Nālandā
UNIVERSITY

NIT No.: NU/Engg/91/2020-21/EPC/02

NOTICE INVITING E-TENDER FOR

CONSTRUCTION OF BUILDINGS INCLUDING ONE 500 USER CAPACITY YOGA CENTER CUM MEDITATION/MULTIPURPOSE HALL (GROUND FLOOR - WITH MINIMUM 8.0 M CELLING HEIGHT INSIDE YOGA & MEDITATION HALL), ONE 250 USER CAPACITY CAFETERIA (GROUND FLOOR - WITH MINIMUM 4.0 M CELLING HEIGHT INSIDE YOGA & MEDITATION HALL) AND ONE 2000 SEATER CAPACITY AUDITORIUM (G+1 STORIED - WITH MINIMUM 16.0 M CELLING HEIGHT INSIDE THE AUDITORIUM) - CIVIL WORK INCLUDING ALL WIRED AND PIPED SERVICES COMPRISING OF INTERNAL WATER SUPPLY, SANITARY INSTALLATIONS, FAÇADE WORKS, ROADS, PATHWAYS, DRAINAGE, ELECTRICAL WORKS INCLUDING INTERNAL ELECTRICAL INSTALLATIONS, EXTRA LOW VOLTAGE (ELV) WORKS, FIRE FIGHTING, FIRE ALARM SYSTEM, AIR CONDITIONING, LIFTS, SOLAR SYSTEM, EXTERNAL ELECTRICAL INSTALLATIONS, ETC. , OTHER MISCELLANEOUS WORKS ALL COMPLETE ON EPC BASIS FOR NALANDA UNIVERSITY MAIN CAMPUS AT RAJGIR, DISTRICT NALANDA, BIHAR.

ESTIMATED COST:	**Rs. 94.39 crores**
EARNEST MONEY:	**Exempted** (As per OM issued by DG, CPWD, New Delhi DG/CON/Misc./13 dated 23.11.2020 and should sign the Proforma for EMD Declaration given in the NIT – Form F
TIME ALLOWED:	**24 Months** (03 months approval time plus 21 months for execution of original work)

INDEX

TENDER NOTICE

The Registrar, Nalanda University, Rajgir, District – Nalanda, Bihar on behalf of Nalanda University invites online composite bids on Engineering Procurement Construction (EPC) basis from reputed, approved and eligible composite category contractors of CPWD or any State/Central Govt. Departments/PSUs/Institutions/Autonomous Bodies/other reputed firms fulfilling the set eligibility criteria , in two bid system (Eligibility Bid & Financial bid) for the following work:

NIT No.	:	**NIT No.: NU/Engg/91/2020-21/EPC/02**
Name of Work:		**"Construction of Buildings including one 500 user capacity Yoga Center cum Meditation/Multipurpose Hall (Ground Floor - with minimum 8.0 m celling height inside Yoga & Meditation Hall), one 250 user capacity Cafeteria (Ground Floor - with minimum 4.0 m celling height inside Yoga & Meditation Hall) and one 2000 seater capacity Auditorium (G+1 Storied - with minimum 16.0 m celling height inside the Auditorium) - Civil work including all wired and piped services comprising of internal water supply, sanitary installations, façade works, roads, pathways, drainage, electrical works including internal electrical installations, Extra Low Voltage (ELV) works, Fire Fighting, Fire Alarm System, Air Conditioning, Lifts, Solar System, External Electrical Installations, etc., other miscellaneous works all complete on EPC basis for Nalanda University main campus at Rajgir, District Nalanda, Bihar."**
Estimated Cost	:	**Rs. 94.39 crores**
Earnest Money	:	**Bid Security Declaration to be submitted as per FORM F**
E-tender processing fee	:	Rs. 15,000/-
Period of Work Completion	:	**24 Months** (3 months for planning & designing and obtaining approvals for commencement of work + 21 months for execution of

		original work and obtaining approvals from local bodies for declaring the buildings fit for occupation)
Defect Liability Period	:	12 months post successful completion of works

Pre-bid conference shall be held with the intending bidders in the Conference Hall, Project Office of Nalanda University at Rajgir, District Nalanda, Bihar – 803116 at **03:00 PM on 12th May 2021.**

Last Time & date of the submission of bids is up to **03:00 PM on 26th May 2021**.

Opening of Technical Tenders **at 03:30 PM on 27th may 2021.**

The bid forms and other details can be seen & downloaded from the website https://nalandauniv.edu.in/tenders/ and https://nalandauniv.euniwizarde.com/ .

REGISTRAR

NALANDA UNIVERSITY

PART – I

GENERAL INFORMATION

1.1. CHECK LIST FOR CONTRACTORS FOR SUBMISSION OF BIDS

1.1.1. The tenderers should read all the instructions, terms & conditions, contract clauses, nomenclature of items, specifications etc. contained in the tender documents very carefully, before quoting the rates. The tenderer should also read the General Conditions of Contract 2020 for EPC Project (with correction slips up to last date of submission of tenders) which will be part of the agreement.

1.1.2. The agency shall quote the rate for complete scope of work for construction both in words and figures in the financial bid.

1.1.3. The contractor shall quote his rates keeping in mind the scope of work, specifications, terms & conditions, additional conditions and special conditions etc. and nothing shall be payable extra whatsoever unless otherwise specified.

1.1.4. The shall also furnish Performance Guarantee of 3% of the tendered amount in addition to the other deposits mentioned elsewhere in this document for proper performance of the agreement. The Performance Guarantee shall be in the shape of FDR or Bank guarantee as per Performa given in Annexure-V enclosed. 100% of the performance guarantee shall be released after completion of work.

1.1.5. In the event of the tender being submitted by a firm, it must be signed separately by each partner thereof or in the event of the absence of any partner, it must be signed on his behalf by a person holding a power of attorney authorizing him to do so. Such power of attorney should be produced with the tender and it must be disclosed that the firm is duly registered under the Indian partnership act, 1952.

1.1.6. The bidder shall quote their rates considering all prevalent taxes/Cess like GST, Labour Cess or any other tax on material/work as applicable as per the GoI norms and nothing extra shall be paid to the contractor on this account. The University shall deduct from the R/A bills, the TDS as applicable as per the prevailing rates as prescribed by the Government of India time to time.

1.1.7. The tender, which is not duly signed by authorized signatory or is conditional shall be treated as non-responsive and shall be summarily rejected.

1.1.8. Online bid documents submitted by intending bidders shall be opened only of those bidders, whose EMD declaration proforma deposited with any division office of CPWD, anywhere in India and other documents scanned and uploaded are found in order.

1.1.9. The contractor shall barricade the subject buildings site confirming to CPCB and NGT guidelines to avoid any pollution at site and the surroundings to the subject building. The contractor's rate deemed to be inclusive of the barricading of the site as per requirement of these bodies of Central Govt. Apart from this the contractor has to comply with the guidelines issued from time to time by Bihar State Govt. to ensure pollution control measures at site and surroundings at their own cost.

1.1.10. The University may not allow the labour camps if not feasible, at site and therefore contractor, in that case, has to make his/their arrangement for the stay / transportation at his/their own cost. Other facilities arrangement confirming to

GCC-2020 for EPC Project of CPWD contract labour regulations, safety measures and health measures as per guidelines issued by Govt. from time to time, needs to be followed by contractor. The EPC Contractor's rate deems to all-inclusive and nothing extra shall be paid to the contractor on these accounts.

1.1.11. The arrangement of water suitable to construction works as well as other usage i/c testing of equipment will be arranged by the contractor at site at his own cost from. The contractor will obtain necessary permission from E-in-C with test result of water from source proposed by contractor duly chemical testing report i/c pH value. The department will get independent physical and chemical testing of such source at an interval of every four months. The testing charges of the water tests done will be paid by the department and will be recovered from contractor's bill. Power supply required for construction; testing & commissioning shall have to be arranged by the bidder at his own costs.

1.2. INFORMATION AND INSTRUCTIONS FOR CONTRACTORS FOR e-TENDERING

1.2.1. The Registrar, Nalanda University, Rajgir, District – Nalanda, Bihar on behalf of Nalanda University invites online composite bids on Engineering Procurement Construction (EPC) basis from reputed, approved and eligible composite category contractors of CPWD or any State/Central Govt. Departments/PSUs/Institutions/Autonomous Bodies/ other reputed firms fulfilling the set eligibility criteria , in two bid system (Eligibility Bid & Financial bid) for following work:

NIT No.	:	NU/Engg/91/2020-21/EPC/02
Name of Work		**Construction of Buildings including one 500 user capacity Yoga Center cum Meditation/Multipurpose Hall (Ground Floor - with minimum 8.0 m ceiling height) , one 250 user capacity Cafeteria (Ground Floor - with minimum 4.0 m ceiling height) and one 2000 seater capacity Auditorium (G+1 Storied - with minimum 16.0 m ceiling height) - Civil composite work including all wired and piped services comprising of internal water supply, sanitary installations, façade works, roads, pathways, drainage, electrical works including internal electrical installations, Extra Low Voltage (ELV) works, Fire Fighting, Fire Alarm System, HVAC , Lifts, Solar System, External Electrical Installations, horticulture , other miscellaneous works etc. all complete on EPC basis for Nalanda University main campus at Rajgir, District Nalanda, Bihar."**

Location	:	Nalanda University Main Campus, Rajgir, District Nalanda, Bihar
Estimated Cost Put to Tender	:	**Rs. 94.39 crores**
Earnest Money	:	exempted
E-tender processing fee	:	Rs. 15,000/-
Period of Work Completion	:	**24 Months** (3 months for planning & designing and obtaining approvals for commencement of work + 21 months for execution of original work and obtaining approvals from local bodies for declaring the buildings fit for occupation)
Pre-bid Conference	:	Pre-bid conference shall be held with the intending bidders in the Conference Hall, Project Office of Nalanda University at Rajgir, District Nalanda, Bihar – 803116 at **03:30 PM on 12th May 2021. Only prospective bidders' EPC Contractors' authorised representative is allowed to attend.**
Last date & time of online submission of technical and financial bids	:	Up to 03:30 PM on **26th May 2021** through online in https://nalandauniv.euniwizarde.com/ The tender documents can be viewed and downloaded from Nalanda University website https://nalandauniv.edu.in/tenders/
Time and date of opening of Technical Bids	:	03:30 PM on 27th May 2021
Opening of financial bids of technically qualified bidders	:	Shall be intimated to qualified bidders after approval of Technical bids by the Competent Authority

1.2.1 Eligibility Criteria

Contractors who fulfill the following requirements shall be eligible to apply. **Joint ventures/Consortium and special purpose vehicles are not accepted** .For this purpose, cost of work shall mean gross value of the completed work.

1.2.1.1. Should have satisfactorily completed the works as mentioned below during the last Seven years ending previous day of last date of submission of bids.

Three similar works (40%) each costing not less than **Rs. 37.76** Crore.

OR

Two similar works (60%) each costing not less than **Rs. 56.63** Crore.

OR

One similar work costing (80%) not less than **Rs. 75.51** Crore.

Similar work shall mean: -

"Construction of RCC framed structure for residential or non -residential work, having minimum one building of three storied or completing balance work of one building including structural work minimum up to three storeys including all wired and piped services comprising of Internal Water Supply, Sanitary Installations, sewerage system, Internal Electrical Installations, Site Development including Roads, Pathways, Drainage, Extra Low Voltage (ELV) Works, Fire Fighting, Fire Alarm system, HVAC, Lifts ,External Electrical installations, etc. all complete and executed under one agreement in India. Godowns/Ware houses/factory sheds/industrial buildings shall not be considered as eligible similar works, (Mumty and Machine room will not be counted as storey for this purpose. Stilts and basement/s shall be counted as storey/storeys."

Note:-

(1) Work of basement, specialized E&M services, if executed under a separate contract may also be considered for the purpose of assessing the technical competence only without adding its monetary value for determining the eligibility criteria.

(2) One building of the specified number of storied, as mentioned in definition of similar work constructed in each work of the financial magnitude as specified in para 1.2.2 shall satisfy the criteria of similar work.

(3) 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. Qualified similar works may be physically inspected, if required, by a Technical Expert Committee constituted by the Competent Authority at Nalanda University to ascertain the completion,

performance on quality of works for finalizing the Technical bid and their report will be final and binding.

(4) In case of works executed in Private Sector, Completion Certificate should be accompanied with TDS certificates.

1.2.1.2. Should have minimum average annual financial turn over (gross) of **Rs. 47.20 Crore** on civil/electrical construction works during the last available three consecutive financial year ending March, 2020. Year in which no turnover is shown would also be considered for working out the average. (The bidder should upload financial information about turnover as per Form – 'A' only and should not upload anyother financial sheets like balance sheets etc.)

1.2.1.3. The multiplication factor of 7% per annum simple interest is not applicable on the Annual Financial Turnover figures.

1.2.1.4. Should not have incurred any loss (profit after tax should be positive) in more than two years during the last five consecutive years ending 31st March, 2020 .The contractor should upload financial information about profit/loss only and should not upload any other financial sheets like Balance Sheets etc.

1.2.1.5. Should have a minimum solvency of **Rs. 37.76 Crore** (Scanned copy of original solvency certificate to be uploaded). Such solvency certificate should not have been issued by the Bank beyond 6 months from the date of last submission of bids.

1.2.2 The eligibility bid shall be opened first on due date and time as mentioned above. The time and date for opening of financial of contractors qualifying the eligibility bid shall be communicated to them at later date.

1.2.3 Online financial bid document submitted by the bidders shall be opened only of those bidders who on the basis of pre -qualification documents uploaded by them within the period of bid submission, qualify in accordance with the provision of eligibility bid. The financial bid shall be opened online at the notified time and date in presence of qualified bidders or their representative.

1.2.4 Agreement shall be drawn with the successful bidders on prescribed Form **GCC-2020 for EPC contracts in CPWD which** is available as a Govt. of India Publication and alsoavailable on website **www.cpwd.gov.in.** Bidders shall quote his rates as per various terms and conditions of the said form which will form part of the agreement.

A copy of the document is also enclosed with this NIT.

1.2.5 The site for the work is available. The time allowed for carrying out the work will be **24 (twenty four) Months** (21 months for execution of original work plus 03 months approvals, from the date of start as defined in tender or fromthe first date of handing over of the site, whichever is later, in accordance with the phasing, if any, indicated in the bid documents.

1.2.6 The bidder should have sufficient number of Technical and Administrative Employees for the proper execution of the contract. The bidder shall have to submit a list of these employees stating clearly how these would be involved in this work within 15 days of award of work.

1.2.7 The contractor will take all necessary guards and precautions during the course of execution to ensure safety and stability of the adjoining building structures. All legal consequences of any danger/threat to the safety and stability of adjoining structures rest with the contractor and department stands absolved from all legal liabilities and consequences thereof if any, initiated by the owner/contractor of these building structures.

1.2.8 After submission of the bid, the contractor can resubmit revised bid any number of times but before last time and date of submission of bid as notified. Contractor must ensure to quote his rate in the attached schedules online only. The bids submitted online shall only be considered for evaluation.

1.2.9 The Original Exempted Earnest Money Declaration proforma duly filled shall be scanned and uploaded to the e-Tendering website within the period of bid submission.

1.2.10 Online bid documents submitted by intending bidders shall be opened only of those bidders, whose original EMD Original Exempted Earnest Money Declaration proforma duly filled (Form F) and uploaded to the e-Tendering website and other documents scanned and uploaded are found in order.

1.2.11 **The bid submitted shall become invalid, if:**

1.2.11.1 The bidder is found ineligible.

1.2.11.2 The bidder does not deposit original EMD declaration form (Form F) with Nalanda University.

1.2.11.3 The bidder does not upload all the documents (including GST Registration) as stipulated in the bid document including the copy of receipt for deposition

of Exempted EMD Declaration Performa. (Form F)

1.2.11.4 If any discrepancy is noticed between the documents as uploaded at the time of submission of bid and hard copies as submitted physically by the lowest bidder in the office of bid opening authority.

1.2.11.5 If a tenderer quotes nil rates against any item of work of tender, the tender shall be treated as invalid and will not be considered as lowest tenderer.

1.2.11.6 The contractor whose bid is accepted will be required to furnish performance guarantee of 3% (Three Percent) of the bid amount within the period specified in Schedule F in the form of Demand Draft of any scheduled bank/ Pay order of any Scheduled Bank /Fixed Deposit Receipts or Guarantee Bonds of any Scheduled Bank in accordance with the prescribed form. In case the contractor fails to deposit the said performance guarantee within the period as indicated in tender, including the extended period if any, the contractor will be debarred from tendering in Nalanda University as per the undertaking submitted by the contractor.

The contractor whose bid is accepted will also be required to furnish either copy of applicable licenses/ registrations or proof of applying for obtaining labour licenses, registration with EPFO, ESIC and BOCW Welfare Board including Provident Fund Code No. If applicable and also ensure the compliance of aforesaid provisions by the sub- contractors, if any engaged by the contractor for the said work within the period specified in tender.

1.2.12 The bidder should either himself meet the eligibility conditions for the specialized civil & E&M works as mentioned in NIT or otherwise he will have to associate an agency meeting the eligibility requirements for specialized civil & E&M works after award of work and has to submit details of such agency(s) conforming eligibility conditions as defined in the bid document for the concerned component of work to the University at least two month in advance from taking up the specific component. Names of the agency(s) to be associated shall be approved by the Engineer-in-Charge.

1.2.13 The intending bidder must read the terms and conditions of CPWD-6 carefully. He should only submit his bid if he considers himself eligible and he is in possession of all the documents required.

1.2.14 Information and instructions for bidders posted on website shall form part of bid document.

1.2.15 The bid document consisting of plans, specifications, items to be executed and the set of terms & conditions of the contract to be complied with and other necessary documents can be seen from website www.nalandauniv.edu.in/tenders/ or https://nalandauniv.euniwizarde.com/

1.2.16 The bid can only be submitted after uploading the proof of submission of E-Tender Processing Fee (copy of receipt of documents such as Demand Draft/or Pay Order or Banker's cheque or Deposit Receipts of any scheduled bank towards tender processing fee in favour of Nalanda University payable at Rajgir, Bihar) and other documents as specified.

1.2.17 Those Bidders who are not registered in https://nalandauniv.euniwizarde.com/ website mentioned above, are required to get registered themselves beforehand. The intending bidder must have valid Class-III digital signature to submit the bid.

1.2.18 On opening date, the Bidder can login and see the bid opening process. After opening of bids, he will receive the competitor bid sheets.

1.2.19 Bidder can upload documents in the form of JPG format and PDF format.

1.2.20 Bidder should ensure that the document uploaded is legible and full documents page is properly scanned.

1.2.21 Certificate of Financial Turnover: At the time of submission of bid, bidder may upload affidavit/certificate from CA mentioning Financial Turn Over of last 5 years or for the period as specified in the bid document duly certified by the chartered accountant. There is no need to upload entire voluminous balance sheet.

1.2.22 The eligibility (Technical) bid shall be opened first on due date and time as mentioned above. The time and date of opening of financial bid of bidders qualifying the eligibility (Technical) bid shall be communicated to them at a later date.

1.2.23 Pre-bid conference shall be held with the intending bidders in the Conference Hall, Project Office of Nalanda University at Rajgir, District Nalanda, Bihar – 803116 at 03:30 PM on 12th May 2021. After pre-bid conference, modifications if required in the bidding documents and clarifications to the queries raised by intending bidders will be issued to all participating bidders by the University by e-mail. Same will also be uploaded to the website.

1.2.24 All modifications/addendums/corrigendum issued regarding this bidding process, shall be uploaded on website only and shall not be published in any Newspaper. Therefore, prospective bidders must see the website regularly for any update.

The department reserves the right to reject any prospective application without assigning any reason thereof and to restrict the list of qualified bidders to any number deemed suitable by it, if too many bids are received satisfying the minimum laid down criteria.

1.2.25 The eligible bidders shall quote plinth area rates only, which shall include all components of the work. Contractor must ensure to quote rate of each item. The column meant for quoting rate in figures appears in pink colour and the moment rate is entered, it turns sky blue. In addition to this, while selecting any of the cells a warning appears that if any cell is left blank the same shall be treated as “0”. Therefore, if any cell is left blank and no rate is quoted by the bidder, rate of such item shall be treated as “0” (ZERO).

1.2.26 However, if a tenderer quotes nil rates against each item in item rate tender or does not quote any percentage above/below on the total amount of the tender or any section/ Sub head in percentage rate tender, the tender shall be treated as invalid and will not be considered as lowest tenderer.

1.2.27 If any information furnished by the applicant is found incorrect at a later stage, he shall be liable to be debarred from tendering/taking up of works in the University. The University reserves the right to verify the particulars furnished by the applicant independently.

1.2.28 Intending Bidders are advised to inspect and examine the site and its surroundings and satisfy themselves before submitting their bids as to the nature of the ground and sub-soil (so far as is practicable), the form and nature of the site, the means of access to the site, the accommodation they may require and in general shall themselves obtain all necessary information as to risks, contingencies and other circumstances which may influence or affect their bid. A bidders shall be deemed to have full knowledge of the site whether he inspects it or not and no extra charge consequent on any misunderstanding or otherwise shall be allowed. The bidders shall be responsible for arranging and maintaining at his own cost all materials, tools & plants, water, electricity access, facilities for workers and all other services required for executing the work unless otherwise specifically provided for in the contract documents. Submission of a bid by a bidders implies that he has read this notice and all other contract documents and has made himself aware of the scope and specifications of the work to be done and of conditions and rates at which stores, tools and plant, etc. will be issued to him by the Government and local conditions and other factors having a bearing on the execution of the work.

1.2.29 After submission of the bid the agency can re-submit revised bid any number of times but before last time and date of submission of bid as notified.

1.2.30 While submitting the revised bid, agency can revise the rate of one or more item(s) any number of times (he need not re-enter rate of all the items) but before last time and date of submission of bid as notified.

1.2.31 Any dispute arising out of this tender including dispute related to encashment of any Bank Guarantee/ FDR etc., shall be subject to the jurisdiction of courts of Patna High Court only.

1.2.32 Details of the Bank for submission of Performance Guarantee :

Name of A/c holder	:	NALANDA UNIVERSITY
Name & Address of Branch		DHARAMSHALA ROAD, DIST NALANDA, City :RAJGIR 803116, State :BIHAR
Type of Account	:	Current Account
Branch Code	:	2059
IFSC Code	:	HDFC0002059

1.2.33 List of documents to be filled in by the bidders in various forms as indicated in Section 3, to be scanned and uploaded within the period of bid submission –

Sl. No.	**Details of Documents to be submitted**
1.	Letter of transmittal
	Copy of receipt for deposition of original E-Tender Processing Fee (in favour of Nalanda University, payable at Rajgir, Bihar)
2.	**Note:** EMD is exempted subject to deposition of Earnest Money deposit declaration Form (Form 'F' of this NIT) to be scanned and uploaded at the time of tendering by the bidders for composite bids .

3.	List of eligible similar nature of works completed during the last seven years from date of completion to previous day of last date of submission of bid in Form -C. (If private works are shown in support of eligibility, certified copy of the tax deducted at source certificate (TDS) shall be submitted along with the experience certificate and the TDS amount shall tally with the actual amount of work done).
4.	Certificate of Financial Turnover from CA in Form –A. Bank Solvency Certificate in Form-B.
5.	GST Registration Certificate of the State in which the work is to be taken up, if already obtained by the bidder. If the bidder has not obtained GST registration in the state in which the work is to be taken up, or as required by GST authorities, then in such case the bidder shall scan and upload following undertaking along with other bid documents. "If work is awarded to me, I/We shall obtain GST registration Certificate of the state, in which work is to be taken up, within one month from the date of receipt of award letter, falling which I/We shall be responsible for any delay in payments which will be due towards me/us on a/c of the work executed "and/or for any action taken by Nalanda University or GST department in this regard.
6.	Performance report of works (mentioned in Form-C) in Form-D. Structure and Organization of the bidder in Form-E.
7.	Permanent Account Number (PAN) as issued by the Income Tax Department.
8.	Signed copy of Integrity Agreement.
9.	Undertaking of Structural/services Design as per proforma in para 1.3 below.

1.3 CERTIFICATE REGARDING STRUCTURAL / SERVICE DESIGN

The following certificates are to be submitted along with the technical bid of the tender: (This affidavit/certificate is to be submitted in non-judicial stamp paper of appropriate value and duly notarized)

It is certified that the structural design & services design and drawings along with integrated services drawings including safety norms from natural hazards like seismic, wind, fire etc., shall be prepared by associate agency(s) conforming to

eligibility criteria as defined in the bid document having duly qualified Structural and service engineer respectively for specialized component (s) including GRIHA Consultant /Facilitator as per norms prescribed in N.B.C/B.I.S/I.R.C./ GRIHA etc. Accordingly, I/ we shall get the buildings designed from qualified Structural Engineer, Services Engineer, Integrated Services Consultant and GRIHA Consultant /Facilitator.

It is further certified that the structural and services Consultants hired by us for carrying out the structural design and services design shall have following experience:

BE/B. Tech. from Any reputed Government Engineering College like IIT/NIT/Govt. Engineering College.

OR

Under the panel list of CDO/CPWD (mention as the case may be).

AND

The structural consultant will have at least degree of M. Tech (Structure) & M. Tech (E&M service) or equivalent and has got 15 years or more experience in the field of structural design and services design of similar nature of works. Documents in support of the above will be submitted at appropriate time for approval of the department.

OR

Should have the design experience by serving & designing in CPWD for at least 15 years & should have been retired at least from SE level in CPWD.

The structural designer firm of above should have an experience of structural design of completed non-residential or residential building of minimum 5 storied building of minimum plinth area as below:

3 RCC framed structure of having 5000 sqm build up area each.

OR

2 RCC framed structure of having 8000 sqm build up area each.

OR

1 RCC framed structure of having 10000 sqm build up area each.

The GRIHA Consultant and facilitator hired by bidder shall be well qualified having

minimum experience of 07 years in GRIHA consultancy and shall be on the approved list of the GRIHA authorities.

Signature of the contractor with date

Name in Blocks letters ----------

Address _____

1.4 DESIGN CONSIDERATIONS & REQUIREMENTS (CIVIL WORK)

1.4.1 The Buildings will be designed and built as per minimum “5 Star GRIHA Rating”.

1.4.2 The Design controls based upon design guidelines/criteria laid down in various BIS codes have been prepared and is given as under.

1.4.3 Type of Structure –RCC structure / shear wall as per Tenderer’s Own Structural Designs. The tenderer should invariably adopt the indicative architectural plans, elevations enclosed to develop detailed architectural drawings to tender with little changes if necessary, with permission of Engineer in Charge.

1.4.4 Plain and reinforced concrete shall be cast -in-situ / precast concrete. Precast concrete is allowed if design is based on precast technology.

1.4.5 All concrete to be used /prepared in RCC shall be Design Mix RMC.

1.4.6 Design criteria of RCC structural units shall conform to the Design requirements of Latest Version of IS:456-2000.

1.4.7 Minimum grade of concrete for In-situ concrete shall be of M-25 Grade as per Latest version of IS:456-2000.

1.4.8 High yield strength deformed bars or equivalent TMT bars of grade Fe 500 D or Fe 550Dconfirming to IS 1786 (Latest Version), as per approved structural design, shall only be used in all RCC work.

1.4.9 The permissible stresses for plain and reinforced concrete shall be in accordance with the requirements of Latest Version of IS: 456-2000.

1.4.10 Components of RCC structure shall be designed for loads in accordance with IS 875 (Parts l to 5) and IS 1893 (Latest Version). (Part 1). In addition, loads that might be expected during the construction shall also be considered in the design.

1.4.11 Resistance to horizontal loading shall be provided by having moment resisting frames and/or shear walls.

1.4.12 The structure shall be designed for Fire rating of two hours.

1.4.13 Then considering thermal shrinkage and heat effects, provisions of expansion Joints as per IS 3414(Latest Version) shall be provided.

1.4.14 Frame members i.e. Beams & columns to be designed for shear and moments as per the values obtained from model analysis. All other components of the building shall be designed with approved design programs. Design calculations shall be provided for all the components of the structure.

1.4.15 Basic load calculations shall be provided for all values of loads applied on all

members in STAAD model / E-tabs model or any other approved design programs.

1.4.16 Water retaining structures shall be designed in accordance with relevant provision of IS: 3370 (Part-I to part-IV, Latest Version). In addition, Earthquake forces as per IS 1893 shall (Latest Version) also be considered.

1.4.17 FOUNDATION

1.4.17.1 Soil Investigation has been done by Nalanda University and its report has been made part of this bid document. However, this is for reference purpose only. Further subsurface investigation if required, shall be carried out indicating vertical sections of the strata, testing of soil samples in an reputed and approved testing laboratory, preferable IIT/NIT/CSIR Lab for determining shear strength parameters, bearing capacity of the soil, permeability, index properties, water table, compressibility characteristics, swelling properties type & classification of soil and other geophysical information to decide economical & sound foundation type.

1.4.17.2 Number of Trial Pits and Borings

For a compact building site covering an area of about 2 acre, one bore hole or trial pit in each corner and 4 in the center part should be tested or as approved by E-In-C in consultation with contractor structural consultant. SPT or Cone penetration tests may be performed at every 50 m by dividing the area in a grid pattern and number of bore holes or trial pits decided by examining the variation in the penetration value curves.

1.4.17.3 Depth of Exploration:

The bore holes shall be made up to the required depths as per IS : 1892 (latest version). In weak soils, the exploration should be continued to a depth at which the loads can be sustained without undesirable settlement and shear failure. Water level in the bore shall be determined in accordance with, IS : 6935 (latest version). The cement concrete foundation (plain or reinforced) shall be designed in accordance with IS 456 (Latest Version). Masonry structures (foundation & superstructure) shall be designed in accordance with IS 1905 (Latest version). Design Considerations for Spread or Strip foundation shall be as per I.S. 1080 (Latest version).Pile foundation shall be designed as per IS

2911 (latest version).

Pile foundation

Since adequate load-bearing strata at shallow zone is not available, pile foundation is to be provided. Choice of piling system shall be made based on the soil report values, load values of the super-structure. Design Consideration for Piling system shall be as per relevant provisions in IS 2911(Latest version). Testing of piles and other requirements shall be as per IS 2911(Latest version) section-1 Para-4 and IS:14593 (latest revision). The minimum diameter of pile shall be 450 mm & minimum depth of pile shall be 12.70 meter.

1.4.17.4 Seismic considerations

1.4.17.4.1 Dynamic analysis shall be performed on latest version of STAAD PRO / E-tabs. Considering the site being in the border of Seismic Zone III & IV , parameters conforming to Seismic Zone IV is to be considered for design. Dynamic analysis, if required, shall be performed by Response Spectrum method using the design spectrum specified under clause 6.4.2 of IS 1893 (Latest Version). RC building frame system / wall system shall be designed and detailed to provide ductile behavior and shall comply with the requirements given in IS 4326 and IS 13920. In the buildings with Dual frame system, the RC frame as well as the shear walls shall be designed and detailed to provide ductile behavior and comply with the requirements given in IS 4326 and IS 13920.

