineers Representative" means a person appointed from time to time by the Employer.

iii. "Contractor" means an individual or firms (proprietary, partnership, Pvt Ltd. or Limited) whether incorporated or not, that has entered into contract (with the employer) and shall include his / its heirs, legal representatives, successors and assigns, successors in interest of individuals or persons. Changes in the constitution of the firm, if any shall be immediately notified to the employer, in writing and approval obtained for continued performance of the contract.

iv. "Subcontractor" means any person named in the Contract as a Subcontractor for a part of the Works or any person to whom a part of the Works has been subcontracted by the contractor with the consent of the Employer and the legal successors in title to such person, but not any assignee of any such person.

(b) i. "Contract" means these Conditions of Contract, the Specifications, the Drawings, the Price Schedule, the Letter of Acceptance, the Contract Agreement and such further documents as may be expressly incorporated in the Letter of Acceptance or Contract Agreement.

ii. "Specification" means the specification of the Works included in the Contract and any modification thereof or addition thereto made or submitted by the Contractor and approved by the Employer.

iii. "Drawings" means all drawings, calculations and technical information of a like nature provided by the Employer to the Contractor under the Contract and all drawings, calculations, samples, patterns, models, operation and maintenance manuals and other technical information of a like nature either provided to the Contractor or submitted by the Contractor and approved by the Employer.

iv. "Price Schedule" means the priced and completed Price Bid forming part of the Tender and Agreement.

v. "Tender" means the Contractor's priced offer to the Employer for the execution and completion of the Works and the remedying of any defects therein in accordance with the provisions of the Contract, as accepted by the Letter of Acceptance. The word Tender is synonymous with "Bid" and the words "Tender Documents" with "Bidding Documents".

vi. "Letter of Acceptance/Award" means the formal acceptance by the Employer of the Tender.

vii. "Appendix to Tender" means the appendix comprised in the form of Tender annexed to these Conditions.

(c) i. "Commencement Date" means the date upon which the Contractor receives the notice to commence the works as issued by the Employer

ii. "Time for Completion" means the time for completing the execution of and passing the Tests on Completion of the Works or any Section or part thereof as stated in the Contract calculated from the Commencement Date.

(d) i. "Tests on Completion" means the tests specified in the Contract or otherwise agreed by the Employer and the Contractor which are to be made by the Contractor before the Works or any Section or part thereof are taken over by the employer.

ii. "Taking-Over Certificate" means a certificate issued by the Employer of having accepted and taken over the completed works.

(e) i. "Contract Price" means the sum stated in the Letter of Acceptance as payable to the Contractor for the execution and completion of the Works and the remedying of any defects therein in accordance with the provisions of the Contract.

ii. "Retention Money" means the aggregate of all monies retained by the Employer.

(f) i. "Works" means the Permanent Works and the Temporary Works or either of them to be executed in accordance with the contract.

ii. "Permanent Works" means the permanent works to be executed (including Plant) in accordance with the Contract.

iii. "Temporary Works" means all temporary works of every kind (other than Contractor's Equipment) required in or about the execution and completion of the Works and the remedying of any defects therein.

iv. "Plant" means machinery, apparatus and the like intended to form or forming part of the Permanent Works.

v. "Contractor's Equipment" means all appliances and things of whatsoever nature (other than Temporary Works) required for the execution and completion of the Works and the remedying of any defects therein.

vi. "Section" means a part of the Works specifically identified in the Contract as a Section.

vii. "Site" means the places provided by the Employer where the Works are to be executed and any other places as may be specifically designated in the Contract as forming part of the Site.

(g) i. "Cost" means all expenditure properly incurred or to be incurred, whether on or off the Site, including overhead and other charges properly allowable there but does not include any allowance for profit.

ii. "Day" means calendar day and “Month” means calendar month.

iii. "Foreign Currency" means a currency of a country other than that in which the Works are to be located.

iv. "Writing" means any hand-written, type-written, or printed communication, including telex, cable, email and facsimile transmission.

2.0 Employer's Representative

(a) The Employer's Representative shall be appointed by and be responsible to the Employer and shall carry out such duties and exercise such authority as may be delegated to him by the Employer under Sub-Clause 2.0 (b).
Employer's Authority to Delegate

(b) The Employer may from time to time delegate to the Employer's Representative any of the duties and authorities vested in the Employer and he may at any time revoke such delegation. Any such delegation or revocation shall be in writing and shall not take effect until a copy thereof has been delivered to the Contractor.

3.0 Instructions in Writing

Instructions given by the Employer shall be in writing, provided that if for any reason the Employer considers it necessary to give any such instruction orally, the Contractor shall comply with such instruction. Confirmation in writing of such oral instruction given by the Employer, whether before or after carrying out of the instruction shall be deemed to be an instruction, within the meaning of this Sub-Clause. Provided further that if the Contractor, within 7 days, confirms in writing to the Employer any oral instruction of the Employer and such confirmation is not contradicted in writing within 7 days by the Employer, it shall be deemed to be an instruction of the Employer.

The provisions of this Sub-Clause shall equally apply to instructions given by the Employer's Representative and any assistants of the Employer or the Employer's Representative.

4.0 Employer to Act Impartially

Wherever, under the Contract, the Employer is required to exercise his discretion by :

(a) Giving his decision, opinion or consent, or
(b) Expressing his satisfaction or approval, or
(c) Determining value, or
(d) Otherwise taking action which may affect the rights and obligations of the Employer or the Contractor he shall exercise such discretion impartially within the terms of the Contract and having regard to all the circumstances. Any such decision, opinion, consent, expression of satisfaction, or approval, determination of value or action may be opened up, reviewed or revised

5.0 Priority of Contract Documents

The several documents forming the Contract are to be taken as mutually explanatory to one another.

In case of discrepancy between the schedule of quantities, the specifications and or the drawings, the following order of preference shall be observed:

(1) Description of Schedule of Quantities and scope of work
(2) Particular specifications and special condition, if any
(3) Drawings
(4) Specifications (As, applicable and given in tender documents and as approved by the Employer)
(5) Indian Standard specifications of B.I.S and other relevant reference standards, wherever applicable

If there are varying or conflicting provisions made in any one document forming part of the Contract, the Employer shall be the deciding authority with regard to the intention of the document and his decision shall be final and binding on the contractor.

Any error in description, quantity or rate in schedule of quantities or any omission there from shall not vitiate the Contract or release the contractor from the responsibility of execution of the whole or any part of the works comprised therein according to drawings and specifications or from any of his obligations under the Contract.

6.0 Site Operations and Methods of Construction

The Contractor shall take full responsibility for the adequacy, stability and safety of all Site operations and methods of construction. Provided that the Contractor shall not be responsible (except as stated hereunder or as may be otherwise agreed) for the design or specification of Permanent Works, or for the design or specification of any Temporary Works not prepared by the Contractor. Where the Contract expressly provides that part of the Permanent Works shall be designed by the Contractor, he shall be fully responsible for that part of such Works, notwithstanding any approval by the Employer.

7.0 Performance Security

The Contractor shall provide security for his proper performance of the Contract to the Employer within 15 days after the receipt of the Letter of Acceptance/Award. The performance security shall be in the form of bank guarantee. The amount of the bank guarantee shall be 5% (five percent) of the Contract Price and shall be issued by a Nationalised/Scheduled bank.

8.0 Period of Validity of Performance Security

The performance security shall be valid until the Contractor has executed and completed the Works and remedied any defects therein in accordance with the Contract. No claim shall be made against such security after the completion of Defect Liability period and such security shall be returned to the Contractor within 14 days of the completion of Defects Liability Period.

9.0 Cost of Securities

The cost of complying with the requirements of performance security and/or other securities, shall be borne by the Contractor

10.0 Inspection of Site

The Contractor shall be deemed to have inspected and examined the Site and its surroundings and information available in connection therewith and to have satisfied himself (so far as is practicable, having regard to considerations of cost and time) before submitting his Tender, as to:

(a) The form and nature thereof, including the site conditions,
(b) The climatic conditions,
(c) The extent and nature of work and materials necessary for the execution and completion of the Works and the remedying of any defects therein, and
(d) The means of access to the Site and the accommodation, transportation etc. He may require.

And in general, the Contractor shall be deemed to have obtained all necessary information, as above mentioned, as to cover the risks, contingencies and all other circumstances which may influence or affect his Tender

11.0 Sufficiency of Tender

The Contractor shall be deemed to have based his offer on the data made available by the Employer in the Tender document and on his own inspection and examination, all as aforementioned. The Contractor shall be deemed to have satisfied himself as to the correctness and sufficiency of the offer and of the rates and prices stated in the Bill of Quantities, all of which shall, except insofar as it is otherwise provided in the Contract, cover all his obligations under the Contract (including those in respect of the supply of goods, materials, Plant or services or of contingencies) and all matters and things necessary for the proper execution and completion of the Works and the remedying of any defects therein

12.0 Programme to be submitted

The Contractor shall, within 07 days from the date of issue of Letter of Acceptance/Award, submit to the Employer, a detailed programme including labour & material resources, in such form and detail as the Employer shall reasonably prescribe, for the execution and completion of the Works. The Contractor shall, whenever required by the Employer, also provide in writing for his information a general description of the arrangements and methods which the Contractor proposes to adopt for the execution and completion of the Works.

13.0 Contractor's Superintendence

The Contractor shall provide all necessary superintendence during the execution of the Works and as long thereafter as the Employer may consider necessary for the proper fulfilling of the Contractor's obligations under the Contract.

The Contractor, or a competent and authorised representative approved of by the Employer, which approval may at any time be withdrawn, shall give his whole time to the superintendence of the Works. Such authorised representative shall receive, on behalf of the Contractor, instructions from the Employer or, the Employer's Representative. If approval of the representative is withdrawn by the Employer, the Contractor shall, as soon as is practicable, having regard to the requirement of replacing him as hereinafter mentioned, after receiving notice of such withdrawal, remove the representative from the Works and shall not thereafter employ him again on the Works in any capacity and shall replace him by another representative approved by the Employer

14.0 Contractor's Employees

The Contractor shall provide on the Site in connection with the execution and completion of the Works and the remedying of any defects therein:

(a) Only such technical assistants as are skilled and experienced in their respective disciplines and such foremen and leading hands as are competent to give proper superintendence of the Works, and such skilled, semi-skilled and un-skilled labour as is necessary for the proper and timely fulfilling of the Contractor's obligations under the Contract.

15.0 Setting-out

The Contractor shall be responsible for:

(a) The accurate setting-out of the Works in relation to original points, lines and levels of reference given by the Employer or as required,
(b) The correctness, subject as above mentioned, of the position, levels dimensions and alignment of all parts of the Works, and
(c) The provision of all necessary instruments, appliances and labour in connection with the foregoing responsibilities

If, at any time during the execution of the works, any error appears in the position, levels, dimensions or alignment of any part of the Works, the Contractor, on being required to do so by the Employer, shall, at his own cost, rectify such error to the satisfaction of the Employer.

16.0 Safety, Security and Protection of the Environment

The Contractor shall, throughout the execution and completion of the Works and the remedying of any defects therein:

(a) have full regard for the safety of all persons entitled to be upon the Site and keep the Site (so far as the same is under his control) and the Works (so far as the same are not completed or occupied by the Employer) in an orderly state appropriate to the avoidance of danger to such persons, and

(b) Provide and maintain at his own cost all lights, guards, fencing, warning signs and watching, when and where necessary or required by the Employer or by any duly constituted authority, for the protection of the Works or for the safety and convenience of the public or others. Storage space, if any, available at site may be provided to the contractor by the Employer. However all necessary security, safety arrangements for the materials, equipment, goods so stored shall be provided by the contractor

(c) take all reasonable steps to protect the environment on and off the Site and to avoid damage or nuisance to persons or to property of the public or others resulting from pollution, noise or other causes arising as a consequence of his methods or operation.

(d) Screen all lights provided by the Contractor so as not to interfere with any signal light on the railways or with any traffic or signal lights of any local authority.

17.0 Care of Works

The Contractor shall take full responsibility for the care of the Works and materials and Plant for incorporation therein from the Commencement Date until the date of issue of the Taking-Over Certificate, when the responsibility for the said care shall pass to the Employer, Provided that:

(a) if the Employer issues a Taking-Over Certificate for any Section or part of the Permanent Works the Contractor shall cease to be liable for the care of that Section or part from the date of issue of the Taking-Over Certificate, when the responsibility for the care of that Section or part shall pass to the Employer, and

(b) The Contractor shall take full responsibility for the care of any outstanding Works and materials and Plant for incorporation therein which he undertakes to or is otherwise required to finish such outstanding Works till the works have been completed

18.0 Responsibility to Rectify Loss or Damage

If any loss or damage happens to the Works, or any part thereof, or materials or Plant for incorporation therein, during the period for which the Contractor is responsible for the care thereof, from any cause whatsoever, other than the risks defined in Clause 20.0, the Contractor shall, at his own cost, rectify such loss or damage so that the Permanent Works conform in every respect with the provisions of the Contract to the satisfaction of the Employer.

19.0 Loss or Damage Due to Employer's Risk

In the event of any loss or damage happening from any of the risks defined in Clause 20.0, the Contractor shall, if and to the extent required by the Employer, rectify the loss or damage and the Employer shall determine an addition to the Contract Price and shall notify the Contractor

accordingly. In the case of combination of risks causing loss or damage any such determination shall take into account the proportional responsibility of the Contractor and the Employer.

20.0 Employer's Risks

The Employer's risks are:

(a) (i) war, hostilities (whether war be declared or not), Invasion, act of foreign enemies,
(ii) Rebellion, revolution, insurrection, or military or usurped power, or civil war,
(iii) ionising radiations, or contamination by radio-activity from any nuclear fuel, or from any nuclear waste from the combustion of nuclear fuel, radio-active toxic explosive, or other hazardous properties of any explosive nuclear assembly or nuclear component thereof,
(iv) Pressure waves caused by aircraft or other aerial devices travelling at sonic or supersonic speed,

(b) Loss or damage due to the use or occupation by the Employer of any Section or part of the Permanent Works, except as may be provided for in the Contract,

(c) loss or damage to the extent that it is due to the design of the Works, other than any part of the design provided by the Contractor or for which the Contractor is responsible,

(d) Any operation of the forces of nature (insofar as it occurs on the site) which a contractor could not have reasonably foreseen.

21.0 Insurance of Works

The Contractor shall, without limiting his or the Employer's obligations and responsibilities under Clause 17.0 to 20.0, insure:

(a) The Works, together with materials and Plant for incorporation therein, to the full replacement cost and it being understood that such insurance shall provide for compensation to be payable to rectify the loss or damage incurred.

(b) an additional sum of 15 percent of such replacement cost, to cover any additional costs of and incidental to the rectification of loss or damage including professional fees and the cost of demolishing and removing any part of the Works and of removing debris of whatsoever nature, and it being understood that such insurance shall provide for compensation to be payable to rectify the loss or damage incurred.

(c) The Contractor's Equipment and other things brought onto the Site by the Contractor, for a sum sufficient to provide for their replacement at the Site.

The insurance policy (All Risk Covered Policy) under this clause shall be issued by an acceptable insurance company. The insurance policy shall be in the joint names of the Contractor and the Employer and shall cover:

'The Employer and the Contractor against all loss or damage from whatsoever cause arising (including natural calamities, earthquake, subsidence, landslide, rock slide, flood, storm, cyclone, fire, theft, burglary, strike, riot, sabotage, terrorism), from the commencement date until the date of completion and issue of Taking-Over Certificate in respect of the Works or any Section or part thereof as the case may be'.

22.0 Third Party Insurance

The Contractor shall, without limiting his or the Employer's obligations and responsibilities, insure, in the joint names of the Contractor and the Employer, against liabilities for death of or injury to any person or loss of or damage to person or any property, arising out of the performance of the Contract.

23.0 Damage to Persons and Property

The Contractor shall, except if and so far as the Contract provides otherwise, indemnify the Employer against all losses and claims in respect of:

(a) Death of or injury to any person, or
(b) Loss or damage to any property

Which may arise out of or in consequence of the execution and completion of the Works and the remedying of any defects therein, and against all claims, proceedings, damages, costs, charges and expenses whatsoever in respect thereof or in relation thereto.

24.0 Compliance with Statutes, Regulations

The Contractor shall conform in all respects, including by the giving of all notices and the paying of all fees, with the provision of:

(a) any National or State Statute, Ordinance, or other Law, or any regulation, or bye-law of any local or other duly constituted authority in relation to the execution and completion of the Works and the remedying of any defects therein, and

(b) The rules and regulations of all public bodies and companies whose property or rights are affected or may be affected in any way by the Works, and the Contractor shall keep the Employer indemnified against all penalties and liability of every kind for breach of any such provision.

25.0 Opportunities for other Contractors

The Contractor shall, in accordance with the requirements of the Employer, afford all reasonable opportunities for carrying out their work to:

(a) Any other contractors employed by the employer and their workmen,
(b) The workmen of Employer, and
(c) The workmen of any duly constituted authorities who may be employed in the execution on or near the Site of any work not included in the Contract or of any contract which the employer may enter into in connection with or ancillary to the Works

26.0 Clearance of Site on Completion

Before the issue of any Taking-Over Certificate the Contractor shall clear away and remove from that part of the Site to which such Taking-Over Certificate relates all Contractor's Equipment, surplus material rubbish and Temporary Works of every kind, and leave such part of the Site and Works clean and in a workmanlike condition to the satisfaction of the Employer. Provided that the Contractor shall be entitled to retain on Site, until the end of the Defects Liability Period, such materials, Contractor's Equipment and Temporary Works as are required by him for the purpose of fulfilling his obligations during the Defects Liability Period.

27.0 Observance of Legislation

The Contractor shall at all times during the continuance of the Contract comply fully with all existing Acts, regulations and bylaws including all statutory amendments and re-enactments and acts that may be passed in future either by the state or the Central Government or local authority, including, Indian Workmen's Compensation Act, Contract Labour (Regulation and Abolition) Act 1970 and Equal remuneration Act 1976. Factories Act, Minimum Wages Act provident fund regulations employees provident Fund Act and schemes made under same Act, Health and Sanitary Arrangements for workmen, Insurance and other benefits and shall keep the Employer indemnified in case any action is commenced for contravention by the contractor.

If the Employer is caused to pay or reimburse any amounts for non-observance of the provisions of this clause on the part of the contractor, the Employer shall have the right to deduct from any moneys due to the contractor or recover from the contractor personally any sum required or estimated to be required for making good the loss or damage suffered by the Employer. All registration and inspection fees if any, in respect of his work pursuant to the contract shall be to the account of the contractor.

28.0 Safety Provisions

The Contractor shall comply with all the precautions as required for the safety of the workman by the I.L.O Convention as far as they are applicable to the Contract. The Contractor shall provide all necessary safety appliances, gears like goggles, helmets, masks, etc. to the workmen and the staff deputed for execution and completion of works. The Contractor shall be responsible for observance by his sub-Contractors of the foregoing provisions.

29.0 Suspension of Work

The Contractor shall, on the instructions of the Employer, suspend the progress of the Works or any part thereof for such time and in such manner as the Employer may consider necessary and shall, during such suspension, properly protect and secure the Works or such part thereof so far as is necessary in the opinion of the Employer. Unless such suspension is:

(a) Otherwise provided for in the Contract, or
(b) Necessary by reason of extra-ordinary climatic conditions on the Site, or
(c) Necessary for the proper execution of the Works or for the safety of the Works or any part thereof (save to the extent that such necessity arises from any act or default by the Employer or from any of the risks defined in Clause 20.0

30.0 Employer's Determination following Suspension

Where, pursuant to Sub-Clause 29.0, this Sub- Clause applies the Employer shall, after due consultation with the Contractor determine

(a) Any extension of time to which the Contractor is entitled under Clause 32, and
(b) the amount, which shall be added to the Contract Price, in respect of the cost incurred by the Contractor by reason of such suspension.

And shall notify the Contractor accordingly.

31.0 Time for Completion

The whole of the Works shall be completed within the time Completion Time stated in the Contract, calculated from the Commencement Date, or such extended time as may be allowed under Clause 32.0

32.0 Extension of Time for Completion

The Employer may consider extension of time for completion of the works by the Contractor, if requested by the Contractor, In the event of:

(a) The amount or nature of any extra or additional work, or
(b) Any cause of delay referred to in these Conditions by reference to clause 29.0, or
(c) Exceptionally adverse climatic conditions, or
(d) Any delay, impediment or prevention by the Employer, or
(e) Other special circumstances which may occur, other than through a default of or breach of contract by the Contractor or for which he is responsible,

being such as fairly to entitle the contractor to extension of time for completion of the works or any section or part thereof, the Employer shall after due consultation with the contractor, determine the amount of such extension and shall notify the contractor accordingly.

33.0 Liquidated Damages for Delay

If the Contractor fails to complete the execution of the works by the stated time for completion given in the Contract, then the Contractor shall pay to the Employer a sum **of ½% of Contract Price per week of delay, as liquidated damages** for such default and not as a penalty, for every day or part of a day which shall elapse between the relevant Time for Completion and the date of Actual Completion of the Works. **The maximum amount of Liquidated Damages shall be 5% of the Contract Price**. Provided that the provisions of this clause shall not be applicable for the extended time for completion in accordance with Clause 32.0. The Employer may, without prejudice to any other method of recovery, deduct the amount of such damages from any monies due or to become due to the Contractor. The payment or deduction of such damages shall not relieve the Contractor from his obligation to complete the Works, or from any other of his obligations and liabilities under the contract.