1.4.17.4.2 Soft storey, if any, in the structure shall be treated as per clause 7.10 of IS 1893 (latest version).

1.4.17.4.3 Time period of the structure shall be taken as per clause 7.6 of IS 1893 (latest version).

1.4.17.4.4 Torsional forces in the structure arising out of mass or stiffness irregularity shall be dealt as per clause 7.9 of IS 1893 (latest version).

1.4.17.4.5 For underground structures and foundations at depths of 30 m or below, the design horizontal acceleration spectrum value shall be taken as half the value as comes out from clause 6.4.2. of IS 1893 (part-1)2002. For structures and foundations placed between the ground level and 30m depth, the design horizontal acceleration spectrum value shall be linearly interpolated between Ah

and 0.5 Ah, where Ah is as specified in clause 6.4.2. of IS 1893 (part-1)2002. The design acceleration spectrum for vertical motions, when required, may be taken as two-thirds of the design horizontal acceleration spectrum specified in 6.4.2.

1.4.17.4.6 To perform well in earthquake, the building shall be of simple & regular configuration and of adequate lateral strength, stiffness and ductility. The building shall be considered as irregular, if at least one of the conditions given in Tables 4 & 5, of IS 1893 (part1)2002 is applicable.

1.4.17.4.7 Vertical cantilever projections like RCC parapets, Tanks, etc. and others attached to the buildings projecting above the roof, shall be designed and checked for stability for five times the design horizontal seismic coefficient A as specified in 6.4.2. of IS 1893 (part1)2002. In the analysis of the building, the weight of these projecting elements will be lumped with the roof weight. The increased design forces specified are only for designing the projecting parts and their connections with the main structures. For the design of the main structure, such increase need not be considered.

1.4.17.4.8 Seismic consideration in design of Isolated footings/pile caps

1.4.17.4.9 The site area being in border of Seismic Zones III & IV, the individual spread footings/pile caps shall be interconnected with ties. The ties shall be provided at the foundation level (pile cap level) and at Plinth level.

1.4.17.4.10 All ties shall be designed to carry in tension and in compression, an axial force equal to Ah/4 times the larger of the column or pile cap load where Ah is as per clause 6.4.2 of IS 1893 (part-1)2002.

1.4.17.4.11 The ties are to be designed for additional load of filler wall if acting in addition to otherwise computed forces.

1.4.17.5 <u>Separation Between adjacent buildings :</u>

Two adjacent buildings or two adjacent units of the same building with separation Gap in between shall be separated by a distance equal to the amount R times the sum of the calculated storey displacements calculated as per clause 7.11.1 of IS 1893 (part-1)2002 each of them, to avoid damaging contact when the two units deflect towards each other. When floor levels of two similar adjacent units or buildings are at the same elevation levels, factor R in this requirement may be replaced by R/2.In addition due allowance for Thermal Expansion shall also be made.

1.4.17.6 Proof checking: The contractor shall develop detailed architectural drawings and design and submit the complete structural drawings, calculations, soft copies on CDs and two set hard copies for proof checking. Proof checking will be got done through any IIT/NIT or any reputed Govt. Engineering College as approved by the University. After getting the proof checking done by any Institute as decided by the University the contractor shall submit corrected and faired structural drawings in two set softcopies on CDs and eight set hard copies. The consultancy fees for proof checking shall be borne by the Contractor.

Note :- Whether specifically mentioned or not, all the IS codes referred above are to be used with latest edition and amendments up to last date of submission of bid. Contractor shall keep one set of all the relevant BIS codes, NBC 2016 at site for reference of Engineer-in-charge.

1.5 SCOPE OF WORK

1.5.1 The work shall be executed on EPC basis involving getting all local body clearances, soil testing, structural design & drawings, all services design & drawings ,integrated services drawings, all shop drawings, RCP and technical data sheet for specialized works as required, adopting & documenting all process necessary for obtaining the 5-Star GRIHA rating, proof checking of structural and E & M services including road design & drawings, constructions & commissioning of buildings & services and obtaining completion certificate in accordance with layout plan, architectural, structural and E & M services drawings, submitting all necessary data to GRIHA authorities and obtaining 5 star GRIHA Rating from the GRIHA authorities. The detailed working architectural drawings shall be got prepared by the contractor based on indicative layout plan and architectural plans provided in the bid document. Based upon the Architectural drawings, the structural design, E & M services design, conduiting & piping route drawings, layout drawings of All electrical switches, fans & fittings, layout details of fittings and fixtures in Toilets, required shop and RCP drawings , integrated services design and drawings in consultation with GRIHA Consultant shall be got prepared by the contractor.

1.5.2 Scope of work contained in the paras mentioned below is only indicative and not exhaustive. In addition the contractor shall be responsible for executing all items required for completing the various buildings in all respects to make them

habitable/usable for their intended purpose and ready for occupation complete as per direction of Engineer-in-charge.

1.5.3 Local Body Approval:-

Agency will get the scheme i/c bulk services (civil & electrical) with one deep tubewell approved from the local bodies wherever required before start of the work and as & if required after completion of the work also. However if modification is required in any of the architectural /E&M services drawing/any other drawing by any of the local bodies, the same shall be carried out by the contractor at his own cost.

1.5.3.1 The contractor shall obtain all mandatory approval and No Objection Certificate/ Consent for Establishment from local body authorities like AAI, Fire department, town planning authority, ground water authority, electricity supply authority, pollution control board, Forest department, Environmental clearance, Lift inspectorate, Central Electricity Authority, Heritage building committee etc.

1.5.3.2 The contractor has to prepare all the documents as required and submit directly to the local statutory bodies.

1.5.3.3 The contractor shall at his own cost collect field samples and carry out all necessary tests required for submission of necessary applications.

1.5.3.4 The contractor has to comply and, if necessary, resubmit applications as required by the local bodies.

1.5.3.5 If required the contractor has to appoint, at his own cost, consultants for obtaining local body approval.

1.5.3.6 The statutory payments of fees, for getting all statutory approvals, shall be paid by the University as per actuals based on receipt/estimate letter from concerned service department.

1.5.3.7 Three final copies of the documents prepared shall be submitted to Engineer-in-Charge for record.

1.5.3.8 All the documents created out of the assignment will become the sole property of the Department.

1.5.3.9 The contractor shall obtain completion and /or occupation certificate after completion of the project from statutory local bodies before handing over.

1.5.4 Contractor will get the detailed soil investigation done as per relevant IS code, NBC 2016 etc. as applicable through the reputed soil consultant, as approved by E-in-C,

having professional experience of at least 15 years and must have carried out soil investigation successfully for at least two similar works & one set of test report shall be deposited with the department. The department may verify the results submitted by the agency, if need be.

1.5.5 Contractor will get the height clearance from Civil Aviation Department before approval of drawings for the work and if required after completion of the work also.

1.5.6 Contractor will get the scheme approved from local fire authority before start of work as well as after completion of the work.

1.5.7 Down take feeder pipe for water supply will not serve more than three floors and accordingly the diameter of the feeder pipe and the branch pipes (external as well as internal in building) to individual supply points shall be designed and provided in such a way so that on opening of all the taps at supply points being fed by the concerned down-take pipe system, water with full pressure reaches in each tap. For convenience in maintenance, necessary Gunmetal valves/ butterfly valve of approved make and required diameter along with union shall also be provided in the waterline of every type of water at entry toilet.

1.5.8 Tenderer may satisfy himself by conducting pre-soil tests if he so requires. However an indicative soil investigation report is uploaded for general guidelines of the Bidders, although this will not have any bearing on the quoted rates by the bidders. Tenderer will be required to conduct detailed soil investigation including detection of harmful chemicals for buildings pockets separately at their own cost for carrying out structural design of building pocket, through soil consultants for advising the type of cement to be used in foundation to take care from the harmful effect of the chemicals encountered in the soil in contact with foundation.

1.5.9 <u>Structural Design:</u>

1.5.9.1 Prepare complete structural design, drawings for foundation, superstructure and for other related structures of various buildings as per provision contained in IS/ relevant codes under Seismic Zone IV.

1.5.9.2 The contractor shall take all precautions and submit method statement like filling of sand in pit or any other measures approved by Engineer-in-charge so that vibrations from Rolling Stock/Railway Track are not transferred to the structures tendered for. Nothing extra shall be paid to contractor for the execution of related work on this account.

1.5.9.3 The structural drawings shall be got proof checked from the agency which can be any NIT /IIT / any Engineering college approved by the University. Similarly, the E& M services design and drawings including integrated services drawings, road design shall be got proof checked by the bidder from the institute approved by the department. The structural drawings and E & M services drawings, with proof vetting report, shall be issued to university for scrutiny and approval as GFC prior to start of any execution of work at site by the contractor. If any modification in design/ drawing is needed as per site conditions, or as desired by proof checking agency, the bidder shall do/ redo the design without any extra cost. The decision of the Engineer-in-charge shall be final and binding. No claim whatsoever will be entertained in this regard. The cost of proof-checking shall be borne by the contractor but agency shall be approved by E-in-C , Nalanda university. The design basis report shall be submitted by the agency within 20 days of issuance of Letter of Award/Acceptance, which shall be approved by the University within 10 working days. Thereafter, the agency shall submit the structural and E&M services and road design and drawings within 45 days' time which shall be approved in another 45 days by the University, which includes the scrutiny period by the proof checking agency.

1.5.10 **Construction** includes construction and finishing of the buildings complete as well as related structure and services as per the technical specifications provided along with this NIT.

1.5.11 Planning, preparing drawing for internal services and execution of the same i.e. internal sanitary work, water supply work, drainage system etc. complete for the building including all pipes, its fittings, testing etc. complete as approved by the University.

1.5.12 **Water supply:** Water supply lines will be laid as per scheme prepared, submitted by the contractor and approved by Engineer-in-charge.

Pipe line will be provided for supply of water through Dual pipe system, i.e.

1.5.12.1 Pipe lines for supply of Municipal / R.O. treated Deep Tube Well water for kitchen through overhead tank.

1.5.12.2 Pipe lines for supply of water from available source of water/Deep Tube Well for Bath, W.C through overhead tank.

1.5.12.3 For this, different Tanks of required capacity will be provided at the terrace. Separate stacks of down take pipe lines from tanks on terrace to each supply area and from tanks on terrace up to outside plinth

protection of appropriate diameter as per design and approved will be provided for supply of treated STP water, Municipal/R.O. treated Deep Tube well water and Raw Tube well water.

1.5.13 Statutory fees / connection charges, if any, is to be paid to the local bodies by the contractor. The cost of restoration of any services damaged by the agency during execution shall also be borne by him. The contractor shall carry out a Radar survey for locating any underground services up to depth of foundation and shift the falling services, if any from the working area of the tendered buildings at no extra cost to Nalanda University.

1.5.14 Taking all precautionary measures to safeguard against any accident for the contractors employees, general public, supervisory staff of the University and its by providing necessary safety equipment e.g. MS sheet barricading etc. and Personal Protection Equipment e.g. helmets, safety shoes etc. at work site.

1.5.15 The site has to be kept clean of all debris, rubbish and dirt & surplus/waste material all the time during execution and after completion of works. It also includes maintenance, cleaning & de-silting the drains, pipe lines laid by the agency for all services etc. executed by the agency to the entire satisfaction of the Engineer-in-charge during the maintenance periods. Cleaning and de-silting will also be done by the agency before handing over the completed institutional campus to Nalanda University. All machines, equipment and labour for this purpose will be arranged by contractor.

1.5.16 The contractor will submit the schedule containing the item, rates (i.e. DSR reference, if available), and quantities of items, detailed measurements & specifications (four sets) within three months from the date of start of the work to accord the T.S if required by Engineer-in-charge.

1.5.17 Contractor shall procure design mixed concrete from approved external or at site installed RMC plant of adequate capacity with computer control for weigh batching and feeding of all concrete materials as per all approved design parameters and shall ensure that the quality and strength of cement concrete procured from RMC plant is as per design requirement through a well-defined quality control system, testing of samples, transportation of concrete(IS 4926:2003) and continuous analysis of result as per CPWD specification and relevant Indian Standards. Sufficient number and capacity of TMs shall be deployed by contractor with concrete

pump and placing boom to ensure timely and quality execution of work.

1.5.18 The scope of work includes execution of Electrical & Mechanical works and preparation of various drawings of internal electrical installations and fittings, firefighting, lifts and fire alarm, central AC plant etc., as per CPWD specifications given in the tender document & directions of the University's Engineering Section.

1.5.19 All labour employed by the firm/ contractor shall be got registered with Bihar Construction Labour Welfare Board, ESIC and EPF, etc.

1.5.20 Maintenance / defect liability period would be uniformly One (1) year from the date of taking over the respective buildings complete in all respects & fit for occupation. However, maintenance of other building activities such as cleaning, sweeping of pocket & de-silting of sewer lines, S.W. Drain shall be done only once, at the time prior to handing over the respective pocket. The DLP will be only limited to removal of defects noticed in the works pertaining to quality of material and /or workmanship for works carried out by the agency. The terms of Maintenance & liability period for Electrical subheads is as mentioned in the part -C for E&M works.

1.5.21 Structural defect liability period would be uniformly Ten (10) year from the date of taking over the respective buildings complete in all respects & fit for occupation for which guaranty bond for Ten (10) years should be submitted for amount of 1% of the tendered cost at the time of handing over.

1.5.22 The final plinth level will be decided soon after actual start of work at site. Plinth level of the building shall be minimum 750 mm above the crown of finished road. Changes if any, would not affect the agreed rates and no claim on this account shall be entertained.

1.5.23 The above scope of work includes within quoted cost, cost of all materials, manpower, equipment, T&P fixtures, accessories, shuttering, scaffolding, designing, preparation of GFC (Architectural, civil, structural, E&M works) , shop drawings and technical data sheet for all relevant works, proof vetting of design of civil, structural and E&M services from approved reputed institutes , royalties, taxes, GST, watch & ward, site barricading, EPF, ESIC, BOCW registration, compliances to all EHS norms, obtaining GRIHA 5 star rating, all Pre, During and Post construction statutory approvals , all COVID protocols of GOI to be complied, all relevant insurances incl. CAR policy to be obtained , site lab, testing of material as directed by E-in-C , mock up preparation for internal and external finishes work and all other essential elements for completion and DLP of works as aforesaid whatsoever as directed by E-in- C. The approval accorded by Nalanda University before acceptance of tender

is only for tender evaluation. Any changes, modifications, revisions etc. required to be done by the University, local bodies, proof consultants etc. in accordance with applicable standards and tender document will have to be done by contractor at contractor's cost and nothing extra shall be payable.

1.5.24 The shuttering and scaffolding intended to be used for RCC roof casting in these buildings viz. Auditorium ,Yoga Center, Cafeteria shall be properly designed and approved for structural integrity , shape , size etc. of members to be used in shuttering and scaffolding , from reputed and approved Institutes like IIT / NIT etc. and details / drawings shall be submitted to E - IN -C prior to commencement of any work.

1.5.25 Providing Lift of required capacity as per NBC norms and as specified in the Architectural drawings including provision of shaft for lift well, machine rooms and standby Diesel Genset in case of power failure. The scope includes getting the requisite permission of lift inspector from the concerned authority before commissioning of the same.

1.5.26 Planning, designing and providing required firefighting system for proposed building as per NBC norms and chief fire officer's approval including the provision of required capacity underground water tank, overhead tank, pumps, hydrant, extinguisher, sprinklers, provision of refuge area, fire stair case etc. all to the entire satisfaction of CFO.

1.5.27 The contractor shall bear the expenditure of service cable for making the electric connection from office campus to feeder point of service provider as per the specification of concerned local body.

1.5.28 In case of any discrepancy in the number, quantity and specification of any item in various parts / sections of bid document, the higher number / quantity as well as richer specification of an item shall be considered during design and execution of the work without entertaining any claim from contractor for any extra payment / compensation.

1.5.29 Mobilization advance (with interest) will be payable after completion of design or getting the local body approval whichever is later.

1.5.30 Out of 24 months as stipulated period, the time limit for Planning & Designing, proof vetting & obtaining statutory approvals shall be maximum 3 months. The remaining period i.e., 21 months will be for completion of entire work fit for its end use. The details scope of work for the components may also be seen with in this document.

1.6 GUIDELINES / PROCEDURE TO BE FOLLOWED IN INTRODUCTION OF 'E'-PROCUREMENT SOLUTION

1.6.1 The bidders can view / download the tender documents, from the www.nalandauniv.edu.in/tenders or https://nalandauniv.euniwizarde.com/ or https://eprocure.gov.in/epublish/app.

1.6.2 **Submission of Bids:** The bidders who are desirous of participating in this e-Tender shall submit their price bids in the standard formats prescribed in the Tender documents, displayed at www.nalandauniv.edu.in/tenders or https://nalandauniv.euniwizarde.com/ The bidder should upload the scanned copies of all the relevant certificates, documents etc., in the https://nalandauniv.euniwizarde.com/ in support of their bids. The bidder shall sign on all the statements, documents, certificates, uploaded by him, owning responsibility for their correctness / authenticity.

1.6.3 **Payment of Bid Security (Earnest Money Deposit):- Exempted.**

1.6.4 **Processing of Tenders:-** The concerned Committee as appointed by the Competent Authority at Nalanda University will evaluate and process the tenders as done in the conventional tenders and the decisions will be communicated to the bidder online. Any correspondences or queries related to this tender shall be submitted to the University in the email address – phase1.tender@nalandauniv.edu.in only.

1.6.5 **Price Bid opening**:-The Price bid will be opened online by the Committee at the specified date and time and the result will be displayed on the website www.nalandauniv.edu.in/tenders and https://nalandauniv.euniwizarde.com/ , which can be seen by all the bidders who participated in the tender.

1.6.6 **Payment of performance Guarantee**: -The bidder shall submit irrevocable performance guarantee of 3% (three percent) of the tendered amount in addition to other deposits mentioned elsewhere in the contract for his proper performance of the contract. This guarantee shall be in the form of Banker Cheque / pay order / FDR / guarantee bonds of any scheduled bank in favour of Nalanda University, payable at Rajgir. 100% of the performance guarantee shall be released after completion of work .However, the Performance Bank Guarantee will be kept valid time to time by the bidder as per the direction of Engineer-in-charge.

1.6.7 **Participation of Bidders at the time of opening of bids** :- Bidders have two options to participate in tendering process at the time of opening of Bids :

1.6.7.1 Bidders can come at the place of opening of bids (electronically) by the Tender Opening Committee as done in the conventional tender process.

1.6.7.2 Bidders can attend the process online.

1.6.8 **Signing of agreement:** -After the award of the contract, an agreement will be signed as done in Conventional Tenders.

Sd/-
Registrar
Nalanda University

1.7 CPWD -6 for E-TENDERING

The Registrar, Nalanda University, Rajgir, District – Nalanda, Bihar on behalf of Nalanda University invites online composite bids on Engineering Procurement Construction (EPC) basis from reputed, approved and eligible composite category contractors of CPWD or any State/Central Govt. Departments/PSUs/Institutions/Autonomous Bodies/other reputed firms fulfilling the set eligibility criteria, in two bid system (Eligibility Bid & Financial bid) for following work:

NIT NO:	NU/Engg/91/2020-21/EPC/02
Name of Work:	**"Construction of Buildings including one 500 user capacity Yoga Center cum Meditation/Multipurpose Hall (Ground Floor - with minimum 8.0 m ceiing height), one 250 user capacity Cafeteria (Ground Floor - with minimum 4.0 m ceiling height) and one 2000 seater capacity Auditorium (G+1 Storied - with minimum 16.0 m celling height) - Civil composite work including all wired and piped services comprising of internal water supply, sanitary installations, façade works, roads, pathways, drainage, electrical works including internal electrical installations, Extra Low Voltage (ELV) works, Fire Fighting, Fire Alarm System, HVAC , Lifts, Solar System, External Electrical Installations, Horticulture , other miscellaneous works etc. all complete on EPC basis for Nalanda University main campus at Rajgir, District Nalanda, Bihar."**

1.7.1 The work is estimated to cost **94,39,00,000/- (Rupees ninety four crore thirty nine lakh only).**

1.7.2 Intending bidder is eligible to submit the bid provided he has definite proof from the appropriate authority, which shall be to the satisfaction of the Competent Authority at Nalanda University, of having satisfactorily completed similar works of magnitude as specified below:

1.7.2.1 Contractors who fulfill the following requirements shall be eligible to apply.

1.7.2.2 Should have satisfactorily completed the works as mentioned below during the last

Seven years ending previous day of last date of submission of tenders:

Three similar works each costing not less than **Rs. 37.76** Crore.

or

Two similar works each costing not less than **Rs. 56.63** Crore.

or

One similar work costing not less than **Rs. 75.51** Crore.

Similar work shall mean: -

"Construction of Buildings including one 500 user capacity Yoga Center cum Meditation/Multipurpose Hall (Ground Floor - with minimum 8.0 m celling height inside Yoga & Meditation Hall), one 250 user capacity Cafeteria (Ground Floor - with minimum 4.0 m celling height inside Yoga & Meditation Hall) and one 2000 seater capacity Auditorium (G+1 Storied - with minimum 16.0 m celling height inside the Auditorium) - Civil work including all wired and piped services comprising of internal water supply, sanitary installations, façade works, roads, pathways, drainage, electrical works including internal electrical installations, Extra Low Voltage (ELV) works, Fire Fighting, Fire Alarm System, Air Conditioning, Lifts, Solar System, External Electrical Installations, etc., other miscellaneous works all complete on EPC basis for Nalanda University main campus at Rajgir, District Nalanda, Bihar."

Note:-

(1) Mumty and machine room will not be counted as storey for this purpose.

(2) For this purpose, each basement, stilt constructed in the building shall be considered as a storey.

(3) Work of basement, specialized E&M services, if executed under a separate contract may also be considered for the purpose of assessing the technical competence only without adding its monetary value for determining the eligibility criteria.

(4) One building of the specified number of storeys, as mentioned in definition of similar work constructed in each work of the financial magnitude as specified in para 1.7.2.2 shall satisfy the criteria of similar work.

1.7.2.3 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. Qualified similar works may be physically inspected, if required, by a Technical Expert Committee constituted (TEC) by the Competent Authority at Nalanda University to ascertain the

completion, performance on quality of works for finalizing the Technical bid. Decision of TEC is final and binding.

1.7.2.4 The Bidders should have minimum average annual financial turn over (gross) of **Rs. 47.20 Crore** on construction work during the last available three consecutive financial year ending March, 2020. Year in which no turnover is shown would also be considered for working out the average. The multiplication factor of 7% per annum simple interest is not applicable on the Annual Financial Turnover figures.

1.7.2.5 Should not have incurred any loss (profit after tax should be positive) in more than two years during the last five years ending 31st March, 2020

1.7.2.6 Should have a minimum solvency of **Rs. 37.76 Crore** (Scanned copy of original solvency certificate to be uploaded).

1.7.2.7 The bidder should have sufficient number of Technical and Administrative Employees for the proper execution of the contract. The bidder shall have to submit a list of these employees stating clearly how these would be involved in this work within 15 days of award of work.

1.7.3 Agreement shall be drawn with the successful bidders on prescribed format under Annexure –VI along with General Conditions of Contract for EPC works CPWD-2020 as amended up to the last date of submission of bid, which is available as a Govt. of India Publication and also available on website www.cpwd.gov.in. A copy of the document has also been uploaded along with this Notice Inviting Tender. **Bidders shall quote his rates as per various terms and conditions of the said document which will form part of the agreement**.

1.7.4 The time allowed for carrying out the work will be **24 Months** (3 months for planning & designing and obtaining approvals for commencement of work + 21 months for execution of original work and obtaining approvals from local bodies for declaring the buildings fit for occupation) from the date of start as defined in

Schedule ‘F’ or from the first date of handing over of the site, whichever is later, in accordance with the phasing, if any, indicated in the bid document.

1.7.5 The site for the work is available.

1.7.6 The bid document consisting of scope of work, specifications, plans and the set of terms & conditions of the contract to be complied with and other necessary documents can be seen from the websites www.nalandauniv.edu.in/tenders and https://nalandauniv.euniwizarde.com/ .

1.7.7 After submission of the bid, the contractor can re-submit revised bid any number of times but till before last time and date of submission of bid as notified.

1.7.8 After submission of the bid, contractor can revise the quoted rates any number of times but before last time and date of submission of bid as notified.

1.7.9 E-tender processing fee of Rs. 15,000/- in the form of Demand Draft or Pay order or Banker’s Cheque or Deposit at Call Receipt or Fixed Deposit Receipt (drawn in favour of Nalanda University payable at Rajgir) shall be scanned and uploaded to the e-Tendering website within the period of bid submission. The original EMD should be deposited in the office of the Registrar, Nalanda University within the period of bid submission.

1.7.10 Earnest Money : Exempted

1.7.11 Bids shall be summarily rejected if the Original e-Tender Processing Fee is not received within the period of bid submission.

1.7.12 Copy of certificate of work experience and other documents as specified in the press notice shall be scanned and uploaded to the e-Tendering website within the period of bid submission. Also hard copy of certified copy of all the scanned and uploaded documents as specified in press notice shall have to be submitted by the lowest bidder only within period of bid submission physically in the office of tender opening authority.

1.7.13 Online bid documents submitted by intending bidders shall be opened only of those bidders, whose original EMD deposited with the Office of the Registrar and other documents scanned and uploaded and physically submitted, are found in order.

1.7.14 The technical part of the bid submitted shall be opened at 03.30 PM on 27th May 2021.

1.7.15 The eligibility (Technical) bid shall be opened first, on due date and time as

mentioned above. The time and date of opening of financial bid of contractors qualifying the eligibility (Technical) bid shall be communicated to them at a later date.

1.7.16 Pre-bid conference shall be held with the intending bidders in the Conference Hall, Project Office of Nalanda University at Rajgir, District Nalanda, Bihar – 803116 at 11:30 Hrs. on 12th May 2021 to clear doubts of the intending bidders, if any. Bidders should send by email (along with editable softcopy) all their queries, before pre-bid conference, latest by closing hours on 3rd May 2021 in the email address – phase1.tender@nalandauniv.edu.in and hardcopies may be sent to **"The Registrar, Nalanda University, Rajgir, District Nalanda, Bihar-803116"**. After pre-bid conference, modifications if required in the bidding documents and clarifications to the queries raised by intending bidders will be issued to all participating bidders by the University by e-mail. The same will also be uploaded in the website (www.nalandauniv.edu.in/tenders and https://nalandauniv.euniwizarde.com/). If further pre-bid conferences are required for complete and effective interactions, the date and time of same will be communicated at the end of 1st pre-bid meeting or later. **All modifications/addendums/corrigendum issued regarding this bidding process, shall be uploaded on the above-mentioned websites only and shall not be published in any Newspaper.**

1.7.17 The bidders are advised to visit the site before attending the pre-bid meeting to have more clarity about the site conditions and availability of space for execution of the work. The Bidders shall submit an affidavit of site visit as per proforma placed under Annexure-VII.

1.7.18 GST or any other tax applicable in respect of inputs procured by the contractor for this contract shall be payable by the contractor and the University shall not entertain any claim whatsoever in respect of the same. However, component of GST at time of supply of service (as provided in CGST Act 2017) provided by the contract shall be varied as it may be different from that applicable on the last date of receipt of tender including extension if any.

1.7.19 The bid submitted shall become invalid if:

1.7.20.3 The bidder is found ineligible.

1.7.20.4 The bidder does not deposit original e-Tender processing fee with the

office of the Registrar.

1.7.20.5 The bidder does not upload all the documents (including PAN/GST registration) as stipulated in the bid document including the copy of receipt for deposition of original EMD.

1.7.20.6 If any discrepancy is noticed between the documents as uploaded at the time of submission of bid and hard copies as submitted physically by the lowest bidder in the office of bid opening authority.

1.7.20.7 If a tenderer quotes nil rates against any item in tender or does not quote any percentage above/belowon the total amount of the tender or any section/sub head in percentage rate tender, the tender shall be treated as invalid and will not be considered as lowest tenderer.

1.7.20 The contractor whose bid is accepted will be required to furnish performance guarantee of 3% (three Percent) of the tendered amount within the period specified in schedule F. This guarantee shall be in the form of Deposit at Call receipt of any scheduled bank or Banker's cheque of any scheduled bank or Demand Draft of any scheduled bank or Pay order of any scheduled bank or Fixed Deposit Receipts or Guarantee Bonds of any Scheduled Bank or the State Bank of India in accordance with the prescribed form. In case the contractor fails to deposit the said performance guarantee within the period as indicated in schedule 'F' including the extended period if any, the tender will be rejected and bidder will be disqualified for 01 year for bidding this tender and /or any tender of Nalanda University. 100% of the performance guarantee shall be released after completion of work as certified by E-in-C.

1.7.21 The bidder whose bid is accepted will also be required to furnish either copy of applicable licenses/registrations or proof of applying for obtaining labour licenses, registration with EPFO, ESIC and BOCW Welfare Board including Provident Fund Code No., as and if applicable, and also ensure compliance of aforesaid provisions by the sub-contractors, if any, engaged by the contractor for the said work .

1.7.22 Bidder will also submit Programme Chart (Time and Progress) on primavera or MS Project software within the period specified in Schedule F.

1.7.23 The description of the work is as follow:

Construction of one 500 user capacity Yoga Center cum Meditation Hall, one 250 user capacity Cafeteria and one 2000-seater capacity Auditorium including all

Internal Water Supply, Sanitary Installations, Roads, Pathways, Drainage, sewerage, Internal Electrical Installations, Fire Fighting, air conditioning and external Electrical installations, site development, Lifts, Road etc. all complete on EPC basis for Nalanda University Main Campus at Rajgir, District Nalanda, Bihar as per scope and terms and conditions of this tender.

1.7.24 Intending Bidders are advised to inspect and examine the site and its surroundings and satisfy themselves before submitting their bids as to the nature of the ground and sub-soil (so far as is practicable), the form and nature of the site, the means of access to the site, the accommodation they may require and in general they shall themselves obtain all necessary information as to risks, contingencies and other circumstances which may influence or affect their bid. A bidder shall be deemed to have full knowledge of the site whether he inspects it or not and no extra charge/claim consequent on any misunderstanding or otherwise shall be allowed. The bidder shall be responsible for arranging and maintaining and use at his own cost all new construction materials, tools & plants, water, electricity access, facilities for workers and all other services required for executing the work unless otherwise specifically provided for in the contract documents. Submission of a bid by a bidder implies that he has read this notice and all other contract documents and has made himself aware of the scope and specifications of the work to be done and of conditions and rates at which stores, tools and plant, etc. if any, will be issued to him by the Nalanda University and local conditions and other factors having a bearing on the execution of the work.

1.7.25 The competent authority at Nalanda University does not bind itself to accept the lowest or any other bid and reserves to itself the authority to reject any or all the bids received without assigning any reason thereof. All bids in which any of the prescribed conditions is not fulfilled or any condition including that of conditional rebate is put forth by the bidders shall be summarily rejected.

1.7.26 Canvassing whether directly or indirectly, in connection with bidders is strictly prohibited and the bids submitted by the contractors who resort to canvassing will be liable to rejection.

1.7.27 The competent authority at Nalanda University reserves to itself the right of accepting the whole or any part of the bid and the bidders shall be bound to

perform the same at the rate quoted.