34.0 Taking-Over Certificate

When the whole of the Works have been completed and all the equipment and systems have satisfactorily passed the Tests on Completion and the equipment and systems have been satisfactorily validated in accordance with the Contract, the works shall be considered as Completed by the Contractor. The Employer shall, within 21 days of the date of receiving a completion notice from the Contractor, shall either issue to the Contractor, a Taking-Over Certificate / Completion Certificate, stating the date on which, in his opinion, the Works were completed in accordance with the Contract or give instructions in writing to the Contractor specifying all the work which in the Employer's opinion, is required to be done by the Contractor before the issue of such Certificate.

35.0 Defects Liability Period

The expression "Defects Liability Period" shall be for 1 year (One year) and shall mean the specified period calculated from the date of completion and acceptance of the Works in accordance with Clause 34.0and issuance of Taking-Over Certificate. The Contractor shall rectify and execute all such work of remedying defects, shrinkages or other faults, excluding fair wear and tear accepted, as the Employer may instruct the Contractor to execute, during the Defects Liability Period or within 14 days after its expiration, as a result of an inspection or observation made by the Employer.

All the installations, equipment/s, items, systems and services executed by the Contractor shall remain under Guarantee and Defects Liability for a period of one year, for delivering the design and approved performance of individual equipments and systems and the complete facility as a whole.

Any defect or damage due to faulty material or improper workmanship, whenever notified during the Guarantee and Defects Liability period to the Contractor, shall be repaired and rectified by the Contractor to the satisfaction of the Employer, at his own cost. If the contractor fails to timely rectify and execute any such instructed work of remedying defects, the Employer shall reserve the right to proceed and get all such work executed by another agency and debit the entire cost to the contractor and recover the amount from the money due or will become due for payment to the contractor.

36.0 Variations

The Employer may make any variation to the form, or the Scope of Works or any part thereof that may, in his opinion, be necessary and for that purpose, or if for any other reason it shall, in his opinion, be appropriate, he shall have the authority to instruct the Contractor to do any of the following:

(a) Execute additional work of any kind necessary for the completion of the Works
(d) Change any specified sequence or timing of construction of any part of the Works.

The provisions under this clause shall apply only to the varied works, which are not covered and included in the scope of the work given in the Contract.

Provided that, No such variation shall in any way vitiate or invalidate the Contract, but the effect and financial implication, if any, of all such variations shall be valued in accordance with Clause 37.0 .

37.0 Valuation of Variations

All variations referred to in Clause 36.0 and any additions to the Contract Price which are required to be determined, shall be valued in the following order of preference:

a) Shall be valued at the rates and prices set out in the Contract if, in the opinion of the Employer, the same shall be applicable.
b) If the contract does not contain any such rates or prices applicable to the varied work, the rates and prices in the Contract for similar works shall be used as the basis for valuation so far as may be reasonable and the same shall be agreed upon between the Employer and the Contractor.
c) In the event of disagreement, the varied works shall be derived, as appropriate based on CPWD norms as per market rate analysis.

Until such time as rates or prices are agreed or fixed, the Employer shall determine provisional rates or prices to enable on-account payments to be included in interim/adhoc payments certificates issued.

38.0 Force Majeure

The Contractor shall be under no liability for damage to the works, destruction of or damage to property (whether of the Institute or third party) or injury or loss of life, in consequence of any of the following risks whether by way of indemnity or otherwise:

a) As a consequence of war, hostilities (whether war be declared or not), invasion, act of foreign enemies.
b) Rebellion, revolution, insurrection, or military or usurped power or civil war.
c) Ionizing radiations, or contamination by radio-activity from any nuclear fuel, or from any nuclear waste from the combustion of nuclear fuel, radio-active toxic explosive or other hazardous properties of any nuclear assembly or nuclear component thereof,
d) Pressure waves caused by aircraft or other aerial devices travelling at sonic or supersonic speed.

39.0 Terms of Payment

The Contractor shall submit a Statement for Payment in 2 copies to the Employer in each month for the work executed upto the end of previous month in a tabulated form, showing the amounts to which the Contractor considers himself to be entitled.

The statement shall include the following items, as applicable, which shall be taken into account in the sequence listed:

(a) The estimated contract value of the Temporary and Permanent Works executed up to the end of the month in question, at approved unit rates and prices.
(b) The actual value certified for payment for the Temporary and Permanent Works executed up to the end of the previous month, at unit rates and prices.
(c) The estimated contract value due for payment at unit rates and prices of the Temporary and Permanent Works for the month in question, obtained by deducting (b) from (a);
(d) The value of any variations executed up to the end of the month in question, less the amount certified in the previous Interim Payment Certificate
(e) Any amount to be withheld under the retention provisions, determined by applying the percentage set forth to the amounts due
(f) Any other sum, to which the Contractor may be entitled under the contract.
(g) The amount to be deducted towards the advance income tax and any other deductions as per the statutory requirements in this regard.
(h) The following percentage payments shall be considered for the items in the Bill of Quantity:

i) On supply of item/material/equipment at site	-	70% of item rate
ii) On completion of construction/erection	-	10% of item rate
iii) On completion of Testing &Commissioning	-	10% of item rate
iv) On completion of Validation and Handover	-	10%of item rate

Notwithstanding the terms of this Clause or any other Clause of the Contract, no amount will be certified by the Employer for payment until the performance security has been provided by the Contractor and Contract Agreement has been signed.

40.0 Place of Payment

Payments to the Contractor shall be made by the Employer, within 15 days of submission of Bill, in Indian Rupees into a bank account or accounts nominated by the Contractor or by Account Payee Cheque/Demand Draft/ RTGS transfer.

41.0 Retention Money

A retention amounting to 10 (Ten) percent of the Running Bill Amount, determined in accordance with the procedure set out in Clause 39.0 shall be made by the Employer in the first and following Interim Payment Certificates, until the amount so retained reaches a limit of retention money, which will be Five Percent (5%) of the Contract Price.

42.0 Payment of Retention Money

The retention money amount shall be released to the contractor on successful completion of the works and acceptance of the Works in accordance with Clause 34.0 and issuance of Taking-Over Certificate by the Employer.

No interest shall be paid to the contractor on retention money.

43.0 Advance Payment

The Employer will not make any advance payment to the Contractor for the works.

44.0 Breakdown of Lump-Sum Price

To facilitate release of Running Account Bill payments, the Contractor shall submit a detailed Price Breakup of Lump-Sum Priced item/s, given in the Price Schedule. While submitting the price breakup, the Contract award value shall remain unchanged.

45.0 Taxation

The contractor shall pay all taxes, duties, levies, GST etc. as applicable. Deduction of Income-Tax and other statutory taxes shall be made from each certificate of payment as per the relevant provisions of the Income Tax and/or other statutory authority.

46.0 Settlement of Disputes

If a dispute of any kind whatsoever arise between the Employer and the Contractor in connection with , or arising out of, the Contract or the execution of the Works, whether during the execution of the Works or after their completion and whether before or after repudiation or other termination of the Contract, including any dispute as to any opinion, instruction, determination, certificate or valuation of the Employer, the matter in dispute shall, in the first place, be referred in writing to the Employer. Such reference shall state that it is made pursuant to this Clause. On receipt of such reference the Employer shall give notice of his decision to the Contractor. Such decision shall state that it is made pursuant to this Clause.

Unless the Contract has already been repudiated or terminated, the Contractor shall, in every case, continue to proceed with the Work with all due diligence and the Contractor and the Employer shall give effect forthwith to every such decision of the Employer unless and until the same shall be revised, as hereinafter provided in an amicable settlement or an arbitral award.

If either the Employer or the Contractor be dissatisfied with any decision, then either the Employer or the Contractor may give notice to the other party of his intention to commence arbitration as hereinafter provided, as to the matter in dispute. Such notice shall establish the entitlement of the party giving the same to commence arbitration, as hereinafter provided, as to such dispute. The Arbitrator/s shall be appointed by the Director AIIMS Jodhpur.

Where notice of intention to commence arbitration as to dispute has been given, arbitration of such dispute shall not be commenced unless, the parties have explored the possibility of conciliation as per the provisions of the Arbitration and Conciliation Act, 1996. When such conciliation has failed, the parties shall adopt the procedure for arbitration, as per Indian Arbitration and Conciliation Act 1996.

For settlement of all disputes & Arbitration the place of jurisdiction shall be Jodhpur.

47.0 Default of Contractor

If the Contractor is deemed by law unable to pay his debts as they fall due, or enters into voluntary or involuntary bankruptcy, liquidation or dissolution (other than a voluntary liquidation for the purposes of amalgamation or reconstruction), or becomes insolvent, or makes an arrangement with, or assignment in favour of, his creditors or agrees to carry out the Contract under a committee of inspection of his creditors, or if a receiver, administrator, trustee or liquidator is appointed over any substantial part of his assets, or if, under any law or regulation relating to reorganisation, arrangement or readjustment of debts proceedings are, commenced against the Contractor or resolution passed in connection with dissolution or liquidation or, if any, step are taken to enforce any security interest over a substantial part of

the assets of the Contractor, or if, any act is done or event occurs with respect to the Contractor or his assets which under any applicable law has a substantially similar effect to any of the foregoing acts or events, or if the Contractor has an execution levied on his goods, or if the Employer certifies, with a copy to the Contractor, that, in his opinion the contractor

(a) Has repudiated the Contract, or
(b) Without reasonable excuse has failed
    (i) To commence and complete the work in accordance with contract, or
    (ii) To proceed with the Works, or any section thereof, within 28 days after receiving notice, or
(c) Despite previous warning from the Employer, in writing, is otherwise persistently or flagrantly neglecting to comply with any of the obligation under the Contract,

then for the avoidance of doubt the contractor shall be in default of its obligations under this contract and furthermore the Employer may, after giving fourteen days' notice to the Contractor, enter upon the Site and expel the Contractor there from without thereby avoiding the Contract, or releasing the Contractor from any of his obligations or liabilities under the Contract, or affecting the rights and powers conferred on the Employer by the Contract, and may himself complete the Works or may employ any other contractor to complete the Works.

48.0 Valuation at Date of Expulsion

The Employer, as soon as may be practicable after any such entry and expulsion by the Employer, shall fix and determine ex parte, or by or after reference to the parties or after such investigation or enquiries as he may think fit to make or institute, and shall certify :

(a) what amount (if any) had, at the time of such entry and expulsion, been reasonably earned by or would reasonably accrue to the Contractor in respect of work then actually done by him under the Contract, and
(b) The value of any of the said unused or partially used materials, any Contractor's Equipment and any Temporary Works.

49.0 Default of Employer

In the event of the Employer

a) becoming bankrupt or being a company, going into liquidation, other than for the purpose of a scheme of reconstruction or amalgamation, or
b) Giving notice to the Contractor that for unforeseen reasons, due to economic dislocation, it is impossible for him to continue to meet his contractual obligations,

The Contractor shall be entitled to terminate his employment under the contract by giving notice to the Employer, with a copy to the Employer. Such termination shall take effect 14 days after the giving of the notice.

50.0 Payment on Termination

In the event of such termination by the Contractor as per Clause 49.0, the employer shall determine the amount due or payable to the contractor, but in addition, the Employer shall pay to the Contractor the amount of any loss or damage to the Contractor arising out of or in connection with or by consequence of such termination.

51.0 Water Supply& Power Supply

Water and power supply at site for drinking purpose as well as for construction purpose shall be made available to the contractor. However, the contractor shall make his own arrangements at his cost to avail water and power from the source/s made available at site by the Employer.

Non availability of power supply and/or water from whatever source shall not entail any additional claims or extension of contract period.

52.0 Arrangement of Labour and workers

The contractor shall make his own arrangement for labour and workers required to execute and complete the works and shall make all the required arrangements for travel, food, lodging etc. at his own cost and the cost of the same is deemed to have been included in the quoted price. Labour hutments shall not be allowed inside the campus of AIIMS Jodhpur.

53.0 TRAINING

On completion of the work, the contractor shall provide training to the Employer's staff. The training shall cover the following aspects:

a) Handling, operation, servicing and maintenance of all the equipment/s, systems, services and engineering installations in the facility.
b) Training on emergency response in situation like fire, spill, power outage etc.
c) Training on carrying out laboratory fumigation
d) Training on loading & unloading of autoclave and selection and operation of decontamination cycle
e) Training on operation of effluent decontamination system
f) Any other training, as desired and requested by the Employer on the installations made by the contractor.

54.0 PRICE ESCALATION

No price escalation shall be considered or paid during the Contract period including the operations and maintenance period. The price quoted by the bidders for executing the works on 'Turnkey Basis' in the Price Bid shall remain fixed and firm during the entire contract period.

FORM- A :FORMAT OF AGREEMENT

(on Rs. 100/- non-judicial stamp paper)

This Agreement is made on the _____day of _____ 2019, between AIIMS Jodhpur represented by The Director, AIIMS Jodhpur (hereinafter called "**The Employer**") who enters into this Agreement of the one part and M/s _____ (hereinafter called "**The Contractor**") of the other part.

Whereas The Employer is desirous that certain Works should be executed by the Contractor, viz Design and Construction of BSL-3 Laboratory at AIIMS Jodhpur ("**The Works**") and has accepted a Bid/Offer by the Contractor for the execution and completion of The Works and the remedying of any defects therein during the defect liability period, at a total estimated contract value of Rs._____.

Now this Agreement witnessed as follows:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to.

2. The following documents shall be deemed to form and be read and construed as part of this Agreement, viz :

   (a) The Letter of Award Ref. No. _____
   (b) The said Bid and the offer Ref. No. _____;
   (c) The Tendered Scope of Work and Technical Specifications;
   (d) The Tender Drawings;
   (e) Instructions to Bidders;
   (f) The Conditions of Contract;
   (g) The Priced Bill of Quantities;
   (h) Any other relevant documents referred to and attached in this Agreement or in the aforementioned documents;

3. In consideration of the payments to be made by the Employer to the contractor as hereinafter mentioned, the Contractor hereby covenants with the Employer to execute and complete the Works and remedy any defects therein in conformity in all respects with the provisions of this Contract.

4. The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and the remedying of defects therein the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by this Contract

5. This Contract shall remain valid and continue to be in-force until the Contractor has successfully completed The Works and has remedied the defects therein and completed the defects liability period.

   In Witness whereof the parties hereto have caused this Agreement to be executed the day and year first before written.

Binding Signature & Stamp of [Employer] _____
For and on Behalf of AIIMS Jodhpur

Name & Designation _____

_____

Binding Signature & Stamp of [Contractor] _____

Name & Designation _____

_____

In the presence of:

Witness (1)

Witness (2)

FORM- B :FORMAT FOR PERFORMANCE SECURITY BANK GUARANTEE

(On stamp paper from any Nationalised/Scheduled Bank)

To,
The Director,
AIIMS Jodhpur,

Dear Sir,

In consideration of AIIMS Jodhpur (hereinafter called **The Employer**) which expression shall include his successor and assigns, having awarded to M/s._____ (hereinafter referred to as **The Contractor or 'Contractor**') which expression shall wherever the subject or context so permits include its successors and assigns) a Contract No _____ in terms inter alia, of the Letter of Award No._____ dated____and the Conditions of Contract and upon the condition of the contractor's furnishing security for the performance of the contractor's obligations and discharge of the contractor's liability under and in connection with the said contract upto a sum of Rs. _____ (Rupees _____only).

1. We,_____(hereinafter called `The Bank' which expression shall include its successors and assigns) having our branch office at _____ and registered/Head office at _____ a company registered under the Companies Act, 1956) hereby undertake to guarantee the payment to the Employer in rupees forthwith on demand in writing and without protest or demur any and all moneys anyways payable by the contractor to the Employer in respect of or in connection with the said contract inclusive of all the Employer's losses, damages and costs, (inclusive between attorney and client) charges and expenses and other moneys anyways payable in respect of the above as specified in any notice of demand made by the Employer to the Bank with reference to this guarantee upto an aggregate limit of Rs._____(Rupees _____ only).

2. We_____(The Bank) further agree that The Employer shall be sole judge of and as to whether the said contractor has committed any breach or breaches of any of the terms and conditions of the said contract and the extent of loss, damage, cost, charges and expenses caused to or suffered by or that may be caused to or suffered by The Employer on account thereof and the decision of The Employer that the said Contractor has committed such breach or breaches and as to the amount or amounts of loss, damage, costs, charges and expenses caused to or suffered by The Employer from time to time shall be final and binding on us.

3. The Employer shall be at liberty without reference to the Bank and without affecting the full liability of the Bank hereunder to take any other security in respect of the Contractor's obligations and liabilities hereunder or to vary the contract or the work to be done thereunder vis-a-vis the Contractor or to grant time or indulgence to the Contractor or to reduce or to increase or otherwise vary the prices of the total contract value or to release or to forbear from enforcement of all or any of the security and/or any other security(ies) now or hereafter held by The Employer and no such dealing(s) reduction(s) increase(s) or other indulgence(s) or arrangements with the Contractor or release or forbearance whatsoever shall absolve the bank of the full liability to The Employer hereunder or prejudice the rights of The Employer against the bank.

4. This guarantee shall not be determined or affected by the liquidation or winding up, dissolution, or change of constitution or insolvency of the Contractor but shall in all respects and for all purposes be binding and operative until payment of all monies payable to The Employer in terms thereof.

5. The bank hereby waives all rights at any time inconsistent with the terms of this guarantee and the obligations of the Bank in terms hereof shall not be anywise affected or suspended by reason of any dispute or disputes having been raised by the Contractor stopping or preventing or purporting to stop or prevent any payment by the Bank to The Employer in terms hereof.

6. The amount stated in any notice of demand addressed by The Employer to the Bank as liable to be paid to The Employer by the Contractor or as suffered or incurred by The Employer on account of any losses or damages or costs, charges and/or expenses shall be conclusive evidence of the amount so liable to be paid to The Employer or suffered or incurred by The Employer as the case may be and shall be payable by the Bank to The Employer in terms hereof.

7. This guarantee shall be a continuing guarantee and shall remain valid and irrevocable for all claims of The Employer and liabilities of the contractor arising upto and until midnight of _____.

8. This guarantee shall be in addition to any other guarantee or security whatsoever that The Employer may now or at any time anywise may have in relation to the Contractor's obligations/or liabilities under and/or in connection with the said contract, and The Employer shall have full authority to have recourse to or enforce this security in preference to any other guarantee or security which The Employer may have or obtain and no forbearance on the part of The Employer in enforcing or requiring enforcement of any other security shall have the effect of releasing the Bank from its full liability hereunder

9. It shall not be necessary for The Employer to proceed against the said Contractor before proceeding against the Bank and the Guarantee herein contained shall be enforceable against the Bank notwithstanding that any security which The Employer may have obtained or obtain from the contractor shall at the time when proceedings are taken against the said bank hereunder be outstanding or unrealised.

10. We, the said Bank undertake not to revoke this guarantee during its currency except with the consent of The Employer in writing and agree that any change in the constitution of the said contractor or the said bank shall not discharge our liability hereunder.

11. We_____the said Bank further that we shall pay forthwith the amount stated in the notice of demand notwithstanding any dispute/difference pending between the parties before the arbitrator and/or that any dispute is being referred to arbitration.

12. Notwithstanding anything contained herein above, our liability under this guarantee shall be restricted to Rs._____(Rupees_____) and this guarantee shall remain in force till_____ and unless a claim is made on us within 3 months from that date, that is before_____, all the claims under this guarantee shall be forfeited and we shall be relieved of and discharged from our liabilities thereunder.

Dated_____day of_____20

For and on behalf of Bank.

Issued under seal

SECTION - II

SCOPE OF WORK

TECHNICAL SPECIFICATIONS

1.0 SCOPE OF WORK

The Scope of work shall be *'**Design and Construction of BSL-3 Laboratory AIIMS Jodhpur on 'Turnkey Basis' in accordance with the Fifth edition of BMBL Guidelines issued by the U.S. Department of Health and Human Services, CDC, USA'*** including Testing, Commissioning and Validation of the facility.

The scope under the contract shall cover and include the following works to be executed by the Contractor on 'Turnkey Basis':

a) Design, Supply, installation, execution, testing and commissioning of following items and works on 'Turnkey Basis':

- Dismantling of existing internal brick partition walls, floors etc. including removal of malba and site clearance works as required
- Internal construction works including pre-fabricated partition wall and ceiling, doors and view panels etc. in complete facility
- Self levelling epoxy flooring in complete facility
- Drain piping and water distribution piping in complete facility
- Emergency Eye and Hand wash station in BSL-3 Lab
- Wring for light, power, networking, communication/intercom, fire alarm system, CCTV, access control system etc. in complete facility
- Light fittings and fixtures, switches, sockets, power distribution boards for Light and power including MCB's etc., and main power supply LT panel. in Complete facility
- Fire alarm system, CCTV system, access control system, EPABX, telephone handsets in complete facility
- Inverter for lighting backup
- UPS for Access Control and Building Management System
- Air cooled chiller
- Air handling units
- Exhaust blowers
- Supply, return and exhaust ducting with insulation, diffusers/grilles, volume control dampers and fire dampers
- Containment HEPA housing with filters for BSL-3 Lab supply and exhaust
- Chilled water pumps (1 working + 1 standby) including interconnecting piping, insulation, valves, supports, expansion tanks etc.
- Building management system for complete HVAC system including pressure sensors, temperature & Rh sensors, VAV for BSL-3 Lab, VFD's for AHU and Exhaust blower motors, control wiring and BMS Panel with PLC with Software and HMI touch screen panel for display
- Prefabricated Shower module and Shower system for BSL-3 Lab
- Chemical type Effluent decontamination system for BSL-3
- Class 2 A2 Type Biosafety Cabinets for BSL-3 Lab
- Pass Box and Dunk tank for BSL-3 Lab
- Work station in BSL-3 Lab with chairs
- Double Door Autoclave for BSL-3 Lab
- Ventilated Garment Cabinet
- Garment Storage locker
- Portable Fire Extinguishers (CO_2 /Dry Powder type) in lab and AHU room
- Water softener and water storage tanks for HVAC system and steam boiler

b) The Tender Drawings are given in the Tender Documents for the purpose of understanding the layout and work requirements by the bidders. However, the bidders are advised to visit the site and assess the site conditions and work requirements. The bidders may also seek clarification on queries they may have by making written submission to the Employer. The Employer reserves the right to do minor changes in the given layout plan and scope, without any additional cost.

c) Site preparatory works including dismantling/demolition of existing walls, clearance of malba, making opening in walls and any other ancillary works required to complete the works. The contractor shall take all precautions not to damage any part of the existing building and the structure. All the opening and dismantling works required for the execution of the works shall be repaired by the contractor in good condition at no extra cost.
d) Testing and commissioning of all the equipment/s, items, systems and services supplied and installed in the Laboratory Facility and Validation of the BSL-3 Laboratory as per the BSL-3 Laboratory Certification Guidelines of NIH, USA in the presence of representative/s of Employer and submission of compiled report.
e) Preparation and submission of 3 sets of 'AS BUILT DRAWINGS' and 'OPERATION& MAINTENANCE MANUAL AND INSTRUCTIONS' for the complete installation.
f) Providing training to the Employer's staff on operation, servicing and maintenance of all engineering installations and handling of emergencies due to fire or engineering system failures.
g) There is an existing DG set available and the backup power supply to the proposed laboratories shall be provided through the same. The required power connection including providing cabling from the DG set panel to the new LT panel shall be in the Bidders scope.