1.7.28 The contractor shall not be permitted to bid if his near relative is posted as an employee in any capacity in the Nalanda University. He shall also intimate the names of persons who are working with him in any capacity or are subsequently employed by him and who are near relatives to any employee of the Nalanda University. Any breach of this condition by the contractor would render his bid liable to be rejected and shall be treated as concealing of information and appropriate action will be taken for blacklisting of such contractors.

1.7.29 No employee of Nalanda University employed in the Engineering Section or Administration is allowed to work as a contractor for a period of one year after his/her retirement or repatriation from service, without written permission of the Competent Authority at Nalanda University. This contract is liable to be cancelled if either the contractor or any of his employees is found any time to be such a person who has not obtained the permission of the University as aforesaid before submission of the bid or engagement in the contractor's service.

1.7.30 The tender for the works shall remain open for acceptance for a period of 120 days from the date of opening of technical bid. Further :

1.7.30.1 If any tenderer withdraws his tenders or makes any modifications in the terms & condition of the tender which is not acceptable to the University, after opening of tender (excluding date of opening of tender) then the University shall without prejudice to any other right or remedy, be at liberty to debar the said bidder for 01 year from any tender of Nalanda university.

1.7.31 This notice inviting tender shall form a part of the contract document. The successful bidder/contractor, on acceptance of his bid by the Accepting Authority shall within 15 days from the stipulated date of start of the work, sign the contract consisting of –

1.7.31.1 The Notice Inviting Bid, all the documents including additional conditions, specifications and drawings, if any, forming part of the bid as uploaded at the time of invitation of bid and the rates quoted online at the time of submission of bid and acceptance thereof together with any correspondence leading thereto.

1.7.31.2 CPWD GCC for EPC Works 2020 along with all correction slips issued by the Department till last date of submission of bids.

PART – II

TECHNICAL BID

Section I

1.1 BRIEF PARTICULARS OF THE WORK

Nalanda University was established in November 2010. It came into being by an Act of the Indian Parliament – a testimony to the important status that Nalanda University occupies in the Indian intellectual landscape. Nalanda University is a standalone international university unlike any other established in the country. Located in the town of Rajgir, in the northern Indian State of Bihar, Nalanda University is mandated to be "an international institution for the pursuit of intellectual, philosophical, historical and spiritual studies". This new university contains within it a memory of the ancient Nalanda University and is premised on the shared desire of Member States of the East Asia Summit countries to re-discover and strengthen "educational co-operation by tapping the East Asia Regions Centres of excellence in education ... [and] to improve understanding and the appreciation of one another's heritage and history"

The proposed site for the University is located at Rajgir in the Nalanda district of Bihar and fronts the State Highway 71. The site for the University is on the South West outskirts of Rajgir town at a distance of 3.5 kilometers from the current urban edge of the town.

This tender document is for construction of one 500 user capacity Yoga Center cum Meditation Hall, one 250 user capacity Cafeteria and one 2000 seater capacity Auditorium including all Internal Water Supply, Sanitary Installations, sewerage Roads, Pathways, Drainage, Internal Electrical Installations, Fire Fighting, Lifts , HVAC and external Electrical installations, landscape, solar system etc. all complete on EPC basis for Nalanda University Main Campus at Rajgir, District Nalanda, Bihar.

This work is to be executed on ENGINEERING, PROCUREMENT AND CONSTRUCTION (EPC) basis. The execution will be done on the basis of drawings and schedule to be prepared by the consultant appointed by the Contractor, after due approval of E-in-C. The specialized consultants appointed by the agency/contractor should give complete details related to planning and design. The functional units within the scope of work can have competing needs and priorities. Idealized scenarios and strongly-held individual preferences must be balanced against mandatory requirements, actual functional needs and taking into consideration local culture and traditions in the architectural form of the proposed buildings. .The drawings and schemes shall be got approved from Nalanda University in line with CPWD GCC EPC projects 2020, CPWD Specifications (civil) 2019 Vol I & II,CPWD general specifications Electrical Part I, Part III, Part IV, Part V, Part VI, Part VII,

Part VIII, CPWD Specification (Horticulture & landscape) 2020 with correction slips issued up to last date of submission of Bid, relevant IS codes, National Building Code 2016 and other standard specifications suitable for such buildings and latest technology will be followed in general except otherwise mentioned in the bidding document. Samples of the materials of approved make shall be got approved from the Engineer-in-charge before use in the work.

The scope of work includes Survey, Soil Investigation, preparation of architectural design, structural design and design of RCC multistoried Building along with all required E&M services i.e. Internal Electrical work, HVAC, Fire Fighting System, Plumbing & Water Supply, sewerage , Data & IP based telephony with Display on device and applicable license, EPABX, STP, Electrical Substation i/c building, DG Set, Lifts, Fire Alarm System, UPS, Solar Water Heating System, Solar PV General System, Provision for LT panels etc., Compact STP, area development, roads ,horticulture & landscaping works etc all complete as required for modern buildings on the basis of the functionality and user requirements. Thereafter construction and commissioning of building(s) complete with high side electrical installations, DG Sets, Lifts, Fire Alarm System, UPS, Solar Water Heating System, Provision for LT panels & external street lighting, underground sump & pump room, etc.

Obtaining mandatory approvals from local bodies/ State & Central authorities/ Municipal Corporation etc. including tree cutting/tree transplantation permissions etc. for the complete work is in scope of this contract. Approvals as per latest Bihar Building Byelaws with up to date correction slips, necessary Environmental Clearance from the appropriate authority, NOC from Fire Department, obtaining Green Building Certificate etc. and any other statutory approval/MCI/ AERB/Central Licensing Approving Authority etc. related to building for office campus, approval from authorities required for commencing the work, execution of civil work i/c finishing, façade, etc. & E&M services all complete and handing over the assets. Contractor shall also take all necessary measures required to be taken to remove any live or dead service lines running through the plot area without any extra cost. DLP against all defects regarding quality of material /workmanship in the completed building(s) & all services i/c HVAC & Fire Fighting System, horticulture etc. for a period of one year from the actual date of completion (called defect liability period) is included in the scope of work. The scope is inclusive of topographic & contour survey, subsoil investigation and all ancillary works. The cost of labour, material, tools and plants, shuttering, scaffolding, site barricading, all taxes/duties, PF/ESI/BOCW, all labour related insurances incl. CAR policy , EHS norms , watch and ward, working in shifts for timely completion, any work required related to Covid protocol as per CPWD guidelines and machinery required for execution of the whole project as per

Layout plan & detailed design and drawings to be approved, specifications etc. is within the scope of this work within the quoted cost and nothing extra will be admissible under any circumstances.

The Nalanda University campus is already registered under GRIHA 5-Star for Large Development (LD) and the Masterplan of the campus has received the prestigious GRIHA 5-Star rating for LD Projects. Therefore, the buildings are to be planned, designed and constructed to meet 5 STAR GRIHA rating. The brief scope of work is as follows:

Buildings: Floor wise distributions of various facilities are only indicative. The plinth area details included in scope of works are as per architectural drawings with this document:

Minimum Plinth Area to be provided –

Name of Building	**Minimum Plinth Area**
500 user capacity Yoga Center cum Meditation Hall	3235 square meter
250 user capacity Cafeteria	1230 square meter
2000-seater capacity Auditorium	7500 square meter

The broad architectural specification shall be as below which is indicative and not exhaustive. In case some space inside and outside the building is left out the same is included with concept of commensurate specification with approval of Engineer-in -charge:

BUILDING WISE INTERIOR ARCHITECTURAL SPECIFICATIONS

SL. NO.	Building Name	Category	Room	Flooring	Skirting/ dado	Internal partitions	Wall finish	Celling	Door type	Misc. Details (Exterior Finish/ Structural Glazing/ Handrails)
1	**500 user capacity Yoga Center cum Meditation Hall**	Entrance	17, 7.3	6.2.2	6.2.2	5.2	17	7.3	2.3.4	Combination of Dry Stone Cladding (12) and Structural Glazing system (13.3) Handrails – 5, 5.1 As per approved Architectural design
		Reception & Entrance Lobby	15, 17.1, 7.3, 18	6.2.3	6.2.3	7.3	17.1	7.3	2.3.4	
		500 user capacity Yoga/Meditation Center	17.1, 7.3	6.2.8	6.2.8	17.1, 7.3, 18	17.1	7.3	2.4	
		Office	7.1	6.2.5	6.2.5	17.1, 7.3	17.1	7.3	13.1.1	
		Change rooms & Toilet banks for male, female and differently abled	10, 11, 1.2.1	6.2.4	6.2.3	17.1, 7.3	17.1	7.3	13.1.1	
		Pantry	6.2.2.2, 7.1.1	6.2.1	6.2.3, 6.2.2.2	17.1	17.1	7.3	3	
		VIP Lounge,	17.1, 7.3	6.2.5	6.2.5	17.1	17.1	7.3	2.4	
		Store	7.1.1	6.2.1	6.2.1	17.1	17.1	7.3	3	
		Services	7.1.1	6.2.1	6.2.1	17.1	17.1	7.3	3	
		Green room	17.1, 7.3	6.2.5	6.2.5	17.1	17.1	7.3	2.4	
		Control room	7.1.1	6.2.1	6.2.1	17.1	17.1	7.3	3	
		Emergency Exits etc.	7.1.1	6.2.1	6.2.1				3	
2	**250 user capacity Cafeteria**	Entrance	17.1, 7.3, 18	6.2.2	6.2.2	17.1, 7.3,	17.1	7.3	2.3.4	Combination of Dry Stone Cladding (12) and Bamboo Mat Boards for wall and roof (17, 18) Handrails/
		Covered seating of 150 pax	14, 8.2, 7.1	6.2.5	6.2.5	17.1	17.1	7.3	2.3.4	
		Semi-covered seating of 100 pax		6.2.1	6.2.1	17.1	17.1	7.3	2.3.4	

SL. NO.	Building Name	Category	Room	Flooring	Skirting/ dado	Internal partitions	Wall finish	Celling	Door type	Misc. Details (Exterior Finish/ Structural Glazing/ Handrails)
		Toilet banks for male, female and differently abled	10, 11, 7.1.1, 1.2.1	6.2.4	6.2.3	16.2.1	17.1		13.1.1	ramps – 5, 5.1 As per approved Architectural design
		Serving counter	6.2.2.1, 6.2.2.2	6.2.5	6.2.5	17.1	17.1	7.3	2.3.4	
		kitchen	6.2.2.2, 7.1	6.2.4	6.2.3, 6.2.2		6.2.2	7.3	3	
		Store	7.1.1	6.2.1	6.2.1	17.1	17.1	7.3	3	
3	**2000-seater Auditorium**	Entrance,	17.2.3	6.2.2	6.2.2	5.2	6.2	7.2	2.3.4	Combination of Dry Stone Cladding (12) and Structural Glazing system (13.3) Handrails – 5, 5.1 As per approved Architectural design
		Reception & Entrance Lobby	7.2	6.2.7	6.2.7		6.2.1.2	7.2	2.2	
		2000 user capacity theatre type auditorium with 1000 sqm stage	16.3, 16.1, 16.2, 17.2.2	Carpet as per acoustic requirements	As per acoustic design require ments	16.1.1/16.2.1 As per acoustic design require ments	As per acoustic design require ments	16.3 As per acoustic design require	2.4.1	
		Office	7.1	6.2.2	6.2.2	5.2	6.2	7.2	2.3.4	
		Toilet banks for male, female and differently abled	10, 11, 7.1.1, 1.2.1	6.2.4	6.2.3	6.2.1.2	6.2.1.2	7.2	13.1.1	
		Pantry	6.2.2.2, 7.1	6.2.4	6.2.3, 6.2.2.2	6.2.1.2	6.2.1.2	7.2	3	
		VIP Lounge	15,7.3, 16.3	6.2.5	6.2.5		8.2.2	7.2	2.4	
		Store	7.1.1	6.2.1	6.2.1		8.2.2	7.2	3	
		Services	7.1.1	6.2.1	6.2.1		8.2.2	7.2	3	
		Green room	17.1, 7.3	6.2.5	6.2.5		8.2.2	7.2	2.4	
		AV Control room		6.2.1	6.2.5		8.2.2	7.2	3	
		Emergency Exits	7.1.1	6.2.1					3	
		Substation, AC Plant room, any other utility rooms, etc.		6.2.1	6.2.1	6.2.1		8.2.2	7.2	

1. STONE WORK :

1.1. Misc. Stone Work :

1.1.1. Granite stone work in wall lining up to plinth level.

1.2. Marble Work / Granite Work:

1.2.1. 18 mm thick mirror polished Black granite up to 2.0 sqm.in one piece, in toilet basin deck, kitchen counters etc. including half round edge moulding in high gloss finish as per Architectural details.

2. WOOD WORK : (height of the doors shall be as approved by E-in-C, as per site requirement. Door frames shall be fixed with expandable dash fasteners of HILTI or equivalent make of specified size with necessary plastic sleeves and SS screws including drilling holes complete as per the instruction of Engineer in charge. Size of fastener should not be less than 10mm dia x 140mm long)

2.1. Frame :

2.1.1. 2nd class kiln seasoned CP teak wood frame for doors as per size as approved by E-in-C as per CPWD specifications, all PU polish.

2.1.2. 2nd class kiln seasoned CP teak wood moulded beading to teakwood frames all PU polish.

2.2. Shutters :

2.2.1. 35 mm thk. factory made wooden flush door shutter - core of block board const. with factory fixed teak-ply veneering of approved make and shade on both faces for room doors including all SS fittings and accessories i/c vision glass panel of approved size, using 6mm clear glass fitted with teak wood moulding beads

2.2.2 Vision glass panel , of approved size, of 6mm clear glass fitted with teak wood moulding beads

2.3. Door Fittings :

2.3.1. SS 304 handle , decorative type of approved make shall be provided in the front door shutter in all rooms.

2.3.2. Stainless steel fittings e.g. mortice latch & lock, Tower bolts , door stopper etc. with SS 304 grade for room doors, size and design as approved .

2.3.3. SS hanging floor door stopper for flush doors.

2.3.4. Extruded aluminum tubular type, heavy duty , hydraulic door closer of approved make , for Glazed Aluminium doors of rear entrance doors etc.

2.4. Sound proof wooden Door for Auditorium/Yoga Hall/Meditation Hall:

2.4.1. Supply, of the Acoustical door shall be provided for Auditorium ,Yoga etc areas as per approval of E-In-C as per specification given below

Acoustical door shall be of thickness as mentioned in the approved drawing, having 38 dB acoustic cum fire check door shutters, having Fire rating 120 Minutes minimum, including door frame of minimum section 145mm x 75mm teak wood fixed to the door jambs with anchor fasteners as required, having infill of 47mm thick resin bonded glass wool of 24kg/cum density coated with FR Acrylic sealant sandwiched between two 9mm thick calcium silicate boards 100% without asbestos, Brucite and Meerschaum having a density not more than 1150kg/cum and thermal conductivity 0.14 W/M*K faced with 8mm thick marine IS 303 grade ply of approved with heat activated intumescent fire seal strip of size 10mm x 4mm mounted in the grooves having hardwood lipping of size 15mm x 70mm and fire retardant 1mm thick laminate finish facing on both sides in desired shade and colour. The work shall be executed as per drawings, and instructions of engineer in charge. (Note: Contractor to submit shop drawing & Test certificates from manufacturer (The Manufacturers should already have a test report with complete Raven Seals tested from CBRI Roorkee for the total design including door closers and panic bar) for approval of the Engineer in charge. The scope to include supply and installation of all required hardwares as per hardware schedule.

3. FIRE DOOR:

3.1. Two Hr metal Fire resistant door including door frame confirming to BS: 476 part 22 and IS 3614 part II all complete, design and size as per Local fire authority and NBC norms and recommendations . The fire door should not collapse during the rated period of fire under the specified fire conditions. Door to have fire rated vision panel

with 6mm thick clear glass as per specifications. The door frames and shutter are finished with thermo setting acrylic paint for scratch resistance and durability. All fittings and accessories to be SS and shall also include Panic hardware and incl 2 hr fire rated automatic dual adjustable door closer ,30 minute fire rated smoke seal (including 2 hr fire resistance stop seal for shaft as per NBC norms) shall be as per fire norms specifications and as approved by E-in-C. The Panic Hardware shall have 05 years mechanical warranty.

3.2. 50 mm thick glazed fire resistant door shutters of 120 minutes fire rating conforming to IS:3614 (Part-II), tested and certified as per laboratory approved by Engineer-in- charge, to be done by EPC contractor as per CPWD specification and as per relevant DSR 2018 item(s) as per approval of E-in-C. The fire door should not collapse during the rated period of fire under the specified fire conditions. All fittings and accessories to be SS 304 grade and shall incl. Panic hardware and incl 2 hr fire rated automatic dual adjustable door closer ,30 minute fire rated smoke seal (incl 2 hr fire seal in shafts as per NBC norms) shall be as per fire norms specifications and as approved by E-in-C

4. STEEL WORK:

4.1. Factory made 1.2mm thk. M. S. sheet steel door with frame of MS tubular frame , powder coated , for roof mumty room doors & lift machine room doors,

4.2. Factory made, powder coated MS Standard half glazed/ solid door with fittings and fixtures for Wet riser, telephone, computer cable & fire alarm shaft.

5. Factory made Stainless steel (SS) RAILING:

Factory made S.S. railing SS grade 304 , satin finish , with side mount round baluster dia 50.8 x 2mm with total height 1100mm with 50x 1.5mm mm dia for top round SS handrail support with SS Base plate dia 100x6 mm thick with SS cover plate, baluster @ 900mm C/C and at every corner , the railing to either have 5 nos. of Infill tube dia 16x1.5mm thick (SS 304 grade) with SS infill tube holder on baluster complete or infill can be 12 mm thick toughened laminated glass of total height of railing as 1100mm from FFL, as per architectural approved drawing for stair-cases & parapet incl all handrail accessories/hardwares complete as directed by E-in-C.

5.1. For Barrier free entrance Ramps Modular Stainless Steel Railing which incorporated top handrail in A1S1 304 18/8 grade in satin finish of 50.8mm dia x

1.5mm wall thickness connected with modular fitting made of 40mm x 50mm x 3mm underlay welded with T section made of 22mm x 8mm SS flat of 30mm length screwed and tightened with Allen bolt and Grub screw on the Pillars/Balusters made of 50.8mm dia x 2mm wall thickness in A1S1 304 18/8 grade in stainless steel on base plate made in stainless steel 304 18/8 grade of 100mm dia x 4mm wall thickness grouted with the help ¾ fasteners, height of the pillars/balusters from the finished floor level to be maintained at 1100mm including top handrail and span distance to be kept at 900mm from center to center of the pillar. In between pillars 5 rows of 16x1.5mm hollow pipe of 1.6mm wall thickness as intermediaries connected with a pillar/balusters with the help of modular component made in A1S1 304 18/8 grade of 22mm dia solid rod extruded to fit 16mm pipe of 26mm in length supported by the stud of M6 x 25 mm to fit with pillars/balusters and the intermediaries tightened by grub screw of 5mm, incorporated handicap handrail in A1S1 304 18/8 grade in satin finish of 50.8mm dia x 1.6mm wall thickness connected with modular 'L' type fittings attached with the pillars/balusters, height to be maintained as 800 mm from finished floor level including handicap handrail and span distance to be kept at 900mm from center to center of the pillar. All the joints and bends after 20 feet will be welded at site respectively etc all complete and as per manufactures specification, and approved Architectural drawing.

6. FLOORING & DADO WORK:

6.1. Cement Concrete Flooring & Skirting:

6.1.1. 52 mm thk. Cement conc. flooring with hard-crete conc. topping in, AHU, electrical room etc.

6.1.2. 18 mm. thk. Cement plaster skirting 150mm ht.

6.2. Stone Flooring:

6.2.1. Kota stone flooring in store, records, lower terraces etc.

6.2.1.1. Granite with 18 mm thk. Polished & flamed (leather finish) granite slabs combination of approved sizes and shades to be laid over a floating coat of cement & jointed with cement slurry in entrance hall, outdoor steps, main staircase etc. & corridor flooring pattern in combination with double charge vitrified tiles, of size (minimum

900x900mm) and color as per approved drawing.

6.2.1.2. Granite wall cladding with 18 mm thk. Polished & flamed (leather finish) granite slabs combination of approved sizes and shades to be laid over a floating coat of cement & jointed with cement slurry in lift walls etc.

6.2.1.3. Granite counters with 18 mm thk. Polished & flamed (leather finish) granite slabs combination of approved sizes and shades to be laid over a floating coat of cement & jointed with cement slurry in kitchen counters & toilet wash basin counters etc. including edge moulding of half round or full round.

6.2.2. 1st quality double charge vitrified tiles , size 300x600mm or as approved by E-in-C in dado of toilets up to full ceiling height, make and shade as approved, including grouting the joints with matching polymer grout with minimum 3 mm spacer

6.2.3. Double charge heavy duty vitrified floor tiles of size 600x600 as min. size in toilets etc , of shades as approved by E-in C including grouting the joints with matching polymer grout with minimum 3 mm spacer.

6.2.4. Providing and laying heavy duty full body vitrified floor tiles of minimum size 900mm x 900mm of as per preferred make list (thickness to be specified by the manufacturer min 12mm) with water absorptions less than 0.5% and conforming to IS 4457 : 2007 of approved make in all colours and shades, laid on 20 mm thick cement mortar 1:4 (1 cement : 4 coarse sand) including grouting the joints with matching polymer grout with minimum 3 mm spacer etc., complete for outdoor terrace garden, central atrium etc.

6.2.5. Providing and laying GVT or super white full body design vitrified floor tiles of minimum size 800mm x 800mm /1000mm x 1000mm (thickness to be specified by the manufacturer) with water absorptions less than 0.08% and conforming to IS: 15622 of approved make in all colours and shades, laid on 20 mm thick cement mortar 1:4 (1 cement : 4 coarse sand) including grouting the joints with matching epoxy grout with minimum 4mm spacer etc., complete for corridor, office halls &

cubicles etc including granite border skirting, strips etc.

6.2.6. Providing and laying non-skid vitrified floor tiles of minimum size 600mm x 600mm (thickness to be specified by the manufacturer) with water absorptions less than 0.08% and conforming to IS: 15622 of approved make in all colours and shades, laid on 20 mm thick cement mortar 1:4 (1 cement: 4 coarse sand) including grouting the joints with matching polymer grout etc., complete for all canteen, recreation, conference etc. including granite border skirting, strips etc.

6.2.7. Providing & laying Laminated HDF plank (1200 x 200mm) flooring, Class 33 - Heavy Commercials AC-5 grade as per manufacturer's specification of approved shade and make including 2mm foam beneath for stage & adjacent steps and all accessories complete for Yoga room, conference rooms etc.

7. FALSE CEILING:

7.1. Metal False Ceiling: Providing and fixing tiled false ceiling of approved materials of size 595x595 mm in true horizontal level, suspended on inter locking metal grid of hot dipped galvanized steel sections (galvanized @ 120 grams/ sqm, both side inclusive) consisting of main "T" runner with suitably spaced joints to get required length and of size 24x38 mm made from 0.30 mm thick (minimum) sheet, spaced at 1200 center to center and cross "T" of size 24x25 mm made of 0.30 mm thick (minimum) sheet, 1200 mm long spaced between main "T" at 600 mm center to center to form a grid of 1200x600 mm and secondary cross "T" of length 600 mm and size 24x25 mm made of 0.30 mm thick (minimum) sheet to be interlocked at middle of the 1200x600 mm panel to form grids of 600x600 mm and wall angle of size 24x24x0.3 mm and laying false ceiling tiles of approved texture in the grid including, required cutting/making, opening for services like diffusers, grills, light fittings, fixtures, smoke detectors etc. Main "T" runners to be suspended from ceiling using GI slotted cleats of size 27 x 37 x 25 x1.6 mm fixed to ceiling with 12.5 mm dia and 50 mm long dash fasteners, 4 mm GI adjustable rods with galvanized butterfly level clips of size 85 x 30 x 0.8 mm spaced at 1200 mm center to center along main T, bottom exposed width of 24 mm of all T-sections shall be pre-painted with polyester paint, all complete for all heights as per specifications, drawings and as directed by Engineer-in-charge.

7.1.1. GI Metal Ceiling Lay in plain Regular edge Global white color tiles of size 595x595 mm, and 0.5 mm thick with 8 mm drop; made of G I sheet having galvanizing of 100 gms/sqm (both sides inclusive) and electro statically polyester powder coated of thickness 60 microns (minimum), including factory painted after bending – FOR TOILET.

7.1.2. GI Metal Ceiling Lay in perforated Regular edge global white color tiles of size 595x595 mm and 0.5 mm thick with 8 mm drop; made of GI sheet having galvanizing of 100 gms/sqm (both sides inclusive) and 20% perforation area with 1.8 mm dia holes and having NRC (Noise Reduction Coefficient) of 0.5, electro statically polyester powder coated of thickness 60 microns (minimum), including factory painted after bending and perforation, and backed with a black Glass fiber acoustical fleece.

7.2. Peripheral Gypsum Drop False Ceiling :Providing and fixing false ceiling at all height including providing and fixing of frame work made of special sections, power pressed from M.S. sheets and galvanized with zinc coating of 120 gms/sqm (both side inclusive) as per IS : 277 and consisting of angle cleats of size 25 mm wide x 1.6 mm thick with flanges of 27 mm and 37mm, at 1200 mm centre to centre, one flange fixed to the ceiling with dash fastener 12.5 mm dia x 50mm long with 6mm dia bolts, other flange of cleat fixed to the angle hangers of 25x10x0.50 mm of required length with nuts & bolts of required size and other end of angle hanger fixed with intermediate G.I. channels 45x15x0.9 mm running at the spacing of 1200 mm centre to centre, to which the ceiling section 0.5 thick bottom wedge of 80 mm with tapered flanges of 26 mm each having lips of 10.5 mm, at 450 mm centre to centre, shall be fixed in a direction perpendicular to G.I. intermediate channel with connecting clips made out of 2.64 mm dia x 230 mm long G.I. wire at every junction, including fixing perimeter channels 0.5 mm thick 27 mm high having flanges of 20 mm and 30 mm long, the perimeter of ceiling fixed to wall/partition with the help of rawl plugs at 450 mm centre, with 25mm long dry wall screws @ 230 mm interval, including fixing of gypsum board to ceiling section and perimeter channel with the help of dry wall screws of size 3.5 x 25 mm at 230 mm c/c, including jointing and finishing to a flush finish of tapered and square edges of

the board with recommended jointing compound , jointing tapes , finishing with jointing compound in 3 layers covering up to 150 mm on both sides of joint and two coats of primer suitable for board, all as per manufacturer's specification and also including the cost of making openings for light fittings, grills, diffusers, cutouts made with frame of perimeter channels suitably fixed, all complete as per drawings, specification with 12.5 mm thick tapered edge gypsum fire resistant board conforming to IS: 2095-Part I for PERIPHERAL DROP.

7.3 Bamboo Mat Board False Ceiling: Providing and fixing at all height false ceiling of 4mm thick phenol bonded Bamboo Mat board (595x595mm) of Timpack Greengold / Saru Décor / Kinzok or equivalent makes conforming to IS:13958-1994 including providing and fixing of frame work made of GI angle 25x25x0.4 mm thick all around suitably fixed to wall with the help of dash fastener and hanger frame (600x600 c/c) made GI slotted Tee having powder coating on bottom side (30x25x0.3 mm thick for main member & 25x25x0.3 mm for cross member) connected to ceiling with 2.64mm GI wire and anchor fastener at every junction and also including cost of making openings for light fittings, grills, diffusers, cut outs made with frame of perimeter channels suitably fixed all complete as per direction of Engineer-in-charge and as per CPWD – Specifications 2019 Vol. I & II.

8. FINISHING WORK:

8.1. Cement Plaster In Coarse Sand :

The work shall be done in accordance with CPWD specifications 2019 Volume - I & II with correction slips up to the last date of submission of tender documents. Wherever directed by the Engineer in Charge, all joints between concrete frames and masonry in filling shall be expressed by a groove cut in the plaster. Where grooves are not called for, the joints between concrete members and masonry in filling shall be covered by plaster mesh strips of approved make shall be used over junctions of concrete and masonry or two dissimilar materials about 200mm wide fixed with GI wire nails etc. which shall be in position before plastering. All the exposed edges to be protected with the concealed PVC corner guard of make at the time of internal plastering.

8.1.1. Plastering with 1:6 or 1:4 sand-cement mortar:

8.1.1.1. 15mm thk. Internal plaster. (1 cement :4 fine sand)

8.1.1.2. 20 mm thk. External plaster. (in two coats – under layer 12 mm thick cement plaster 1 cement : 4 coarse sand) finished with top layer of 8 mm thick cement plaster 1cement:3 find sand) . Water proofing compound of approved make shall be admix in external plaster in proportion recommended by manufacture and as directed by E-in-C.

8.1.1.3. 6mm thk. ceiling plaster (1 cement : 3 fine sand).

8.1.2. White cement based putty.

8.1.3. Providing and applying white cement based putty of average thickness 1 mm, of approved brand and manufacturer, over the plastered wall surface to prepare the surface even and smooth complete.(internal wall & ceiling).

8.2. Internal Paint:

8.2.1. Applying 2 priming coats on internal walls & ceiling with primer of approved brand and manufacture, having low VOC (Volatile Organic Compound) content with water based cement primer on wall surface having VOC content less than 50 grams/liter.

8.2.2. Painting ceiling & wall with 2 coats of Wall painting with premium acrylic emulsion paint of interior grade, having VOC (Volatile Organic Compound) content less than 50 grams/ liter of approved brand and manufacture, including applying additional coats wherever required to achieve even shade , make and colour over one coat of int. primer.

8.2.3. Painting wood work (all teak work to be PU polished) / steel work with synthetic enamel paint (where not specified for powder coating) of approved brand and manufacture of required colour to give an even shade, as per approved drawings.

8.2.3.1. Two or more coats on new work over an under coat of suitable shade with ordinary paint of approved brand and manufacture over

appropriate wood/ steel primer excepting over pipes as per approved drawing

8.2.4. PU polish on all teakwood work & teak veneered door shutter.

8.3. Exterior Finish:

8.3.1. Finishing walls with double coats of Premium Acrylic Smooth exterior paint with Silicone additives over a 2 coats of base coat of acrylic primer on ext. wall surface of approved shade and make ,as per approved drawing

8.3.2. Painting on all rain water, soil, waste & vent pipes with synthetic enamel paint over a coat of zinc chromate yellow primer as per approved shade and make as per approved drawing.

8.3.3. Glass mozaic tiles of Italia / Paladia fitted with tile adhesive on free standing pillars, water body etc., of approved colour combination as per approved drawing.

9. MISCELLANEOUS BLDG. WORKS:

9.1. Plinth Protection:

9.1.1. Making plinth protection with 100mm thk. Interlocking paver blocks (M40 grade) over 75mm thk. base conc. (m10 grade) over flat clay brick soling over rammed earth.

9.2. Toilet Door Frame & Shutter:

9.2.1. In toilets the door frame will be confirming to DSR 2018 Item No. 26.86.1 to 26.86.4 and the corresponding door frame shall be confirming to DSR 2018 Item No. 26.87.1 and 26.87.2 in ladies and gents main toilets with approved teak finish.

9.2.2. 50x12mm 2nd class teak wood moulded beading to teakwood frames.

9.2.3. 35 mm thk. factory made flush door shutter - core of block board const. & 1.0mm thick decorative laminate of make and shade as approved on both faces for room doors including SS 304 grade hardware of approved size and design.

9.2.4. Glass doors and glass partition in work station /open office area.

10. SANITARY INSTALLATIONS :

10.1. Water Closet:

10.1.1. Providing and fixing white vitreous china floor mounted water closet with seat and lid, white vitreous low flow flushing cistern for all toilets as per approved make list and design as approved and with CP fittings as approved .

10.2. Wash Basin:

10.2.1. White Vitreous China oval shaped granite counter top designer basin with single with movable long swan neck C.P brass mixer tap with hot & cold arrangement as per approved make list.

11. TOILET REQUISITE:

11.1. Beveled edge mirror of superior glass sheet of full length over 6mm thick PVC board fitted with SS studs as per approved make list.

11.2. CP Health faucet (Water Jet) with each WC as per approved make and design .

11.3. C.P. brass toilet paper holder for attached toilets as per approved make list and design.

11.4. CP liquid soap container in attached toilets and canteen as per approved make list and design

11.5. 600 mm long CP brass towel rail in attached toilets as per approved make list.

11.6. 40 mm dia Stainless steel pipes in toilets for disabled persons as per approved make list and design

11.7. Automatic hand dryer as per approved make and design.

11.8. Fittings:

11.8.1. All bib cocks, pillar cocks/ wall or basin Mixer, stop cocks and valves shall be of C.P. brass in toilets as per approved make and design and without sensors . Urinal flush & basin mixer/ pillar cocks of wash basin shall be fitted with sensors.

11.8.2. P.V.C. connection pipe with C.P brass union.

11.8.3. CP Brass / steel floor trap cover of PTMT.

12. EXTERIOR FINISH:

12.1. Providing and fixing exterior dry stone cladding up to full heights with 30 mm thick gang saw cut red / white/ yellow/any other color sandstone with machine cut edges of uniform color and size min 1mx1m or as approved , fixed to structural steel frame work and/ or with the help of cramps, pins etc. and sealing the joints with approved weather sealant as per Architectural drawing Dry stone cladding items to be executed as DSR 2018 item no. 8.20, 8.21 and 8.22 and at all heights as per above details as per approved drawing.

12.2. Providing and fixing structural steel frame (for cladding with 25 mm thick gang saw cut with machine cut edges sand stone) on walls at all heights using M.S. square/ rectangular tube in the required pattern as per architectural drawing, including cost of cutting, bending, welding etc. The frame work shall be fixed to the wall with the help of M.S. brackets/ lugs of angle iron/ flats etc. which shall be welded to the frame and embedded in brick wall,with cement concrete block 1:2:4 (1 cement :2 coarse sand :4 graded stone aggregate 20 mm nominal size) of size 300x230x300 mm/ fastened with RCC structure at floor level and in between, including cost of necessary centering and shuttering and with approved expansion hold fasteners on CC/RCC surface, including drilling necessary holes. Approved cramps/ pins etc. shall be welded to the frame work to support stone cladding, the steel work will be given a priming coat of Zinc primer as approved by Engineer-in-charge and painted with two or more coats of epoxy paint (Shop drawings shall be submitted by the contractor to the Engineer-in-charge for approval before execution). The frame work shall be fixed in true horizontal & vertical lines/planes. Dry stone cladding items to be executed as DSR 2018 item no. 8.20, 8.21 and 8.22 and at all height as per above details as per approved drawing.

12.3. Providing and fixing adjustable stainless steel cramps of approved quality, required shape and size, adjustable with stainless steel nuts, bolts and washer (total weight not less than 260 gms), for dry stone cladding fixed on frame work at suitable location, including making necessary recesses in stone slab, drilling required holes etc. complete. Dry stone cladding items to be executed as DSR 2018 item no. 8.20, 8.21 and 8.22 and at all height as per above details as per approved drawing

12.4. Providing, fabricating and supplying and fixing panels of aluminum composite panel

cladding in pan shape in metallic colour of approved shades made out of 4mm thick aluminum composite panel material consisting of 3mm thick FR grade mineral core sandwiched between two Aluminum sheets (each 0.5mm thick). The aluminum composite panel cladding sheet shall be coil coated, with Kynar 500 based PVDF / Lumiflon based fluoropolymer resin coating of approved colour and shade on face # 1 and polymer (Service) coating on face # 2 as specified using stainless steel screws, nuts, bolts, washers, cleats, weather silicone sealant, backer rods etc. This item of ACP cladding shall be executed as DSR 2018 item no. 8.32

12.5. The fastening brackets of Aluminum alloy 6005 T5 / MS with Hot Dip Galvanized with serrations and serrated washers to arrest the wind load movement, fasteners, SS 316 Pins and anchor bolts of approved make in SS 316, Nylon separators to prevent bi-metallic contacts all complete required to perform as per specification and drawing The item includes cost of all material & labour component, the cost of all mock ups at site, cost of all samples of the individual components for testing in an approved laboratory, field tests on the assembled working curtain wall with aluminum composite panel cladding, cleaning and protection of the curtain wall with aluminum composite panel cladding till the handing over of the building for occupation. Base frame work for ACP cladding is payable under the relevant aluminum items of DSR 2018. The Contractor shall provide curtain wall with aluminum composite panel cladding, having all the performance characteristics all complete , as per the Architectural drawings, as per item description, as specified, as per the approved shop drawings and as directed by the Engineer-in-Charge. This item of ACP cladding shall be executed as DSR 2018 item no. 8.32.

12.6. Finishing walls with Premium Acrylic Smooth exterior paint with Silicone additives of required make and shade: Two or more coats applied @ 1.43 ltr/10 sqm over and including priming coat of exterior primer applied @ 2.20 kg/10 sqm.

13. ALUMINIUM WORKS :

13.1. Factory fabricated (factory as approved by E-in-C) Glazed Aluminum Doors and Windows. The EPC Contractor shall guarantee about proper design and performance of aluminium work for a period of 10 years from the date of completion of work.

13.1.1. The aluminum material for the work shall be procured by the EPC Contractor from the approved manufacturer as per approved make list for materials in this

tender. The EPC Contractor shall procure and submit samples of various materials to be used in the work for the approval of Engineer-in-Charge and no work shall commence before such samples are approved. Glazed, 60 micron polyester coating , of approved color and shade, Aluminum double acting swing doors with glass as per approved thickness and make and specifications including all hardware & accessories and other fixtures like cleats, SS screws , nuts , bolts , etc used shall conform to the relevant specifications as approved by E-in-C. All doors, windows, ventilators and glazing etc. shall be made water tight with microwave cured EPDM gaskets and weather silicone sealants to the satisfaction of the Engineer-in-Charge.

13.1.2. Aluminium glazed window with 60 micron polyester coating , of approved color and shade aluminum glazed window with glass of thickness , specification , make as approved for all windows and fixed glazing. The EPC Contractor shall prepare a finished sample of the aluminium window along with glazing panel of thickness , toughening, specification and fittings etc. for approval of workmanship and material. Nothing extra shall be payable on this account. The factory for fabrication and polyster coating of aluminum windows/doors/frameworks shall be got approved from Engineer-charge. All windows, ventilators and glazing etc. shall be made water tight with microwave cured EPDM gaskets and weather silicone sealants to the satisfaction of the Engineer-in-Charge. All hardware and other fixtures like cleats, SS screws , nuts , bolts , rawl plug, backer rods etc used shall conform to the relevant specifications as approved by E-in-C. The screws used for fixing fixed aluminum frames of the aluminum windows to masonry walls / RCC members and aluminum members to other aluminum members shall be of stainless steel of approved make and quality and of stainless-steel grade 304. 15.10.2

For the aluminum windows, the gap between the aluminum frames and the R.C.C / Masonry and also any gaps in the various sections shall be filled with weather silicone sealant DC 795 of Dow Corning or equivalent in the required bite size, to ensure water tightness including providing and fixing backer rod, wherever required. Fixing of glass panes shall be designed in such a way that replacing damaged / broken glass panes is easily possible without

having to remove or damage any members or interior finishing materials.

13.2. Structural Glazing:

13.2.1. Designing, Supplying , Fabrication ,testing, protection and Erecting in position semi(grid) unitized system of structural glazing (with open joints) with DGU system on façades on elevation sides as approved by E-in-C ,including Providing and supplying aluminium extruded tubular and other aluminium sections as per the architectural drawings and approved shop drawings, the aluminium quality as per grade 6063 T5 or T6 as per BS 1474, including super durable polyester powder coating of 60-80 microns conforming to AAMA 2604 of required colour and shade as approved by the Engineer-in-Charge.

13.3. Providing, assembling and supplying vision glass panels (IGUs) comprising of hermetically-sealed 6-12-6 mm insulated glass (double glazed) vision panel units of size and shape as required and specified, comprising of an outer high performance heat strengthened float glass 6mm thick, of approved colour and shade with reflective soft coating on surface # 2 of approved colour and shade, an inner Heat strengthened clear float glass 6mm thick, spacer tube 12mm wide, desiccants, including primary seal and secondary seal (structural silicone sealant) etc. all complete for the required performances, as per the Architectural drawings, as per the approved shop drawings, as per color and shade of glass as specified and as directed by the Engineer-in-Charge. The IGUs shall be assembled in the factory/ workshop of the glass processor. Coloured tinted float glass 6mm thick substrate with reflective soft coating on face # 2, + 12mm Airgap + 6mm Heat Strengthened clear Glass of approved make having properties as visible Light transmittance (VLT) of 25 to 35 %, Light reflection internal 10 to 15%, light reflection external 10 to 20 %, shading coefficient (0.25-0.28) and U value of 3.0 to 3.3 W/m2 degree K etc. with details, specs as per approved drawing . The structural glazing façade shall also have Openable side / top hung vision glass panels (IGUs) including providing and supplying at site all accessories and hardwares for the openable panels as specified and of the approved make such as heavy duty stainless steel friction hinges, min 4 -point cremone locking sets with stainless steel plates, handles, buffers etc. including necessary stainless steel screws/ fasteners, nuts, bolts, washers etc. all complete as per the Architectural drawings, as per the approved shop drawings, as specified and as directed by the Engineer- in-Charge. The DGU shall also be tested for

air and water leakge from testing house as approved as per CPWD specification . It shall also include Providing, fabricating and supplying shadow box of required size and shape, for fixing in the spandrel portion of the structural glazing, in linear as well as curvilinear portions of the building by providing semi- rigid, inorganic, non-combustible fibre glass wool insulation 50 mm thick having density 48 Kg/cum, conforming to IS: 8183 and BS:3958 Part 5. And also including Providing and supplying Spandrel Glass Panels comprising of 6 mm thick heat strengthened monolithic float glass of approved colour and shade with reflective soft coating on surface # 2 of approved colour and shade so as to match the colour and shade of the IGUs in the vision panels etc. ,all complete for the required performances as specified, as per the Architectural drawings, as per the approved shop drawings, as specified, and as directed by the Engineer- in- Charge.

EPC Contractor needs to follow below mentioned procedures and submit to Engineer in charges for approvals before structural glazing/stone/ACP façade installations:

- Preparing shop drawings for all elements of façade.
- Engineering calculations, structural STAAD, FEM analysis for all products and components duly vetted from reputed engg institute like IIT/NIT
- Installation methodology.
- All material approval plans, design submission plan and all material samples
- Detailed project schedule
- All process test reports, material test certificates and product guaranties and warranties.
- Operation and maintenance manuals.
- Design and performance guaranties.
- Thermal performance calculation on overall Facade as per ECBC norms
- Design and supply and installation of Façade Cleaning System

14. STRUCTURAL GLAZING WITH PATCH FITTING GLASS DOOR:

14.1. Design supply & installation of suspended Spider Glazing system designed to withstand the wind pressure as per IS 875 (Part-III). The Suspended System held with Spider Fittings of SS-316 Grade Steel of approved manufacturer with glass panel having 12 mm thick clear toughened glass held together with SS- 316 Grade Stainless steel Spider & bolt assembly with laminated glass fins 21 mm thick. The Glass fins and glass panel assembly shall be connected to Slab/ beams by means of SS- 316 Grade stainless steel brackets & Anchor bolts and at the bottom using SS channel of 50x25x2mm using fastener & anchor bolts, non-staining weather sealants of approved make, Teflon/ nylon bushes and separators to prevent bi-metallic contacts, all complete to perform as per specification and approved drawings. The complete system to be designed to accommodate thermal expansion & seismic movements etc. The joints between glass panels (6 to 8 mm) and gaps at the perimeter & in U channel of the assembly to be filled with non-staining weather sealant, so as to make the entire system fully water proof & dust proof.

14.2. Providing and fixing 12 mm thick frameless toughened glass door shutter of approved brand and manufacture, including providing and fixing top & bottom pivot & spring type fixing arrangement and making necessary holes etc. for fixing required door fittings, all complete as per approval of E-in-C.

15. FRAMELESS TOUGHENED GLASS DOOR & TOUGHENED GLASS PARTITION WITH SS PATCH FITTINGS FOR CABINS:

15.1. Providing and fixing 12 mm thick frameless toughened glass door shutter of approved brand and manufacture, including providing and fixing top & bottom pivot & spring type fixing arrangement and making necessary holes etc. for fixing required door fittings, all complete including hardware as per direction of Engineer-in-charge and as per CPWD specifications.

15.2. Providing and fixing 12 mm thick frameless toughened glass partition of approved brand fixed with heavy duty SS patch fittings of approved make . The joints between glass panels (2 to 4 mm) and gaps at the perimeter & in U channel of the assembly to be filled with non-staining weather sealant, so as to make the entire system fully water proof & dust proof as per drawing approved by E-in-C

16. ACOUSTIC WALL PANELLING & ACOUSTIC FALSE CEILING: (Note: EPC contractor to ensure that design of acoustic features in all the buildings in this tender conform to acoustic properties as required from functional point

of use of these building with proper acoustic design done by specialist consultant of EPC contractor and details approved by E-in-C before procuring the material and executing the work)

16.1. Wooden Slat Wall Paneling:

16.1.1. Providing & fixing of wall panel by G.I. frame work with 600 x 300mm c/c to be fixed on wall (channel section placed 300 c/c and intermediate section will be placed 600 c/c), all the framing section materials made of approved make . There after Acoustical backing by Ploy fiber wool of thickness 50mm having density of 20 Kgs/M3 tie up by Galvanized wire mesh and galvanized wire to avoid sagging. On top of GI frame provide Anutone wooden Slats (128 X 2440 X 16) or equivalent make as approved , Melamine finish having density 800 kg/M3, nrc 0.75 and Fire class 1 &P with a special channel section of CC18. This run of wall paneling to be provided on both side and back wall of the hall partially. Design of wall to be made for proper sound reproduction.

16.2. Fabric Wall Paneling:

16.2.1. Providing, Fitting and fixing of wall panel up by G.I. frame work with 600 x 300mm c/c to be fixed on wall (channel section placed 300 c/c and intermediate section will be placed 600 c/c), all the framing materials of ultra-section made of approved make . Thereafter Acoustical backing by Ploy fiber wool of thickness 50mm having density of 20 Kgs/M3 tie up with Galvanized wire mesh and Galvanized wire, to avoid sagging. On top provide Soak cord Binary (600 X 600/1200 mm of size) having density 400Kg/M3 and fire class 1 & P and NRC up-to 0.95 covered by the thick fabric, of shade and make as approved to be fixed by H-Spline to maintain the functional activities & aesthetic decor of the hall. This kinds of treatment to be provided on both side wall of the Hall. Design of wall to be made for proper sound reproduction.

16.3. Acoustic False Ceiling: (Note :EPC contractor to ensure that design of acoustic features in all the buildings in this tender conform to acoustic properties as required from functional point of use of these building with proper acoustic design done by specialist consultant of EPC contractor and details approved by E-in-C before procuring the material and executing the work)

16.3.1. Providing and fixing mineral fiber false ceiling tiles at all heights of size

595X595mm of approved texture, design and pattern. The tiles should have Humidity Resistance (RH) of 99%, Light Reflectance > 85%, Thermal Conductivity k = 0.052 - 0.057 w/m K, Fire Performance as per (BS 476 pt - 6 &7)in true horizontal level suspended on interlocking T-Grid of hot dipped all round galvanized iron section of 0.33 mm thick (galvanized @120 gsm) comprising of main T runners of 15x32 mm of length 3000 mm, cross T of size 15x32mm of length 1200 mm and secondary intermediate cross T of size 15x32 mm of length 600 mm to form grid module of size 600x600 mm suspended from ceiling using galvanized mild steel item (galvanized @80gsm) 50 mm long 8mm outer diameter M-6 dash fasteners, 6 mm diameter fully threaded hanger rod up to 1000 mm length and L-shape level adjuster of size 85x25x2 mm, spaced at 1200 mm center to center along main 'T'. The system should rest on periphery walls /partitions with the help of GI perimeter wall angle of size24x24X3000 mm made of 0.40 mm thick sheet, to be fixed to the wall with help of plastic rawl plug at 450 mm center to center & 40 mm long dry wall S.S. screws. The exposed bottom portion of all T-sections used in false ceiling support system shall be repainted with polyester baked paint, for all heights With 16 mm thick beveled regular mineral fiber Antimicrobial false ceiling tile.

17. WINDOW COVERINGS:

17.1. Roller Blind (Blackout) For Yoga Hall, Multipurpose Hall, Conference, Rooms, etc.

17.1.1. Providing and Installation of roller blind (straight line fabric) has a thickness of 0.58mm, comprises of Vinyl-coated fiberglass fabric laminated with a two-ply 100% PVC blackout film and a mesh weight of 671 g/m; openness factor is opaque; Acoustic Value -NRC .05/SAA .03.It comes with a TRACKLESS technology which minimizes the fiberglass yarns inherent tendencies to track when being rolled up in shade. With Trackless Technology these same fabrics now track less, roll up straighter and reduce share fabrication time. It comes with 10 years warranty. Fire classification: NFPA 701-2004 TM # 1 (small scale), NFPA 01 (CLASS A) IBC SECTION 903.1(CLASS A RATING), BS 5867 2008. Bacterial and

Fungal Resistance: Microban antibacterial additives and meets the standards of ASTM E 2180,ASTM G21,AATCC30 PART 3,ASTM D 3273, GREENGUARD MOLD and Bacteria Standard ASTM 6329 , includes Microban antimicrobial additives; Lead free factor- RoHS/ Directive 2002 / 95/EC ,CONSUMER Product Safety Commission Section 101, ANSI/WCMA A100.1-2007 for lead content , and REACH (EC 1907/2006) Compliant; Acoustical Performance : NRC (Noise Reduction Coefficient) and SAA (sound absorption average) tested in accordance with ASTM C423-09a. Certified to GREENGUARD AND GREENGUARD Gold Standards for low chemical emissions into indoor air during product usage. Roll-Up Shades, panel tracks and Screens.

17.1.2. PULLEY SYSTEM: Reducing gear pulley 1:3 for better/ easy lifting.

17.2. Vertical Blinds for General Areas as per Architectural Drawing:

Providing and fixing 100mm vertical blinds 1.20mm to 1.30mm wall thickness headrail 20mm to 25mm high x 40mm to 50mm wide extruded high strength aluminum alloy section which is anodized for smooth and corrosion resistance high. It has an end control unit which has a sprocket fixed with it which is driven by the tilter chain, made of 4.5mm plastic beads moulded on 2.20mm.Thick Polyester cord which rotates the lovers by 180 degree. For the tilting operation to be smooth end, end control unit has a tilt rod fixed to it which is of 5.80mm to 6.00mm average diameter and made up of extruded aluminum with 3 key ways to achieve torsional deflection. Runners made up of molded plastic having anti-friction additive which has gear and warm mechanism to control the vertical louvers movement. Proper spacing of runner is made up of molded Derlin / stainless steel having anti friction additive. Louvers to be kept straight and prevented from swaying by bottom mechanism where the bottom weight is made up of powder coated galvanized steel sheet 1.7mm thick for maximum corrosion resistance and bottom chain made up of 2mm diameter plastic beads moulded on polyester cord available depending upon the width of the louvers, fabrics 100% polyester, water repellent and dust guard, FABRICS WEIGHT 300 GSM.

17.2.1. TACTILE STUDS: Providing and fixing coloured, preferably yellow PU - Tactile Studs (Warning/Positional) with 1 stem having stem dia of 6.0 mm & stem length between 20 - 25 mm, as ground surface indicators for the visually impaired persons, on the pedestrian pathway as per manufacturers design / specification and as per harmonized guidelines complete in all respect and as per direction of Engineer-in-charge.

17.2.2 ATRIUM COVER DOME: Installation of multi-layered Danpolan or equivalent make polycarbonate sheeting system of DPI Daylight or equivalent over pre-engineered MS tubular dome structure over central atrium above roof level. The polycarbonate system will be a complete assembly of extruded multilayer UV protected polycarbonate panels incorporated into a complete system. Co-extruded UV protected polycarbonate panel system of minimum 25 mm thick and minimum 1200 mm wide. Panel body is of a different colour than the angular louvers, both being translucent. Panel shall have 6-7 layers for required lux level, all fixing accessories to ensure best performance for wind uplift, vibration, oil canning and visual appearance. Panels shall be with grip lock offset vertical standing seam running lengthwise to accommodate the aluminum connectors/spacer at both sides of the panel. Panels shall be fixed on Purlin with snap on connectors with grip lock locking mechanism and will be secured on MS structure (will be paid Separately) with 3 numbers self-drilling screws & trapezoid SS fasteners to ensure a pull- out load of min. 21000N (21KN) tested as per ISO 6892:1998 and IS 1608: 2005. with Snap on aluminum Connectors. U value shall not be more than 1.80 Watt/m2K as per EN ISO 1077-2:2018. Panels must satisfy Dart drop impact test as per IS 14443-97 shall show no sign of breakage on Polycarbonate sheets which have been exposed to UV for a min. of 500 Hours as per ASTM G 155. Panels shall not have Yellowness Index as per ASTM D 1925 of 15 units when tested on a sample exposed to UV for 500 Hours as per ASTM G 155. Panel shall be with additional End cap/Aluminum U/F profile/ Glazing Bar for ends as required. Panel shall be fixed over MS structural steel/MS purlin (paid separately) conforming to the detail

technical specifications as per approved architectural drawings. Trained and factory authorized labour with supervision to complete the entire panel installation as per drawing & direction of the engineering in charge.

18. WALL PANELLING FOR INTERIOR PARTITIONS WITH BAMBOO MAT BOARDS 9MM:

18.1 Internal Partitions/Walling shall be executed with Bamboo Mat Boards 9mm (ISI: 13958 specification) as per CPWD – DSR 2018 item no: 26.6D.4 and CPWD – Specifications 2019 Vol. 1 & II - Providing and fixing Bamboo Mat board conforming to IS: 13958 1994 for partition to frame by backing or studding with screws etc. complete (Frames, backing or studding to be paid separately) with approved makes of Timpack Greengold / Saru Décor / Kinzok or equivalent.

19. BAMBOO MAT ROOFING SYSTEM:

19.1 Roofing shall be executed with Bamboo Mat Corrugated Sheets (ISI: 15476 specification) as per CPWD – DSR 2018 item no: 26.6A and CPWD – Specifications 2019 Vol. 1 & II. Providing, erecting, laying and fixing in position in 3.5 to 4 mm thick bamboo mat corrugated sheet (BMCS) as per IS: 15476- 2004 in roofing with self-drilling screws along with EPDM washers complete or with galvanized iron J or L hooks 8mm dia G.I. plain and bitumen washers etc, all complete as per direction of Engineer-in-Charge with approved makes of Timpack Greengold / Saru Décor / Kinzok or equivalent.

19.2 Providing and fixing in position ridges of 3.5 to 4 mm thick bamboo mat ridge cap (BMRC) as per IS: 15476-2004 in roofing with self-drilling screws along with EPDM washers complete or with galvanized iron J or L hooks 8mm dia G.I. plain and bitumen washers etc., all complete as per direction of Engineer-in-Charge with approved makes of Timpack Greengold / Saru Décor / Kinzok or equivalent.

20. AUDITORIUM CHAIRS (2000 Nos) :

Providing and fixing in position 2000 Nos Auditorium chairs with auto Tip up facility of coil/spring steel IS : 4454 1981 having central distance (arm to arm) shall be 20”-22” as required. The cushioning is done on hot press ply of 12 mm with PU foam of density 50 kg/cum as per JIS K 6401. The hardness of seat foam would be 120 (+ 30/-20) Newton and back foam hardness would be 80 (+30/-20) newton, upholstered with fabric as per sample approved. All metal part is made out of HRCA /CRCA sheet as per IS : 1079 1994 with powder coating of 50 microns. The PU arms /PPCP arms to be used in chairs . The chairs

stand on floor with support of expansion bolts 100mm of length. The manufacturer shall have Quality & safety Assurance like ISO-9001:2015,ISO-14001:2015,ISO-18001:2007,GREENGUARD compliance, BIFMA membership. The sample is to be duly approved by the E-in-C. Approved Makes: Haworth/Steelcase/Godrej/Fine Grace/HNI

21. Electrical & Mechanical Works:

Brief description of E&M works for "Construction of one 500 user capacity Yoga Center cum Meditation Hall, one 250 user capacity Cafeteria and one 2000 seater capacity Auditorium including all Internal Water Supply, Sanitary Installations, Roads, Pathways, Drainage, Internal Electrical Installations, Fire Fighting, Air Conditioning and External Electrical installations on EPC basis for Nalanda University Main Campus at Rajgir, District Nalanda, Bihar."

The scope of work includes –

(i) Design, Supply, Installation, Testing and Commissioning of the following Electrical & Mechanical (E&M) Services –

Sl. No.	Item	Description / Specifications
1.	Internal & External Electrification	Wiring in PVC conduit for internal electric installation i.e. light & fan point, light & power plug, central, LAN & IPABX, wiring for TV, CCTV with modular switch, socket and accessories, Fittings, Exhaust fan, Ceiling fan, switch board, SDBs, floor panel, main panel, rising main for UPS, Essential & Non-essential supply, chemical Earthing, lightening arrestor , conductor, Street LED lights, High Mast compound lighting, Facade lighting with LED & decorative poles etc. , 25 mm dia M.S. conduit and G.I. box as per approved drawing shall be provided for automatic fire alarm system. Planning Designing and SITC of occupancy sensors is within scope of the work. **Further details are available in Section – C of this bid document.**
2.	Fire Fighting System with	Fire Fighting system with Wet riser & sprinklers for the building as per the requirement of NBC 2016 with amendments,
	Wet riser & sprinklers	updated BIS codes, Fire bye-laws of **Govt. of Bihar** and CPWD specifications and NBC norms. This will also include peripheral header, electric & diesel fire pump, internal & external fire hydrants, Portable fire extinguishers etc. **Further details are available in Section – C of this bid document.**

3.	HVAC system	Capacity of HVAC system shall be based on heat load calculation , room wise , floor wise , building wise of the Buildings which will be prepared and shared by EPC contractor with E-in –C for approval, based on which HVAC system capacity will be finalisied . The temperature has to be maintained at 22 degree (+/-) 2 degree centigrade .HVAC plant consisting of low and high side equipment i.e. water cooled screw type chilling machines and heat pumps, cooling tower, Hot water generator complete with condenser, HRW, VFD, chilled (primary & secondary), hot water pumps, AHUs / FCUs, electrical panels, control panels and pipes line, cabling work. The low and high side of the plant shall be controlled by BMS System. Stair case pressurization fans, Lift shafts and lobbies pressurization fans, Toilet Exhaust System, Smoke Evacuation System, as per NBC guidelines, CPWD specifications and relevant IS Codes. HVAC System shall be modular type **Further details are available in Section –C of this bid document.**
4.	Pumping sets	All pumps shall be designed to fulfill the requirement of water for building and firefighting system. Submersible pumps shall be provided in bore wells, booster pumps for supply of drinking water. One pump of each type and of same capacity shall be provided as stand by. **Further details are available in Section –C of this bid document**.
5.	Electrical sign board and Exit signs	Electrical LED signage board and exit signs shall be provided for the various services, at various floors and building as per requirement.

(ii) Planning and design, supply and installation of the following E & M services : (all E&M services shall be designed keeping in mind use of conforming material and specifications for civil and E&M work for ensuring obtaining 5 start GRIHA rating)

Sl. No.	**Item**	**Description / Specifications**
1.	Automatic fire alarm system	SITC of automatic fire alarm system is in the scope of this work. This includes design of fire alarm system i/c marking of various fire alarm accessories i.e. location of detectors, MCP, fault isolator, hooters/speakers, main panel, repeater panel on the approved architecture drawings, preparation of inventory and SOQ as per CPWD specification/NBC/IS codes is under the scope of this work. **Further details are available in Section –C of this bid document.**

2.	Lifts	SITC of lifts- Goods lift and passenger lift - is in the scope of this work. This includes designing of lift for its capacity, speed of travel etc. and number of lifts . Submission of data sheet and catalogue of the various equipment in support of their design, BOQ, technical specification are in the scope of this EPC work. Providing lift of required capacity as per NBC norms and as specified in the approved Architectural drawings including provision of shaft lift well, machine rooms. The scope includes getting the requisite permission of lift inspector from the concerned authority before commissioning of the same. **Further details are available in Section –C of this bid document.**
3.	Sub-station Work	SITC of indoor/outdoor type substation equipment is in the scope of this work with design as approved by E-in-C . This included planning and design comprising of calculation of electrical load after getting EI & equipment loads of the building and electrical load of HVAC system, fire system, pumping system, lift system or any other electrical installation and then calculating total working capacity of the transformers considering diversity factor of the system as per NBC norms , Planning & making SLD drawings for the distribution system, sizes of cables as per loads etc. are in the scope of work. The consultant will prepare the drawing of Distribution system, SLD and layout of the equipment. During the approval of design and drawing the consultant will submit the data sheet and catalogue of the various equipment in support of their design. Preparation of inventory, SLD, BOQ, technical specification are in the scope of this work. **Further details are available in Section –C of this bid document.**
4.	DG Set Work	SITC of D.G. set are in the scope of this work. The total electrical load of the buildings in this tender has to be on DG backup supply. This included planning and design comprising of making SLD for the distribution system, Calculation of essential load, sizes of cables/bus trucking, layout of the equipment and sizes of the rooms as per site condition, submission of data sheet and catalogue of the various equipment in support of their design, Preparation of SLD, BOQ, technical specification etc. are in the scope of this work. **Further details are available in Section –C of this bid document.**
5.	Solar Hot water system	SITC of solar hot water system is in the scope of this work. This includes planning and design comprising of preparation of BOQ, Preparation of SLD, submission of data sheet and catalogue of the various equipment in support of their design, technical specification etc. are in the scope of this work. **Further details are available in Section –C of this bid document.**
6.	UPS System	As per Section – C

19.2.1 Site Development Works (including survey, investigation, design and construction):

1. **Roads:** The PQC road shall be constructed as per requirement of office campus which should be as per the layout plan as far as possible and as per the drawing submitted by agency and approved by Nalanda University. Length of the road to be completely developed is approximately 500 meter. The sectional profile of the road given in the NIT document should be broadly followed but thickness etc. should be as per the design criteria applicable to rigid pavements. The bidder should plan and design the section as per site conditions and submit the same for approval before execution. The minimum width of road shall be as under:-

Sl. No.	Item	Description / Specifications
1.	Main Road	6m wide carriage way as per the layout plan drawing by the consultant appointed by the EPC contractor subject to the availability of space. Road to have minimum 1.2 mtr wide footpath on both sides of all roads – Main or peripheral. Footpath to have M 40 , 60mm thick CC paver block floor over compacted sand underfloor as required.
2.	Peripheral Road	5 m wide in between open space car parking as per the layout plan drawing to be submitted by the consultant appointed by the EPC contractor subject to the availability of space.
3.	Entry and Exit Gate	Entry & exit gate along with security check posts as approved by Nalanda University. If approach road leading to main entry gate of the building (s) over drain, contractor has to take required approvals from the Nalanda University to negotiate this part of access towards main entry and exit gate and suitably plan and design a RCC structure over the drain to provide proper access to these gates. This is very much within the scope of work.
4.	Electrical Substation	Floor height to be considered as 4.2 mtr. Flooring would Kota Stone with provision of M.S. rolling shutter, top hung ventilation with inbuilt exhaust fan system, ramp for entry & exit with heavy duty paver tiles , RCC trenching for cable and covered with heavy duty concrete precast factory make covers.