2.0 TENDER DRAWINGS

2.1 The tender drawings of the proposed BSL-3 Laboratory facility are attached for reference purpose and guidance to the Bidders to understand the scope of work. The Bidder/executing agency shall check and verify the correctness of dimensions and quantities given and indicated in the tender drawings. The work shall be executed as given and detailed in the scope of work, technical specifications and the final working drawings to be submitted by the Contractor and approved by the Employer.

3.0 TECHNICAL SPECIFICATIONS - INTERNAL CONSTRUCTION & FINISHES

GENERAL

3.a The specifications for Civil and Plumbing works shall be in accordance with latest C.P.W.D. specifications, including revisions/correction slips issued till date, Unless otherwise specified in the nomenclature or description of individual item or in the specifications, the works shall be carried out as per the C.P.W.D. specifications with upto date correction slips.

3.b For the item not covered under CPWD Specifications mentioned above, the work shall be executed as per latest relevant standards/codes published by B.I.S. inclusive of all amendments issued thereto or revision thereof, if any, till date.

3.c In case of B.I.S. codes/specifications are not available, the decision of the Engineer based on acceptable sound engineering practice and local usage shall be final and binding on the contractor.

3.1 MODULAR WALL AND CEILING PANELS

3.1.1 All the internal partition walls and ceiling construction in BSL-3 Laboratory and other areas shall be carried out in prefabricated, non-particle shredding panels in Powder Coating finish. The prefabricated wall and ceiling panels shall provide impervious and monolithic construction and surface finish. The existing external brick walls shall be provided with cladding from inside with similar pre-fabricated wall panels.

3.1.2 The modular wall and ceiling panels shall be minimum 80 mm thick, constructed in 0.8 mm thick GSS sheet on both sides, in-filled with PUF insulation (density approx. 40kg/m3), finished with epoxy plaster powder coating, oven lacquered smooth to 60 to 80

micron thickness. All the joints between panels, cut-outs and openings shall be sealed with silicone sealant.

3.1.3 The wall and ceiling panels shall be supported on heavy duty aluminium profile supported by anchoring, minimum 70 mm (R-70) aluminium coving on the wall and ceiling corners shall be provided in the wall and ceiling colour, corners shall be rounded at turn from X-Y direction, milled solid aluminium spheres shall be provided in same colour at the 3-D(wall/ceiling/wall junction) and 2-D(wall/ceiling junction). The ceiling shall be adequately supported with suspension and hangar.

3.1.4 The conduits for providing wires and cables for light, power, data, voice and other services shall be factory inserted in the wall panels.

3.2 VIEW PANEL

The view panels shall be double glazed and designed to fit flush into the wall panel system on both sides with 5 mm thick toughened glass. Glass shall be fixed onto aluminium frame work with high performance double coated black colour structural glazing tape (3 M VHB or equivalent). Aluminium frames shall be with 2 mm thick sheet formed to match panel thickness with epoxy powder coating of 60 to 80 micron thickness. The gap between the glasses shall have anti-moisture with silica gel granules/molecular seive. Glazing shall be perfectly flush with the outer surface of the frame and wall panel. All joints shall be taped and sealed with silicon sealant.

3.3 DOORS

3.3.1 Door frames shall be fabricated from 1.25 mm thick galvanized steel sheet to the required profile and dimensions. The door shutters shall be manufactured from 0.8 mm galvanized sheets press formed to double skin hollow profile with lock seam joints at stile edges. Shutters to have no visible screws or fasteners on either face. Frames and shutter shall have factory finish in thermo setting polyurethane aliphatic grade paint (35 micron DFT) or powder coated in approved color.

3.3.2 Frames and shutters to have factory finishes pre-punched cutouts to receive specific hardware's like hinges, lock etc.

3.3.3 Double glazed vision panel to be provided in door shutters with toughened float glass of 5 mm thickness. Glass to be fixed with high performance structural glazing tape (3 M VHB or equivalent)

3.3.4 The Biosafety Doors of Fumigation Airlock and Shower of BSL-3 Laboratory shall be fabricated in double profiled stainless steel 304 in hollow section with all round gasket. The Fumigation Door doors shall be provided with sealed vision glass and all biosafety doors shall be complete with door closers and stainless steel handles.

3.4 DRAINS AND WATER LINES

3.4.1 Floor traps/U-traps in BSL-3 Lab area shall provide double pass and shall have minimum 3" W.C head. The effluent drainage piping from the BSL-3 Lab shall be in chemical resistant material like HDPE with all joints welded and tested to be leak proof. The drain lines from the Containment area shall be segregated from drain lines of other areas.

3.4.2 The drain piping may have to be laid on floor and shall be covered with 80 mm PCC, in proper level, as per site requirement

3.4.3 Water distribution piping in BSL-3 Containment area shall be provided in PP and shall be provided with non-return valve/backflow prevention device. Water supply lines in other areas shall be in PVC/GI

3.5 EPOXY FLOORING

The joint less Epoxy flooring consists of Epoxy resin based joint less flooring over concrete surface including preparing the surface as required, application of epoxy primer, 5-6 mm or more in thickness epoxy screed and self-levelling 2mm minimum epoxy topping in required approved shades. The entire job is to be undertaken by manufacturer's trained and skilled technicians to lay the Epoxy based floor.

Surface Preparation:

Applicator for the works should check out the moisture content in the existing RCC surface and if the percentage of moisture content is high same to be removed by using hot compressed air machine and the surface irregularities shall be removed by using floor screed. The concrete floors shall be roughened using hand grinders to provide a mechanical key for the epoxy screed to bond well the substrate. Presence of dust, laitance etc. should be completely cleaned before commencing the application. Moisture testing should be done to ensure moisture limit not exceeding 5%.

Epoxy Primer:

On the prepared floor surface epoxy primer with high penetrating properties shall be applied, as per manufacturer’s recommendations.

Self-levelling Epoxy topping:

The self-levelling top coat mixture shall be spread evenly by means of rollers and serrated trowels. The floor should be rolled by a spike roller to remove trapped airs to uniform level and smoothness.

EPOXY COVING

Epoxy primer shall be applied at the junctions of wall corner. Epoxy coving of size 70 mm on either side shall be applied to the junctions between wall & floor. It is to be made with solvent less epoxy screed/resin incorporating very high abrasion resistant aggregates. Screed mortar shall be applied by trowel. The material should be compacted and finished with a round trowel to a smooth concave finish as per

manufacturer's specifications. Sealing of screed surface shall be made with sealer coat to ensure that a smooth finish is obtained in desired colour matching that of the floor finish as per manufacturer's specifications.

Performance properties shall meet or exceed the following:

Finish	- Gloss/ Semi Gloss (as approved)
Compressive strength (ASTM C 579)	- > 60 Mpa
Tensile strength (ASTM C 307)	- > 30 Mpa
Hardness (ASTM D 2240)	- 80
Taber Abrasion Loss/1000 cycles (ASTM D 4060)	- 45 mg

4.0 TECHNICAL SPECIFICATIONS - HVAC SYSTEM

4.1 GENERAL

The proposed BSL-3 Laboratory, shall be air-conditioned through a separate dedicated Central AC System comprising of Chiller Pack, Air Handling Units, Exhaust System, Air Filtration System and Air Distribution System complete in all respect. The system shall be with standby and backup provisions capable to provide un-interrupted continuous operation of BSL-3 Lab to maintain the required temperature, humidity, air-change rate, differential pressure gradient and air filtration conditions of the Laboratory Facility.

The following design and performance conditions shall be maintained in the BSL-3 Laboratories and support areas:

- Inside Temperature : 22 +/- 2° C
- Relative humidity : less than 60%
- Negative Pressure gradient : As per tender zoning plan
- ACPH in BSL-3 Lab : More than 12
- Filtration : HEPA Filter Supply Air in BSL-3 (with pre-filters and fine filters)
  HEPA Filter Exhaust Air in BSL-3
- Ventilation : 100% FA system for BSL-3
  Other areas on Re-circulatory system
- Exhaust Fan location for BSL-3 : Minimum 25 ft from AHU intake

4.2 AIR COOLED CHILLER

a) SCOPE

The scope of this section comprises the supply, erection, testing and commissioning of air cooled chiller conforming to these Specifications and in accordance with requirements of drawings and of the Schedule of Quantities.

b) COMPRESSOR

Packaged Liquid Chillers shall be complete with multiple Hermetic Scroll compressors. The compressor motor shall be hermetic, refrigerant gas cooled with inherent all phase protection and shall be suitable for 380-420 Volts, 3 Phase, 50 Hz operation. The maximum KW/Tr shall be around 1.2 at ARI conditions.

c) COOLER

The Shell & Tube Cooler shall be direct expansion type with refrigerant in the tubes & chilled liquid in the shell. The tubes used shall be 5/8" OD, high efficiency inner grooved tubes. Refrigerant heads are removable. The Refrigerant shall be R407C/R410A/Equivalent.

d) AIR COOLED CONDENSER

I) Material and construction- The condenser coil shall be fabricated of seamless hard drawn copper tubes and Aluminum fins of 0.18 mm minimum thickness, fins spacing ranging from 3 to 5 fins per cm. The minimum wall thickness of tubes shall be 1.0 mm.

II) The coil shall normally be 2/3/4 rows deep unless otherwise specified.

III) The condenser shall be designed so as to hold 1.25 times the refrigerant charge in the system during the idle periods.

IV) Suitable number and capacity of propeller type fans shall be provided for moving the air through the entire condenser coils. For more uniform flow over the condenser coil, the condenser shall be designed on the draw through principle.

e) CONNECTION AND ACCESSORIES

The following connections and accessories shall be provided on the condenser and conforming to Section "Refrigeration Piping" where applicable:
Hot gas inlet and liquid outlet connections. The liquid outlet connections shall be provided with isolating valves, Pressure relief device.

The pressure testing shall be done at 31 kg/sq.cm. on refrigerant side.

f) CONTROL CENTRE

The control centre shall include a high and low-pressure protection & mini circuit breaker for each compressor. The panel shall also contain thermostats & an electronic temperature controller for chilled water temperature control, Anti-freeze thermostats for cooler protection, control wiring, pressure gauges and indicator lights. The service doors shall be provided with transparent windows to view the indicator lights & pressure gauges.

g) INSULATION

The Cooler & Suction lines shall be insulated with adequate thickness of foam rubber or equivalent insulating material to prevent condensation.

h) The complete unit shall be finished painted at factory after assembly.

4.3 CHILLED WATER AND HOT WATER PUMP

Pumps shall be as per IS:1520-1660, IS:9079,IS:325 and shall be of the following construction:

Sl.No.	Pump Description		Horizontal Split Casing
1.	Casing	:	Cast Iron as per IS :210; grade FG260
2.	Impeller	:	Bronze as per IS : 318;
	Impeller ring	:	Bronze
3.	Shaft	:	High Tensile steel -EN8 or SS 410
	Shaft sleeve	:	Stainless steel or Bronze
4.	Bearings	:	Heavy duty Ball/Roller Bearings.
5.	Base Plate	:	Cast Iron
6.	Flanges	:	Conforming to I.S.1536/1960
7.	Seal		:Mechanical
8.	Max. Speed	:	1500 RPM
9.	Driver	:	T.E.F.C.
10.	Starter	:	See Schedule of Equipment.

Pumps of a particular category shall be identical and shall be suitable for parallel operation with equal load division. Components of identical pumps shall be interchangeable.
Impeller shall be made in one piece and securely keyed to the shaft. Measures to prevent loosening during operation including rotation in the reverse direction shall be provided. The critical speed of the pump shall be at least 30% above the rated speed. All the pumps shall be provided with mechanical seals. Common base plate shall be provided for pump and motor. Suitable holes shall be provided for grouting and these shall be so located that the base can be grouted in place without disturbing the pump and the motor. Adequate space shall be provided between pump drain connection and base plate for installation of minimum 15mm dia. drain piping. Foundation bolts shall be complete with nuts and washers. Driver ratings shown are only tentative and contractor shall select their drivers at least 15% in excess of the maximum B.H.P of the pump plus transmission losses if any. Drivers shall be supplied with starters unless otherwise stated. Pump and driver shall be mounted on a single bed-plate and directly driven through flexible coupling in case of horizontal split casing pumps.
The following accessories shall be provided with each pump among other standard accessories:

Coupling guard for horizontal split casing pumps.
Lubrication fittings and seal piping.
Test and/or air vent cocks.

4.4 DOUBLE SKINNED AIR HANDLING UNITS

4.4.1 CASING

The housing/ casing of the air handling unit shall be of double skin construction. The housing shall be so made that it can be delivered at site in total/ semi knock down conditions depending upon the conditions. The framework shall be of extruded aluminium hollow sections fitted with pre-formed insulated sections. All the members shall be assembled thru mechanical joints to make a sturdy and strong framework for various sections.
Double skin panels (each not exceeding 750mm wide) shall be made of 0.60mm pre-plasticised coated Galvanised sheet steel and 0.60mm galvanised sheet inside with minimum 43mm thick P.U. insulation of 38 Kg/Cu.M injected between the panels.

The panels shall be bolted from inside on to the framework with soft rubber gasket in between to make the joints airtight. Suitable doors with powder coated hinges and latches shall be provided for access to various panels for maintenance.

The Fan and the motor arrangement shall be mounted on to the extruded aluminium framework. The entire housing i.e. The Air Handling Unit shall be mounted on GI Base channel framework.

Drain pan shall be constructed of 18 gauge SS sheet with 25 mm thick 38 Kq/Cu.M. nitrile foam insulation. The K-value shall not be more than 0.014 Kcal/hr-sq.mtr-°C/M at 10°C mean temperature. The pan shall have necessary slope to facilitate for fast removal of condensate. The coil shall be mounted on the rollers in order to facilitate easy removal of the coil from the drain pan for cleaning. Outlet shall be provided on both the sides of drain pan.

4.4.2. MIXING BOX

AHU's requiring mixing boxes for re-circulatory unit shall be complete with fresh and return air dampers.

4.4.3 DAMPER

Dampers shall be opposed blade type. Blades shall be made of double skinned aerofoil aluminium sections with integral gasket and assembled within a rigid extruded aluminium alloy frame. All linkages and supporting spindles shall be made of aluminium or nylon, turning in Teflon bushes. Manual dampers shall be provided with a Bakelite knob for locking the damper blades in position.

Linkages shall be extended wherever specified for motorised operation. Damper frames shall be sectionalised to minimise blade warping. Air leakage through dampers when in the closed position shall not exceed 1.5% of the maximum design air volume flow rate at the maximum design air total pressure.

4.4.4 MOTOR AND DRIVE

Fan motors shall be energy efficient (IE-3) and shall be 415±10% volts, 50 cycles, three phase, totally enclosed fan-cooled class F, with IP-55 protection. Motors shall be especially designed for quiet operation and motor speed shall not exceed 1440 rpm. Drive to fan shall be provided through belt-drive arrangement. Belts shall be of the oil-resistant type.

4.4.5 FAN

Fans shall be centrifugal type. Fans driven by variable frequency drive shall be backward inclined irrespective of static pressure value. Fan casing shall be made of galvanised steel sheet. Fan wheels shall be made of galvanised steel. Fan shaft shall be grounded C40 carbon steel and supported in self-aligning Plummer block operating less than 75% of first critical speed, grease lubricated bearings. Fan wheels and pulleys shall be individually tested and precision balanced dynamically. Fan motor assembly shall be statically and dynamically balanced to G6.3 grade as per relevant ISO/AMCA standard. Computerized fan selection print outs shall be submitted along with the offer.

Motors shall be mounted inside the AHU casing on slide rails for easy belt tensioning, and be totally enclosed,EFF1 fan cooled, to be class `F' insulation. Motors shall drive heavy duty V-belt, constant pitch, drive selected at 110% of motor horsepower. Both fan and motors assemblies shall be mounted on a deep section aluminium alloy or galvanized steel (depending on size) base frame.

Combination spring and rubber anti vibration mounts shall be provided for isolating the unit casing. Frame retardant, waterproof silicone rubber impregnated flexible connection shall be provided at the fan discharge.

4.4.6 COOLING COILS

Chilled water coils shall have 12.5mm (1/2") to 15mm (5/8") dia. tubes minimum 0.5 mm thick with aluminium fins firmly bonded to copper tubes assembled in a zinc coated steel frame. Face and surface areas shall be such as to ensure rated capacity from each unit and such that the air velocity across each coil shall not exceed 150 meters per minute. The coil shall be pitched in the unit casing for proper drainage. Each coil shall be factory tested at 21 Kg./Sq.cm air pressure under water. Tube shall be hydraulically/mechanically expanded for minimum thermal contact resistance with fins. Fins spacing shall be 11 to 13 fins per inch (4 to 5 fins per centimetre). The cooling coils shall be ARI certified

4.4.7 FILTER SECTION

Each unit shall be provided with a factory assembled filter section containing washable synthetic type air filters having anodised aluminium frame. The filter shall have minimum 90% efficiency down to 10 microns. The media shall be supported with HDPE mesh on one side and aluminium mesh on other side. Filter banks shall be easily accessible and designed for easy withdrawal and renewal of filter cells. Filter framework shall be fully sealed and constructed from aluminium alloy.

4.4.8 VIBRATION ISOLATORS

Vibration isolators shall be provided with all air handling units. The fan and motor framework shall be isolated from the AHU framework by means of spring type vibration isolators. The AHU shall be mounted on PCC blocks/frame suitable for weight of the AHU. The framework of the AHU and the PCC blocks/frame shall be isolated by means of neoprene mats of size 150mmx150mm in two layers with 20g G.S.S. sheet sandwiched in between.

4.4.9 ACCESSORIES

Each air handling unit shall be complete with the accessories including but not restricted to the following.

- Insulated isolation valves, Y-strainer, header drain valves, unions and insulated condensate drain piping upto sump or floor drain in air handling unit room / nearest point.
- Manual air vents at high points in the cooling coil and drain plug in the bottom of the coil.
- Thermometers in thermometer wells and pressure gauges in test points in chilled water supply and return lines.

4.5 ELECTRIC HOT WATER GENERATOR

4.5.1 The shell of the generator shall be vertical / horizontal, shell type, designed, Constructed and tested for the specified water flow rates and temperatures. The hot water generator shall be suitable for Indoor / Outdoor application (exposed to sky)

4.5.2 The shell of the generator shall be made 10mm M.S steel sheet and dish of 12mm M.S steel sheet with electric fusion welded seams. In accordance with ASME section 4 / unfired pressure Vessel code IS 2825

4.5.3 Electric heaters shall be provided in banks of equal capacity distributed our three power phase, heaters shall be mounted within seamless copper / Incoloy sheathed electrically resistant U-tubes floor mounted with EPDM Rubber and S.S steel with magnesium anode for Longevity and easy maintenance of heaters. The heaters shall be easily removable externally, without opening terminal plate or disturbing other components. Heaters shall be suitable for 415 + 10% volts, three phase AC supply and shall be in direct contact with water contained in shell.

4.5.4 The hot water generator shall be provided with following accessories.

a. Inter locking of electric panel cover with incoming switch / limit switch.
b. Flow switch, automatic alarm for low water level and reset type high temperature switch with respective indication lights.
c. Drain point with GM valve and Descaling point with GM valve.
d. Automatic air vent and automatic high temperature pressure relief valve.
e. Step control thermostat for individual heaters bank/Master safety thermostat.
Flanges for water pipe connections.

4.5.5 The shell shall be tested in the factory up to two times the working pressure as specified by head of water column in tender or 21 kg/sq. cm. gauge whichever is higher.

4.5.6 The shell shall be insulated with 50mm thick resin bonded fiberglass wool insulation and covered with 26 SWG aluminum cladding.

4.5.7 The electric control cabinet shall be provided and mounted directly on main frame. All controls and terminals shall be factory wired and tested. The control cabinet shall consist of following major controls of rated capacities:

a. Incoming S.F.U / M.C.C.B
b. ON / OFF Rotary switch for individual banks with light.
c. SCR with MCB for individual heaters.
d. Indicating lights for ON status for individual banks.
e. Fault indicating lights.
f. Alarm with manual reset.
g. Cabling and control wiring.
h. Three phase ammeter and voltmeter with selector switches.
i. Control cabinet shall be BMS compatible.

The panel shall be openable only after switching off the incoming power supply.

4.6 CHILLED AND HOT WATER PIPING

4.6.1 Following material shall be used for pipes and fittings.

Pipes Nominal size (mm)	**Material Specification**
≤150	IS 1239 Part-1 (Mild steel medium class (Black steel) tube)
200 and above	IS 3589 Gr. FE 48 (6mm thick ≤300NB, 8mmthick > 300NB &≤ 600NB, 10mm thick above 600 NB) (welded black steel pipe, class 2)

Fittings Nominal size (mm)	**Material Specification**
≤40	Socket welded, ASTM A85 as per ANSI B16.9
50-150	Butt welded, ASTM A234 Gr. WPB as per ANSI B16.9
≥200	Site fabricated from IS 3589 Gr. FE 48 (6mm)

Flanges Nominal size (mm)	**Material Specification**
≤ 150	ASTM A85 as per ANSI B16.5 (#150 class)
≥200	IS 2062 Gr.A, as per ANSI B16.5 (#150 class)

All jointing in the pipe system shall generally be by welding, unless otherwise mentioned, or directed at site. All welding shall be done by qualified welders and shall strictly conform to BIS Code of practice for manual metal arc, welding of Mild Steel.

Spacing of pipe supports shall not exceed the following:

Pipe size	**Spacing between supports**	**Rod Size**
Upto 12 mm	1.5 Meter	8 mm
15 to 25 mm	2.0 meter	8 mm
30 to 150 mm	2.0 meter	8 mm
Over 150 mm	2.5 meter	12.5 mm

4.6.2 All welded joints (except pipe welded end-to-end) shall be made by use of one-piece welding flanges, caps, nozzles, elbows, branch outlets and tees of approved make. Cut samples shall be submitted for approval, if directed. All such fittings etc., shall be of a type which maintain full wall-thickness at all points, simple radius and fillets, and proper bevels or shoulders at ends. All job welding shall be done by the electric arc welding process in accordance with the following:

- All joints shall have 45 degree bevel type, pipe mill-bevelled or machine-bevelled by the contractor.
- All scale and oxide shall be removed with hammer, chisel or file and bevel left smooth and clean.

4.6.3 All pipes and their steel supports shall be thoroughly cleaned and given one primary coat of red oxide paint before being installed. For vibration isolators remoulded polyurethane pipe sections of 160 Kg/m3 density with adhesive shall be fixed between pipe and MS support. 8 mm thick MS ‘U’ clamp with resistoflex shall be fixed on the pipe so that the pipe is kept in position.

4.6.4 Ball and butterfly valves conforming to the following specifications shall be provided as shown on Drawings:

Size	Construction	Ends	Type
15 to 40 mm	Brass ASTM B62	Screwed	Ball
50 mm and over	Body Cast iron,	Wafer	Butterfly

Valves shall have non-rising spindles unless specified otherwise and shall be suitable for PN 10/ PN 16 rating.

4.6.5 BUTTERFLY VALVES

Butterfly valves shall perform the function of isolating valves. Butterfly valves shall have cast iron body with black nitrile rubber seat and shall be suitable for PN 10/ PN 16 rating as indicated in the schedule of quantities. All butterfly valves shall be provided with locking devices. Valves 250 mm and above dia shall be gear driven.
Butterfly/Ball valves shall be provided at

i. Suction and delivery side of pumps.
ii. Inlet and outlet of each condenser, chiller & cooling towers.
iii. Inlet and outlet of AHU, FCU, TFA etc.
iv. All drain connection from equipments

4.6.6 BALANCING VALVES

Manual double regulating balancing valves shall be provided at chiller, condenser, various tap-offs and each AHU outlet line.

The valves shall have built-in pressure-drop measuring facility to compute flow rate across the valve. The test cocks shall be long enough to protrude out of pipe insulation.

4.6.7 All ball valves and ball valves with Y strainer shall be bronze forged body construction with chrome plated bronze ball and handle of stainless steel constructions.

4.6.8 NON RETURN VALVES

Non return valves shall be dual plate check valve conforming to relevant Codes and in accordance with the following Specifications:

Size	Construction	Ends
50 to 150 mm	Body cast iron, gun metal plate.	Flanged
200 mm to 450 mm	Body cast iron, plate carbon steel with 11% chrome overlay.	Flanged

The spring and hinge/stop pin shall be SS304 and bearing PTFE material. Valves shall be PN 10/PN 16 rating.

4.6.9 Y-STRAINER

The Y-strainer shall be fabricated out of MS `C' class pipe two size higher than that of strainer pipe size. Flanges as per BS 10 shall be provided at inlet & outlet of connections. The body shall be pressure tested at 10 Kg/Sq. cm and shall be hot dip galvanized.

Permanent magnet shall be provided in the body of the strainer to arrest MS particles. Filter element shall be of nonmagnetic 20 gauge SS sheet with 3 mm perforation. Strainer shall be provided at inlet of each AHU & chilled water pumps. It should be easily removable when required to be cleaned. Isolating butterfly valves at either end of the strainer shall be provided.

4.6.10 **Flanges** shall be of PN 10/PN 16 rating. Flanges shall be provided with bolts, washers, nuts and suitable rubber insertion gaskets (minimum 5 mm thick)

4.6.11 All piping work shall be carried out in a workmen like manner, causing no or minimum disturbance to the existing services, buildings and structure.

4.7 SHEET METAL DUCT WORK

4.7.1 All duct work shall be constructed out of best quality cold annealed, flat galvanized sheet steel (galvanized to specifications of IS : 277 (latest edition). The grade of coat for GS sheet shall be 120 gm / sq m (table 2 of IS 277-1992).The joints shall be finished straight and neat. The duct work shall be supported / secured from roof slab or any other building member using angles, rods as may be required.
Thickness of sheets shall be as shown in the tables given below:

Maximum size of Rectangular Duct (in m)	**Round Duct dia (mm)**	**Thickness of GS Sheet in mm**
Upto 750	Upto 600	0.63 (24 G)
751 to 1500	601 to 750	0.80 (22 G)
1501 to 2250	750 to 900	1.00 (20G)
2251 & above	901 & above	1.25 (18 G)

The fabrication of duct shall be done as per IS : 655 (latest edition). Transverse joints, connections, bracing, seam etc. shall be as per IS : 655.All the ducts over 300 mm in either dimension shall be cross broken except those on which rigid board insulation is applied. Stiffening angles shall be black structural steel and riveted to the duct work. The longitudinal seam on all ducts may be Pittsburgh seam hooked and hammered. Ducts of size 600 mm and above shall be reinforced between the joints. Where drive-slips are used, angles shall be riveted to the ducts 50mm from slips.

4.7.2 Simple elbows, transformation sections shall be formed with Pittsburg corner seams. Complicated fittings shall be constructed with double corners. Elbows, bends and
Offset pieces shall have a center line radius of not less than 1.5 times the radial of width of the duct. Turning vanes should be provided at required spacing such that the aspect ratio of each individual elbow formed by vanes shall not be more.

4.7.3 Dampers shall be provided in the duct work for proper control and balancing of air distribution. Dampers shall have easily accessible operating mechanism. The
operating mechanism shall consist of links, levers and quadrants as required for proper control and setting in a desired position. The position of the handle of Damper operating mechanism shall be clearly visible and it shall indicate the position of the damper in duct. Dampers, splitters and their operating mechanism shall be fabricated of GS sheets of two gauges heavier than duct piece having these fittings and shall be easily accessible through suitable access doors in the ducts.

4.7.4 FIRE DAMPERS

The fire dampers shall be fabricated out of 1.6 mm galvanized sheet steel and shall be multi leaf type. The damper blades shall be provided on both ends using chrome
plated spindles in self-lubricating bushes. The damper shall have spring type motorized actuators, control panels and temperature sensors. Stop seals shall be provided on top and

bottom of the damper housing made of 16G GSS. For preventing smoke leakage side seals shall be provided. The fire dampers of at least one and a half hour rating.

4.7.5 DIFFUSERS & GRILLES

All side wall supply grills shall be double deflection type with both horizontal and vertical vanes being adjustable. Grilles shall be provided with multi-louver damper for volume control with adjustable handle. Side wall grille shall be similar to Tuttle & Bailey. All return air and exhaust grilles shall have only horizontal louvers. The supply air grills and return air grills shall be on same face and continuous. Supply air ceiling diffuser shall be provided with volume control dampers which can be operated from below.

All the diffusers and grilles shall be of powder coated aluminum. Diffusers and grilles shall be provided with sponge rubber gasket between flanges and wall or ceiling. The shade of Grills and Diffuser shall match the Building finish and got approved by Engineer.

4.8 FILTERS

4.8.1 PRE-FILTERS

Air flow	As required for specific system
Frame	Aluminium anodised, cassette type made of 2.00 mm thick sheet
Medium	Polypropylene non-woven supported by anodised aluminium mesh on one side HDP mesh on other side, 11 folds per feet of face area
Sealing of media	By means of ductile epoxy resin
Efficiency	90 % down to 10 micron particle size (minimum)
I.P.D.	<3mm wg at rated cfm
F.P.D.	6 mm wg (maximum)
Thickness	50mm
Filter face velocity	500FPM (maximum)

4.8.2 MICRO VEE (FINE FILTER)

AIR FLOW	As required for specific system
FRAME	Aluminium anodised, flanged type made of 2 mm sheet
Medium	Polypropylene non woven supported by anodised aluminium mesh on one side HDP mesh on other side 11 folds per feet of face area
Sealing of media	By means of ductile epoxy resin
Efficiency	99.9 % down to 5 micron particle size (minimum)
I.P.D.	<8mm wg at rated cfm
F.P.D.	15 mm wg
Thickness	305mm or as specified in schedule of quantities
Filter face velocity	500 FPM (maximum) for 305 mm thick
Gaskets	Rubber gasket on flange.
Packing	Each filter shall be packed in a polythene bag and then placed in carton box.

4.8.3 HEPA FILTER (ABSOLUTE)

AIR FLOW	As required for specific system
FRAME	Aluminium anodised, flanged type made of 18G sheet
Medium	Micro Fibre glass paper, Borosilicate.
Sealing of media	By means of ductile epoxy resin
Efficiency	99.97 % down to 0.3 micron particle size (minimum)
I.P.D.	<15mm wg at rated cfm
F.P.D.	40 mm wg

Separators	Corrugated aluminium
Thickness	305 mm or as specified in schedule of quantities
Filter face velocity	500 FPM (maximum) for 305 mm thickness
Gaskets	Rubber gasket, 6 mm thick to be fixed on flange and sealed on internal edges with epoxy resin.
Packing	Each filter shall be packed in a polythene bag with either face protected by flat hard board/ ply. Assembly to be packed in strong cardboard cartons printed with handling and opening instructions.

4.8.4 CONTAINMENT HOUSING FOR BSL-3 LAB HEPA FILTERS

The Containment Housing shall be made in SS 304 (14 gauge) with air tight and leak proof construction. The HEPA filter plenums shall have provision to carry out on site HEPA filter scanning, testing and validation, magnehelic gauge to monitor pressure drop across the HEPA filter, fumigation ports to allow IN-SITU decontamination of HEPA filters and Bag-In-Bag-Out facility for filter change.

4.9 **CENTRIFUGAL FANS**

4.9.1 Fans, Aerofoil, forward or backward curved, SISW or DIDW, shall be licensed to bear the AMCA Air and Sound Certified Ratings Seal. The test standard used shall be ANSI/AMCA 210-85, ANSI/ASHRAE Standard 51-1985 “Laboratory Method of Testing Fans for Rating” and AMCA 300 “Reverberant Room Method for Sound Testing of fans”.

4.9.2 All fans shall be dynamically trim-balanced to ISO1940 and AMCA 204/3 - G2.5 quality grade after assembly. A computer printout with vibration spectrum analysis shall be attached to the fans.

4.9.3 Fan should be of G.S.S. , the Steel sheet should be JFE Galva zinc (Base metal cold rolled), JIS G3302, SGCC with Z22 (minimum coating weight on both sides @ 220 g/m2) zinc coating & Zero Spangle, skin passed, chromated and dry.

4.9.4 Fans housing shall be of an appropriate thickness to prevent vibration and drumming. The fan scroll shall be attached to the side plate by means of continuous lock seam or intermittent spot welding. The wheel and inlet cone shall be aerodynamically designed and constructed to provide maximum performance and efficiency as published by the manufacturer.

4.9.5 Fans must be physically capable of operating safely at every point of rating at or below the “minimum performance” limit for that class as defined in AMCA standard 99-2408-69 “Performance Class of Operating Limits for Centrifugal Fans”.

4.9.6 Shafts sizes shall be carefully calculated and designed such that the maximum operating speed (RPM) shall not exceed 75% of the first critical speed. For any application that is not a standard product from catalogue of the fan manufacturer detailed calculation of critical speed characteristic shall be submitted for approval.

4.9.7 Shafts shall be made of carbon steel (C45) machined and polished to tolerance of standard ISO 286-2 - grade g6. Protective coat of anti-rusting shall be applied to all bare surfaces of the shafts at the factory.

4.9.8 Bearings shall be of self-alignment (concentric) type with adaptor sleeve bearing. Bearings of eccentric locking collar with grub screw type are not acceptable. Bearing shall be maintenance free with permanently lubricated sealed ball bearing type. Bearing life shall be at least 75,000 hours based on basic rating life, L10 of ISO 281 standard. Calculation sheet of Bearing Life shall be submitted for approval.

4.9.9 Motor installed shall be of a minimum 130% of the fan power absorbed (Brake horsepower) and shall have sufficient torque available for starting and continuous operation.

4.9.10 Belts and pulleys shall be sized for a minimum 150% of the installed motor horsepower. The belt speed shall not exceed 30m/s. The pulley shall be of Taper Lock SPZ, SPA, SPB or SPC type. Conventional type of pulley is not acceptable. Both fan and motor pulley shall be balanced to the quality grade G.2.5.

4.9.11 Fan outlet velocity shall not exceed 10% of the main duct air velocity designed (0.1" per 100 ft or 1 Pascal per meter duct length). Pressure Loss is as referred to in SMACNA Standard, unless otherwise specified.

4.10 INSULATION

4.10.1 Thermal insulation material for Duct & Pipe insulation shall be closed cell Aluminium faced Elastomeric Nitrile Rubber. The duct insulation shall have self-adhesive backing with a peal-off cover for easy installation at site. Thermal conductivity of the insulation material shall not exceed 0.038 W/moK or 0.212 BTU / (Hr-ft^2-^{o}F/inch) at an average temperature of 30^{o}C. Density of the nitrile rubber shall be 40-60 Kg/m^3. The product shall have temperature range of –40 ^{o}C to 105^{o}C. The insulation material shall be fire rated for Class 0 as per BS 476 Part 6: 1989 for fire propagation test and for Class 1 as per BS 476 Part 7, 1987 for surface spread of flame test. Water vapour permeability shall be not less than 0.024 per inch (2.48 x 10-14 Kg/m.s.Pa i.e. μ>7000: Water vapour diffusion resistance).

4.10.2 The insulation thickness for duct work shall be as follows:

a) Supply Air duct - 19 mm
b) Return/exhaust Air duct - 13 mm

4.10.3 Chilled water and Hot water piping shall be insulated in the manner specified herein. Before applying insulation, all pipe work and fittings shall be brushed and cleaned, and dust, dirt, mortar and oil removed.

All pipes shall be provided with a coat of zinc chromate primer, followed by two coats of cold setting adhesive compound. Thermal insulation shall then be applied as follows:

Pipe size (mm)	**Thickness for expanded Polystyrene (TFQuality)mm(24 Kg/m3)**
10 to 40	25
50 to 150	50
Above 150	75

Premoulded pipe sections shall be placed over the pipes, the longitudinal and transversal joints of these pipe sections shall be sealed with the adhesive compound. The insulation shall be continuous over the entire run of piping, fittings and valves.

Insulation shall be applied only after the piping system has been satisfactorily tested for leaks at 1.5 times the working pressure or at minimum 10 kg/sq.cm. test pressure. All insulated pipes shall be covered with two layers of 400 gage polythene sheet to act as vapour barrier. PVC straps at 400 mm centre shall be used to hold insulation and vapour barrier together. Insulation shall be covered with 26 gaugealuminium sheet cladding and finished in neat and clean manner so as to achieve true surface. All longitudinal and transverse joints in the outer cladding shall have a minimum overlap of 50 mm duly beaded and grooved and shall be sealed.

4.11 CONTROLS

4.11.1 3-WAY MIXING VALVE

For Air Handling Units, 3-way mixing valves shall be provided in chilled water and

hot water line at each unit. Each valve shall be actuated by a space thermostat. Constant space conditions shall be maintained by allowing all of the chilled water to either pass through the coil or to bypass the coil and mix-with the chilled water return. The valve shall revert to fully bypass position when fan is shut off. Valve shall have brass seat, self adjusting Teflon cone packing and constant total flow through full plug travel. The valve shall have min. travel time between fully open and closed position.

4.11.2 Thermostats

Shall be electronic type with 3 point output for modulating 2 position reversible motor of 3-valve of AHUwith sensing element located in the return air stream. The profile, mounting arrangements and exact location of the thermostats shall be as approved by the Engineer in charge. All thermostats shall be supplied with the standard mounting boxes, as recommended by the manufacturer.

4.11.3 **Thermometers** shall be mercury-in-glass type with cast brass scale in a steel casing. Thermometers shall be filled with red reading mercury. Thermometers shall be of the separable socket type and shall have extended neck, where required, for insulated pipes. The scale shall be 23 cm long. Thermometers shall be installed at chilled water and hot water supply and return at air handling units, supply and return at chillers and condensers. Range of scales shall be 30-120 F (0-50) for air conditioning applications.

4.11.4 **Pressure Gages** shall be installed on suction and discharge sides of pumps, chilled water and hot water supply and return at air handling units, inlet and outlet at chillers, and condensers. Suction side gauges at pumps shall be compound gauges of 150 mm dia.

4.12 BUILDING MANAGEMENT SYSTEM ROOM PRESSURE CONTROL

Building Management System shall provide control and monitor the operation of HVAC system and laboratory operating parameters in the BSL-3 Lab rooms/zones:

- Room/Area/zone pressure
- Room/Area/zone temperature & RH
- Ambient temperature & RH
- AHU and Exhaust Blower operating status
- VFD status & VAV status
- OPEN/Close dampers status
- Supply & exhaust air quantity in each BSL-3 Laboratory rooms/zone.

The supply and exhaust air duct of each BSL-3 Lab shall be provided with VAV device with flow measurement sensor for adjustment and balancing of the desired supply and exhaust air quantities. The Air Handling Units and Exhaust Blowers shall be provided with Variable Frequency Drives (VFD's). The VAV's and VFD's shall be controlled to maintain the set laboratory inside pressure conditions through BMS Program.

The Building Management System shall allow START/STOP operation of the Complete HVAC system in AUTO Mode. However, the system shall have the provision to over-ride the parameters (password protected) and to enable START/STOP operation of the HVAC system in MANUAL mode, as well. The BMS shall provide alarm in case of HVAC system failure, collapse in room/zone negative pressure and deviation of any operating parameter from the set limits.

Each BSL-3 Laboratory Rooms/Zones area shall be provided with Pressure Sensors, Temperature Sensors and RH Sensors, wired and integrated with the BMS to display the operating conditions.

Each room/zone of BSL-2 Laboratory shall be provided with pressure sensor, temperature sensor and RH sensor and shall be monitored through the BMS.

The Building Management System shall be complete with PLC, Sensors, Controllers, power and control wiring, customized Software and other associated field devices, hardware and accessories complete in all respect, as per requirement and approved design. The HVAC system START and STOP sequence shall be interlocked to prevent positive pressurization of the BSL-3 laboratory, at any point of time. A dedicated desktop PC shall be provided for the BMS operation and control along with a parallel secondary display screen of 32" size at the BSL-3 laboratory entrance to show the operating parameters.

The BMS control panel shall be powered through UPS. Upon restoration of power after a power failure, the BMS shall start the HVAC system automatically without any human interface and restore the normal operational set points of the system.

4.13 CANOPY HOOD

Canopy hood shall be provided above the loading and unloading doors of the Autoclave to capture steam vapor and heat generated by the equipment.

The canopy hood on the containment side shall be ducted and connected to the HEPA filtered laboratory exhaust and on non-containment side shall be ducted and connected to normal exhaust. The Canopy hood exhaust air capture velocity shall be minimum 50 fpm.

4.14 TESTS AFTER INSTALLATION

4.14.1 SAFETY AND CONTROLS

a) Interlocks for compressor motor with chilled water pumps shall be checked.
b) Operation of Flow switch in chilled water lines shall be checked.
c) High pressure-stat shall be checked
d) Low pressure stat shall be tested
e) Anti-freeze thermostat shall be tested
f) Oil failure switch shall be tested

4.14.2 After Air balancing, the quantity of air through every outlet and room performance parameters for pressure and temperature shall be tested

4.14.3 Capacity Test of Chiller, Air Handling Units, Exhaust Blowers etc.

4.14.4 BMS function and operation of system through BMS

4.14.5 Any other test / check decided and directed by Engineer to acertain the correctness of installation and verify the performance and capacity of equipment/system.

5.0 TECHNICAL SPECIFICATIONS - ELECTRICALAND ASSOCIATED WORKS

5.1 CONDUIT SYSTEM, CABLE TRAY, CABLE LADDER AND TRUNKING INSTALLATION

This section describes the supply and installation of wiring facilities systems include conduits, cable trays, cable ladder and Trunking system, c/w associated fittings and accessories. All cables running above the suspended false ceiling, columns, or on surface shall be supported by proper clamps, on cable tray or cable ladder system. No free hanging of cable is allowed.

5.2 Standards

The complete wiring facilities system shall be manufactured, supplied, installed and tested in accordance with the latest revision of the Indian standards and the appropriate BS / IEC include:

1.	Steel Conduit and Fitting Accessories	IS:9537 (Part-II)/ BS4568 & BS731
2.	PVC Conduit and Fitting Accessories	IS-9537/1983 (Part-III)/BS6099 & BS4607
3.	Cable Tray	BS729
4.	Cable Ladder	BS729
5.	Cable Trunking	BS4678

The complete wiring facility system shall conform to the requirements of all relevant local codes, as applicable, together with the additional requirements referred to in the approved specification and drawings.