2. **Storm Water Drains, Sewer Line & Water Supply Line & STP:** Survey, investigation, design & construction of water supply system, deep tube well, underground tank, covered storm water drains, sewer line & rain water harvesting pits in the external area around the buildings in the campus of the

office including surrounding land and hard space as floor (interlocking M40 grade paver blocks) for covered shed car parking. This will also include connection to the trunk sewer line/STP/nearest drain. The contractor shall design, SITC & construct Compact STP (civil and E&M works) of required capacity and submit the specification, drawings & design for approval of Engineer-in-charge. As per the layout plan drawing appended with this NIT, storm water drain, external water supply line and sewerage line required to be executed. These dimensions are just indicative and the bidder has to provide these as per design approved by Nalanda University. Storm water drain has to be connected by the contractor in the storm water drainage system / water management system of the remaining campus through gravity flow or through pumping as per the invert levels of drains. The excess and treated water from STP , also needs to be collected in a sump of required capacity and may be pumped to the nearest drain . The contractor has also to make an arrangement to pump the treated water for irrigation system along with horticulture work and also for make up of water loss in water cooled chiller which may be designed and installed by the contractor. This all is in the scope of this work of this EPC work. Exact alignment for these services over the layout plan will be got approved from Engineer-in- charge before execution.

3. **Landscape and Horticulture:** Survey, investigation, design & construction of Landscape works (both hard & soft) in and around the buildings , along roads & services of this EPC tender buildings is in the scope of this tender including maintenance and replacement of any dead plant/ tree shrub/grass etc for one years after the completion of work.

4. Procurement and installation of high class internal and external signage is in scope of work. Contractor shall submit a plan and signage detail drawing in SS plate of approved finish to be installed depicting various rooms/amenities/facilities inside and outside of the building.

5. Other Items which are not mentioned above but are essential considering functional requirements and according to modern concept of the existing other campus buildings.

Note: (a) All works has to be executed as per specifications provided in the bid document, CPWD Specifications Vol-I & Vol-II 2019 for civil works, CPWD general specification for electrical works Part I, Part III, Part IV, Part V, Part VI, Part VII, Part VIII, CPWD specification for Horticulture 2020 ,CPWD GCC EPC project 2020, relevant IS codes and National Building Codes 2016 with latest amendment issued upto the date of submission of Bid (in case of difference of specifications ,if any, among these specifications /codes , stringent / higher specification of the two shall be followed. In absence of CPWD Specification, IS Codes, MoRTH Specifications, National Building Code 2016 Specifications or sound engineering practices and other standard specifications suitable for modern non-residential buildings and latest technology shall be adopted as per order of precedence defined in the contract. The decision of E-in-C shall be final and binding in this matter.

(b) The scope of works & specification are given in general . The EPC work shall include all the incidental works required to be carried out for complete and satisfactory execution and occupation of the buildings even if not mentioned . The work shall be carried out, all in accordance with true intent and meaning of the specifications and the approved drawings taken together, regardless of whether the same may or may not be particularly shown on the drawings and/ or described in the specifications, provided that the same can be reasonably inferred there from. There may be several incidental works, which may not mentioned/missed in the tender document/specifications but will be necessary to complete the item in all respect. All these incidental works/ costs which are not mentioned, but are necessary to complete the work to enable effective occupation and use of buildings , shall be deemed to have been included in the overall amount quoted by the EPC contractor for various components of work. No adjustment of rates shall be made for any variation in quantum of incidental works due to variation/change in actual working drawings. Also, no adjustment of rates shall be made due to any change in incidental works or any other deviation in such element of work (which is incidental to the items of work and are necessary to complete such items in all respects) on account of the directions of Engineer-in-charge. Nothing extra shall be payable on this account.

(c) In case, some of descriptions are missing in the scope of work or specifications in the bidding documents, same shall be executed as given in the CPWD Specifications (Civil and electrical and horticulture), NBC-2016, IS Codes or according to sound engineering practices so as to make the building including related services fully functional. No claim what so ever shall be entertained at later stage. All cost of providing and making buildings with services, landscape and horticulture works fully complete in all aspect unless specifically mentioned in the contract document and making buildings with services fully functional are included in the cost tendered for this work.

Brief Description of Activities

1. Planning :

1) Survey, investigation (including soil investigation) and other related works & services.
2) Architectural planning of buildings & services in the campus and obtaining all statutory / local body approvals. The agency shall also take permission from Forest /Fire Department/Environment/Pollution control Board /any other local authority etc. required to start construction work as per plinth area given above.
3) The structural design of earthquake resistant RCC framed structure buildings & design of MEP services in the campus and getting approval from Nalanda University and proof vetting of drawings (structural and MEP services) by reputed approved institute such as NIT/IIT.
4) Design and construction of buildings, services, fittings etc. as per 5 STAR GRIHA rating including dual plumbing system, energy saving LED lights etc.
5) Building shall be designed for differently-able persons as per the latest norms of Central Govt.
6) The guidelines & regulation issued by National Disaster Management Authority for management of building should also be incorporated in the design of building.

2. Execution of Work:

a) After approval from the University and getting approval from local bodies including necessary modifications as per the requirements, to do execution of works as per the scope of buildings & services defined in the contract document, CPWD Specifications (civil, Electrical and horticulture) , NBC-2016, IS Codes, MoRTH Specifications and Sound Engineering Practices and handing over the assets.
b) Submission of completion plan of the building & services including getting approval/clearance from local bodies. Submission of building & services plan & drawings and other related documents both in hard copy (3 sets) and the soft copy (in Auto CAD) after completion (i.e. 'As-built').
c) Clearance of site and deep cleaning of buildings (internal and external) before Handing over of the facilities/buildings after fulfilling all the obligations under the contract.
d) Obtaining necessary clearances/licenses from different local bodies, statuary authorities required to make office building fully operational during/after completion of work including handing over all warranties/guaranties/ manual /maintenance schedule of installed MEP equipments.

3. Defect Liability Period Of 1 Year:

a) Free defect liability period for buildings, horticulture works and services for one year after completion of this complete EPC project as certified by E-in-C (not from the date of actual commissioning of installations).
b) Free maintenance of all horticulture related works under the scope of works for one year after the completion of work.

ANNEXURE II

GUIDELINES FOR WORKING OUT PLINTH AREA

(For purpose of calculating plinth area as per IS code: 3861-2002)

In order to ensure the adoption of a uniform method of working out Plinth Area from plans, the following guidelines are laid down. These guidelines are general in nature. These are based on the fundamental principle that the plinth area of a building should present a true picture of the covered floor area provided in the plans.

General:

1. The total plinth area of a building shall be the sum total of plinth area at every floor level and plinth area of the following :

   (i) Basement.

   (ii) Floor without cladding (Stilted floor).

   (iii) Floor of varied floor heights including top floor which may be partially covered.

   (iv) Garages.

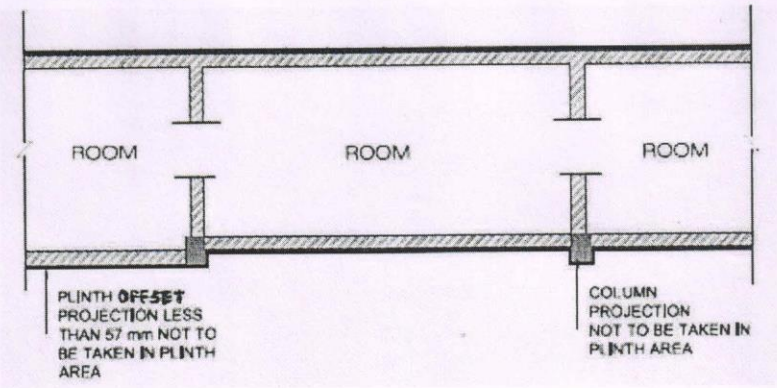
2. The plinth area of S.No. (i) to (iv) as mentioned above, shall be measured separately and shall not be clubbed together, so as to enable the cost computation at different rates per sqm as worked out for varied heights or categories.

3. If there is more than one basement, the lower most basement shall be termed as basement and upper basement shall be treated as floors.

A. For the purpose of calculating the plinth area, the following shall be included :-

a. Areas of walls at floor levels excluding plinth offsets (if any). When buildings consists of columns and columns are projecting beyond cladding, the area shall be taken only up to external face of cladding {Refer sketch-1} (in case of corrugated sheet cladding, outer edge of corrugation shall be considered).

Note: In case, a common wall is owned jointly by two owners, only half the area of such walls shall be included in the plinth area of one owner.



Sketch -1

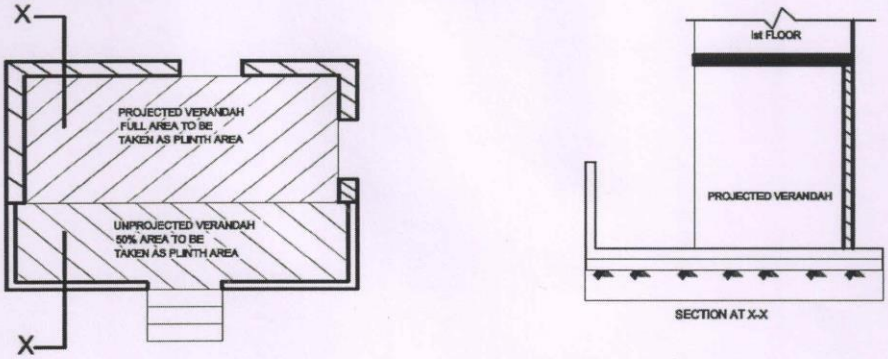
b. Shafts & ducts

c. Stair Cases

d. In case of open verandah with parapets at ground floor; {Refer Sketch-2}

(I) 100 percent of area for the portion protected by projections above and,

(ii) 50 percent of area for the portion unprotected from above.



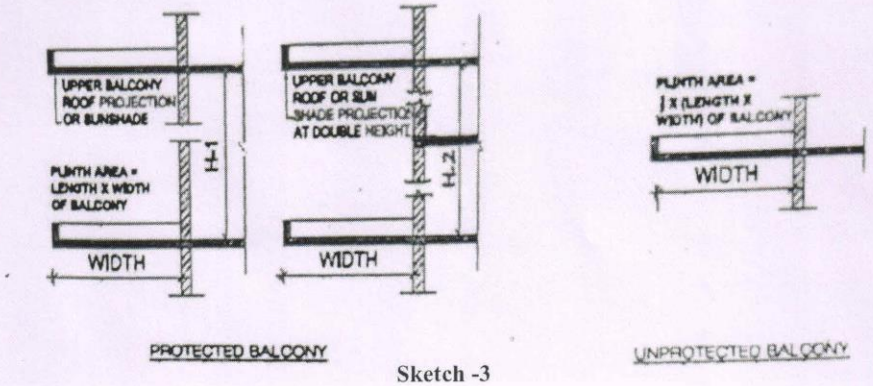
Sketch -2

e. In case of balconies {Refer sketch-3}

(I) 100 percent of area, protected by projection above

(ii) 50 percent of area, unprotected balcony from above

Note: If balconies are proposed in staggered manner, that is covering slab of balcony is at double floor height then also it shall be treated as protected balcony and shall be measured as per (i) above.



Sketch -3

H-1 refers to floor height & H-2 refers to double the floor height in case of staggered balconies.

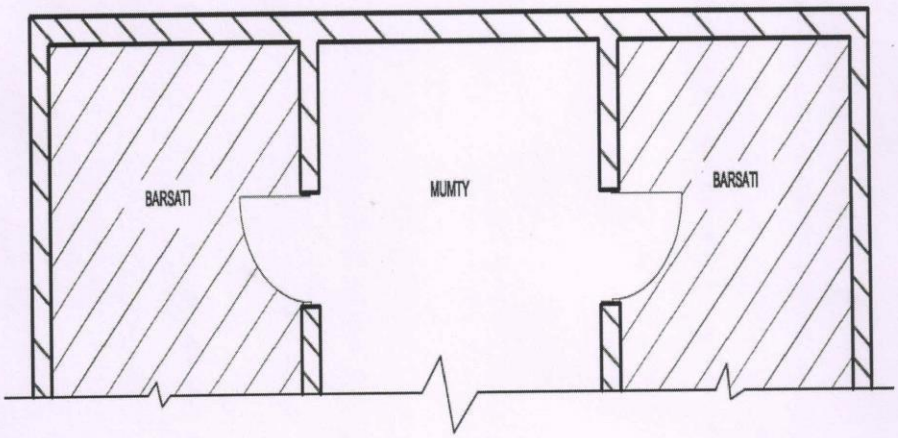
f. In case of alcove by cantilevering a slab beyond external walls;

(i) 25 percent of the area for the alcove of height up to 1.00 metre.

(ii) 50 percent of the area for the alcove of height more than 1.00 metre & up to 2.00 meter and

(iii) 100 percent of the area for the alcove of height more than 2.00 metre

g. Barsati (covered enclosure at terrace level) including mumty **(Refer sketch – 4)**



Sketch -4

h. Area of galleries i.e. upper floor seating area in an assembly hall, auditorium or theater to be included.

i. Area of an independent floor of shorter height of minimum 2.2 metre or 1.80 metres (if allowed by bye-laws) between two main floors with access stairs leading to it, is termed as mezzanines floor and shall be included in the Plinth Area, though may be measured separately (as costing may be different)

j. Open stair cases/ spiral stair cases for the purpose of fire escape or service with no enclosing / covering structure from sides, are to be considered for 50 percent plan area of stair at each floor level.

k. Mumty, machine room, turrets, domes etc. (only if the height of walls/structure/enclosure exceeds 2.25 m clear of terrace.)

Note:

As per IS code 3861-2002, Note under (e) and para (j) & (k) are not to be included in plinth area. However, as shown above these are included in plinth area for the purpose of cost computation. NIT approving authority may decide, whether to include or not to include the areas of these three categories for payments when the tenders are called on EPC mode.

B. The following shall not be included in the plinth area

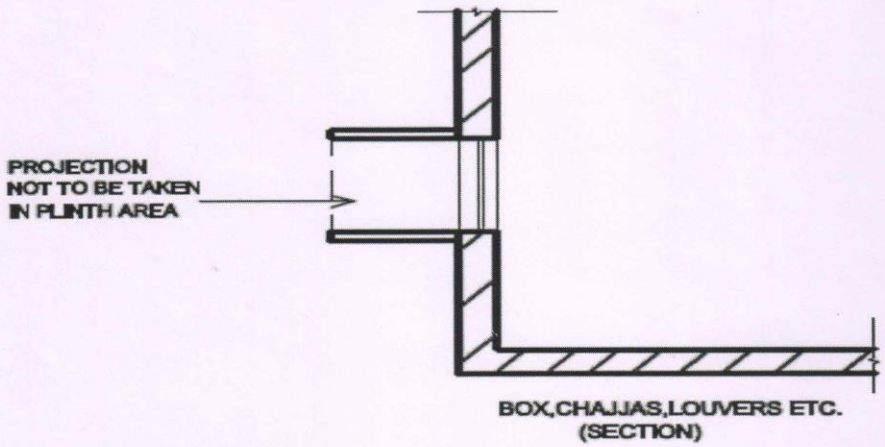
a. Area of loft (i.e. an intermediate partial slab between two floors, having no direct access stair)

b. Area of Architectural bands, cornices etc. projecting from external face of walls.

c. Area of vertical sun-breakers or box louvers projecting out and other architectural features, for example slab projection for flower pots etc. {Refer Sketch-5}

d. Open platform

e. Terrace



Sketch- 5

SECTION – II

INFORMATION AND GUIDE-LINES FOR BIDDERS

1. GENERAL:

1.1. Letter of transmittal and forms for deciding eligibility are given in Section III.

1.2. All information called for in the enclosed forms should be furnished against the relevant columns in the forms. If for any reason, information is furnished on a separate sheet, this fact should be mentioned against the relevant column. Even if no information is to be provided in a column, a “nil” or “no such case” entry should be made in that column. If any particulars/query is not applicable in case of the bidder, it should be stated as “not applicable”. The bidders are cautioned that not giving complete information called for in the application forms or not giving it in clear terms or making any change in the prescribed forms or deliberately suppressing the information may result in the bid being summarily disqualified. Bids made by telegram or telex and those received late will not be entertained.

1.3. The bid should be type written. The bidder should sign each page of application, forms and documents before scanning & uploading.

1.4. Over writing should be avoided. Corrections if any should be made by neatly crossing out, initialing, dating and rewriting. Pages of the eligibility criteria document are numbered. Additional Sheets if any added by the Bidder should also be numbered by him. They should be submitted as a package with signed letter of transmittal.

1.5. References, information and certificates from the respective clients certifying suitability, technical knowledge or capability of the bidder should be signed by an officer not below the rank of Executive Engineer or equivalent.

1.6. The bidder may furnish any additional information which he thinks is necessary to establish his capabilities to successfully complete the envisaged work. He is, however, advised not to furnish superfluous information. No information shall be entertained after uploading of eligibility criteria document unless it is called for by the Employer.

1.7. If private works are shown in support of eligibility, certified copy of the tax deducted at source certificate (TDS) shall be submitted along with the experience certificate and the TDS amount shall tally with the actual amount of work done.

2. DEFINITIONS :

2.1 In this document the following words and expressions have the meaning hereby assigned to them:

2.1.1 **EMPLOYER:** Means the Nalanda University.

2.1.2 **User/Client/Owner:** Means the Nalanda University.

2.1.3 **BIDDER:** Means the individual, proprietary firm, firm in partnership, limited company (private or public) or corporation.

2.1.4 **"Year"** means **"Financial Year"** unless stated otherwise.

3. METHOD OF APPLICATION:

3.1 If the bidder is an individual, the application shall be signed by him above his full type written name and current address.

3.2 If the bidder is a proprietary firm, the application shall be signed by the proprietor above his full type written name and the full name of his firm with its current address.

3.3 If the bidder is a firm in partnership, the application shall be signed by all the partners of the firm above their full type written names and current address, or, alternatively, by a partner holding power of attorney for the firm. In the later case a certified copy of the power of attorney should accompany the application. In both cases a certified copy of the partnership deed and current address of all the partners of the firm should accompany the application.

3.4 If the bidder is a limited company or a corporation, the application shall be signed by a duly authorized person holding power of attorney for signing the application accompanied by a copy of the power of attorney. The bidder should also furnish a copy of the Memorandum of Articles of Association duly attested by a Public Notary.

4. FINAL DECISION-MAKING AUTHORITY:

4.1 The employer reserves the right to accept or reject any bid and to annul the process and reject all bids at any time without assigning any reason or incurring any liability to the bidders.

5. PARTICULARS PROVISIONAL: The particulars of the work given in Section A are provisional and indicative. They are liable to change and must be considered only as advance information to assist the bidders.

6. SITE VISIT :

6.1 The bidder is advised to visit the site of work, at his own cost, and examine it and its surroundings to himself collect all information that he considers necessary for proper assessment of the prospective assignment. All the bidders are required to submit a duly notarized affidavit (as per Annexure-VII) stating in oath that the Bidder has visited the site and examined its surroundings and collected all information that the bidder considers necessary for proper assessment of the prospective assignment.

7. CRITERIA FOR ELIGIBILITY (TECHNICAL BID):

7.1 The bidder who fulfils the following requirements shall be eligible to apply. Joint ventures/ Consortium and Special Purpose Vehicles are not accepted.

Should have satisfactorily completed the works as mentioned below during the last seven years ending previous day of last date of submission of tenders:

Three similar works (40%) each costing not less than **Rs.**

37.76 Crore. or

Two similar works (60%) each costing not less than **Rs.**

56.63 Crore. or

One similar work (80%)costing not less than **Rs. 75.51** Crore.

Similar work shall mean: -

"Construction of RCC framed structure for residential or non -residential work , having minimum one building of three storied or completing balance work of one building including structural work minimum up to Three storeys including all wired and piped services comprising of Internal Water Supply, Sanitary Installations, sewerage system, Internal Electrical Installations, Site Development including Roads, Pathways, Drainage, Extra Low Voltage (ELV) Works, Fire Fighting, Fire Alarm system, HVAC, Lifts ,External Electrical installations, etc. all complete and executed under one agreement in India. Godowns/Ware houses/factory sheds/industrial buildings shall not be considered as eligible similar works, (Mumty and Machine room will not be counted as storey for this purpose. Stilt/s and basement/s shall be counted as storey/storeys,

Note:-

(1) Mumty and machine room will not be counted as storey for this purpose.

(2) For this purpose, each basement, stilt constructed in the building shall be considered as a stored.

(3) Work of basement, specialized E&M services, if executed under a separate contract may also be considered for the purpose of assessing the technical competence only without adding its monetary value for determining the eligibility criteria.

(4) One building of the specified number of stored, as mentioned in definition of similar work constructed in each work of the financial magnitude as specified in para 7.1 shall satisfy the criteria of similar work.

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. Qualified similar works may, if required, be physically inspected by a Technical Expert Committee constituted by the Competent Authority at Nalanda University to ascertain the completion, performance on quality of works for finalizing the Technical bid. The decision of TEC on quality/performance etc shall be final and binding.

7.2 Should have minimum average annual financial turn over (gross) of **Rs. 47.20 Crore** on civil and electrical work during the last available three consecutive financial year ending March, 2020. Year in which no turnover is shown would also be considered for working out the average. The multiplication factor of 7% per annum simple interest is not applicable on the Annual Financial Turnover figures. The tenderer should upload financial information about turnover only and should not upload any other financial sheets like balance sheets etc.

7.3 Should not have incurred any loss (profit after tax should be positive) in more than two years during the last five years ending 31st March, 2020). The tenderer should upload financial information about profit/loss only and should not upload any other financial sheets like balance sheets etc.

7.4 Should have a minimum solvency of **Rs. 37.76 Crore** (Scanned copy of original solvency certificate to be uploaded).

7.5 The bidder should have sufficient number of Technical and Administrative Employees for the proper execution of the contract. The bidder shall have to submit a list of these employees stating clearly how these would be involved in this work within 15 days of award of work.

7.6 **Evaluation of Performance:** Evaluation of performance of contractors for eligibility

shall be done by NIT approving authority or a committee constituted by him/her. All/any one of the eligible similar works executed and submitted by the bidders and ongoing works as well for the works with estimated cost put to tender more than 30 crores may be got inspected by a committee, if required, which may consist of the client or any other authority as decided by NIT approving authority. The marks for quality shall be given based on this inspection, if inspection is carried out.

8 EVALUATION CRITERIA FOR TECHNICAL QUALIFCATION

8.1 The details submitted by the bidders will be evaluated in the following manner:

8.1.1 The initial criteria prescribed in para 7 above in respect of experience of eligible similar works completed, loss, solvency and financial turn over etc. will first be scrutinized and the bidder's eligibility for the work be determined. Evaluation of performance of Contractors for eligibility shall be done by NIT approving authority or a committee constituted by him. All the eligible similar works executed and submitted by the bidders and ongoing works as well for the works with estimated cost put to tender more than 30 Crores (Thirty crores) may get inspected by a committee which may consists client or any other authority as decided by NIT approving authority. The marks for the quality shall be given based on this inspection, if inspection is carried out.

Scoring method of evaluation as detailed in page 83 of the tender documents.

8.1.2 The bidders qualifying the initial criteria as set out in para 7.0 above will be evaluated for following criteria by scoring method on the basis of details furnished by them:

Sl. No.	Evaluation Criteria	Basis for Evaluation	Maximum marks
(a)	Financial Strength	(Form 'A' & 'B')	Maximum 10 marks
(b)	Experience in eligible similar nature of work during last 7 years	(Form 'C') and for ongoing works (Form C-1)	Maximum 10 marks
(c)	Presentation	Presentation of the project-plan including all individual building conceptual detailing plans along with the competence of the Bidder competence of proposed architectural, structural and MEP consultants, proposed materials manpower to be deployed (including technical/supervisory	Maximum 25 marks

<table>
<tr><td></td><td></td><td>staff and workers), logistics and timeframe, conformance of proposed work methodology with GRIHA norms towards achievement of 5 Star ratings, etc.

The Bidder must be ready to give presentation on the mentioned work along with conceptual plans of the buildings, detailed material palette proposed, detailed manpower deployment plan with skill set mentioned against each activity, plant & machineries to be deployed and a macro schedule for completion of the work in Primavera/MS project</td><td></td></tr>
<tr><td>(d)</td><td>Functionality of all components</td><td>Meeting the requirements of the employer in terms of functionality of the buildings and functionality of all services</td><td>Maximum 10 marks</td></tr>
<tr><td>(e)</td><td>Performance on works – Time Over Run</td><td>Form ‘D’</td><td>Maximum 15 marks</td></tr>
<tr><td>(f)</td><td>Performance on works – Quality</td><td>Form ‘D1’</td><td>Maximum 25 marks
Comple-ted Works | Ongoing Works | Total Marks
Max. 15 Marks | Max. 10 Marks |</td></tr>
<tr><td>(g)</td><td>Additional Value</td><td>Any value addition from the bidder assessed through Proposal document / methodology of construction proposed etc.</td><td>Maximum 5 marks</td></tr>
<tr><td></td><td>Total =</td><td></td><td>100 Marks</td></tr>
</table>

To become eligible for short listing, the bidder must secure at least 50% (fifty percent) marks in each (section a, b, c, d, e, f and g) and 60% (sixty percent) marks in aggregate.

The University, however, reserves the right to restrict the list of such qualified contractors to any number deemed suitable by it.

NOTE: The average value of performance of works for time overrun and quality shall be taken on the basis of performance report of the eligible similar works.

9 **FINANCIAL INFORMATION:** Bidder should furnish the following financial information –

9.1 Annual Financial Statement for the last five years (in Form “A”) and solvency certificate (in Form “B”).

10 EXPERIENCE IN WORKS HIGHLIGHTING EXPERIENCE IN SIMILAR WORKS:

10.1 Bidder should furnish the following financial information –

10.1.1 Annual financial statement for the last Five years in Form ‘A’.

10.1.2 Solvency Certificate in Form B.

10.1.3 List of eligible works of similar nature of works successfully completed during the last seven years (in form “C”) and ongoing works as well (Form C-1).

10.2 Performance report at the works referred (in Form – “D and D 1”)

10.3 Structure & organization information (in Form “E”).

10.4 If required University officials may inspect the eligible works as submitted by the agency. The agency shall coordinate such inspections and provide all necessary documents, information as desired by the visiting officer(s).

11 ORGANISATION INFORMATION

11.1 Bidder is required to submit the following information in respect of his organization (in form ‘E”).

11.2 The bidder should have sufficient number and /or exhibit plan to deploy required number of Technical and Administrative employees for the proper execution of the contract. The bidder should submit a list of these employees stating clearly how these and /or new inductions would be involved in this work within 15 days of award of work.

12 CONSTRUCTION PLANT & EQUIPMENT

12.1 Bidders should furnish the list of construction plant and equipment as per CPWD norms /specification /CPWD GCC including steel shuttering, centering and scaffolding to be used in carrying out the work. Details of any other plant & equipment required for the work not included in agreement and available with the bidder may also be indicated.

13 **LETTER OF TRANSMITTAL -** The bidder should submit the letter of transmittal attached with the document.

14 **OPENING OF THE FINANCIAL BID -** After evaluation of applications, a list of short listed agencies qualified in technical evaluation will be prepared. Thereafter, the financial bids of only the qualified and technically acceptable bidders shall be opened at the notified time, date and place in the presence of the qualified bidders

or their representatives. The validity of the tenders shall be 90 days and shall be reckoned from the date of opening of the Technical Bid.

15 AWARD CRITERIA –

15.1 The employer reserves the right, without being liable for any damages or obligation to inform the bidder, to:

15.1.1 Amend the scope and value of contract to the bidder.

15.1.2 Reject any or all of the applications without assigning any reason.

16 CRITERIA FOR EVALUATION IN QUALITY AND COST BASED SELECTION (QCBS) PROCESS (as per GFR 2017 Rule 192) –

16.1 The quality of proposals received through this tender shall be assessed through **QUALITY AND COST BASED SELECTION (QCBS)** process (as per GFR 2017 Rule 192)**.** Initially the quality of technical proposals shall be scored as per criteria mentioned under Para 7 & 8 above. Only those responsive proposals that have achieved at least minimum specified qualifying score in quality of the technical proposals shall be considered further.

16.2 Thus the score achieved by the respective technically qualified bidder, after evaluation of the technical bids based on the criteria stipulated under Para 7 & 8 above, shall be denoted as $\mathbf{T_n}$.

16.3 After opening and scoring the financial proposals of technically qualified responsive bidders, a final combined score shall be arrived at by giving predefined relative weight ages for the score of quality of the technical proposal and the score of financial proposal.

16.4 The Financial Bids of technically qualified bidders will be opened on the prescribed date in the presence of bidder representatives.

16.5 Financial bids which appear to be either grossly under quoted or over quoted are liable to be rejected and this will be at the sole discretion of the Owner.

16.6 The bidder with lowest qualifying financial bid (L1) will be awarded 100% score (amongst the bidders which did not get disqualified on the basis of para 16.5 above). Financial Scores for other than L1 bidders will be evaluated using the following formula –

Normalized Financial Score of a Bidder (F_n) = {(Quoted Price of L1 / Quoted Price of the respective Bidder) X 100} %

(Adjusted to two decimal places)

16.7 Only fixed price financial bids indicating total price for all the deliverables and services specified in this NIT of EPC tender will be considered.

16.8 The bid price will include all taxes and levies including GST and shall be in Indian Rupees and mentioned separately.

16.9 Any conditional bid would be summarily rejected.

16.10 Errors & Rectification: Arithmetical errors will be rectified on the following basis: "If there is a discrepancy between the unit price and the total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total price shall be corrected.

16.11 The Tender Evaluation Committee appointed by the Competent Authority at Nalanda University would evaluate the commercial bids in isolation and in comparison, with other commercial bids to confirm whether all foreseeable & probable risks have been factored in appropriately at the fair market price. Also the ability of the bidder to absorb the adverse risk position shall also be evaluated.

16.12 In case the Tender Evaluation Committee feels that the commercial risks have not factored in all such costs & risks mitigation plan and necessary contingency, the commercial bid proposal may be rejected.

16.13 The Proposal Evaluation Committee shall also confirm whether any new avenues of costs OR revenues should not be mentioned in the Price Bid, which was not detailed out previously in the Technical Bid.

16.14 Combined and Final Evaluation

The technical and financial scores secured by each bidder will be added using weight age of 70% and 30% respectively to compute a Composite Bid Score. The bidder securing the highest Composite Bid Score will be adjudicated as the most responsive Bidder for award of the Project. The overall score will be calculated as follows:

$$B_n = 0.70 * T_n + 0.30 * F_n$$

Where,

B_n = overall score of the Bidder

T_n = Technical score of the Bidder (out of maximum of 100 marks achieved based on technical bid evaluation criteria under Para 8 above)

F_n = Normalized Financial score of the Bidder (as mentioned in Para 16.6 above)

16.15 In the event the bid composite scores are tied, the bidder securing the highest technical score will be adjudicated as the Best Value Bidder for award of the Project.

CRITERIA FOR EVALUATION OF THE PERFORMANCE OF CONTRACTORS FOR PRE-ELIGIBILITY

Attributes		**Evaluation**
(i) Financial Strength - (i) Average annual turnover (ii) Solvency Certificate	**(10 marks)** (8 marks) (2 Marks)	(i) 60% marks for minimum eligibility criteria (ii) 100% marks for twice the minimum eligibility criteria or more (iii) In between (i) & (ii) on pro-rata basis
(ii) Experience in similar class of works	**(10 Marks)**	(i) 60% marks for minimum eligibility criteria (ii) 100% marks for twice the minimum eligibility criteria or more (iii) In between (i) & (ii) on pro-rata basis
(iii) Presentation of the Bidder –	**(25 Marks)**	**Shall be evaluated based on –**
(i) Proposed Conceptual Plan, Specifications & 3D views	(15 Marks)	1) Overall Aesthetic Beauty of the buildings to include elegance and attractiveness of the buildings demonstrated through 3D views/Plans/walk through. 2) More preference shall be given to proposals which are in harmony with the remaining campus architecture 3) Sustainability features - inclusion of technology and design elements to create the buildings with a lower carbon footprint conforming to GRIHA 5- Star rating features 4) Comfort level - with the right proportions for different spaces and the amount of people occupying it. The building (s) should not feel cramped, awkward or too large for its primary function 5) Overall Space Management – to be dynamic & flexible in order to deliver a building that will function for decades to come 6) The building plans should be preferably Vastu compliant 7) Material Selection – Based on climate, durability, availability, sustainability, maintenance, aesthetic

<table>
<tr><td></td><td></td><td>appeal and performance and GRIHA requirement along with the specific requirements of the Owner as stipulated in this EPC NIT.</td></tr>
<tr><td>(ii) Proposed Construction Plan & deployment of resources</td><td>(10 Marks)</td><td>1) Building wise macro schedule for work completion
2) Plans for conforming to GRIHA 5-Star rating during execution of works
3) Detailed manpower deployment plan with skill set mentioned against each activity
4) Detailed plans for deployment of Plant & Machineries for the construction
5) Detailed construction plans for E & M works</td></tr>
<tr><td>(iv) Functionality of all components</td><td>(10 marks)</td><td>To be evaluated based on the proposal meeting all the requirements of the owner in terms of functionality of the buildings and functionality of all the services.</td></tr>
<tr><td colspan="3">(v) Performance on works (Time Over Run) (15 marks)
<table>
<tr><th>Parameter</th><th colspan="4">Calculation for Marks</th><th>Maximum Marks</th></tr>
<tr><td>If TOR =</td><td>1.00</td><td>2.00</td><td>3.00</td><td>>3.50</td><td rowspan="4">15</td></tr>
<tr><td>(1) Without levy of compensation</td><td>15</td><td>11.25</td><td>7.5</td><td>7.5</td></tr>
<tr><td>(2) With levy of compensation</td><td>15</td><td>3.75</td><td>0</td><td>-3.75</td></tr>
<tr><td>(3) Levy of compensation not decided</td><td>15</td><td>7.5</td><td>0</td><td>0</td></tr>
</table>
For the above calculations
TOR = AT/ST
Where, AT = Actual Time taken for completion of the work
ST = Stipulated Time in the agreement (+) justified period of extension of time.
Note: Marks for value in between the stages indicated above is to be determined by straight line variation basis.</td></tr>
<tr><td>(vi) Performance of works (Quality) as per Assessment in Form D1</td><td>(25 marks)</td><td>
<table>
<tr><td colspan="3">Maximum 25 marks</td></tr>
<tr><td>Completed Works</td><td>Ongoing Works</td><td>Total Marks</td></tr>
<tr><td>Max. 15 Marks</td><td>Max. 10 Marks</td><td></td></tr>
</table>
</td></tr>
<tr><td>(vii) Additional Value</td><td>(5 marks)</td><td>Any value addition from the bidder assessed through Proposal document / methodology of construction proposed etc.</td></tr>
</table>

SECTION – III

INFORMATION REGARDING ELIGIBILITY

LETTER OF TRANSMITTAL

From:

_____

To,

The Registrar
Nalanda University
Rajgir, Bihar - 803116.

Subject: Submission of EPC bid for the civil composite work of "Construction of one 500 user capacity Yoga Center cum Meditation Hall, one 250 user capacity Cafeteria and one 2000 seater capacity Auditorium including all Internal Water Supply, Sanitary Installations, Roads, Pathways, Drainage, sewerage Internal Electrical Installations, Fire Fighting, HVAC, lifts and External Electrical installations , horticulture works etc. on EPC basis for Nalanda University Main Campus at Rajgir, District Nalanda, Bihar.

Sir,

Having examined the details given in the press notice and bid document for the above work, I/we hereby submit the relevant information.

I/We hereby certify that all the statement made and information supplied in the enclosed forms A to E and accompanying statement (s) are true and correct.

I/We have furnished all information and details necessary for eligibility and have no further pertinent information to supply.

I/We submit the requisite certified solvency certificate and authorize the Registrar, Nalanda University to approach the Bank issuing the solvency certificate to confirm the correctness thereof. I/We also authorize the Registrar, Nalanda University to approach individuals, employers, firms and corporation to verify our competence and general reputation.

I/We submit the following certificates in support of our suitability, technical knowledge and capability for having successfully completed the following works:

Name of work	Amount	Certificate issued by

Certificate

It is certified that the information given in the enclosed eligibility bid are correct. It is also certified that I/We shall be liable to be debarred, disqualified/ cancellation of participation in any future tender of nalanda university for 01 year in case any information furnished by me/us found to be incorrect.

Enclosures:

Sign & Seal of bidder

Date & Place of submission:

FORM - 'A'

FINANCIAL INFORMATION

1. Financial Analysis-Details to be furnished duly supported by figures in balance sheet / profit & loss account for the last five years duly certified by the Chartered Accountant, as submitted by the applicant to the Income Tax Department (Copies to be attached).

Amount in Rs. Lakh

Sl. No.	Particulars	Financial Years				
		2015-16	**2016-17**	**2017-18**	**2018-19**	**2019-20**
(i)	Gross Annual turnover on Construction works					
(ii)	Profit / Loss					

2. Financial arrangements for carrying out the proposed work.
3. Solvency Certificate from Bankers of bidder in the prescribed Form "B"

Signature of bidder (s)
With stamp

Signature of Chartered Accountant with Seal

FORM - 'B'

FORM OF BANKERS' SOLVENCY CERTIFICATE FROM A SCHEDULED BANK

To,

The Registrar
Nalanda University
Rajgir, Bihar – 803116.

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

This certificate is issued without any guarantee or responsibility on the bank or any of the officers. This certificate is valid for six months from the date of issue of this letter.

(Signature of Branch Manager)
For the Bank

NOTE:

Banker's certificates should be on letter head of the Bank, sealed in cover addressed to tendering authority.

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

FORM – 'C'

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

Sl. No.	Name of Work/Project and Location	Owner or Sponsoring Organization	Cost of Work in Crore Rs.	Date of Commencement of work as per contract	Stipulated Date of Completion	Actual Date of Completion	Litigation/ Arbitration pending / in progress with details (*)	Name and address (Postal address & e-mail / contact number of the Officer of the Client	Whether the work was done in Back-to-Back Basis
1	2	3	4	5	6	7	8	9	10

(*) Indicate gross amount claimed and amount awarded by the Arbitrator.

Signature of Bidder (s)

(with stamp)

FORM – 'C-1'

PROJECT (S) UNDER EXECUTION

Sl. No.	Name of Work/Project and Location	Owner or Sponsoring Organization	Cost of Work in Crore Rs.	Date of Commencement of work as per contract	Stipulated Date of Completion	Up-to-date percentage progress of work	Slow progress if any Reasons thereof	Name and address (Postal address & e-mail / contact number of the Officer of the Client to whom reference may be made	Remarks
1	2	3	4	5	6	7	8	9	10

Signature of Bidder (s)

(with stamp)

FORM – 'D-1'

ASSESSMENT OF QUALITY FOR COMPLETED AS WELL AS ONGOING WORKS

Name of work:

Date of inspection:

Date of submission of report:

[A] General Observation & Operational Aspects **Yes / No**

1. Availability of approval from local bodies in case of Construction of Private Buildings.
2. Availability of approved Structural drawings.
3. Observation on seepage / leakage in the Building
4. Whether Line & level Maintained 5. In case of basement, observation on seepage, if any
5. Any Structural defects / distress observed, if yes give details
6. Whether safety measures adopted at site as per CPWD Safety Code and or govt. guidelines are adequate or not.
7. Whether the Welfare facilities provided to labour as per Clause 19 H of GCC for CPWD Works / and or Govt. guidelines are adequate or not.
8. Whether AHU getting automatically switched off and fire damps closed in case of fire signal
9. Whether thimbles used for termination of wires in DB's, EBDs & Panels?

[B] Quality of Works **Marks Assessed**

1. Quality of plaster / finishing
2. Quality of R C C / C C Work
3. Quality of Flooring
4. Quality of Wood work
5. Quality of Steel Work / Aluminium Work
6. Quality of Plumbing and Sanitary installation
7. Quality of Workmanship
8. Quality of Waterproofing
9. If cladding done, observation of efficiency / quality of cladding Brick work
10. Quality of internal electrification work
11. Quality of DBs, EBDs & Panels?
12. Quality of E&M equipment, panels & feeder pillar
13. Quality of fire alarm system / firefighting system
14. Quality of Air Conditioning work
15. Quality of Sub-station based on complete live diagram, capacitor panel, power factor, insulating Mat, cleanliness, cable termination, earthing pits, earthing of transformer / DG sets
16. Any Other aspect (To be elaborated)

Average Marks
(To be awarded out of 100 Marks based on average of marks assessed on each attribute mentioned at B above).

Note:

1. All the above parameters, may be considered for assessing the overall quality of work executed by the contractor.
2. In case, any attribute is not applicable, the same may not be included in assessment and mentioned are not applicable (N/A)
3. The Works as assessed above shall be converted on a scale of 15/10 marks for completed/ ongoing works respectively.
4. In case of eligible completed as well as ongoing works being more than one the maximum marks assigned for completed works and ongoing works will be equally distributed among the works.

Dated:

Signature & Stamp

(Executive Engineer or Equivalent)

FORM – 'E'

STRUCTURE & ORGANISATION

1. Name & Address of the Bidder :

2. Telephone No./Telex No./Fax No. :

3. Legal status of the bidder (attach copies of original document defining the legal status) :
   (a) An Individual :
   (b) A Propriety Firm :
   (c) A Firm in Partnership :
   (d) A Limited Company or Corporation :
4. Particulars of registration with various Government Bodies (attach attested Photocopy). :

Sl. No.	Organization/Place of Registration	Registration No.
i)		
ii)		
iii)		

5. Names and titles of Directors & Officers with designation to be concerned with this work. :
6. Designation of individuals authorized to act for the organization. :
7. Has the bidder, or any constituent partner in case of partnership firm Limited Company/Joint Venture, ever been convicted by a court of law? If so, give details. :
8. In which field of Civil Engineering Construction, the bidder has specialization and interest? :
9. Any other information considered necessary but not included above. :

Signature of Bidder (s)

FORM – ‘F’

Proforma for Earnest Money Deposit Declaration

Whereas, I/we…… (Name of Agency) ……..……have submittedbids for …….. (Name of Work)
……..…….

I/We hereby submit following declaration in lieu of submitting Earnest Money Deposit.

(1) If after the opening of tender, I/We withdraw or modify my/our bid during the period of validity of tender (including extended validity of tender) specified in thetender documents,

Or

(2) If, after the award of work, I/We fail to sign the contract, or to submit performanceguarantee before the deadline defined in the tender documents,

I/We shall be suspended for one year and shall not be eligible to bid for Nalanda university tenders from date of issue of suspension order.

Signature of the EPC Contractor(s)

INTIGRITY PACT DECLARATION

To
All Bidders

Subject: NIT No: NU/ENGG/91/2020-21/EPC/02

Name of Work: Civil composite work for Construction of one 500 user capacity Yoga Center cum Meditation Hall, one 250 user capacity Cafeteria and one 2000-seater capacity Auditorium including all Internal Water Supply, Sanitary Installations, Roads, Pathways, Drainage, Internal Electrical Installations, Fire Fighting, sewerage, HVAC, lifts and External Electrical installations , horticulture etc. complete on EPC basis for Nalanda University Main Campus at Rajgir, District Nalanda, Bihar.

Dear Sir,

It is hereby declared that Nalanda University is committed to follow the principle of transparency, equity and competitiveness in public procurement.

The subject Notice Inviting Tender (NIT) is an invitation to offer made on the condition that the Bidder will sign the integrity Agreement, which is an integral part of tender/bid documents, failing which the tenderer/bidder will stand disqualified from the tendering process and the bid of the bidder would be summarily rejected.

This declaration shall form part and parcel of the Integrity Agreement and signing of the same shall be deemed as acceptance and signing of the Integrity Agreement on behalf of the Nalanda University.

Yours faithfully

Sd/-

Registrar
Nalanda University
Rajgir, Bihar

INTIGRITY PACT DECLARATION
(BIDDERS)

To
The Registrar
Nalanda University
Rajgir, Bihar - 803116

Subject: NIT No: NU/ENGG/91/2020-21/EPC/02

Name of Work: Composite civil work for Construction of one 500 user capacity Yoga Center cum Meditation Hall, one 250 user capacity Cafeteria and one 2000-seater capacity Auditorium including all Internal Water Supply, Sanitary Installations, Roads, Pathways, Drainage, Internal Electrical Installations, Fire Fighting, sewerage, lifts, HVAC and External Electrical installations , horticulture etc all complete on EPC basis for Nalanda University Main Campus at Rajgir, District Nalanda, Bihar.

Dear Sir,

I/We acknowledge that M/s _____ is committed to follow the principles thereof as enumerated in the Integrity Agreement enclosed with the tender/bid document.

I/We agree that the Notice Inviting Tender (NIT) is an invitation to offer made on the condition that I/We will sign the enclosed integrity Agreement, which is an integral part of tender documents, failing which I/We will stand disqualified from the tendering process. I/We acknowledge that THE MAKING OF THE BID SHALL BE REGARDED AS AN UNCONDITIONAL AND ABSOLUTE ACCEPTANCE of this condition of the NIT.

I/We confirm acceptance and compliance with the Integrity Agreement in letter and spirit and further agree that execution of the said Integrity Agreement shall be separate and distinct from the main contract, which will come into existence when tender/bid is finally accepted by Nalanda University. I/We acknowledge and accept the duration of the Integrity Agreement, which shall be in the line with Article 1 of the enclosed Integrity Agreement.

I/We acknowledge that in the event of my/our failure to sign and accept the Integrity Agreement, while submitting the tender/bid, Nalanda University shall have unqualified, absolute and unfettered right to disqualify the tenderer/bidder and reject the tender/bid in accordance with terms and conditions of the tender/bid.

Yours faithfully

(Duly Authorized Signatory and stamp of the Bidder)

(To be signed by the bidder and same signatory competent /authorized to sign the relevant contract on behalf of the Firm / Company.)

INTEGRITY AGREEMENT

This Integrity Agreement is made at …….. on this ……..…. day of …… 20……

BETWEEN

Nalanda University represented through the Registrar, Nalanda University (Hereinafter referred as the 'Principal/Owner', which expression shall unless repugnant to the meaning or context hereof include its successors and permitted assigns)

AND

…… ……(Name and Address of the Individual /firms /Company) through (Hereinafter referred to as the (Details of duly authorized signatory) "Bidder/Contractor" and which expression shall unless repugnant to the meaning or context hereof include its successors and permitted assigns)

PREAMBLE

WHEREAS, the Principal/Owner has floated the Tender (**NIT No: NU/ENGG/91/2020-21/EPC/02)** (hereinafter referred to as "Tender/Bid") and intends to award, under laid down organizational procedure, contract for "Civil composite work for Construction of one 500 user capacity Yoga Center cum Meditation Hall, one 250 user capacity Cafeteria and one 2000-seater capacity Auditorium including all Internal Water Supply, Sanitary Installations, Roads, Pathways, Drainage, Internal Electrical Installations, Fire Fighting, sewerage, HVAC , Lifts, External Electrical installations, horticulture etc all complete on EPC basis for Nalanda University Main Campus at Rajgir, District Nalanda, Bihar." (hereinafter referred to as the "Contract").

AND WHEREAS, the Principal/Owner values full compliance with all relevant laws of the land, rules, regulations, economic use of resources and of fairness/transparency in its relation with its Bidder(s) and Contractor(s).

AND WHEREAS to meet the purpose aforesaid both the parties have agreed to enter into this Integrity Agreement (hereinafter referred to as "Integrity Pact" or "Pact"), the terms and conditions of which shall also be read as integral part and parcel of the Tender/Bid documents and Contract between the parties.

NOW, THEREFORE, in consideration of mutual covenants contained in this Pact, the parties hereby agree as follows and this Pact witness as under:

Article 1: Commitment of the Principal/Owner

1) The Principal/Owner commits itself to take all measures necessary to prevent corruption and to observe the following principles:
   a) No employee of the Principal/Owner, personally or through any of his/her family members, will in connection with the Tender, or the execution of the Contract, demand, take a promise for or accept, for self or third person, any material or immaterial benefit which the person is not legally entitled to.

b) The Principal/Owner will, during the Tender process, treat all Bidder(s) with equity and reason. The Principal/Owner will, in particular, before and during the Tender process, provide to all Bidder(s) the same information and will not provide to any Bidders(s) confidential/additional information through which the Bidder(s) could obtain an advantage in relation to the Tender process or the Contract execution.

c) The Principal/Owner shall endeavour to exclude from the Tender process any person, whose conduct in the past has been of biased nature.

2) If the Principal/Owner obtains information on the conduct of any of its employees which is a criminal offence under the Indian Penal code (IPC)/Prevention of Corruption Act,1988 (PC Act) or is in violation of the principles herein mentioned or if there be a substantive suspicion in this regard, the Principal/Owner will inform the Chief Vigilance Officer and in addition can also initiate disciplinary actions as per its internal laid down policies and procedures.

Article 2: Commitment of the Bidder(s)/Contractor(s)

1) It is required that each Bidder/Contractor (including their respective officers, employees and agents) adhere to the highest ethical standards, and report to the Government/Department all suspected acts of fraud or corruption or Coercion or Collusion of which it has knowledge or becomes aware, during the tendering process and throughout the negotiation or award of a contract.

3.

2) The Bidder(s)/Contractor(s) commits himself to take all measures necessary to prevent corruption. He commits himself to observe the following principles during his participation in the Tender process and during the Contract execution:

a. The Bidder(s)/Contractor(s) will not, directly or through any other person or firm, offer, promise or give to any of the Principal/Owner's employees involved in the Tender process or execution of the Contract or to any third person any material or other benefit which he/she is not legally entitled to, in order to obtain in exchange any advantage of any kind whatsoever during the Tender process or during the execution of the Contract.

b. The Bidder(s)/Contractor(s) will not enter with other Bidder(s) into any undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to cartelize in the bidding process.

c. The Bidder(s)/Contractor(s) will not commit any offence under relevant IPC/PC Act. Further the Bidder(s)/Contract(s) will not use improperly, (for the purpose of competition or personal gain), or pass on to others, any information or documents provided by the Principal/Owner as part of the business relationship, regarding plans, technical proposals and business details including information contained or transmitted electronically.

d. The Bidder(s)/Contractor(s) of foreign origin shall disclose the names and addresses of agents/representatives in India, if any. Similarly, Bidder(s)/Contractor(s) of Indian Nationality shall disclose names and address of foreign agents/representatives, if any. Either the India agent on behalf of the foreign principal or the foreign principal directly could bid in a tender but not both. Further, in cases where an agent participates in a tender on behalf of one manufacturer, he shall not be allowed to quote on behalf of another manufacturer along with the first manufacturer in a subsequent/parallel tender for the same item.

e. The Bidder(s)/Contractor(s) will, when presenting his bid, disclose (with each tender as per proforma enclosed) any and all payments he has made, is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the Contract.

3) The Bidder(s)/Contractor(s) will not instigate third persons to commit offences outlined above or be an accessory to such offences.

4) The Bidder(s)/Contractor(s) will not, directly or through any other person or firm indulge in fraudulent practice **means a willful misrepresentation or omission of facts or submission of fake/forged documents in order to induce public official to act in reliance thereof, with the purpose of obtaining unjust advantage by or causing damage to justified interest of others and/or to influence the procurement process to detriment of the Government interests**.

5) The Bidder(s)/Contractor(s) will not, directly or through any other person or firm use Coercive Practices (means the act of obtaining something, compelling an action or influencing a decision through intimidation, threat or the use of force directly or indirectly, where potential or actual injury may befall upon a person, his/her reputation or property to influence their participation in the tendering process).

Article 3: Consequences of Breach

Without prejudice to any rights that may be available to the Principal/Owner under law or the Contract or its established policies and laid down procedures, the Principal/Owner shall have the following rights in case of breach of this Integrity Pact by the Bidder(s)/Contractor(s) and the Bidder/Contractor accepts and undertakes to respect and uphold the Principal/Owner's absolute right:

1) If the Bidder(s)/Contractor(s), either before award or during execution of Contract has committed a transgression through a violation of Article 2 above or in any other form, such as to put his reliability or credibility in question, the Principal/Owner after giving 14 days' notice to the contractor shall have powers to disqualify the Bidder(s)/Contractor(s) from the Tender process or terminate/determine the Contract, if already executed or exclude the Bidder/Contractor from future contract award processes. The imposition and duration of the exclusion will be determined by the severity of transgression and determined by the Principal/Owner. Such exclusion may be forever or for a limited period as decided by the Principal/Owner.

2) Forfeiture of Performance Guarantee and /or Security Deposit: If the Principal/Owner has disqualified the Bidder(s) from the Tender process prior to the award of the Contract or terminated/determined the Contract or has accrued the right to terminate/determine the Contract according to Article 3(1), the Principal/Owner apart from exercising any legal rights that may have accrued to the Principal/Owner, may in its considered opinion forfeit the entire amount of , Performance Guarantee and Security Deposit of the Bidder/Contractor.

3) Criminal Liability: If the Principal/Owner obtains knowledge of conduct of a Bidder or Contractor, or of an employee or a representative or an associate of a Bidder or Contractor which constitutes corruption within the meaning of Indian Penal code

(IPC)/Prevention of Corruption Act, or if the Principal/Owner has substantive suspicion in this regard, the Principal/Owner will inform the same to law enforcing agencies for further investigation.

Article 4: Previous Transgression

1) The Bidder declares that no previous transgressions occurred in the last 5 years with any other Company in any country confirming to the anticorruption approach or with Central Government or State Government or any other Central/State Public Sector Enterprises in India that could justify his exclusion from the Tender process.

2) If the Bidder makes incorrect statement on this subject, he can be disqualified from the Tender process or action can be taken for banning of business dealings/holiday listing of the Bidder/Contractor as deemed fit by the Principal/Owner.

3) If the Bidder/Contractor can prove that he has resorted/recouped the damage caused by him and has installed a suitable corruption prevention system, the Principal/Owner may, at its own discretion, revoke the exclusion prematurely.

Article 5: Equal Treatment of all Bidders/Contractors/Subcontractors

1) The Bidder(s)/Contractor(s) undertake(s) to demand from all subcontractors a commitment in conformity with this Integrity Pact. The Bidder/Contractor shall be responsible for any violation(s) of the principles laid down in this agreement/Pact by any of its Sub-contractors/sub-vendors.

2) The Principal/Owner will enter into Pacts on identical terms as this one with all Bidders and Contractors.

3) The Principal/Owner will disqualify Bidders, who do not submit, the duly signed Pact between the Principal/Owner and the bidder, along with the Tender or violate its provisions at any stage of the Tender process, from the Tender process.

Article 6: Duration of the Pact

This Pact begins when both the parties have legally signed it. It expires for the Contractor/Vendor, 36 months after the completion of work under the contract or till the continuation of defect liability period, whichever is more and for all other bidders, till the Contract has been awarded.

If any claim is made/lodged during the time, the same shall be binding and continue to be valid despite the lapse of this Pacts as specified above, unless it is discharged/determined by the Competent Authority at Nalanda University.

Article 7: Other provisions

1) This Pact is subject to Indian Law, place of performance and jurisdiction is the Headquarters of the Principal/Owner, who has floated the Tender.

2) Changes and supplements need to be made in writing. Side agreements have not been made.

3) If the Contractor is a partnership or a consortium, this Pact must be signed by all the partners or by one or more partner holding power of attorney signed by all partners and consortium members. In case of a Company, the Pact must be signed by a representative duly authorized by board resolution.

4) Should one or several provisions of this Pact turn out to be invalid; the remainder of this Pact remains valid. In this case, the parties will strive to come to an agreement to their original intensions.

5) It is agreed term and condition that any dispute or difference arising between the parties with regard to the terms of this Integrity Agreement/Pact, any action taken by the Owner/Principal in accordance with this Integrity Agreement/Pact or interpretation thereof shall not be subject to arbitration.

Article 8: Legal and Prior Rights

All rights and remedies of the parties hereto shall be in addition to all the other legal rights and remedies belonging to such parties under the Contract and/or law and the same shall be deemed to be cumulative and not alternative to such legal rights and remedies aforesaid. For the sake of brevity, both the Parties agree that this Integrity Pact will have precedence over the Tender/Contract documents with regard any of the provisions covered under this Integrity Pact.

IN WITNESS WHEREOF the parties have signed and executed this Integrity Pact at the place and date first above mentioned in the presence of following witnesses:

……..……..	……..……..
(For and on behalf of Bidder/Contractor)	(For and on behalf of Principal/Owner)

WITNESSES:

4. ……..……..……..……..
(Signature, name and address)

5.

6. ……..……..……..……..
(Signature, name and address)

Place:
Date:

PART – III

FINANCIAL BID

NALANDA UNIVERSITY
RAJGIR, BIHAR – 803116

ENGINEERING, PROCUREMENT AND CONSTRUCTION (EPC) BID

[A] Tender for the civil composite Work of Construction of one 500 user capacity Yoga Center cum Meditation Hall, one 250 user capacity Cafeteria and one 2000 seater capacity Auditorium including all wired and piped services comprising of Internal Water Supply, Sanitary Installations, Roads, Pathways, Drainage, Internal Electrical Installations, Extra Low Voltage (ELV) Works, Fire Fighting, Fire Alarm system, sewerage ,HVAC, lifts , External Electrical installations, horticulture etc. all complete on EPC basis for Nalanda University Main Campus at Rajgir, District Nalanda, Bihar.

(a) To be uploaded by 15:00 hours on___/__/____to …*…/…*…/20…*… on website www.eprocure.gov.in

(b) To be opened in presence of tenderers who may be present at 15:30 hours on __/__/____in the Project Office of Nalanda University, at Rajgir, Bihar.

BID

I/We have read and examined the notice inviting bid, schedule – A, B, C, D, E & F, CPWD Specifications (civil, Electrical (all relevant applicable parts) and horticulture) applicable with all addendum/corrigendum issued time to time up to the last date of submission of bids, CPWD GCC EPC project 2020, General Rules and Directions, approved makes list , clauses of contract, Special conditions, & other documents and Rules referred to in the conditions of contract and all other contents in the EPC bid document for the work.

I/We hereby submit our bid for the execution of the work specified for the Nalanda University within the time specified in Schedule 'F' viz., user requirement and approved drawings and in accordance in all respect with the specifications, designs, drawing and instructions in writing referred to in Rule-1 of General Rules and Directions and in Clause 11 of the Conditions of contract of 2020 for EPC Contract with amendments up to the last date of submission of bids and with such materials as are provided for, by, and in respect of accordance with, such conditions so far as applicable.

We agree to keep the bid open for 120 (one hundred twenty) days from the date of opening of technical bid and not to make any modification in its terms and conditions.

If I/We, fail to furnish the prescribed performance guarantee within prescribed period, I/We agree that Nalanda University or their successors, in office shall without prejudice to any other right or remedy, be at liberty to cancel the LOI issued and we will be debarred for participation in all future tenders of Nalanda university for period of 01 year . Further, if I/We fail to commence work as specified. I/We agree that Nalanda University or its successors in office shall without prejudice to any other right or remedy available in law, be at liberty to forfeit the said performance guarantee absolutely, the said performance guarantee shall be a guarantee to execute all the works referred to in the EPC bid documents upon the terms and conditions contained or referred to those in excess of that limit at the rates to be determined in accordance with the provision contained in clause 12.2 and 12.3 (as modified) of the bid form if any applicable .

Further, I/We agree that in case of forfeiture of Performance Guarantee as aforesaid, I/We shall be debarred for participation in the re-bidding process of the work.

I/we undertake and confirm that eligible similar work(s) has/have not been got executed through another agency on back-to-back basis. Further that, if such a violation comes to the notice of the University, then I/we shall be debarred for bidding in Nalanda University in future forever. Also, if such a violation comes to the notice of Nalanda University before date of start of work, the Engineer-in-charge shall be free to forfeit the entire amount of Performance Guarantee.

I/We hereby declare that I/We shall treat the bid documents drawings and other records connected with the work as secret/confidential documents and shall not communicate information/derived there from to any person other than a person to whom I/We am/are authorized to communicate the same or use the information in any manner prejudicial to the safety of the University.

Dated : ……..**……. .....**.....

(Signature of Contractor)

Witness : ……..**…….

Address : ……..**…….

Postal Address : ……..**…….

Occupation : ……..**…….

ACCEPTANCE

The above tender (as modified by you as provided in the letters mentioned hereunder) is accepted by me for and on behalf of Nalanda University for a sum of Rs. ……..… Rupee ……* .....).