5.3 PVC Conduit and Accessories

PVC Conduit

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

PVC Conduit Accessories

1. Accessories used for conduit wiring shall be of an approved type conforming to IS: 3837-1966.
2. All accessories used shall be of standard white or black color, identical to conduit used.
3. Plain conduits should be joined by slip type of couplers with manufacturer's standard sealing cement.
4. All conduit entries to outlet boxes, trunking and switchgear are to be made with adaptors female thread and male bushes screwed.
5. PVC-switch and socket boxes with round knockouts are to be used. The colors of these boxes and the conduits shall be the same.
6. Standard PVC circular junction boxes are to be used with conduits for intersection, Tee-junction, angle-junction and terminal. For the drawing-in of cables, standard circular through boxes shall be used.
7. Samples of accessories shall be submitted for approval prior to installation.
8. All jointing of PVC conduits shall be by means of adhesive jointing. Adequate expansion joints shall be allowed to take up the expansion of PVC conduits.

5.4 Installation

1. The conduit layout and conduit routes shall be approved.
2. Conduit routes shall be chosen for easy, straight runs with minimum bends and crossings. Generally they shall follow the structure of building, running at right angles or in parallel to floors and ceilings. Conduits shall be kept within 300 mm of floors and ceilings when running parallel to them.
3. Outlet boxes for housing accessories shall be used as draw boxes. The total number of draw boxes shall be kept to a minimum and shall be provided so that conduit runs do not exceed 12 m or have more than two right angle bends.
4. All conduits shall be kept clear of gas and water pipes. In particular, conduits shall be at least 150 mm away from gas pipes. Where proximity to these pipes is unavoidable, they shall be effectively segregated e.g. using rubber or other insulating material to prevent appreciable voltage differences at possible points of contact. Segregation from extra

low voltage circuits and telecommunication circuits shall also apply unless these are wired to the same voltage requirements as lighting and power circuits.

5. Conduits from different distribution boards shall not be connected to the same junction box. Each run of conduit shall be assembled complete with draw-in-wires.

Wiring / Cabling

1. All the wiring installation shall be as per IS: 732 with latest amendment.
2. The conduit system must be installed free of obstructions and sharp corners before any cables are drawn in. Conduits shall be thoroughly cleaned to remove dirt immediately prior to the drawing in of cables.
3. Cables shall be continuous throughout conduit lengths and no joints are permitted. There shall be no kink in cables, neither any cut, abrasion or chink in the cable insulation.
4. Cables for power and lighting circuits and extra low voltage systems shall not be drawn into the same conduit. Lighting and power circuits shall run in separate conduits except, where an adopter box is employed as final distribution point, a number of final circuits are grouped together in larger conduits between the distribution board and the adopter box provided that all final circuits in one conduit are of the same phase. In the case of three phase circuits, all three phases including neutral, if any, shall be drawn into the same conduit.
5. Flexible conduits shall have a separate earthing conductor installed within the tubing and connected at conduit ends. Flexible conduits in general shall not be used for more than 3m length.
6. Maximum number of PVC insulated 650/1100V grade/copper conductor cable shall conform to IS:694-1990.

5.5 Cable Tray/ Cable Ladder

Cable Tray and Cable Ladder systems are intended for the support and accommodation of cables and possibly other Electrical equipment in Electrical/Instrumentation/ Communication systems.

The cable trays / ladders shall be fabricated according to the design specified by IEC 61537 and should be tested for Safe Working Load (SWL). The relevant details of SWL and the

load chart with respect to SWL, supporting distance and the deflection should be according to the following chart.

Safe Working Load (SWL) with a span length up to 5 meters								
Description	Side Height (in mm)	Width (in mm)	Span length (in meters)					
			1.5m	2m	2.5m	3m	4m	5m
			Permitted Load (in kg/meter)					
Perforated tray	60	100-500	150	100	50	-	-	-
	85	100-500	175	110	50	-	-	-
	100	150-500	185	130	75	60	-	-
Cable Ladder	60	200 - 600		225	150	110	45	-
	110	200 - 600		310	-	140	65	50

Safe Working Load (SWL) with a span length up to 10 meters									
Description	Side Height (in mm)	Width (in mm)	Span length (in meters)						
			4m	5m	6m	7m	8m	9m	10m
			Permitted Load (in kg/meter)						
Perforated Cable	110	200 - 300	160	110	75	-	20	-	-

Tray for long span distance		400 - 600	200	150	100	-	40	-	-
	160	200 - 300	230	180	140	100	70	-	-
		400 - 600	250	200	160	130	100	-	-
Cable Ladder for long span distance	110	200 - 300	160	110	80	40	-	-	-
		400 - 600	210	150	100	70	-	-	-
	160	200 - 300	230	180	140	100	70	-	-
		400 - 600	250	200	160	130	100	-	-
	200	200 - 600	-	-	300	250	200	140	100

Fabrication of Tray / Ladder and accessories at site and welding is not permitted. In unavoidable circumstances, If any cut or holes are made in the trays/Ladder/accessories, zinc spray need to be applied over the surface. The metal edge has to be protected by edge protection sleeves to avoid cable damage. Edge of the supports has to be protected with plastic END caps. Screwed connections and internal fixing Devices should not create any damage to the cable when correctly fixed. Sudden or jerky motions shall not be used to tighten reusable screw connections.

Cable Tray:-

The cable tray and all accessories shall be fabricated from sheet steel and has to be galvanized against corrosion confirming to EN10346/ ISO1461-1999 for installations in indoor and outdoor applications respectively. The cable trays shall be supplied in standard lengths of 3000 mm and the width of the tray shall be as follows.

Width: 100, 150, 200, 300, 400, 500.

All the cable tray accessories like Bend's, TEES's, Cross over's etc. should be in accordance with IEC 61537 and shall be factory fabricated. The accessories shall be from the same material as of the tray and modular type, it should be connected with the trays by using fasteners. Typical details of trays, fittings and accessories. etc. are shown in the enclosed drawings.

For Cable trays, the thickness of cable tray should be 2 mm up to span length of 1.5 meter, 2.5 mm for span length between 2 to 3 meter and 3 to 4 mm for span length between 4 and 10 meter

Cable ladder:-

The cable Ladder and all accessories shall be fabricated from sheet steel and has to be galvanized against corrosion confirming to EN10346/ ISO 1461-1999 for installations in indoor and outdoor applications respectively. The cable ladders shall be supplied in standard lengths of 3000 mm and the width of the ladder shall be as follows.

Width: 200 to 600 mm in multiples of 100 mm

Maximum rung spacing in the ladder shall be 300mm. The rung's should be made of C profiles suitable to fix cables by special metal clamps according to the drawing. The ladder shall be of riveted and foldable type for easy transportation and to avoid damage during transportation and storage. All the ladder accessories like Bend's, TEES's, Cross over's etc. should be designed in accordance with IEC 61537 and shall be factory fabricated. The accessories shall be made from the same material as of the ladder and modular type, it should be connected with the ladder by using fasteners. The details of ladders, fittings and accessories etc. are shown in the enclosed drawing.

The Cable Ladders thickness should be 2.5 mm up to span length of 1.5 to 2 meter, 3 mm for span length between 2.5 to 4 meter and 3 to 4 mm for span length between 5 and 10 meter

Mounting Accessories (supports and Brackets):-

The mounting accessories shall be fabricated from steel and has to be hot dip galvanized against corrosion confirming to ISO 1461-1999 for installations in both indoor and outdoor applications and should be of completely modular type.

All supports and Brackets should be factory made, hot dip galvanized after completing welding, cutting, drilling, other machining operations and tested according to IEC 61537 according to the arrangements in the enclosed drawing. The system shall be designed such that it allows easy assembly at site by using Bolts and Nuts. The main support and brackets shall be fixed at site using necessary brackets, clamps, fittings, bolts, nuts and other hard ware etc to form various arrangements required to support the cable trays. Welding of the components at the site shall not be allowed.

Corrosion Protection:-

The cable tray/ ladder/accessories shall be galvanized according to EN10346 / ISO 1461-1999 for installations indoor and corrosive outdoor applications respectively. Sample tray/ ladder/ accessories/ mounting accessories and supports should be salt spray tested according to ISO 9227 for > 150 hours & 500 hours. (*155 hours according to class 3 for pre-galvanized surface and 550 hours according to class 6 for Hot dip Galvanized surface as per ISO)

5.6 WIRES AND CABLES

The wires shall be single core PVC insulated 1.1 KV grade stranded twisted wires and shall comply with following standards with update amendments under the specifications.

- IS-3961: Current rating for cables.
- IS-5831: PVC insulation and sheath of electric cables.
- IS-694: PVC insulated cables for working voltage up to and including 1100 volts.
- IEC-54 (I): PVC insulated cable.

The wires shall be color coded - (red, yellow, blue) for Phases, black for Neutral and green for Earth. All LT cables for normal power/control circuits within buildings shall be XLPE insulated and PVC sheathed Aluminium conductor and control cables shall be PVC insulated and PVC sheathed copper conductor respectively. Cables in service duct, open trench, direct-laid underground in soil shall be by means of armoured cables. Non-armoured cables shall only be laid in conduits, trunkings or tray/ladder for mechanical protection.

All cables shall be manufactured and constructed in accordance of the following standards with the latest revision:

1.	IS: 694	HRPVC/XLPE insulated (heavy duty) electric cables for working voltage up to and including 1100 volts.
2.	IS: 424-1475(F-3)	Power cable-flammability test.
3.	IS: 7098(I)	Specification for cross-linked polyethylene insulated LSZHPVC sheathed cable for working voltage up to 1.1 KV.
4.	IS: 1554	Specification for PVC insulated (heavy duty) electric cables for working voltages up to and including 1100 volts.
5.	ASTM-D: 2863	Standard method for measuring the minimum oxygen concentration to support candle-like combustion of plastics (Oxygen Index).
6.	ASTM-D: 2843	Standard test method for measuring the density of smoke from the burning or decomposition.
7.	IEEE: 383	Standard for type of tests Class-IE, Electric cables, field splices and connections for power generation station.
8.	ASTME: 662/ IEC: 754(x)	Standard test method for specific optical density of smoke generated by solid materials
9.	IS: 10418	Cable drums.

10	IS-10810	Testing method of cable.
11.	IS-6121	Cable glands.

5.7 SWITCHES& SOCKETS

Lighting switch inside BSL-3 Lab containment area shall be IP 66 rated

6/16AMP Switch Socket Outlets : Switch socket outlets shall be as per BS: 1363 single pole 6Amp 3round pin, except otherwise specified and suitable for surface or flush mounting according to location. Switches shall be of the quick-make and break type silent action totally enclosed with solid silver alloy contacts. Switched socket outlets for indoor use shall be housed in suitable galvanized steel boxes as per BS: 4662 with conduit knockouts. Types and finishes of socket plates shall match those for the lighting switches.

6/16 AMP Switch Socket inside BSL-3 Lab containment area shall be IP 66 rated

5.8 Miniature Circuit Breaker

The MCB shall be suitable for manual closing, opening and automatic tripping under overload and short circuit. The MCB shall be rated for 10KA fault level. The MCB shall generally conform to IEC/ IS: 60898
The MCB shall be suitable for housing in the lighting boards and is suitable for connection at the outgoing side by tinned cable lugs and for bus-bars connection on the incoming side.

5.9 Earth Leakage Circuit Breaker

ELCB shall be 4 pole 415 volts 50Hz, 30-300mA sensitivity. The rating of the ELCB shall be as required and approved. These shall be suitable for manual closing and opening and for automatic tripping under earth fault circuit of 30-300 mA. The enclosure of the ELCB shall be moulded from high quality insulating material. The material shall be fire retardant, anti-tracking, non-hygroscopic, and impact resistant and shall with stand high temperature. All parts of switching mechanism shall be non-greasing, self-lubricating material so as to provide consistent and trouble free operation. Operation of ELCB shall be independent of mounting position and trip free type.

5.10 Lighting/Small Power Distribution Boards

Distribution boards shall be of standard make with MCBs as per approved make given. Distribution boards shall be of steel sheet construction double door all welded enclosure of IP42 protection and powder coated painted. Ample clearance between the conductors of opposite pole and sheet steel body shall be maintained in order to obviate any chance of short circuit. Removable conduits entry plates shall be provided at top and bottom to facilitate drilling holes at site to suit individual requirements. Additional / separate adopter box of suitable size shall be provided to accommodate wires, cables and No. of conduits etc. The MCB shall be mounted on high grade rigid insulating support and connected by electrolytic copper bus bars. Each incoming MCB isolator shall be provided with solder-less cable sockets for crimping. Phase separation barriers made out of arc resistant materials shall be provided between the phases. Bus bars shall be colour coded for phase identification. Distribution boards shall be recessed in wall or mounted on surface of wall with necessary mounting arrangement.
Distribution board shall be provided with proper circuit identification name plate and danger sticker/plate as per requirement. All the distribution boards shall be provided with engraved name plates with ‘lighting’, ‘power’ or ‘UPS’ with DB Nos., as the case may be. Each DB shall be provided with circuit list giving details of each circuit. All the outgoing circuit wiring shall be provided with identification ferrules giving the circuit number &phase.Each distribution board shall have separate neutral and earth connection bar mounted within the DB each having the same number of terminals as the total number of outgoing individual circuits

from the distribution board. Conduit & cable armouring shall be bonded together & connected to the distribution board earth bar.

Distribution Boards shall be tested as per IEC61439-III standards and have following features:
Recess/ Surface type with integral loose wire box.
Phase/ neutral/ earth terminal blocks for termination of incoming & outgoing wires.
Din Channel for mounting MCBs.
Arrangement for mounting incomer MCB/ RCCB/ RCBO/ MCCB as required.
Copper Bus bar
Earthing bolts- 2 nos.
Wiring from MCBs to phase terminal block.
Terminal blocks should be suitable for termination of conductor/ cable of required size but minimum rated cross section of the terminal blocks should be 6 sq. mm.
Terminal block shall be made of flame retardant polymide material.
Colour terminal blocks and FRLS wires for easy identification of RYB Phases, Neutral and Earth.
Horizontal TPN DBs shall have Separate Insulated Neutral bar for each phase to achieve per phase Isolation (PPI)

5.11 MAIN LT PANEL

Medium Voltage power control centers (generally termed as switchboard panels) shall be in sheet steel clad cubicle pattern, free floor standing type, totally enclosed, compartmentalized design having multi-tier arrangement of the incomers and feeders as per details given in the schedule of quantities. The panels shall be of extensible type with provision of bus bar extensions. All panels shall conform to the requirements of the latest addition of IS and shall be suitable for 415 V, 3 phase AC supply or 230 V single phase AC supply as required.

All switch board panels or power control centers of free standing type shall have a bus bar chamber at the top and the cable compartment at the bottom or as approved by the Developer/Consultants depending upon the specific requirements of the job. The space between the bus chamber and cable compartment shall be suitably compartmentalized to accommodate either air circuit breakers or molded case circuit breaker of various ratings. The cable terminations shall be carried out on the rear side of the panels for which adequate space and clamping arrangements shall be provided. Where panels have to be installed with very little access space at the rear, the cable terminations shall be carried out in suitable cable alleys provided on the front of the panel. All the live parts shall be properly shrouded with Bakelite barriers. All the equipment shall be accessible from the front. However, protection relays, KWH meters, etc. may be mounted on the rear side/front side. Arrangements and marking of bus bars, main connections and wiring shall be in accordance with latest IS code. The structure of the panel shall be robust and provided with adequate bracing's to withstand the operation of the equipment and stresses due to system short circuit. The panels shall be fabricated out of best quality heavy gauge sheet steel. The panel shall be machine pressed with punched openings for meters, indicating lamps etc. The enclosure system shall be Modular in nature with bolted on construction. Enclosure parts/kits shall be interchangeable to reduce downtime during modification or maintenance work. Enclosure system and switchgear components shall be from same manufacturer.

BUSBAR

The bus bars shall be suitable for 4 wire, 415 Volts, 50 Hz, system. The main bus bar shall be made of high conductivity electricity conductor grade electrolytic AL 91E Aluminium and shall be liberally sized. In case of copper bus bar it shall be electrically conductor grade electrolytic copper and at the time of joining of two copper buses tinning will be done on the copper strips ends to a length equal to the lap length of the joint plus one each. The bus bars shall have uniform cross section throughout. The bus bars shall be capable of carrying the rated current at 415 Volts continuously. The bus bar will run in a separate busbarbus bar

chamber using bus insulators made of non-deteriorating, vermin proof, non-hygroscopic materials such as epoxy fibre, reinforced polyester or molding compound. The interval between the two insulators will be designed after considering:

a. Strength and safe load rating of the insulator,
b. The vibrating force generated during a fault,
c. A Factor of safety of 1.8
d. A set of insulators at both ends of the bus.

The bus bars shall be designed to withstand a temperature rise of 45o above the ambient. To limit the temperature rise in the bus bar chamber a set of louvers can be provided at strategically places considering the air circulation. The louvers provided will have a brass wire mesh covering from inside with more than 100 openings per sq. inch. The overall temperature of bus bar shall not exceed 85°C in any case. A current density of 1.0 Amps/Sq. mm shall not be exceeded for Aluminium bus bars.

All the bus bars shall be insulated with PVC heat shrinking sleeves suitably throughout (except at joints) the length. The electro galvanized galvanized high tensile steel nuts, bolts, plain or spring washers of suitable size will be used in connecting the various section of the bus bar. A minimum of 1.6 times the width of bus bar will be the lapping length of each joint.

EARTHING

The panels shall be provided with an aluminium or copper earth bus of suitable size running throughout the length of the switchboard. Suitable earthling eyes/bolts shall be provided on the main earthing bus to connect the same to the earth grid at the site.

INTERLOCKING

The panels shall be provided with the following interlocking arrangement.

a. The door of the switch-fuse compartments is so interlocked with the switch drive or handle that the door can be opened only if the switch is in `OFF' position. De-interlocking arrangement shall also be provided for occasional inspection.
b. It shall not be possible for the breaker to be withdrawn when in `ON' position.
c. It shall not be possible for the breakers to be switched on unless it is either in fully inserted positions or for testing purposes in fully isolated position.
d. The breaker shall be capable of being raked in to `testing' `isolated' and `maintenance' positions and kept locked in any of these position.
e. A safety latch to ensure that the movement of the breaker as it is withdrawn, is checked before it is completely out of the cubicle shall be provided.

PROTECTION & INTSRUMENTATION

Protection and instrumentation shall be as per standard specifications. All ACBs, MCCBs of Main LT Panel and Incomer MCCBs shall have inbuilt Earth Fault Protection

CONTROL WIRING

The control wiring of all the panels will be done with PVC single core flexible copper wires of cross section 1.5 sq. mm and 2.5 sq. mm. All the wiring involving current transformers or circuits with currents of more than 5 Amps will be wired with 2.5 sq. mm cross section wire and the others with 1.5 sq. mm. Similarly all the interconnecting between the incoming bus and the outgoing of 100 Amps and above rating shall be done by insulated copper strips of suitable sizes and equipment below 100 Amps rating shall be wired with insulated copper conductors. All of the control wiring will be done by properly dressing all the wires in a laminar manner either in a PVC duct of liberal size or bunched together by PVC strapping tapes at a distance not exceeding 150 mm. Each wire will terminate with a copper ferule crimped to the wire.

SURFACE TREATMENT

The each part of the fabricated panel will be subjected to seven tank treatment and all sheet metal accessories and components of power control centers and switchboard panels shall be thoroughly cleaned, degreased, de-rusted and hot dip phosphatized before red oxide primer is

applied. The panel shall be stove enameledgray shade finish and the Interior surfaces of the panel shall be painted to an off-white shade.

ENCLOSURE
The panel enclosure shall be totally dust and vermin proof and shall be suitable for indoor installation. All the cubical will be adopted with front located, outward openings, lockable doors having hidden hinges and a bolted back cover both using no deteriorating neoprene rubber gasket. Enclosure design shall be in accordance with

degree of protection IP 54 as per latest IS code. All the nut bolts handles, meters, knobs etc. appearing from outside of the panel should be in symmetry so as to give a neat appearance.

NAME PLATE
The panel as well as the feeder compartment doors shall be provided with name plate giving the switchboard/feeder descriptions as indicated on the approved drawings.

METERING, INSTRUMENTATION AND PROTECTION
Ratings, type and quantity of meters, instruments and protective devices shall be as per approved SLD and GA Drawing.

Current Transformers
CTs shall confirm to latest IS codes in all respects. All CTs used for medium Voltage application shall be rated for 1 kV. CTs shall have rated primary current, rated burden and class of accuracy as specified in schedule of quantities/drawings. Rated secondary current shall be 5A unless otherwise stated. Minimum acceptable class for measurement shall be 0.5 to 1 and for protection class 10. CTs shall be capable of withstanding magnetic and thermal stresses due to short circuit faults. Terminals of CTs shall be paired permanently for easy identification of poles. CTs shall be provided with earthing terminals for earthing chassis, frame work and fixed part of metal casing (if any). Each CT shall be provided with rating plate indicating:
• Name and make
• Serial number
• Transformation ratio
• Rated burden
• Rated Voltage
• Accuracy class
CTs shall be mounded such that they are easily accessible for inspection, maintenance and replacement. Wiring for CT shall be with copper conductor PVC insulated wires with proper termination works and wiring shall be bunched with cable straps and fixed to the panel structure in a neat manner.

Potential Transformer
PTs shall confirm to latest amendment up to date IS Codes.