The letters referred to below shall form part of this contract agreement –

(1) _____
(2) _____
(3) _____

For & on behalf of Nalanda University

Signature……*……
…
Dated: ……*……..
Designation……*…….

PROFORMA OF SCHEDULES: A TO F

(Civil & Electrical Works)

SCHEDULE – 'A'
FINANCIAL BID FORMAT
(To be submitted online in https://nalandauniv.euniwizarde.com/)

SCHEDULE OF QUANTITIES

NALANDA UNIVERSITY						
NIT NO: NU/Engg/91/2020-21/EPC/02						
Name & Address of the Bidder:						
Name of Work: Civil composite work for Construction of one 500 user capacity Yoga Center cum Meditation Hall, one 250 user capacity Cafeteria and one 2000 seater capacity Auditorium including all wired and piped services comprising of Internal Water Supply, Sanitary Installations, Roads, Pathways, Drainage, Internal Electrical Installations, Extra Low Voltage (ELV) Works, sewerage , Fire Fighting, Fire Alarm system, HVAC, Lifts External Electrical installations, horticulture etc. all complete on EPC basis for Nalanda University Main Campus at Rajgir, District Nalanda, Bihar.						
Sl. No	Description of Item	Quantity (Plinth Area)	Unit	Rate in Figures (In Rs.)	Rate in words (In Rs.)	Amount (In Rs.)
1.	Construction of RCC framed structure building as per scope for work and user requirement, and site development , all complete as per design and direction of the Engineer in Charge for Nalanda University including planning and designing by incorporating stipulated specifications, all works of E&M services & Civil works including any type of foundation ,in EPC mode including all necessary service drawings etc. and including all works and as per stipulations and scope of work defined in this tender documents along with all corrigendum with respect to this tender published time to time, if any. **Note : Measurement shall be done based on Plinth Area calculated as per CPWD PAR 2020 guidelines.**	11,965.00	Square Meters			
					Total Amount (In Figures) in Rs. =	
					(Total Amount in Words in Rs.)	

Note :

1. The rates quoted in the tender will cover all provisions of tender documents such as scope of

work, relevant specifications, CPWD Specifications for Civil , electrical (all applicable parts) and horticulture, CPWD GCC EPC projects 2020, relevant IS codes , NBC and other terms & conditions.

2. **Cost of Construction in this EPC tender as quoted above is inclusive of all taxes charges including GST (as applicable) , all material , all T& P, all scaffolding, machineries, construction equipment and materials, all labour, PF/ESI, labour Insurance including CAR policy, royalty, any other taxes/duties etc. all complete . Rate shall be quoted by contractor, presuming a plinth area of 11965 Sqm for the Buildings. The Plinth area** to be actually constructed at site can be increased/decreased and the cost will be accordinglyincreased/decreased considering the Plinth Area Rate per Sqm quoted by the contractor asabove. Plinth Area shall also be calculated as per IS Code 3861 & as per CPWD Memo No. 29/21/58/WI dated: New Delhi October, 1983 (attached herein below with the tender) (in case of any discrepancy between CPWD norms (i.e. CPWD Memo and CPWD PAR 2020 guidelines) and IS code (IS 3861) for plinth area measurement, the lower area as calculated by above three methods will be considered for plinth area calculation and subsequent payment).

3. Ramp for various buildings with stainless steel railing for physically challenged persons as provided at Ground floor, shall not be considered for plinth area calculation for measurement.
4. The work will be awarded as a whole and no splitting of work shall be considered. The lowest tender shall be decided on the basis of overall tendered amount.

Central Public Works Department

…

Copy of the Memo no. 29/21/58/WI Dated: New Delhi, Oct. 1983

Subject: **Rules for working out plinth area from plans**

In order to ensure the adoption of a uniform method of working out plinth areas from plans, the following rules are laid down. These rules are general in nature and should be taken as a guide. They are based on the fundamental principle that the plinth area of a building should present a true picture of the covered floor area provided in the plan.

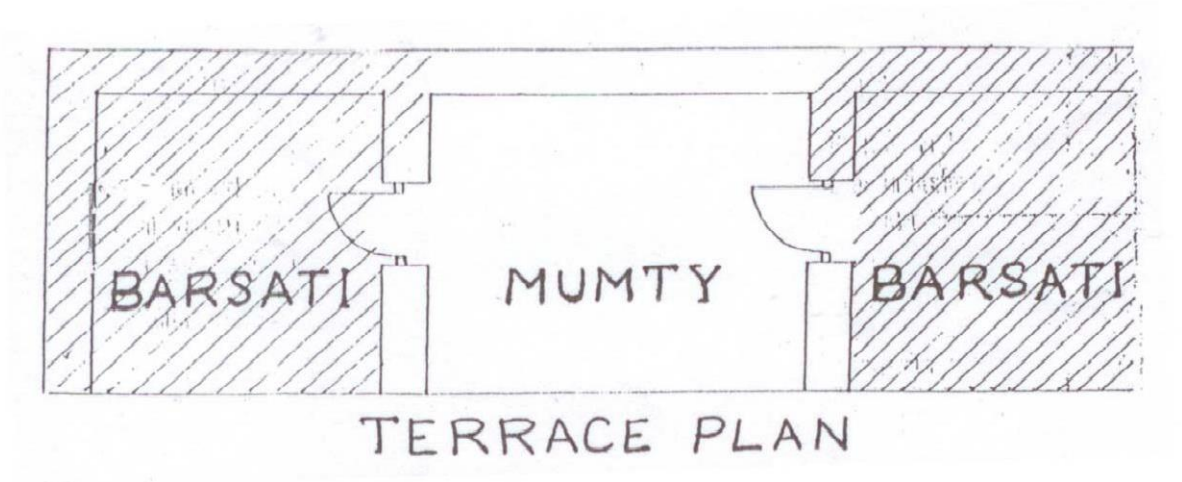
1. GENERAL

(a) The total plinth area of a building shall be he sum total of the plinth area at every floor including the basement, if any.

(b) Internal sanitary shafts shall not be included in the plinth area in the case of a residential building at any floor level.

(c) In case of non-residential building internal shafts for sanitary installations, air-conditioning ducts, lifts etc. shall be included in the plinth area at all floor levels.

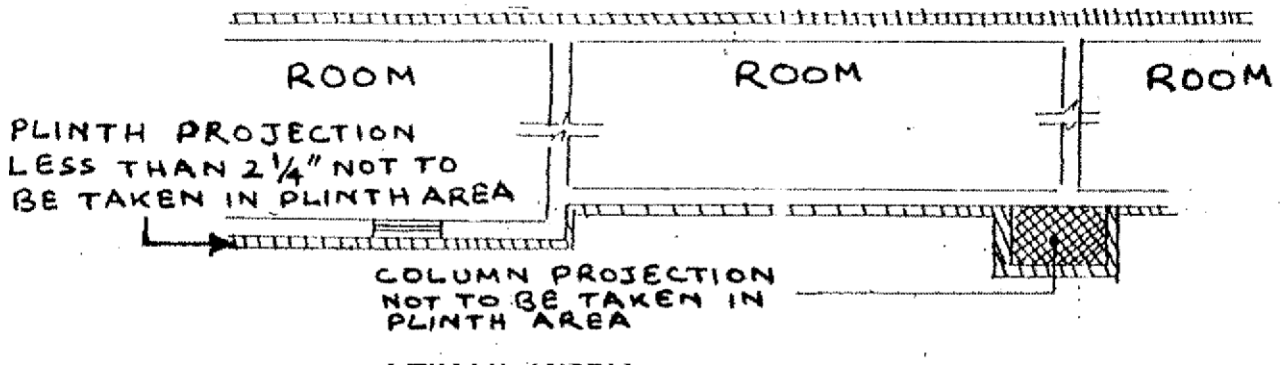
(d) The area of the mumty at terrace level shall not be included in the plinth area. If a Barsati is provided jointly with mumty then the area of the Barsati excluding mumty at the terrace level shall be included in the plinth area as shown below in the hatched area.



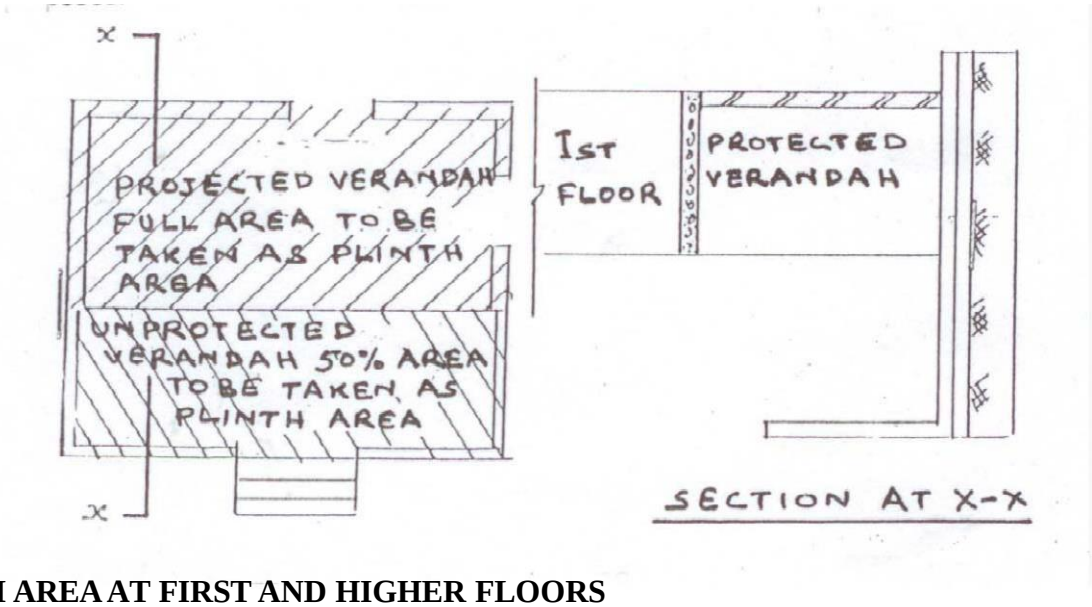
(e) Towers, turrets domes projecting above the terrace shall not be included in the plinth area at terrace level, but shall be allowed for separately for costing purposes.

PLINTH AREA OF GROUND FLOOR

The plinth area of the ground floor shall be calculated at the plinth level excluding the plinth off-sets provided such plinth off-sets are not more than 2 ¼" . In cases where the building consists of – columns projecting beyond cladding, the plinth area shall be taken up to the external face of the cladding and shall not be included the projections of the columns.

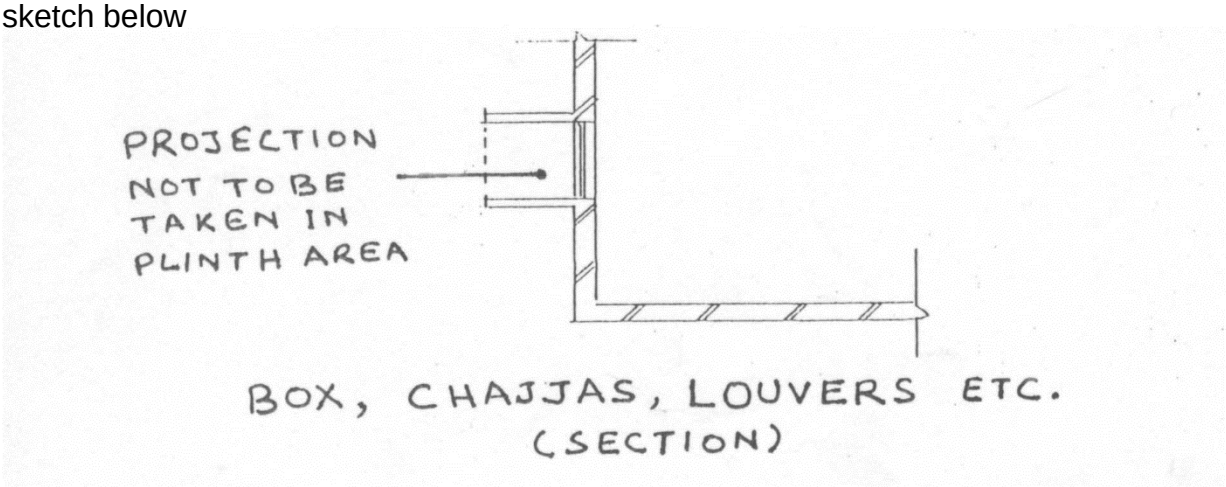


In case open verandah with parapets are protected at the ground floor projecting out of the building, the full area shall be taken up to the outer line of the external verandah lintel and only 50% of area shall be taken for the unprotected verandah. Open platform without parapets and terraces at ground floor and porches, shall not be included in the plinth area but shall be allowed for separately for costing purposes.

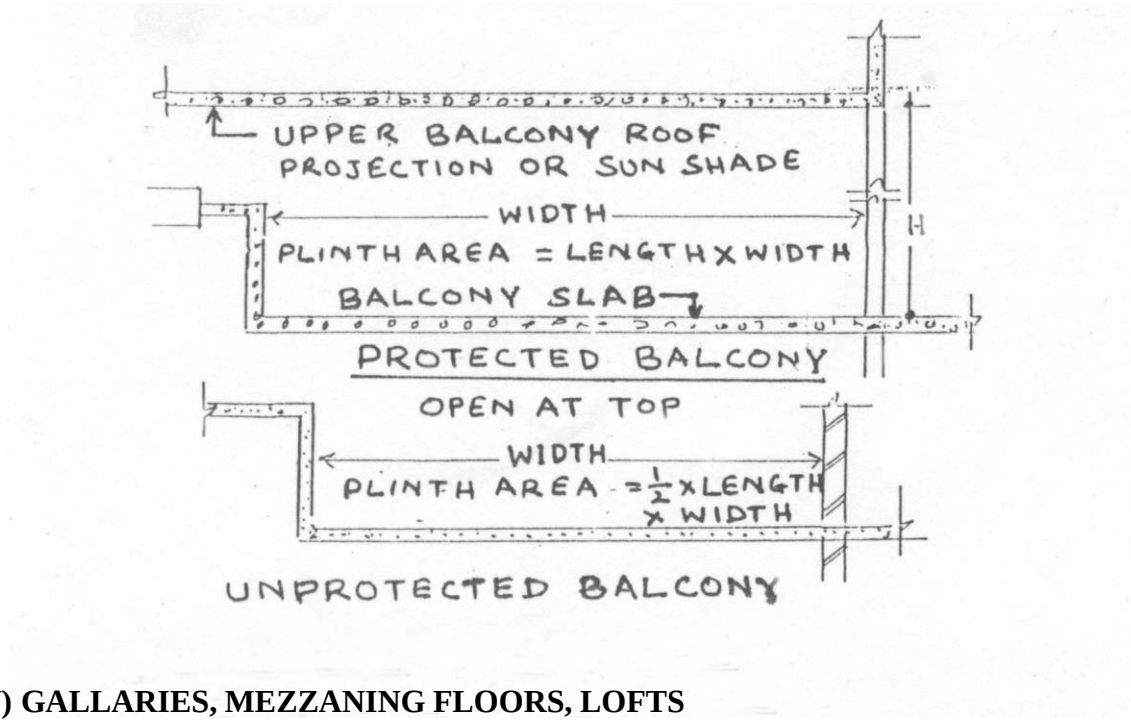


PLINTH AREA AT FIRST AND HIGHER FLOORS

The plinth area of first and higher floors shall be calculated at the relevant floor levels. Architectural bonds, cornice etc. shall not be included in the plinth area even though they may occur at the floor level, vertical sun breakers or box louvers projecting out also shall not be include in plinth area. See illustrative sketch below



In the case of projecting balconies protected to their full width by the shades full width roof projectionsor by upper in the case of unprotected balconies equivalent area to the extent of 50% of the area of the balconies shall be included in the plinth area. See illustrative sketch given below:



IV) GALLARIES, MEZZANING FLOORS, LOFTS

(a) Area of galleries i.e. upper floor of seats in an assembly hall, Auditorium, theatres, etc. shall befully included in the plinth area.

(b) Area of mezzanine floor i.e. an intermediate floor introduced between two main floors, shall beincluded in the plinth area, if no separate provision is made for the same.

(c) The area of a loft i.e. an intermediate slab just beneath the floor of roof without any direct staircaseleading to it and used for storage purpose shall not be included in the plinth area.

Sd/-
Chief Engineer
Central P.W.D.

(Er. RAM DIYA)	(Er. K.L.LANGAR)	(Er. M.K.KANCHAN)
ASSTT. ENGINEER-III	EXECUTIVE ENGINEER	SUPTDG.ENGINEER(S&S)
S&S- II, CPWD	(S&S) II, CPWD	CPWD, NIRMAN BHAWAN
NIRMAN BHAWAN, N.D.	NIRMAN BHAWAN, N.D.	NEW DELHI

.

SCHEDULE – 'B' Schedule of material to be issued to the agency	**:**	**-NIL-**
SCHEDULE – 'C' Tools and Plants to be hired to the agency.	**:**	**-NIL-**
SCHEDULE – 'D' Extra schedule for specific requirements/ documents for the work, if any.	**:**	**-NIL-**
SCHEDULE – 'E' Reference to General Conditions of Contract	**:**	CPWD General Conditions of EPC Contract 2020 EPC projects , as amended / modified up to the last date of submission of Bid.
Name of work	**:**	Civil composite work for Construction of one 500 user capacity Yoga Center cum Meditation Hall, one 250 user capacity Cafeteria and one 2000 seater capacity Auditorium including all wired and piped services comprising of Internal Water Supply, Sanitary Installations, Roads, Pathways, Drainage, Internal Electrical Installations, Extra Low Voltage (ELV) Works, Fire Fighting, Fire Alarm system, sewerage , HVAC, Lifts , External Electrical installations, horticulture etc. all complete on EPC basis for Nalanda University Main Campus at Rajgir, District Nalanda, Bihar.
Estimated cost of work	**:**	**Rs. 94.39 crores**
Earnest Money	**:**	Exempted (As per OM issued by DG, CPWD, New Delhi DG/CON/Misc./13 dated 23.11.2020 and bidder should sign the Proforma for EMD Declaration given in the NIT
Performance Guarantee	**:**	3% (three percent) of accepted composite tendered value. 100% of this amount will be released after completion of total work of this EPC tender as per completion certified by Engineer – in-charge.
Security Deposit	**:**	**2.5% (two & Half percent) of** accepted composite tendered value . The security deposit of 2.5% of tender value will be released after successful completion of Defect liability period. To be deducted from each RA bills.

SCHEDULE 'F' (GENERAL RULES & DIRECTIONS)

Definitions		
Tender Accepting Authority	:	Hon'ble Vice Chancellor, Nalanda University
Officer Inviting Bid	:	The Registrar, Nalanda University
Engineer-In-Charge	:	The Engineer Officer appointed by the University
Department	:	The Nalanda University Engineering Section along with its Project Management Consultant (PMC) appointed by Nalanda University
Percentage on cost of materials and Labour to cover all overheads and profits	:	15% (Provided that no extra overheads and profits shall be payable on the part(s) of work assigned to other agency(s) by the contractor as per terms of contract).
Standard Schedule of Rates		
Civil Works	:	Delhi Schedule of Rates 2018 (Civil works) with amendments up to the date of submission of bid. CPWD Plinth Area Rates 2020 (Civil + Electrical)
Electrical work	:	Delhi Schedule of Rate 2018-(E&M) with amendments up to the date of submission of bid
Horticulture work	:	Horticulture Schedule of Rate2018 with amendments, up to the date of submission of bid.
Standard CPWD Contract Form	:	CPWD Form 8 & CPWD GCC 2020 for EPC projects as modified & Corrected up-to the last date of submission of Bid & CPWD works manual 2019
Clause – 1 (i) Time allowed for submission of Performance Guarantee, programme chart (Time and Progress) and applicable labour licenses, registration with GST, EPFO, ESIC and BOCW Welfare Board or proof of applying thereof from the date of issue of letter of acceptance. (ii) Maximum allowable extension with late fee @ 0.1% per day of Performance Guarantee amount beyond the period provided in (i) above	: :	15 (Fifteen) days from date of issuance of LOA. 15(Fifteen) days with late fee @ 0.1% per day of PG amount (non-refundable)

Clause – 2 (i) Authority for fixing compensation under clause - 2	**:**	Hon'ble Vice Chancellor, Nalanda University or her/his successor thereof.
Clause – 2A (i) Whether Clause 2A shall be applicable	**:**	Yes
Clause – 5 Number of days from the date of issue of letter of acceptance for reckoning date of start	**:**	15 (Fifteen) days or date of handing over of site whichever is later
Table of Mile stone	**:**	As per Mile Stone Table in Appendix-II.
Time allowed for execution of work	**:**	**24 months** (3 months for planning & designing and obtaining statuary and university approvals for commencement of work + 21 months for execution of original work and obtaining approvals from local bodies for declaring the buildings fit for occupation plus GRIHA-LD 5 Star Certification.)
Authorities to decide –		
(i) Extension of Time	**:**	Hon'ble Vice Chancellor, Nalanda University or her/his successor thereof.
(ii) Rescheduling of Milestones	**:**	Hon'ble Vice Chancellor, Nalanda University or her/his successor thereof.
(iii) Shifting of date of start in Case of delay in handing over of site	**:**	Hon'ble Vice Chancellor, Nalanda University or her/his successor thereof.

Schedule of handing over of site

Part	Portion of Site	Description	Time period for handing over reckoned from date of issue of letter of intent
Part A	Portion without any hindrance	The entire site	Available

Schedule of issue of Designs

Part	Portion of Design	Description	Time period for issue of design reckoned from date of issue of letter of intent
Part A	Portion already included in NIT	Indicative location plan & soil report is attached as **Annexure VIII**. However consultants to be appointed by the successful EPC Contractor for preparation of Soil	Indicative location plan & Soil report Available in NIT.

		report, survey, LOP & detailed Architectural Drawings including elevations, 3D renderings, walk through, Model, etc. fresh for approval of Nalanda University.	
Part – B-1	Portions of Architectural Designs and drawings to be prepared along with Design Brief Report of all architectural, structural and E&M related works by EPC Contractor through his consultants	To be finalized by EPC contractor through his appointed Architectural / Structural and E&M consultants appointed by EPC contractor i/c statutory approvals and Nalanda University approval	Within 3 months of award of work (this is to be done by the successful EPC bidder through his consultant)
Part – B-2	Portions of Civil/Structural Designs and drawings to be prepared by EPC bidder through his consultants	-do-	Within 3 months of award of work (this is to be done by the successful EPC bidder through his consultant)
Part – B-3	Portions of E&M Designs and drawings to be prepared by EPC Bidder through his consultants	-do-	Within 4 months after award of work (this is to be done by the successful EPC bidder through his consultant)

Clause 5.2

Nature of Hindrance Register - Web based. OM No. DG/MAN/394 dated 28/01/2020 shall be followed for documentation of hindrances available on CPWD website www.cpwd.gov.in.

Schedule of rate of recovery for delay in submission of the modified programme in terms of delay days:

Contract Value	Recovery (Rupees)
More than Rs. 20 Crores	Rs. 5,000/- per day

Clause – 6	**:**	Applicable
Clause – 7 Gross work to be done together with net payment / adjustment of advances for material collected, if	**:**	Gross payment of Rs 400 lakhs as per the stage achievement or part payment as decided by Engineer-In-Charge.

any, since the last such payment for being eligible to interim payment		
Clause – 7A No Running Account Bill shall be paid for the work till the applicable labour licenses, registration with GST, EPFO, ESIC and BOCW Welfare Board, whatever applicable as submitted by the EPC Bidder to the Engineer-in Charge.	**:**	Yes, Applicable
Clause – 8B	**:**	In case contractor fails to submit the completion plan as prescribed in clause 8B, he shall be liable to pay a sum equivalent to 2.5% value of work subject to ceiling of Rs. 2,00,000/-.
Clause – 10A List of testing equipment to be provided by the agency at site lab	**:**	List attached as Appendix – III
Clause – 10B (i)	**:**	Applicable
Clause – 10B (ii) Whether Clause 10B(ii) shall be applicable	**:**	The mobilization advance shall be given as mentioned below: **(i) 1st installment = 5%*.** **(ii) 2nd installment = 5%*.** **Note:** A separate dedicated Bank Account shall be opened by the agency in any scheduled Bank before release of mobilization advance. Mobilization advance will not be given for any material for which secured advance is payable, T & P advance will not be given for tools & plants equipment, owned by the agency as intimated in the eligibility documents. Installments of Mobilization advance except the first installment shall be released only after receiving the utilization certificate supported by bank statement of the said account showing the disbursement of mobilization advance by the agency as per clause 10B(ii) of GCC. ***[of bid value as per award of work].**
Clause - 10C Component of labour expressed as percent of value of work	**:**	Not Applicable.
Clause – 10CA	**:**	Applicable

Sl. No.	Materials covered under this clause	Nearest materials (other than cement, reinforcement bars and structural steel) for which all India wholesale price index shall be followed	Base Rate without GST per MT of all materials covered under clause 10CA applicable for the month of February 2021 of CPWD (include cement component used in RMC brought at site from outside approved RMC plant if any)
1.	Cement: PPC	NIL	Rs. 4,325/- per MT
2.	Reinforcement steel TMT bars Fe500D (Primary manufacturers)	NIL	Rs. 55,571/- per MT
3.	Structural Steel	NIL	Rs. 53,888/- per MT

Clause – 10CC	**:**	Applicable (for Civil Work)

Clause 10CC to be applicable in contracts with stipulated period of completion exceeding the shown in next column.	:	Applicable (for Civil Work)
Schedule of component of other materials, Labour, POL etc. for price escalation.		
Component of civil (Except materials covered under clause 10 CA) expressed as percent of total value of work	:	40%
Component of labour expressed as percent of total value of work	:	25%
Component of POL expressed as percent of total value of work	:	NIL
Note: - Payment under this clause is admissible only when contractor submits proof of having paid increased wages due to every worker through Bank of ECS or online transfer to his account.		

Clause – 11 Specifications to be followed for execution of work	**:**	**Civil work :** • CPWD Specifications 2009 Volume – I & II with corrections slips up to last date of submission of bid. **E&M & other work :** 1. CPWD General Specification for Electrical Works Part I Internal – 2013. 2. CPWD General Specification for Electrical Works Part IV Substation -2013. 3. CPWD General Specification for Electrical Works Part VII DG Sets – 2013. 4. CPWD General Specification for Electrical Works Part VIII Gas Based Fire Extinguishing System – 2013. 5. General Specification for Heating Ventilation & AirConditioning-2017.

		6. General Specification for Electrical Works (Part III Lifts & Escalators)-2003. 7. CPWD specification of Horticulture & Landscaping – 2018. 8. CPWD Specification for firefighting and sprinklers All above specifications shall be applicable with corrections slips up to the last date of submission/ uploading of bid. In items of work where CPWD specification is not available, standard Engg. practice or as per manufacturer advise , work will be done with prior approval of E-In-C
Clause – 12 Type of work : Project and original work	**:**	Applicable
Clause – 12.1	**:**	Applicable
Clause – 12.2 & 12.3	**:**	30% (Thirty percent) applicable for plinth area. Any additional/ Extra item other than the specified item will be treated as Extra item and rate will be derived based on market rate prevailing at the time of execution of item. For any change in specification, any extra/ deduction amount will be paid/deducted as per the difference in market rates (prevailing at the time of decision communicated to the contractor) of the original specified item and the changed/modified item.
Clause – 12.5 :		
(i) Deviation Limit beyond which clauses 12.2 & 12.3 shall apply for foundation work(except items mentioned in earth work sub head in DSR and related items)	**:**	Not applicable
(ii) Deviation Limit for items mentioned in earth work sub head of DSR and related items.	**:**	Not applicable
Clause – 16 Competent Authority for deciding reduced rates.	**:**	Hon'ble Vice Chancellor, Nalanda University on recommendations of PMC and Engineer-In-Charge
Clause – 17	**:**	Defects liability period shall be **12 months** after declaring the original construction work completed by the Tender Accepting Authority i.e. Hon'ble Vice Chancellor, Nalanda University or his successor. For structural work, aluminium work, water proofing and ATT work, defect liability period will be 10 years from the completion of work.

Clause – 18	**:**	Suggestive List of machinery, tools & plants to be deployed by the Bidder at site, As per Appendix-IV
Clause – 25	**:**	**Constitution of Dispute Redressal Committee –** The Competent Authority at Nalanda University constitutes a committee to redressal of all disputes arouse out of this Contract. If the matter is not resolved, upon invocation of Clause 25 the Sole Arbitrator is appointed by the Competent Authority at Nalanda University. Place of arbitration: - Headquarters of Nalanda University at Rajgir, District – Nalanda, Bihar.

Clause – 32

[A] Requirement of Minimum Technical / Architectural Personnel required to be deployed by the EPC Contractor for planning stage and their recovery rates are as below:

Sl. No.	Qualification	Discipline	Number of Staff	Minimum Experience (Years)	Designation	Rate at which recovery shall be made from the Contractor in the event of not fulfilling provision of Clause 36(i)
1.	Graduate Architect	Architect	1	20	Lead Architect	Rs. 75,000/- per month per person
2.	Graduate Architect	Architect	2	08	Architect	Rs. 50,000/- per month per person
3.	Graduate Engineer	Civil	1	20	Project manager	Rs. 75,000/- per month per person
4.	Graduate Engineer	Electrical	2	12	Dy project manager	Rs 60000/ per month per person
5.	Graduate Engineer/Diploma Engineer	Civil & Electrical	3+2	05 or10	Project engineer	Rs 40000/ per person per month
6.	Graduate Engineer	Civil & electrical	1+1	8	Quality engg	Rs 40000/ per month per person
7.	Graduate engineer	Civil	1	8	Safety engg	Rs 40000/ per person per month

8.	Graduate engineer	Civil	1	6	Planning engg	Rs 35000/ per month per person
9.	B. Sc. Agriculture	Horticulturist	1	5	Horticulturist	Rs. 35,000 per month per person

Note :

1. The specialized technical staff for execution for component such as plumbing, water proofing, firefighting, HVAC, Acoustic, landscaping, Furniture and furnishing etc. shall be deployed as per the requirement of work.
2. Assistant Engineers retired from Government services that are holding Diploma will be treated at par with Graduate Engineers. Diploma holder with minimum 10-years relevant experience with a reputed construction company can be treated at par with Graduate Engineers for the purpose of such deployment subject to that such diploma holder should not exceed 50% of requirement of degree engineers.
3. The above given strength shall be required to be deployed as and when necessity arises at site or so directed by Engineer-in-charge.