Measuring Instruments
Direct reading electrical instruments shall conform to latest IS codes in all respects. Accuracy of direct reading shall be 1.0 of Voltmeter and 1.5 for Ammeters. Other instruments shall have accuracy of 1.5. Meters shall be suitable for continuous operation between -100C and +5000C. Meters shall be flush mounting and shall be enclosed in dust tight housing. The housing shall be of steel or phenolic mould. Design and manufacture of meters shall ensure prevention of fogging of instrument glass. Pointer shall be black in colour and shall have Zero position adjustment device operable from outside. Direction of deflection shall be from left to right. Selector switches shall be provided for Ammeters and Volt meters used in three phase system.
MCCB's & RCCB's
MCCBs shall comply with standards IS/IEC 60947-1 & 2. The breaking capacity performance certificates shall be available for category A to the above mentioned standards.

MCCB shall have a rated operational voltage (Ue) of 415V, insulation voltage (Ui) of 750 V (AC 50/60 Hz) & impulse voltage (Uimp) of not less than 8kV.MCCBs shall be current limiting type with trip time of less than 10 m sec under short circuit conditions. The MCCBs should be either 3 or 4 poles fixed type. The design is required to minimize the effects of short circuit currents i.e. limit the let through energy and improve the life of cables.
RCCBs must conform to IS12640 -1 and IEC/EN 61008 standards.
RCCBs shall be suitable for operation at 240V/415V, 50Hz supply. The RCCB ratings shall be available from 25A-125A in SPN and TPN versions with the sensitivity of 30mA (for personal protection) and 100/300mA (for Fire protection), as per the BOQ requirements. Rated conditional short circuit shall be 10KA RMS
RCCBs shall carry ISI marking. RCCBs shall have clear indication of 'Tripping on earth leakage fault' on front facia. RCCBs shall have Electrical life of 10,000 operations for all ratings. RCCBs shall have bi-connect facility to terminate fork type busbar and wires, simultaneously. Terminal capacity shall be minimum 25 sq.mm. for ratings up to 32A, and 35 sq.mm. for ratings above 32A, to ensure perfect termination of wires and cables. Terminals of RCCBs shall have captive screws.

5.12 EARTHING

A complete earthing network comprising cables, copper tapes, electrodes and earth bonding of all relevant necessary non-current carrying metal parts of equipments/ apparatus shall be connected as required. The Earthing shall conform to IS 3043.

All earthing conductors shall be of high conductivity copper/ G.I. and able to protect against mechanical damage as per requirement. The cross-sectional area of earth conductor shall not be smaller than half that of the largest current carrying conductor.

Pipe Earth Electrode
G.I. pipe shall be of medium class 100mm dia and 3m in length.
G.I. Pipe electrode shall be cut tapered at bottom and provided with holes of 12mm dia drilled not less than 7.5cm from each other up to 2m of length from bottom.The electrode shall be buried in the ground vertically with its top being 20cm minimum below ground level.Clamping of the earth leads to the earth rod shall be made by earth clamp. The clamps shall be capable of providing high pressure contact between the earth rod and the earth leads to achieve low contact resistance.
When two or more electrodes are driven to form a group, the heads of the electrodes in the group shall be bonded to each other by means of a 25 mm x 3mm GI / Copper strip, laid at a depth of at least 600 mm in soil.

Plate Earth Electrode
The plate earth electrode shall consist of copper plate or G.I. plate. The plate electrode shall be buried in ground with its faces vertical and top not less than 4.5m below Ground level. The plate shall be filled with charcoal dust and common salt filling, extending 15cm around it's on all sides. A watering pipe of 50mm dia of medium class G.I pipe shall be provided.
The top of the pipe shall be provided with a funnel and a G.I. mesh screen for watering the earth. In the case of pipe electrode a removable plug shall be provided.
The earthing lead from electrode onwards shall be suitably protected from mechanical injury by suitable dia medium class G.I. pipe in case of wire and size according to strip size.The overlapping of strips at joints shall done in approved manner

a. GI strips shall be riveted with rivets/ bolted and welded.

b. Copper strips shall be riveted with rivets/ bolted brass nuts, bolts and washers and brazed.

Earth Strip
Earth strips/grids shall be of bare GI/ Copper strips of 25 mm x 3 mm as specified.

Earth strips shall be riveted or joint with proper connector to earth electrodes. In order to minimize the mutual inductance between strips, earth strips shall be positioned at a distance not less than 6m apart unless otherwise specified.

5.13 LIGHT FIXTURES AND FITTINGS

The Laboratory rooms shall provide 400-450 lighting Luxlevel.All the Light Fixtures shall be LED and surface mounted type constructed in CRCA Powder coated housing, powder coted bottom frame, LED panel with suitable driver. The construction shall be in slim panel.

Rating - 40 W and 20 W
Light Fixtures in BSL-3 Lab shall be IP 55 rated

5.14 Fire Detection and Alarm System

The complete BSL-3Laboratory and support areas shall be provided with Addressable type Fire Detection and Alarm System conforming to relevant NBC/BIS code. The Fire Detection & Alarm System shall be complete with Smoke detectors, Heat detectors, Fire Alarm Panel, manual call points, response indicators, power and control wiring and cabling etc. complete in all respect.

5.15 Communication Facility (Intercom & LAN)

The intercom and LAN shall be fully wired in CAT 6 cable, as indicated in drawing. The system shall be complete with required conduit and wiring and RJ outlets.

A suitable EPABX shall be provided for upto 2 incoming lines and 10 outgoing lines. The incoming telephone lines and internet shall be arranged by the EMployer. All the rooms shall be provided with intercom connection and telephone instrument set.

5.16 Door Interlock & Access Control System

The door interlock and access control system shall be provided with combination of proximity card based, numerical key pad lock based and push button based system. The system shall be complete with access logic controllers, door electromagnets, proximity cards and card reader/s, numerical keypad locks, door release push buttons, emergency door release buttons, PC communicator, control and power wiring and cabling and other required accessories, hardware, and software.

A suitable software shall be programmed/loaded on the computer to allow perform the following operations.

- Assign the access rights to the individual proximity cardholder/s
- Create database for bio-metric readers for the authorized persons and assign them access rights.
- Enable/disable access for specified time periods (for visitors etc.)
- Record the transactions and generate transaction reports

Proximity Card Reader and Access Logic Controller shall in general meet the following specifications:

No. of doors control per ALC	- Minimum 4
Recognition of holidays	- Yes
Anti-pass back system	- Yes (system to refuse exit unless there is valid entry)
LCD display on the controller to show status	- Yes
Frequency	- 125 KHZ

Card Reading Time	- Less than 1 second
Output interface	- RS-232 / RS-422 / RS 485
Baud rate	- More than 19000 bps
Power	- 12 to 24 VDC
ID Number	- 1 to 10 digits from keypad or card
Use capacity	- Not less than 100

Access Control Software shall be suitable to operate on latest Windows OS.

The electromagnetic lock shall conform to the following specifications as minimum.

Holding Force	- At least 650 Lb per door
Operating Voltage	- 12/24 VDC or 12/24 VAC
Protect against corrosion	- The electromagnetic lock and its accessories shall be of anticorrosive material/finish
Residual Magnetism	- There should be no residual magnetism after release of Electromagnetic lock

The access control system shall be powered through UPS supply for uninterrupted operation even during mains power failure.

5.17 Closed Circuit TV System (CCTV)

CCTV System shall be provided as per drawing and shall be complete with wall/ceiling mounted high resolution color cameras, multiplexer cum DVR, LED color monitor 40" size, associated power and control cabling etc. and required hardware and software. The output of the CCTV system cameras shall be displayed on a 40" LED monitor, to be installed at approved location.

The cameras shall be high resolution color cameras and shall be suitable for indoor installation and shall be equipped with varifocal lenses to enable adjustment for best view. The cameras shall also have auto Iris lens to control the aperture according to the light fluctuations. The cameras shall be suitable to exposure of chemicals during laboratory fumigation.

The multiplexer cum DVR shall be suitable for saving up-to 16 channels analog data, with play back feature. The DVR memory/Hard disk capacity shall be 2 TB or higher. For convenient backups the DVR shall be compatible with Windows based OS so that it can be backed up through a PC.

6.0 TECHNICAL SPECIFICATIONS - EQUIPMENTS AND SYSTEMS

6.1 DYNAMIC PASS BOX

Pass Boxes (Dynamic) shall be provided at required locations for transfer of samples, chemicals and materials into the laboratory.

The Pass Box shall be constructed in SS 304 (18 gauge). The corners inside the Pass Box chamber shall be coved for easy cleaning. The pass box chamber dimension shall be approximately 610 mm x 610 mm x 610 mm. The unit shall be complete with HEPA filters, blower, motor, door electromagnets, door interlock, UV Lamp with timer, necessary wiring, controls and all other accessories. etc. complete.

The Pass Box doors shall be interlocked by providing suitable electromagnet, so that both the door cannot be opened simultaneously. The interlock shall provide visual indicator for door open/close conditions. The blower motor of Pass Box shall of suitable rating and shall be dynamically and statistically balanced. Magnehelic differential pressure gauge shall be

provided to indicate the pass box chamber pressure. The pass box shall be provided with UV light with ON/OFF switch and shall be interlocked with the pass box doors

The Supply Air velocity across the terminal HEPA filter in Pass Box shall be approximately 0.45 m/sec. Noise level shall be less than 70 dB. The pass box shall be installed flushed with the wall on BSL-3 Lab side and projected on the other side. The projected side shall be provided with SS coving at the pass box and wall junction.

The Pass Box shall be complete with following filters :

Pre-filter : 95% efficiency down to 5 microns
Final Filter : HEPA Filter with 99.97 % efficiency down to 0.3 microns

The blower motor shall of suitable rating and shall be dynamically and statistically balanced.

Magnehelic differential pressure gauge shall be provided to indicate P cros△the HEPA filter

6.2 BIOSAFETY CABINET

The Biosafety Cabinets shall be Class II A2 type and shall conform to NSF 49 standards. The Bio-Safety Cabinet body, frame and supports shall be constructed in SS 316 L (18 gauge). The work surface shall be perforated SS 316 L (18 gauge). The front shall have SS 316 L (18 gauge) top section and sliding sash in toughened glass with required counter weight.

The Biosafety Cabinet shall be factory tested and certified and shall be validated on-site after installation. The Bio-Safety Cabinet shall be complete with following accessories, features and specifications :

- Approx. Work Space of 9000 mm (W) x 660 mm(D) x 610 mm (H)
- Supply Air Face velocity not to exceed 0.65 m/sec
- Working chamber to operate under > 10 mm negative w.r.t room pressure
- Drain receptable with drain faucet
- Flourescent light & UV light
- Extract plenum and Air control dampers
- 2 Nos. Power outlet switch/sockets
- 80 to 100 fpm air inlet velocity at 8-10 inches of sash opening
- Supply and Exhaust HEPA filters shall be mini pleat separator less type with 99.97 % efficiency down to 0.3 micron particle size
- Supply and Exhaust Blowers with motor, statically and dynamically balanced.
- Magnehelic differential pressure gauge for chamber and HEPA filters
- Control console with indication lamps

6.3 DUNK TANK

Dunk tank shall be provided as per drawing. The dunk tank shall be constructed in SS 304 (16 gauge) for active use of disinfectant chemical like NaOH, Sodium Hypo-Chloride Solution. Approx size of dunk tank shall be 550x5500x900 mm. The drain outlet shall be towards containment side.

6.4 SHOWER SYSTEM

The shower system for BSL-3 Lab shall comprise of pre-fabricated cubicle and doors constructed in SS 304 (16 gauge) of approximately 1m x 1m size. All the joints shall be argon welded and perfectly buffed and shall be free from any blurs and sharp edges. The shower cubicle shall be provided with supply & return air diffusers and light fixture. The shower cubicle door shall be in SS 304 of approximately 750x 2100 mm size. The shower floor shall be perforated type with effluent collection tray at the bottom to allow connection

with the effluent drain line without making any opening or puncturing the existing RCC floor slab.

A water heater/calorifier shall be provided for supply of continuous heated water to the showersat controlled temperature (30-35 Deg. C) during winters. The shower system shall be complete with a separate shower water storage tank, insulated water distribution/recirculation piping, water distribution pumps (1W+1S), valves, flow meters, batch controllers (to set each shower cycle), hot water generator, control panel and all other necessary controls, wiring, piping etc. complete as required.

6.5 AIR COMPRESSOR

Compressed Air system shall be provided complete with 1 nos. 5 hp Skid Mounted Air Cooled Compressor. The air compressor shall be complete with in-built compressed air reservoir, oil and particulate removal filters, starter controls, compressed air distribution piping, pressure regulating valves, ball valves etc. complete in all respect, for supply of compressed air to pneumatic valves of Autoclave and Effluent Decontamination system.

The compressed air piping shall be done in heavy class GI pipes with isolation valves fitted at required location to permit uninterrupted maintenance and service of distribution line. The compressed air outlet points shall be provided at the required locations for operation of pneumatic valves.

6.6 VENTILATED TYPE GARMENT STORAGE CABINET

a) The Garment Storage Cabinet shall be constructed in SS 316 L and shall be ventilated type.

b) The front panel shall be constructed with SS 316 L frame and toughened glass panel

c) The garment storage cubicle shall conform to BS 5295-76

d) The garment storage cubicle shall be complete with motor blower assembly, recirculatory plenum, heater with thermostat, fluorescent light, UV germicidal lamp, Prefilter, HEPA filter, Activated carbon filter for odour neutralization, control switches, indications etc.

e) The garment storage cubicle shall meet the following operational requirements :

f) Approx. Dimensions (external) : 2000 mm (W) x 710 mm (D) x 2500 (H)
Air Flow : Shall be 0.45 m/sec to 0.65 m/sec
Cleanliness Level : Class M 3.5
Noise Level : Less than 70 dBA
Vibration Level : Less than 2.5 microns
Power requirement : 230 V AC, 50 Hz, 1 Phase

6.7 LABORATORY WORK STATION

The BSL-3 and BSL-2 Laboratory rooms shall be provided with workstations, as per approved layout drawing. The work stations shall be provided with the most optimum utilization of space in the laboratories. Hand wash sinks and emergency eye wash stations shall be provided integrated with the work station. Taps shall elbow operated laboratory taps.

The workstations in BSL-3 Laboratory shall be constructed in SS 304 (16 gauge). The workstations in BSL-2 Laboratory shall be modular type in powder coated mild steel construction and with granite top. The workstation shall have under counter storage space and drawers. Each work station and Bio-safety cabinet shall be provided with a laboratory chair.

The chair in BSL-3 Laboratory shall be in SS frame and seat (fabric and non-leather finish seats shall not be accepted).

6.8 BIOLOGICAL EFFLUENT DECONTAMINATION SYSTEM (CHEMICAL SYSTEM)

Supply, installation, testing and commissioning of fully modular skid mounted biological liquid waste decontamination system, including and comprising of :

The Chemical Decontamination System for BSL-3 Laboratory effluent shall comprise of Two nos. Effluent Collection tanks (1 Working +1 Standby), each of 800 Ltrs. Capacity. The decontamination tanks shall be constructed in SS 304 (14 gauge)with chemical resistant lining/coating from inside suitable for use disinfectant chemical sodium hypo-chlorite, NaOH etc. The drain line from BSL-3 Laboratory containment area shall be terminated to the effluent decontamination tanks. The effluent decontamination tanks shall be provided with motorized OPEN/CLOSE valves connected with liquid level sensor such that when one tank get filled up to approx. 500 Ltrs. volume, the supply valve shall automatically close and the supply valve of the standby tank shall automatically open to allow collection of effluent. During this time, the effluent collected in filled up tank can be decontaminated by introducing disinfectant chemical. This cycle shall be repeated automatically vice-versa with both the decontamination tanks and the process shall be automatically controlled through a control panel.

One number chemical storage tank in SS 304 (14 gauge) fitted with transfer pump and measuring device, piped and connected to both the decontamination tanks shall also be provided for introducing disinfectant chemical into the decontamination tanks.

The system shall be complete with following items:

- Two nos. Decontamination Tanks, each of 800 Lts. capacity
- Motorized valve connected with liquid level sensor through control panel
- Disinfectant Chemical storage tank constructed in SS 304 (16 gauge) with chemical resistant lining/coating from inside suitable for use of disinfectant chemicals like sodium hypo-chlorite, NaOH etc., of 200 Ltrs capacity
- Disinfectant Chemical dosing pump(1W+1S) in non-corrosive material construction and seal suitable for use of disinfectant chemicals like sodium hypo-chlorite, NaOH etc.
- Non return valves in non-corrosive material construction and seal suitable for use of disinfectant chemicals like sodium hypo-chlorite, NaOH etc.
- Interconnecting piping including piping for chemical dosing
- Pumps for discharging decontaminated effluent into sewer/drain (1W+1S)
- Power and control cabling/wiring for pumps and motorized valves with control panel

6.9 AUTOCLAVE

The autoclave shall be rectangular, steam operated, high pressure high vacuum, double door suitable for horizontal loading of waste. The chamber size shall be approximately 600 mm x 600 mm x 1200 mm. The autoclave shall be free standing type. The autoclave should be complete with a compatible in built steam generator.

CONSTRUCTION

i) The chamber shall be constructed of heavy duty SS of 316 with full argon welding . The chamber material and construction shall meet ASME standards for unfired vessels. The chamber shall be duly reinforced with the help of carbon steel.

ii) Doors and jacket shall be constructed of stainless steel sheet of 304 grade. Doors must be provided with automatic safety locking and unlocking devices. All doors gaskets shall provide high temperature seal.

iii) Chamber and doors must be designed for working under positive pressures upto 31 psig at temperature upto 135^{o} C.

iv) The autoclave shall be insulated with 50 mm thick resin bonded glass wool to minimise heat loss and restrict the skin temperature within reasonable limits so as not to cause burn due to accidental touch.

v) Pipes and fittings shall be of stainless steel and bronze. Valves shall be ball type, self cleaning type.

vi) Key locked main power switch should be provided for additional safety and security.

vii) The autoclave shall be provided with a vacuum pump of required capacity.

viii) The autoclave shall be complete with steam generator compatible with the autoclave. The steam generator shall be fabricated from SS 316 L with industrial immersion heater of reputed make. The immersion heaters shall be heavy duty type in stainless steel construction. The heater shall be of suitable capacity so as to give the required operating temperature and pressure in less than 30 minutes of switching it on and should be capable of maintaining the pressure and temperature thereafter during various load cycles of the autoclave. The steam generators should have automatic pressure control and other safety features like low water cut off to safeguard heaters etc. The steam generator should be complete with all accessories, inlet , outlet, drain connections etc. Shall be electrical operated, shell and tube type and should be compatible with the autoclave.

ix) The autoclave chamber shall be tested to 1.5 times of the working pressure, sterilization jacket to twice the working pressure. The test pressure will be maintained for a minimum of 2 hours.

x) The vacuum line, blow down valve, rupture disk etc. shall meet biosafety requirements with suitable protection

CONTROLS

i) The autoclave shall be fully programmable type with microprocessor and designed to control and monitor a wide variety of sterilizing cycles, depending upon the load to be sterilized. A manual operation facility shall also be provided as a standby in case of control failure. The automatic control shall have following features (but not limited to) :

- Indication Alarm in case of any cycle interruption or cycle failure
- Printer to print relevant information concerning operation during the cycle such as temperature, pressure, cycle time etc
- Cycle parameters should be adjustable with restricted access code to prevent adjustments by non-authorized persons
- Following safety features to prevent the opening of door in following instances (but not limited to).
  * When the chamber is pressurised
  * When the sterilization cycle has not completed

ACCESSORIES

The Autoclave shall be complete with following accessories :

- Jacket Steam Valve
- Chamber Steam Valve
- Safety Valve Exhaust to Drain
- Pressure Reducing Valve
- Jacket and Chamber Steam inlets
- Moisture separator
- Rupturing Disc
- Non return valves and strainers
- Steam Filter
- Solenoid Valve/s
- Vacuum break valve
- Vacuum break filter
- Compound Gauge
- Pressure Gauge
- Safety Valves
- Steam Trap
- Jacket drain valve
- Digital Thermometer
- Electrical Control Console/Panel with printer to record cycle parameter at defined frequency

OPERATING AND PERFORMANCE PARAMETERS

i) The vacuum autoclave shall give a minimum of three vacuum cycles to purge the autoclave of all the air.

ii) Operating temperature shall be 121^{o} C or 135^{o} C, as per programmed cycle parameters, which will be discussed and finalized with the Engineer

iii) The autoclave should completely kill the approved biological indicator at the maximum design capacity. Biological indicator shall be Bacillus stearothermophilus spores using vials or spore strips, with at least $1X10^{6}$ spores per millilitre. The steam condensate shall meet EU WFI Specifications.

INSTALLATION

The autoclave shall be installed/ mounted on a sturdy tubular frame of stainless steel

6.10 WATER SOFTENING PLANT

The HVAC system, the steam boiler, the laboratory room sinks and showers shall be supplied with soft water. A water softener of 200 liter/hour output capacity shall be supplied and installed. The contractor shall get the existing water quality tested from laboratory and provide the system accordingly. The water softening system shall be complete with filters (sand filter, ion filter, carbon filter, as required), interconnecting piping, pumps and piping upto the soft water storage tanks.

6.11 **SERVICE & UTILITIES**

a) Power:

The required Power for the BSL-3 Laboratory shall be arranged and provided by AIIMS, Jodhpur. The contractor shall make arrangements for connections from existing LT Panel including laying of Power supply cable.

b) Water:

Water supply for the BSL-3 Laboratory shall be arranged and provided by AIIMS, Jodhpur at the nearest available source. The required piping work for water connection to storage tanks and further distribution in the proposed facilities shall be done by the Contractor.

c) Drain & Sewer Line

The drain from the BSL-3 laboratories shall be finally terminated to the nearest available drain and sewer line, by the Contractor.

7.0 TESTING, COMMISSIONING AND VALIDATION

a) After completion of the construction and installation works, all the equipment, systems and services shall be commissioned and tested to check the operation and performance of each of the equipment and system.

b) Once all the equipment and systems are found to be working satisfactory, the Validation of the BSL-3 Laboratory shall be carried out by the Contractor in the presence of authorized representatives/committee of AIIMS, Jodhpur. The Validation shall be carried out in accordance with the NIH Guidelines for commissioning and validation of BSL-3 Laboratories. During the validation process, operation and functioning of complete installations shall be checked to verify that the equipment and systems are delivering the desired and approved performance results. It will be checked to ensure that all the biosafety and biosecurity requirements are met, are in place and are functional.

c) Before start of the validation process, the Contractor shall submit a detailed validation document giving details of validation checks and tests to be performed, the acceptance criteria as per the approved designs and drawings and the formats for recording the check and test results.

d) After completion of the validation process, the Contractor shall compile the validation results and submit to AIIMS, Jodhpur.

e) The Contractor shall provide all the test and measuring instruments, tools, tackles, manpower etc. required for the Testing, Commissioning and Validation Process.

8.0 DOCUMENTS & DETAILS TO BE SUBMITTED ON COMPLETION

a) On Completion of the works, the Contractor shall submit the following documents to AIIMS, Jodhpur, Pune in three sets:
   - Complete Set of ‘AS BUIT DRAWINGS’
   - Operation and Maintenance Instructions & Manuals for individual Equipment and Systems
   - Recommended List of Spares and Consumables
   - Preventive Servicing and Maintenance Schedule

b) The Contractor shall submit the Technical Specifications and Data sheet for all the equipment/s and systems supplied and installed.

c) The Contractor shall submit a written undertaking that spares and after sales services for all the equipment, systems and services installed in the facility shall be made available for a period of at least five years from the date of handing over the facility. The after sales services may be availed by the Employer from the executing Contractor under a separate Operation and Maintenance Contract.

9.0 EXTERNAL VALIDATION

AIIMS, Jodhpur may appoint an Expert Committee for Validation of BSL-3 Laboratory. The contractor shall provide all the required assistance for carrying out the validation by the Expert Committee.

The Contractor shall extend full cooperation and provide the validation instruments, tool, tackles and manpower etc., as required and asked by the employer

10.0 COMPREHENSIVE ANNUAL OPERATION &MAINTENANCE SERVICES

10.1 After Completion of Works and Handing Over, AIIMS, Jodhpur may ask the Contractor to provide Comprehensive Operation and Maintenance services for a period of 1-5 years at the quoted and pre-approved rates invited in the tender, and enter into a contract for comprehensive annual operation and maintenance services with the Contractor.

10.2 The Comprehensive Operation and Maintenance Services to be provided by the Contractor shall include:

a) Providing qualified, experienced and trained manpower for handling operation of the Laboratory Facility on day-to-day basis on all working days
b) To carry out routine and preventive servicing and maintenance of the equipment, system and services like Chiller, AHU, Exhaust Blowers, Autoclave, Biosafety Cabinet, Pass Box, Access Control System, BMS, Building Electrical System, Fire Alarm system etc., installed in the facility.
c) Attend to and carry out any breakdown maintenance works required from time to time, as and when it occurs and notified by the Employer.
d) Maintain daily Log Sheet of laboratory operating parameters
e) Providing Spares and Consumables for various equipment, systems and services like BMS, Access Control System, Gaskets (for Doors and Pass Box), Filters, Valves, Light Fittings, spare switches and sockets etc. and maintain suitable inventory at site during the period.
f) Maintenance of electrical system, services and construction works executed by the contractor
g) Annual Validation of the Laboratory Facility

10.3 The following works and consumables shall not be included and covered in the scope of Contractor in the Comprehensive Operation and Maintenance Services:

a) Supply of power, water and fuel
b) Internal and External Painting of the Building
c) Chemicals/reagents for use in laboratory for Fumigation/ Decontamination
d) Water and Power including change of batteries for UPS and Inverter
e) General Housekeeping works including associated consumables
f) Day-to-day operation of equipment/item installed for the BSL-3 Lab.
g) Maintenance of any external works or roads
h) Maintenance of equipment and items supplied directly by AIIMS, Jodhpur
i) Damage or loss of item/equipment caused due to fire and theft

10.4 In case the performance of the Contractor during the Comprehensive Operation and Maintenance Services is found to be un-satisfactory, the Employer may terminate the Contract by giving one month notice to the Contractor and proceed to appoint a new agency

10.5 During the operation and maintenance period, the RESPONSE TIME by the contractor should not exceed 24 hours from the time the breakdown intimation is given by the user.

10.6 During the operation and maintenance period, it is expected that the Contractor shall attend the breakdown and rectify the fault/s promptly with minimum possible downtime. The maximum permitted DOWNTIME shall be 48 Hours from the time the intimation is given by the user.

If the repair/rectification is not carried out by the Contractor within the maximum permitted DOWNTIME, the Employer shall charge penalty, for each breakdown instance, subject to a maximum of 10% of the Annual Contract Value, as follows:

Above 48 hours & Below 96 hours - Penalty of 1% of the Annual Contract Value

Above 96 hours & Below 192 hours - Penalty of 1.5% of the Annual Contract Value

Above 192 Hours - Penalty of 2% of the Annual Contract Value and get the work repair/rectification done from third party at the Contractor's Risk and Cost

10.7 The contractor shall maintain sufficient Inventory of required spares and consumables at site to minimize the downtime and to ensure smooth operation and functioning of the Laboratory.

10.8 Before entering into the Comprehensive Operation and Maintenance Contract, the Contractor shall submit details of manpower proposed to be deployed at site, detailed schedule of preventive servicing and maintenance works, the formats for maintaining daily log sheet and servicing and maintenance records and details of spares and consumables to the Employer

10.9 Payment for Comprehensive Annual Operation and Maintenance Contract Services shall be made by the Employer to the Contractor on QUARTERLY basis, in proportionate amount to the yearly quoted price for the services.

LIST OF APPROVED MAKES / MANUFACTURERS

ITEM		APPROVED MAKES /MANUFACTURER
Prefabricated wall and ceiling panels	:	Nicomac/I-Clean/GMP
View Panels	:	Nicomac/I-Clean/GMP
Laboratory Doors	:	Nicomac/I-Clean/GMP
Epoxy Coating	:	Dr. Beck / Apurva / Fosrok
Air Cooled Chiller	:	Voltas/Blue Star /Carrier/York
Hot water Generator/Calorifier	:	Rapidcool / Khokar / Emerald
Double skin type AHU	:	Zeco/Flakt/Airvision/VTS/System Air
AHU Cooling Coils	:	ARI Certified
AHU Fan	:	Kruger/Nicotra/Comferi (AMCA Certified)
Pumps	:	Kirloskar/Beacon/Greaves/Grundfoss
Motors	:	Crompton/Siemens/ Bharat Bijlee/ ABB
Centrifugal Blowers	:	TCF/Kruger/Nicotra/System Air
MS Pipes	:	Jindal/ Tata/ SAIL
Isolation Damper	:	Trox/Camfil/YIT/Klenzaids
VAV	:	Trox/ Aldes/Celmec/Tek-Air (Accutrol)
HEPA Filters	:	AAF/Camfil/Klenzaids/Thermadyne
Containment HEPA Filter housing	:	Camfil/YIT/Klenzaids
VFD	:	ABB/Seimens/AllenBradley/Danfoss
Pressure sensor & transmitter	:	Honeywell/Dawyer/Danfoss/Siemens
Temperature sensor & transmitter	:	Honeywell/Dawyer/Danfoss/Siemens
Humidity sensor & transmitter	:	Honeywell/Dawyer/Danfoss/Siemens

BMS system	:	AllenBradley / Siemens /ABB
PLC	:	AllenBradley/Siemens
Magnehelic Gauges	:	Dawyer
Grilles/Diffusers	:	Ravistar/System Air/Airvision
Biosafety Cabinet	:	Esco/Nuaire/Klenzaids
Autoclave	:	Pharmalab/Klenzaids/Machinfabrik
Dynamic Pass Box	:	Esco/Klenzaids/I-Clean
Fire Alarm System	:	Honeywell/System Sensor/GST/Siemens
Door Interlock & Access Control	:	HID/LG/ESFL
UPS & Inverter	:	Tata Emerson/APC/Sukam
CCTV Camera	:	LG/Hikvision/CP Plus
LED for CCTV display	:	Samsung/LG/Sony/Panasonic
Butterfly Valves	:	Advance/Audco/ C&R/ Castle/ Arrow/Intervalve
Gate Valves	:	Leader/ BankimSarkar/ Divine/ Sant
Balancing Valves	:	Advance / Audco/Danfoss
Y – Strainers	:	Sant/Emerald/ Rapidcool/Sandhu
NR Valves	:	Advance /C&R/ Castle/ Arrow/ Univass
Flow Switch.	:	Jhonson/Honeywell/Staefa
HVAC Control valves	:	Honeywell/ Johnson/ Danfoss
3-Way Valves	:	Danfoss/Johnson/ Honeywell/Siemens
Modulating Motors	:	Honeywell./Jhonson/Siemens/Danfoss/ Belimo
Pressure & Temperature gauges	:	H. Guru/ Fiebig/ Japsin/Forbesmarshall
G.I. Sheet	:	Sail/Tata/Jindal
Aluminium sheet	:	Hindalco/NALCO/Balco
Volume Control & Fire Damper	:	Ravistar/Caryaire/Airvision
Nitrile Rubber Insulation	:	Armacell/Armaflex/SupremeA-Flex/Thermaflex
Expanded Polystyrene	:	Beardsell/Indian Packaging/FGP/Styrene
LT Panel	:	CPRI approved manufacturer
Electrical Switch Gears/MCCB	:	L&T/ABB/Siemens/Schneider

Starters.	:	L & T/Siemens/ABB
Distribution Board	:	Legrand/L7T/ABB/Havells/Schneider
Copper Conductor/wires	:	Polycab/Havells/RR Kabel/KEI/L&T
LT Cables	:	Polycab/Univversal//Havells/Gloster/KEI
CAT6 cables	:	AT&T/KABEL/LUCENT/LAPP/Digilink
PVC Conduit and accessories	:	BEC/AKG/Polycab/Precision
MCB/ELCB/RCCB	:	Legrand/L&T/Hager/Schneider/ Siemens/ABB
Light Fixtures	:	LED (IP 55 rated) for BSL-3 Lab LED for other areas
Switch & sockets	:	CLIPSAL (Schneider) IP 66 rated for BSL-3 Lab Modular - Legrand/Schneider/Crabtree
Protection Relays	:	ABB/L&T/Seimens/Schneider
Single phase preventor	:	L&T / Minilec
Air Compressor	:	Atlas Copco / Inggersoll Rand

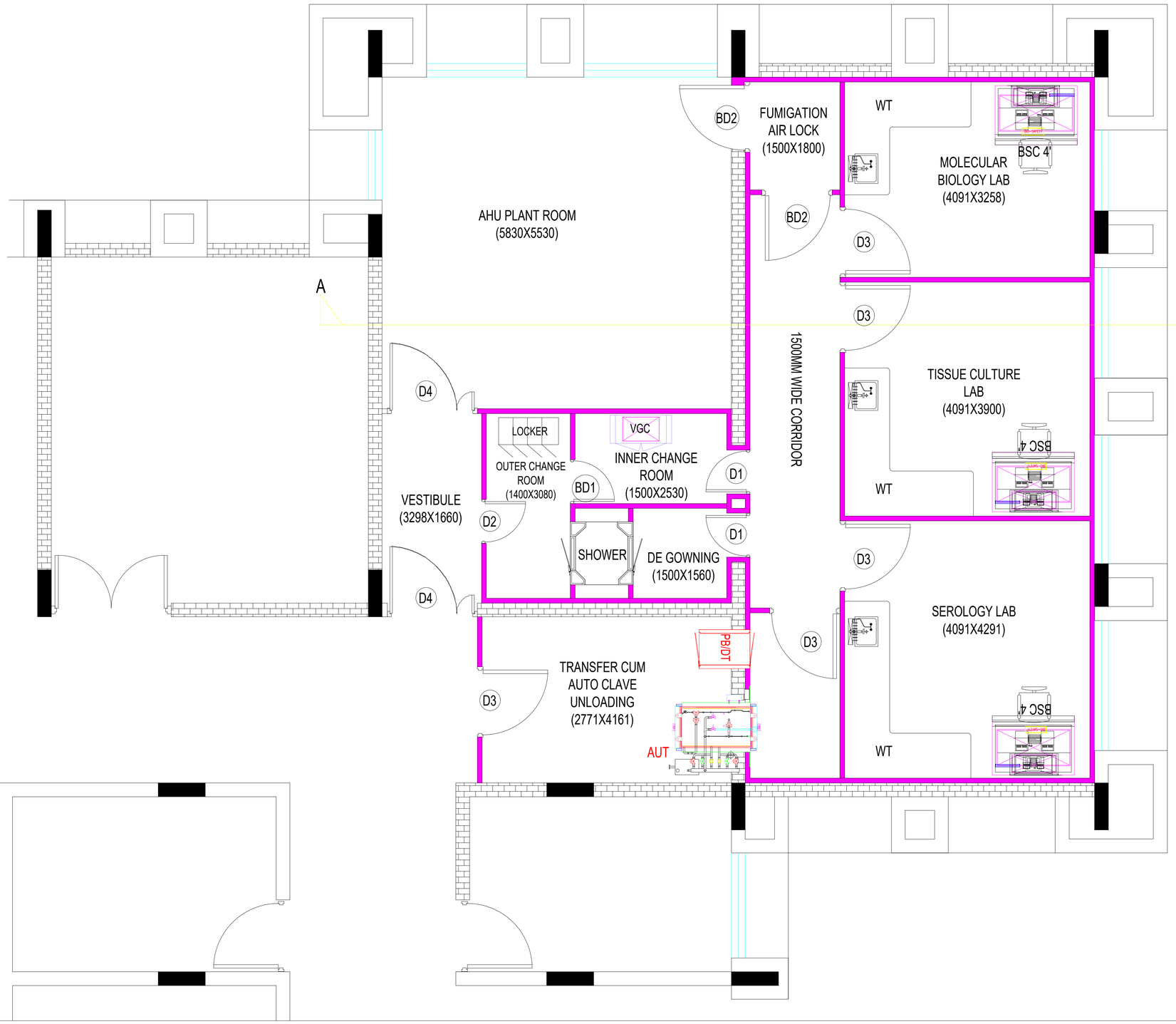
Any item not included above shall conform to the relevant BIS specifications, wherever applicable.

SECTION - III

PRICE BID- Bidder must submit financial bid in .xls (Excel workbook 97-2003 workbook) only

SECTION - IV

TENDER DRAWINGS



LEGEND:-

BSC-4	BIO SAFETY CABINET
PB/DT	PASS BOX/DUNK TANK
	AUTOCLAVE
VGC	VENT GARMENT CABINET
	SINK
	LOCKER

DOOR DETAILS:

D1	750X2100MM
D2	900X2100MM
D3	1200X2100MM
D4	1500X2100MM
BD1	750X2100MM
BD2	1200X2100MM

PROJECT

BSL 3 LABORATORY AT AIIMS JODHPUR

TITLE:-

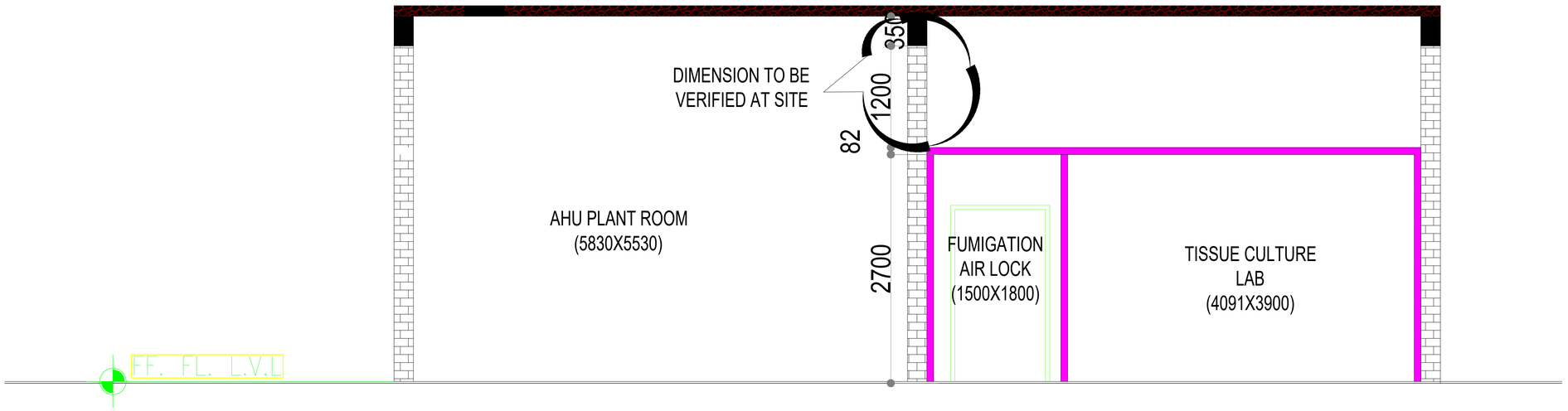
LAYOUT PLAN

FIRST FLOOR

TENDER DRAWING

Drawing No.
AIIMS-JODHPUR/BSL3/01

Scale	Date	REV.
NTS		R0



PROJECT

BSL 3 LABORATORY AT AIIMS JODHPUR

TITLE:-

SECTION A - A

FIRST FLOOR

TENDER DRAWING

Drawing No.

AIIMS-JODHPUR/BSL3/02

Scale	Date	REV.
NTS		R0

PROJECT

BSL 3 LABORATORY AT AIIMS JODHPUR

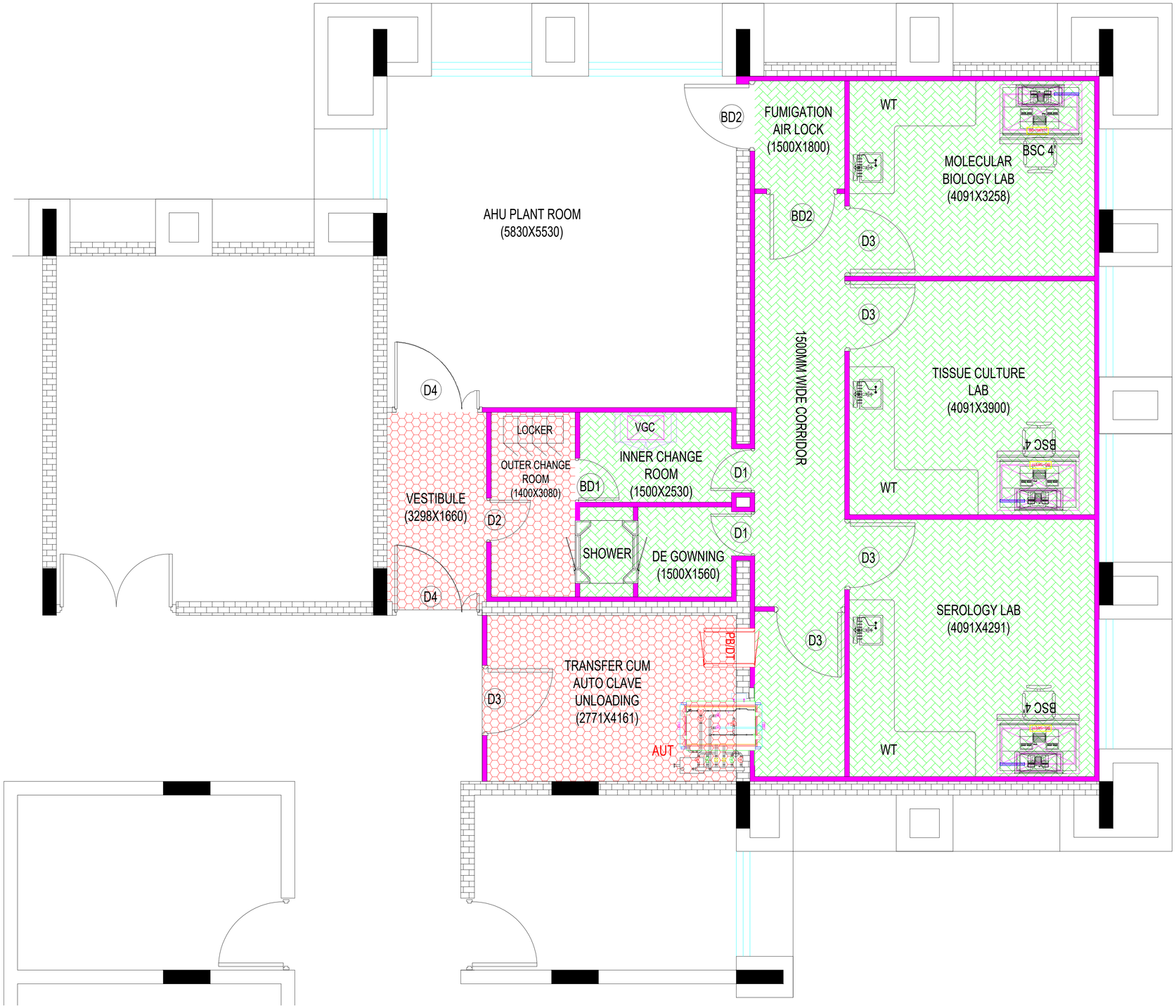
TITLE:-

PRESSURE GRADIENT

FIRST FLOOR

TENDER DRAWING

Drawing No.		
AIIMS-JODHPUR/BSL3/03		
Scale	Date	REV.
NTS		R0



ZONE (AHU SYSTEM 1)

ZONE (AHU SYSTEM 2)

PROJECT

BSL 3 LABORATORY AT AIIMS JODHPUR

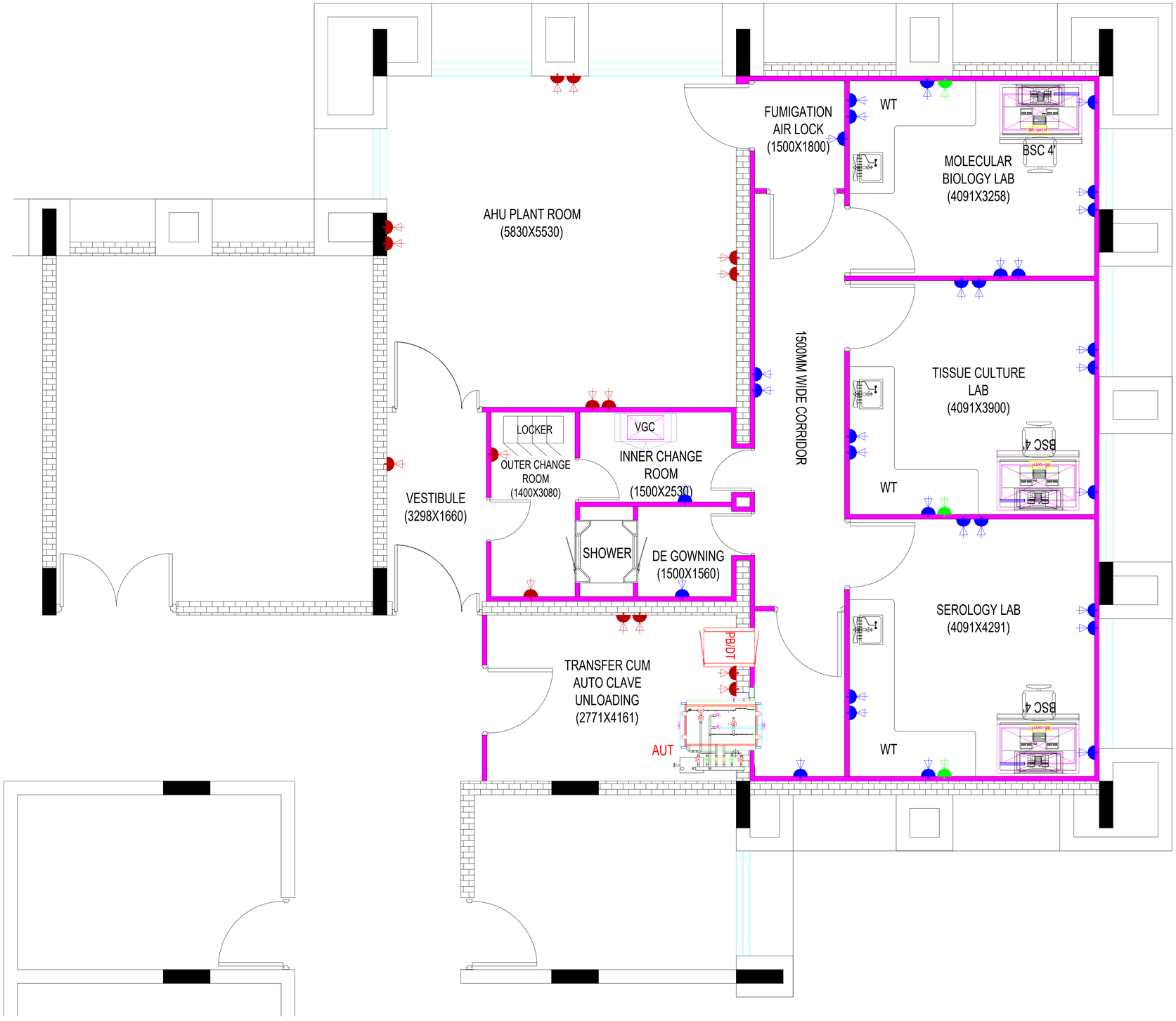
TITLE:-

ZONING LAYOUT

FIRST FLOOR

TENDER DRAWING

Drawing No.		
AIIMS-JODHPUR/BSL3/04		
Scale	Date	REV.
NTS		R0



NORMAL POWER - IP66 SWITCH SOCKET
UPS POWER - IP66 SWITCH SOCKET
NORMAL POWER - MODULAR SWITCH SOCKET

PROJECT

BSL 3 LABORATORY AT AIIMS JODHPUR

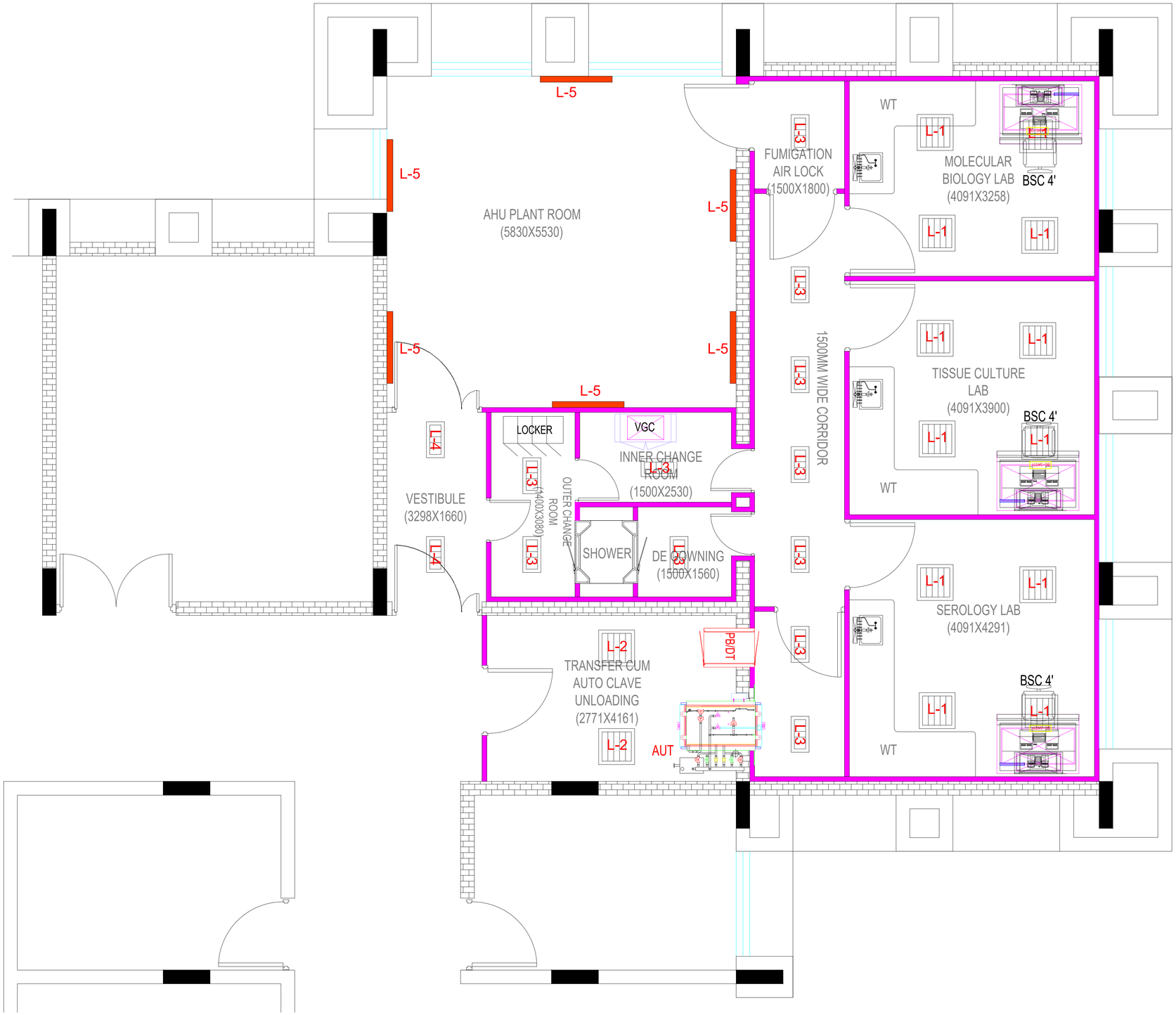
TITLE:-

SWITCH SOCKET LAYOUT

FIRST FLOOR

TENDER DRAWING

Drawing No.		
AIIMS-JODHPUR/BSL3/05		
Scale	Date	REV.
NTS		R0



LEGEND:-

L-1	40W LED SURFACE MOUNTED IP55
L-2	40W LED RECESSED TYPE
L-3	20W LED SURFACE MOUNTED IP55
L-4	20W LED RECESSED TYPE
L-5	40W LED TUBE LIGHT

PROJECT

BSL 3 LABORATORY AT AIIMS JODHPUR

TITLE:-

LIGHTING LAYOUT

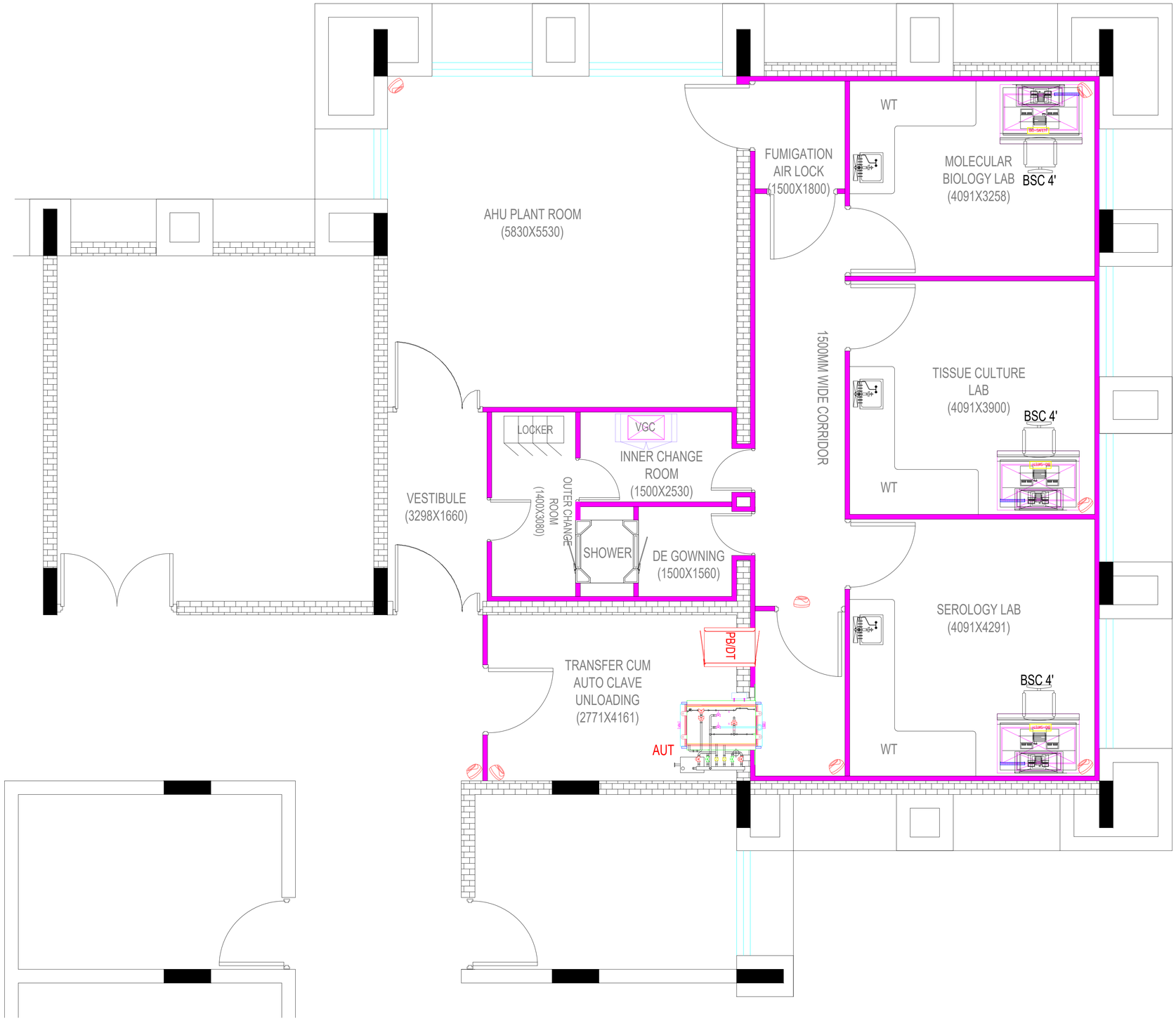
FIRST FLOOR

TENDER DRAWING

Drawing No.

AIIMS-JODHPUR/BSL3/06

Scale	Date	REV.
NTS		R0



LEGEND:-

	CCTV CAMERA

PROJECT

BSL 3 LABORATORY AT AIIMS JODHPUR

TITLE:-

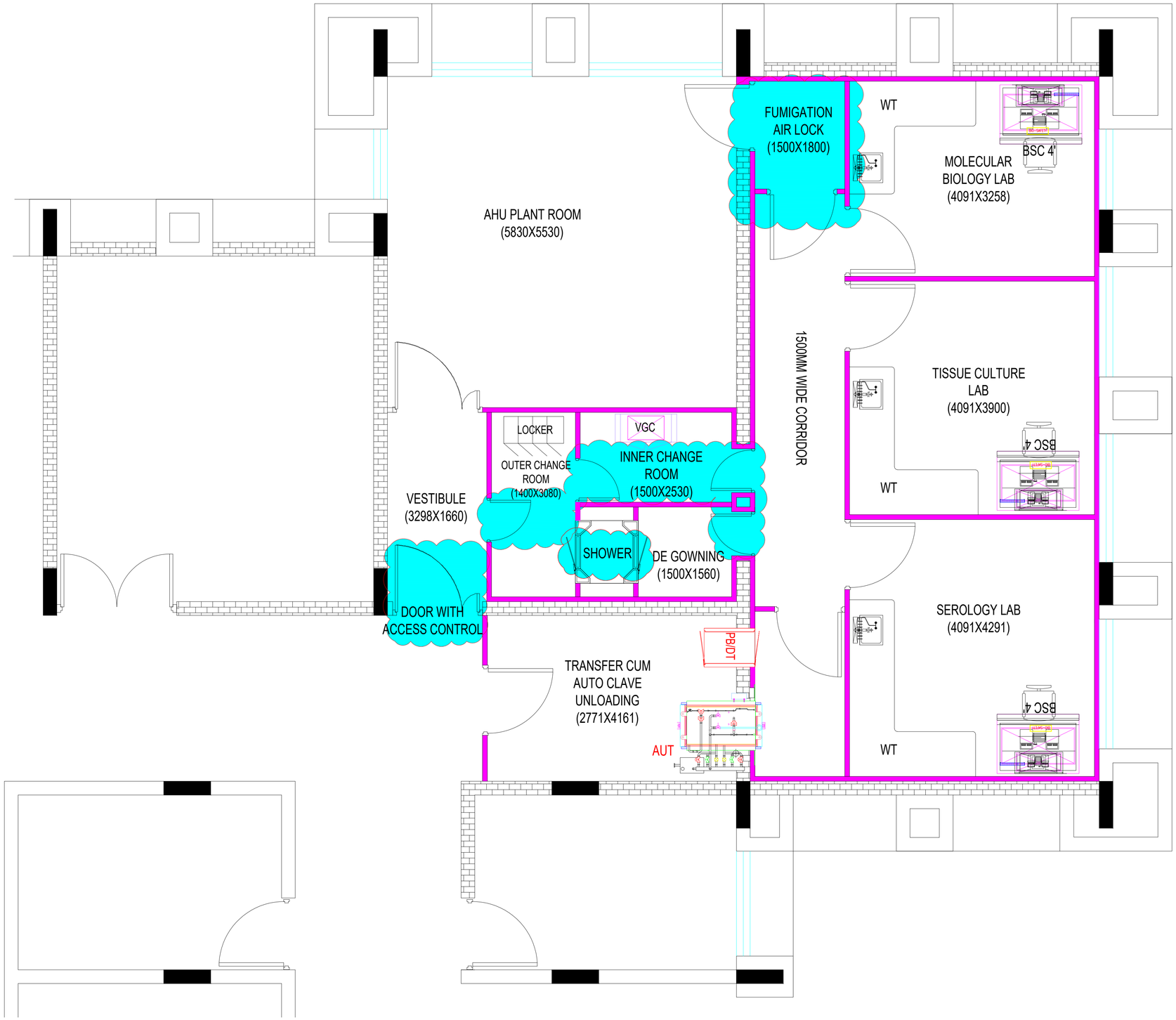
CCTV LAYOUT

FIRST FLOOR

TENDER DRAWING

Drawing No.
AIIMS-JODHPUR/BSL3/07

Scale	Date	REV.
NTS		R0



ACCESS CONTROL / DOOR INTERLOCK SYSTEM REQUIREMENT

ONE DOOR:- 1 SYSTEM
TWO DOOR:- 2 SYSTEM
FOUR DOOR:- 1 SYSTEM (WITH PRIVACY SWITCH)

PROJECT

BSL 3 LABORATORY AT AIIMS JODHPUR

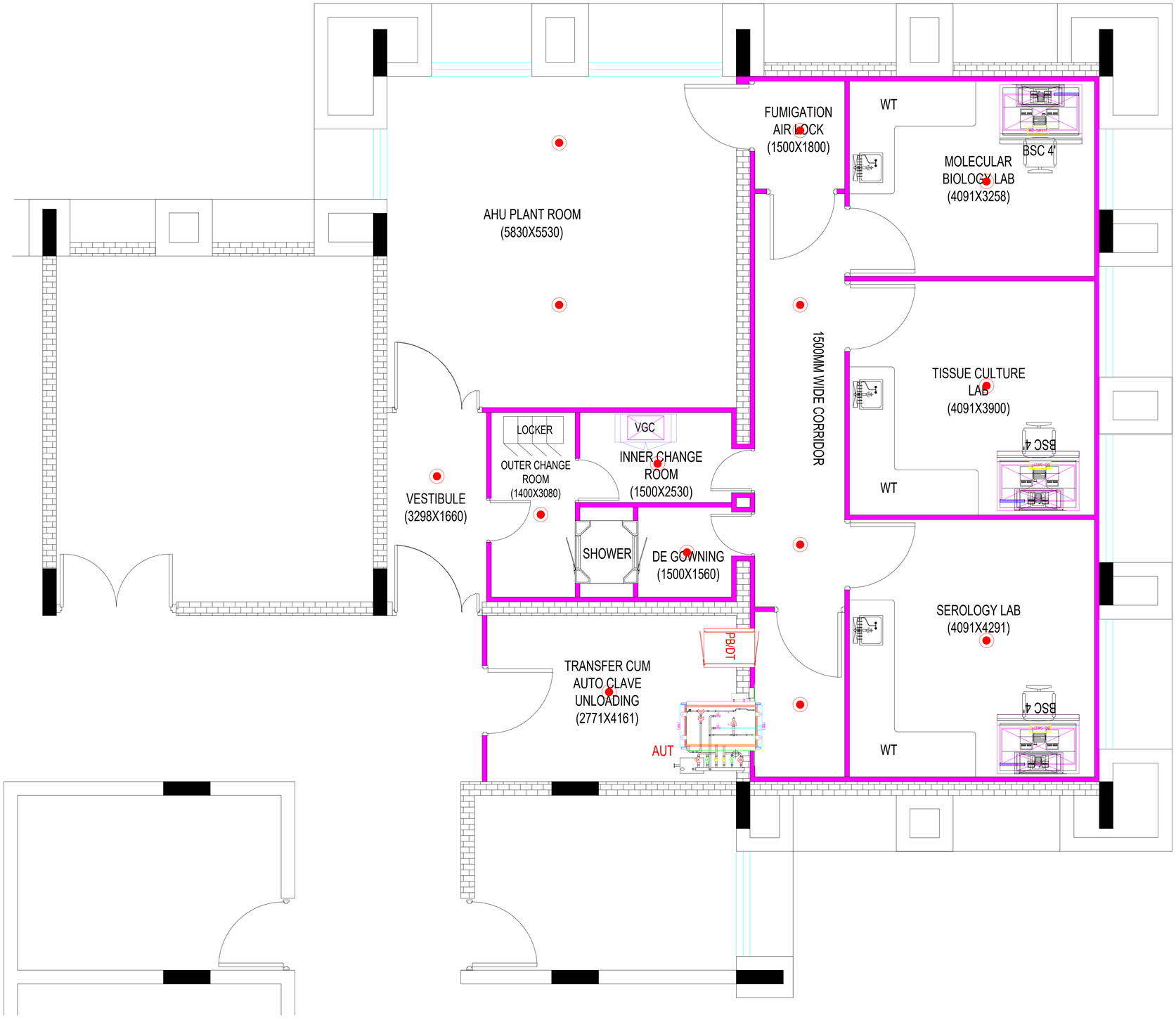
TITLE:-

DOOR INTERLOCK ACCESS CONTROL LAYOUT

FIRST FLOOR

TENDER DRAWING

Drawing No.		
AIIMS-JODHPUR/BSL3/08		
Scale	Date	REV.
NTS		R0



NOTE:-

1. HEAT DETECTOR TO BE PROVIDED ABOVE FALSE CEILING
2. FDA SYSTEM SHALL BE AS PER NBC.

SMOKE DETECTOR

PROJECT

BSL 3 LABORATORY AT AIIMS JODHPUR

TITLE:-

FIRE ALARM LAYOUT

FIRST FLOOR

TENDER DRAWING

Drawing No.		
AIIMS-JODHPUR/BSL3/09		
Scale	Date	REV.
NTS		R0