Clause 38	**:**	**Applicable as given below**
1. Schedule /statement for determining theoretical quantity of cement & bitumen based on Delhi Schedule of Rates.	:	Delhi Schedule of Rates 2018 with amendments up to the date of submission of bid.
2. Variations permissible on theoretical quantities:		
a. Cement Cement for works with estimated cost put to tender more than Rs. 5 Lakh.	:	**3% Plus/Minus**
b. Bitumen for all works	:	**2.5% Plus only and nil on minus side.**
c. Steel reinforcement and structural steel	:	**2% Plus/minus side sections for each diameter, section and category.**
3. All other materials	:	**NIL**

RECOVERY RATES FOR QUANTITIES BEYOND PERMISSIBLE VARIATION

Sl. No.	Description of item	Rates in figure and words at which recovery shall be made from the contractor	
		Excess beyond permissible variation	Less use beyond the permissible variation
1.	Cement (PPC)	NIL	Not permitted
2.	Reinforcement bars (TMT) – (a) Primary producer	NIL	Not permitted
3.	Structural steel	NIL	Not permitted

APPENDIX – I

MODIFICATIONS IN THE CLAUSES OF GCC

REQUIRED FOR EPC MODE OF EXECUTION

The Standard CPWD Contract Form GCC 2020 for EPC Projects modified & corrected up-to last date of submission of bid shall be applicable and shall be construed as a part of this Tender & the Contract Agreement.

Appendix-II

MILESTONE CHART

Sl. No.	Description of Milestone (Physical)	Time allowed in Months (from date of start of Project)	Percentage amount, of accepted tendered amount, to be with-held in case of non- achievement of each milestone	
1.	a) Submission of details of civil and MEP services Consultant for approval, Preparation and submission of detailed architectural & structural drawings i/c MEP service drawings to Nalanda University for approval/vetting by External reputed Engineering Institute like IIT/NIT etc. i/c Submission of final soil report and completion of new Porta cabin site office including furniture along with Porta cabin site lab with all necessary testing equipment.	1.5 months	0.10%	
	b) Submission of architectural & structural Drawings and service plans(MEP) for approval of local bodies/ authorities, fire Department & tree cutting permission incl. tree transplantation etc. Submission of Estimate for TS.	2 months	0.05%	
	c) Submission of results of the design mix Concrete duly vetted by reputed institute like IIT/CSIR lab/NIT etc., for approval of the University , Finalization of specialized/ associate agencies for civil/ electrical/other MEP works who have similar work experience , etc., arrangement of temporary water/electricity connection for construction purposes.	2.5 months	0.05%	
	d) Getting all local body approval & approval of RMC manufacturer, Installation of site laboratory along with equipment, mobilization of machinery/T&P ,etc.	3 months	0.05%	
2.	a) Completion of RCC foundation work and all RCC works up to Plinth level in the three Buildings & pile work in electrical substation & underground sump and pump rooms	9 months	1.00%	
	b) Submission & approval of MEP drawings i/c approval from local bodies/ authorities.			
	a) Completion of RCC work in Superstructure in the Three Buildings including toilet blocks, including			

		Completion of masonry work in 50% area incl. completion of 1 No. Mock up room/area in all respect.			
3.	b)	90% supplying of major E&M equipment like wires, cable, switch & socket, DB, Rising Mains, Fans, luminaries, firefighting equipment, HVAC equipment, pumping sets.	15 months	1.00%	
4.	Completion of masonry work and flooring in all buildings, finishing work in all buildings including plumbing & tiling work, E & M services work incl. Sub Station, Lift, ELV works , HVAC ,Fire fighting works ,UPS except final coat of painting in 75% of the plinth area of the buildings and 50% completion of all external service connections, etc. and site development works.		18 months	1.00%	
5.	100% completion of all civil works i/c internal and external finishing work i/c flooring, aluminum work, wall partitions, false ceiling, acoustic treatment, Façade, water proofing on roof & external stone cladding and ACP etc. & completion of Underground Sump & pump house including waterproofing work & completing all Internal Electrical Installation & Internal Fire Fighting System and HVAC work final coat of finishing, External Services & External Development work (Civil, Electrical & Horticulture). Supply & SITC of Lift, Installation, testing & Commissioning of complete E&M equipments and accessories etc.		22 months	1.00%	
6.	All civil, electrical & mechanical and Landscaping, horticulture, mural & art work completed in all aspects in all the buildings with related services, clearances/approval from local body, service connections (civil & electrical) ,completion certificates, green building certificate etc. incl. cleaning of the site as required to declare buildings and campus authorized for occupation, all complete in all respect.		24 months	0.75%	
			Total %age =	5%	

NOTE:

1. Withheld amount will be released if and when subsequent milestone is achieved within respective time specified. However, in case milestones are not achieved by the Bidder for the work, the amount shown against milestone shall be withheld.

APPENDIX – III

ESTABLISHING SITE LABORATORY AND TESTING OF MATERIALS

Equipment for conducting necessary tests (as per CPWD Specifications 2019 Volume-I & II) shall be provided and installed at site in the well-furnished site laboratory by the EPC agency at his own cost with proper light and ventilation. The following mimimum laboratory equipment should be in general or as and when required be set up at site laboratory: -

Sl. No.	Equipment	Number
1.	100MT compression testing machine, electrical-cum manually operated)	1
2.	Slump cone, steel plate, tamping rod, steel scale, scoop	3
3.	Vicat Apparatus with Desk pot	1
4.	Megger & earth resistance tester	1
5.	Pumps and pressure gauges for hydraulic testing of pressure	1
6.	Weighing scale platform type 100 Kg	1
7.	Graduated glass measuring cylinder of various capacity	As per requirement
8.	Sets of sieves of 450mm internal dia for coarse aggregate [100mm, 80mm, 40mm, 20mm, 12.5mm,10mm]	2 sets
9.	Sets of sieves of 200mm internal dia for fine aggregate [4.75mm; 2.36mm; 1.18mm; 600microns; 300 microns & 150 micron, with lid and pan]	2 Sets
10.	Sieve Brushes and sieve shaker capable of 200mm and 300mm dia sieves, manually operated with timing switch assembly	1
11.	Cube moulds size 70mmx70mmx70mm	12
12.	Cube moulds size 150mmx150mmx150mm	72
13.	Ultrasonic Test Equipment (For concrete)	1
14.	Hot air oven temp. Range 50°C to 300°C-sensitivity 1 degree	2
15.	Electronic balance 600gx0.1g., 10kg and 50 kg	2
16.	Physical balance weight up to 5 kg	2
17.	Digital thermometer up to 150^{o}c	3
18.	Air Content of concrete testing machine	1
19.	Measuring jars 100ml, 20ml, 500ml	5 Nos each size
20.	Gauging trowels 100mm & 20mm with wooden	5
21.	Spatula 100mm & 20mm with long blade wooden handle	5

22.	Vernier calipers 12” & 6” size	3 each
23.	Digital PH meter least count 0.01mm	2 each
24.	Digital Micrometer least count. 0.01mm	2 each
25.	Digital paint thickness meter for steel 500 microns	2
26.	GI tray - 600x450x50mm, 450x300x40mm & 300x250x40mm	3 Nos each
27.	Electric Motor mixer 0.25 cum capacity	1
28.	Rebound hammer test digital rebound hammer	2
29.	Screw gauge 0.1mm-10mm, least count 0.05	4
30.	Water testing kit	1
31.	Motorized sieve shaker	1
32.	Pruning Rods 2 Kg weight length 40 cm and ramming face 25 mm^2	2
33.	Extra Bottom plates for 15 cm cube mould	12
34.	Standard Vibration Table for gauging the Cubes	1
35.	Pocket concrete penetrometer 0 to 50kg/sq.cm	3
36.	Concrete temperature measuring thermometer with Brass protection sheath0- 100 degree centigrade	2
37.	Mortar Cube vibrator	1
38.	Dial type spring balance preferable with zero correction knob capacity 100 kgs. Reading to ½ kg.	2
39.	Counter scale capacity 1 kg and 10 kg	2
40.	Iron Weight of 5 kg, 2 kg, 1 kg, 500 gm, 20 gm, 100 gm	2 each
41.	Brass Weight of 50 gm, 2 gm, 10 gm, 5 gm, 2 gm, 1 gm	2 each
42.	Measuring cylinder TPX or Poly propylene capacity 100 ml, 500 ml, 250 ml, 100 ml	3 each
43.	Pyrex, corning or Borosil beakers with cover capacity 500 ml, 20 ml, 50 ml	3 each
44.	Wash Bottles capacity 500 ml	3
45.	Thermometers 1-100 degree centigrade / max. and Min/ Dry and wet with table	3
46.	Set of box spanner ratchet	2
47.	Hammer 1lb& 2lb	3 each
48.	Distance metre (of 100 metre)	5
49.	Hacksaw with 6 blades	4
50.	Measuring tape (5 metre)	5
51.	Depth gauge 2 cm	5
52.	Shovels & Spade	4
53.	Steel plates 5 mm thick 75x75 cm	4
54.	Plastic or G.I. Buckets 15 ltr, 10 ltr, 5 ltr	2 each
55.	Wheel Barrow	3
56.	Floor Brushes, hair dusters, scrappers, wire brush, paint brushes, shutter steel plat oil, kerosene with stove etc.	3 each
57.	Any other equipment for site tests as outlined in BIS codes and as directed by the Engineer-in-charge.	As per requirement
58.	Concrete Core cutter Machine	1

APPENDIX – IV

REQUIREMENTS OF PLANT AND EQUIPMENT AT SITE

Sl. No.	Equipment	Number
1.	Builders hoist	2
2.	Excavator cum loader (JCB 3D model or equivalent).	2
3.	DG set of minimum capacity 62.5 KVA.	2
4.	Mini batching plant (6 cum./hr & 30 CUM /hr.).	2
5.	Transit mixers	As per requirement
6.	Concrete pump	4
7.	Needle Vibrators	15
8.	Screed leveler	3
9.	Plate Vibrator	3
10.	Automatic Ring making machine(Reinforcement)	2
11.	Dumper/Tipper	As per requirement
12.	Reinforcement bending machine	3
13.	Reinforcement cutting machine	3
14.	Power driven earth rammer (Soil compactor).	2
15.	Total station	1
16.	Water tanker (Minimum capacity of 5000 liters)	1
17.	Welding machine 400 Ampere	2
18.	Screener for coarse sand and fine sand	2
19.	Centrifugal mono block water pump minimum capacity 2 HP	2
20.	Road roller / Vibratory roller 8 to 10 tonnes	1
21.	Drilling machine	1
22.	Shuttering with necessary props	6000 sqm
23.	Double steel scaffolding and staging materials	6000 sqm
24.	Air compressor	1 no
25.	Floor grinding/polishing machines	5 Nos
26.	Granite cutting machine	2 Nos
27.	Ceramic tile cutting machine	2 Nos
28.	Granite polishing machine	2 Nos

29.	Granite hand polishing machine	2 Nos
30.	Mobile tower crane	1 No
31.	Desktop Computers (All in one)	2 Nos
32.	Laptop/IPAD for recording measurements at site	2 Nos
33.	Vacuum dewatering machine for concrete	2
34.	Good quality Camera and handycam for taking photographs and video recording of major activities for record purpose and for quality assurance	1 each
35.	Any other machinery required for completion of the work as per decision of Engineer-in-charge.	As per actual requirement

Note:

1. The above list is only indicative and not exhaustive. The Bidder may be required to deploy more T&P as per requirement of work.

2. All the above plants & equipment are to be deployed as and when required or directed by Engineer-in-Charge.

PART – B

Scope of Work, User Requirements and Technical Specifications

BRIEF SCOPE OF WORK

The scope of work has been defined on Part-II, Section – I "Brief Scope of Work" on Page 39 to 73.

User Requirement & Scope of work

[A] Brief details of the Buildings –

Sl. No.	Building Name	Details
[A]	500 user capacity Yoga Center cum Meditation Hall	1. The Buildings shall be constructed as earthquake resistant RCC framed structure (Ground Floor) as per the indicative drawings accommodating various amenities for practicing Yoga and Meditation/Multipurpose Hall with total plinth area of approx. 3235 sqm. Having minimum floor height 4.0 mtr. including all essential services such as toilet, fire shaft, electric shaft and Ramp, machine room etc. and for yoga & meditation halls minimum floor height 8.0 m. 2. The building shall have the following – (a) Entrance, (b) Reception & Entrance Lobby, (c) 500 user capacity Yoga/Meditation Center, (d) 500 capacity Multipurpose Hall (d) Office (e) Change rooms & Toilet banks for male, female and differently abled, (f) Pantry, (g) VIP Lounge, (h) Store, (i) Services (j) Green room, (k) Control room (l) Emergency Exits etc. 3. Total plinth area of the building will be approx. 3235 sqm out of which yoga hall of 1650 sqm + meditation cum multipurpose hall of 850 sqm and other essential services such as toilet, fire shaft, electric shaft and Ramp etc. having total area of 735 sqm. 4. Air Conditioned in close area and adequate air circulation and AHU system in open area.
[B]	250 user capacity Cafeteria	1. The Buildings shall be constructed as earthquake resistant RCC & Steel composite structure (Ground Floor), as per the indicative drawings accommodating various amenities to be used as cafeteria along with an air-conditioned covered restaurant of 150 seating capacity and an outdoor semi-covered seating capacity of 100. Minimum covered plinth area shall be of 650 sqm and minimum semi-covered plinth area of 550 sqm. Together with total plinth area of approx. 1200 sqm. 2. The building shall have the following – (a) Entrance, (b) Covered seating of 150 pax, (c) Semi-covered seating of 100 pax, (d) Toilet banks for male, female and differently abled, (e) Serving counter, (f) kitchen, (g) Store, etc.

		3. The Building shall have minimum floor height of 4.0 mtr. including all essential services such as kitchen, toilets etc. 4. Air Conditioned in close area and adequate air circulation and AHU system in open area.
[C]	2000-seater Auditorium	1. The Building shall be constructed as earthquake resistant RCC structure, G+1 storied as per the indicative drawings accommodating various amenities to be used as 2000 seater theatre type auditorium of 1300 seating capacity in the ground floor and 700 seating capacity in a mezzanine floor, along with other facilities as mentioned below. Minimum plinth area of the building including utility buildings shall be of 7500 sqm. 2. The building shall have the following key facilities – (a) Entrance, (b) Reception & Entrance Lobby, (c) 2000 user capacity theater type auditorium with 1000 sqm stage, (d) Office (e) Public Toilet banks for male, female and differently abled, (f) Pantry, (g) VIP Lounge, (h) Store, (i) Services (j) Green rooms for male & female, (k) AV Control room (l) Emergency Exits, (m) Compact Substation & AC Plant room, etc. 3. The Building shall have minimum floor height of 16 mtr. In the Auditorium, Entrance Lobby & Reception Area – 7.6 m and all essential services and other areas shall have minimum floor height of 4.0 m. 4. Air Conditioned in close area and adequate air circulation and AHU system in open area.

1. Preliminary Architectural drawings of the buildings are attached with this tender document. This has been approved in-principle by the Competent Authority at Nalanda University for cost estimate (preliminary estimate) purpose. This is only indicative & for guidance. Various buildings should be designed in consultation with other specialist consultants for Architectural, structural, E&M, plumbing, firefighting, HVAC etc. keeping broad concepts as per the preliminary architectural drawings.
2. The buildings should be designed as differently abled persons friendly and shall be constructed as per the latest norms & guidelines with up-to-date corrigendum issued by Ministry of Social Welfare, Govt. of India and necessary pre construction & post construction audit of the building shall be arranged to be carried out through the approved agencies of Govt. of India and completion/compliance certificate shall be obtained from them by the successful bidder.
3. In case hanging type plumbing and sanitary system is adopted; false ceiling of appropriate water-resistant type shall be provided after the approval of Engineer-in-charge. The hubless fixture & fittings should be used.
4. IP Telephone, Intercom System including wiring facility for highly complicated mechanical, electrical and telecommunications systems is to be provided after approval from the University.

5. HVAC system has to be provided for the office building except staircases, kitchen, toilets, other service areas & corridors.
6. Internal light fitting and DALI integrated LED Lights of standard specification shall be provided. Necessary occupancy and lux adjustable system.
7. Internal light fitting and LED Lights of standard specification shall be provided.
8. All plumbing and sanitary lines shall be located in shaft of the building and shall be covered with wooden doors/aluminium louvers of approved design & make matching with elevation. The plumbing shall be dual plumbing system with arrangement for treated STP water to be circulated and distributed through separate pipeline and tank and pump system to toilets of these buildings. Adequate structural support system and provision for maintenance of services shall also be provided.
9. Provision shall also be kept for seating arrangement in the waiting areas with required circulation space, change room, waiting area wash area etc. as per the norms.
10. The external façade of the building should be designed to give a modern look with state of art technology with interiors and in harmony with the rest of the campus.
11. Sufficient number and appropriate locations of exits are to be provided in the office campus as per the NBC-2016 guidelines.
12. The appropriate standards pertaining to Acoustic and noise control shall be followed and maintained so that all spaces should meet the performance standards for indoor ambient noise level, air borne and impact sound insulation and reverberation time as per IBC & latest guidelines issued for the Auditorium, Yoga Center and Multipurpose hall buildings. Accordingly, these parameters are to be properly designed, got approved and incorporated in the buildings.
13. The ventilating system for the buildings should be inaudible. Associated duct work should be sound absorbing material. Fan/compressors must be remotely located or isolated with resilient mounting special grills or diffusers may be needed to assure silent air delivery and extraction. Dampers for balancing must be located upstream of grills or diffusers to avoid noise at the point of distributions.
14. Air-conditioning system shall be designed to meet the requirements of the NBC'2016 as well as standard requirements for such buildings. The ACMV system shall meet the requirements and standards of NBC'2016, BIS, ASHRE, SMACNA, ARI, ASME and AMCA etc.
15. The plumbing for water distribution from centralized RO plant to all drinking water outlets shall provide with SS 304 grade & this all including appropriate capacity of that RO plant (for each building one to be provided separately) is in the scope of this work.
16. The charges for vetting of structural drawings / reports /E&M design /façade design and any other specialized service design etc. from the reputed institutes like NIT/ IIT shall be borne by the EPC contractor.
17. For each building one deep tube well plus pumps etc. all complete is within the scope of this work. Similarly, UG sump for fire (2,00,000 ltr) reserve as required by the fire department / NBC guidelines as well as daily use (50,000 ltr) sump is within the scope of this work.
18. Pump room of suitable size not less than 11.25mx6.30m over fire reserve UG Sump is within the scope of this work where in fire pump and other water supply pumps may be installed, the suction head for fire pump should be positive to the tune of minimum 1.5 mtr or as required by the manufacturer whichever is more.
19. All the roof and terrace area will be casted in such a way that minimum 2% slope is available at each point in case of an RCC flat slab itself to drain off rain water as quickly as possible from such surfaces.

MINIMUM ACCEPTABLE SPECIFICATIONS

Sl. No.	Items of Work	Specifications
The civil works shall be done in accordance with CPWD specifications -2019- Vol I & Vol. II with correction slips upto the last date of submission of tender document and National Building Code 2016.		
1.	**FOUNDATION & SUPER STRUCTURE:**	As per structural design based on latest IS Codes and approved drawings.
1.1	Foundation & Super structure	Building shall be earthquake resistant RCC framed structure with suitable pile foundation system not less than 15 mtr depth as per the details of soil investigation report & design. In case pile length comes lesser than above as per the design necessary recovery shall be made as per the market rate. Pile work also to be done for underground sump & pump room, if required. All parapet walls shall be made with RCC of minimum height of 1.2 mtr, all as per client approved drawing.
1.2	Plinth Filling :	
	a) Sand filling under floor	With Local coarse sand minimum 150mm thick
	b) Concrete under floor/ footings	100 mm thick lean concrete below footing in M10. Minimum 125 mm thick RCC of grade M20 shall be laid under flooring work in ground floors with 8 mm dia @ 300mm c/c both ways or as per design whichever is higher.
1.3	Railing in Staircase / Balcony	SS grade 304, as per client approved drawing & architectural specifications.
1.4	Burnt Clay Brick	All external walls will be full brick thick with common burnt clay bricks (class designation 100) and internal wall half brick thick may be provided wherever required.
2.0	**WOOD WORK:**	
2.1	Door Shutters	As per approved architectural drawing
2.2	Mumty Door:	As per approved architectural drawing
2.3	Hydraulic Door Closer	As per IS: 3564 for door weight up to 80 kg and width up to 1000 mm.

2.4	Floor Spring	Double action hydraulic floor spring of approved brand conforming to IS: 6315 with double spring mechanism and door weight up to 125 kg along with all fittings to be provided.
2.5	Plinth Level	Minimum 75 cm from the crown of road level in front of buildings of this EPC tender.
3.0	**STRUCTURAL GLAZING WORK:**	
3.1	Structural glazing façade ,Glazing of windows and opening	(i) Double glazed unit using high performance glass i/c hardware of approved make, glazing of approved thickness and approved colour with polyester powder coating on aluminium frame for structural glazing facade. All smoke and water penetration test to be done as per CPWD specs on structural façade to avoid any leakage or air leak , all as per client approved drawings (ii) Glazing areas should be sufficient enough as per ECBC norms for day light during day time. The properties of glass should meet the ECBC & NBC 2016 requirement. (iii) Stainless steel (SS-316 grades) Friction stays as per requirement and as per approved drawing.
3.2	Windows Sill	18 mm thick window sill with nosing with granite of suitable colour. All edges to be machine moulded.
4.0	**FLOORING WORK:**	
4.1	Skirting	Specifications for materials of skirting will be same as for flooring with matching joint pattern and should be of 150 mm height in rooms and minimum 1200 mm height in Corridors, as per approved drawing. It shall be finished with edge beading/suitable moulding in stone .
4.2	Kitchen	Kitchen should be designed as industrial kitchen so that all modern cooking equipment and appliances for mass cooking can be accommodated. Mechanical ventilation system be provided in kitchen of client approved make & design.
4.3	(a) Dado	As per client approved drawing
	(b) Fully exposed columns inside the building	Fully exposed columns inside the buildings if proposed shall be fully covered with 18mm thick gang saw cut granite/engineered granite wall lining (veneer work) of suitable colour & textures. In case of circular column SS sheet of 316 grade may be used to full height.

	(c) Floors in Halls, Rooms, Office Floors, cafeteria, etc.	As per client approved Drawings
	(d) Floors in Kitchen & Toilets	As approved by the Engineer-In-Charge.
	(e) Reception, Lobby, Entrance Foyer, VIP Lounge, etc.	All complete as per the approved architectural drawings and as directed by the Engineering- Charge.
	(f) Common circulation area, lift lobby etc.	As per Architectural designs approved by the University.
	(g) Open to sky pathway, porches, plinth protection or any other hardscapes etc.	As per drawing approved by Engineer-In- Charge.
5.0	**ROOFING:**	
5.1	Seismic Joint	The vertical & horizontal expansion joints shall be kept keeping in mind the seismic requirement as per the relevant IS code and CPWD Specifications. It should be covered by stainless steel grade 316 plate of thickness 1 mm thick in vertical joint with polysulphide sealant. In Floor joint, tongue and groove plate system for seismic joint should be provided with min 2mm thick steel plate. At roof seismic joint treatment should be as per CPWD specification.

5.2	Water proofing treatment	(i) **On Roof :** Primer + 2 coat of single component UV resistant flexible acrylic elastomeric coating + coba Integral cement based water proofing treatment including preparation of surface as required for treatment of roofs, balconies, terraces etc will be provided and laid over roof slab in proper slope of 2 %. The operations will be complete in shape as defined in DSR Item no. 22.7.1. (ii) **In Sunken part of Bathroom, Kitchen:** Water proofing treatment to vertical and horizontal surfaces of depressed portions of W.C., kitchen with slope of 2 %. Shall be provided as defined in DSR Item no. 22.3. (iii) **Under raft of basement or lift pit:** EPDM membrane. (iv) **Lift pit retaining wall/UG water tank:** by providing kota stone water proofing along with
		mixing of crystalline material in RCC walls and base in appropriate quantities. (v) **Terrace (for Grassing & Plantation, on top of basement slab, planters or any other structure required in water proofing):** Primer + 2 coats of non-modified, non-bituminous, high solid, liquid applied, polyurethane costing at 1.5 kg per sqm dosages for average thickness of 1.5mm without fiber cloth + M-25 screed concrete as per design.
5.3	Rain Water Pipes	All the RWP pipes including fittings shall be Hub less centrifugally cast (spun) iron pipe as per IS: 15905 exposed on walls/ in the shafts to be executed as per CPWD specification 2009.
6	**FINISHING :**	
6.1	(a) Plastering on walls (External)	All as per drawings/design approved by E-in-C . Necessary drip course shall be provided in Chajja, Balcony, Projecting Roof, Beams etc.
	(b) Plastering on walls (Internal)	All as per drawings/design approved by E-in-C

6.2	Internal finishing	All complete as per drawing approved by E-in-c
6.3	External finishing	All complete as per drawing approved by E-in-c
6.4	Primer	All complete as per drawing approved by E-in-c
6.5	Painting on wood work & steel work	All complete as per drawing approved by E-in-c
7.0	**MISCELLANEOUS :**	
7.1	CC in sunken portion	CC 1:5:10 (1 Cement: 5 coarse sand: 10 brick aggregate 40mm nominal size) or any other suitable light weight material available in the market
7.2	Footpath & Open Paved area	All complete as per drawing approved by E-in-c
8.0	**INTERIOR:**	As detailed under page 40.
9.0	**INTERNAL SANITARY WATER SUPPLY INSTALLATIONS :**	
9.1	E.W.C. Pan	as per Architectural Drawings and as per directions of the Engineer-In-Charge.
9.2	Flushing system	as per Architectural Drawings and as per directions of the Engineer-In-Charge.
9.3	Urinals	as per Architectural Drawings and as per directions of the Engineer-In-Charge.
9.4	Health faucet	as per Architectural Drawings and as per directions of the Engineer-In-Charge.
9.5	Wash basin	as per Architectural Drawings and as per directions of the Engineer-In-Charge.
9.6	Mirror	as per Architectural Drawings and as per directions of the Engineer-In-Charge.

9.7	Soil & waste pipes fittings	All the sanitary pipes including fittings shall be Hub less centrifugally cast (spun) iron pipe epoxy coated inside &outside as per IS: 15905 exposed on walls/ in the shafts to be executed as per CPWD specification 2019.
9.8	House Manhole	Brick masonry with brick of class designation 100 of size as per design Requirement approved by E-in-C with SFRC heavy duty cover and frame.
9.9	Pipe between house manhole & service manhole	HDPE pipes of PN-8 shall be provided for smooth /healthy drainage system with proper slope as per approved design.
9.10	(a) Water supply line	Pipe should be jointed with Teflon tape on male member with at least 6 Nos. round on the whole thread.
	(b) External pipe line up to 50mm	GI pipes as per approved plumbing drawing. Gun metal gate valve with CI wheel of approved quality.
	(c) Concealed Internal piping – Exposed on wall	GI pipes as per approved plumbing drawing. Gun metal gate valve with CI wheel of approved quality.
	(d) Internal piping & fittings– Concealed work	Stainless steel grade 304 as per DSR 18.85 to 18.102
9.11	Drinking water (RO) supply line	SS pipes of 304 grade as per approved plumbing drawings with SS valves and fittings of approved quality.
9.12	Painting of CI Pipes : Exposed on buildings	Synthetic enamel paint
9.13	Fittings	All CP fitting shall be single lever (Quarter turn) and other accessories of the same series/ class as approved. Wall mixture and basin mixture, shower rose. Angle valve and other fitting should be in CP brass of approved quality and of same series, SS gratings, towel rack, soap tray, mirror above the basin, 2 nos. corner glass shelf and 6 robe hooks, Exhaust fan are to be provided.
9.14	Terrace Tank	RCC/PVC water storage tank of adequate capacity (with suitable water proofing treatment) as approved by E-in-C
10.0	**EXTERNAL DEVELOPMENT (WATER SUPPLY):**	
10.1	Pipe	GI pipes or Ductile iron pipe of class K9 as per approved drawings. However for RO drinking water pipes and fittings of SS grade 304 shall be used.
10.2	Fittings	Standard fittings (Heavy class)
10.3	Pig Lead	Pig lead of approved quality
10.4	Sluice Valve	C.I. sluice valve (with cap) complete with bolts & nuts, rubber insertion etc.
10.5	Chambers for : (a) Sluice Valve	Brick masonry chambers of appropriate size with C.I.

	(b) Fire Hydrant	surface box complete as per specification.
10.6	Thrust Blocks	CC 1:2:4 (1 Cement : 2 Coarse sand : 4 graded stone agg. 20 mm nominal size)
10.7	Underground tank	Minimum 2,50,000 litre capacity.
11.0	**SEWERAGE /DRAINAGE:**	
11.1	Pipe	Hub less Centrifugally Cast iron pipe as per IS 15905 in vertical stacks, HDPE Pipes for horizontal discharge of required diameter including testing of joints as per approved design & as per CPWD Specification 2009.
11.2	(a) Rectangular Manhole	
	(i) Inside size 90cm x 80 cm with depth upto 45 cm.	Clay Brick (class 100) masonry manhole with CI covers & frame heavy duty as per CPWD specification 2009.Size may change As per design requirement as approved by E-in-C.
	(ii) Inside 120 cm x 90 cm with depth 45 cm to 90 cm.	Clay Brick (class 100) masonry manhole with CI covers & frame heavy duty as per CPWD specification 2009.size may change as per approved design requirement.
	(b) Circular Manholes as per DSR'2016 item no. 19.9 & 19.11 as per site conditions exceeding 0.90 m depth	Manholes of required dia. As per depth with brick wall (with Sewer Bricks) as per CPWD specification and corresponding DSR 2016 items with SFRC frame and covers HD-20. In sub-soil or adverse soil conditions, manholes & encasing pipes shall be as per approved credible structural design to avoid sinking and settlement of lines/manholes. Note: Orange colour safety foot rest of minimum 16mm thick plastic encapsulated complete as per IS: 10910.
11.3	Waste disposal from Kitchen	Waste & waste water from kitchen shall not be directly discharged in the sewerage system. For garbage a separate storage bin shall be provided.

[B] INTERNAL ROAD & PATH WORK –

1. Separate provision for car parking as defined in the scope of work shall be made as per Building byelaws and to be provided at site as per drawings approved by E-in-C.
2. Machine moulded M-35 kerb stone shall be provided along the edge of internal road constructed under this contract as per design and shape and size as approved by E-in-C.
3. The main road and the peripheral road connecting these buildings to the exiting internal road network of the campus will be Concrete pavement on top laid over three layers of

WBM as per MORTH specifications (fifth edition) laid over subgrade duly prepared with power roller of required thickness as per design based on CBR of soil. Agency will prepare and execute a suitable design of rigid pavement as per site conditions. The edges of roads should be at least 20 cm above the adjoining ground level after giving due camber.

MINIMUM ACCEPTABLE SPECIFICATIONS FOR INTERNAL ROAD WORK (CAMPUS ROADS, OPEN PARKING & PATHS)

Sl. No.	Items of Work	Specifications
1.	Internal Roads	Finished levels of road will be above the formation level. Earthwork has to be compacted accordingly as per approved longitudinal profiles.
2.	GSB	Granular Sub Base as drainage layer minimum 150 mm based on CBR value & traffic and based on designs as per MORTH specification or higher.
3.	(a) WBM Grade I	As per flexible pavement design and latest MoRTH specifications approved by the University based on IRC 75 codes.
	(b) WBM Grade II	As per flexible pavement design and latest MoRTH specifications approved by the University based on IRC 75 codes.
	(c) WBM Grade III	As per flexible pavement design and latest MoRTH specifications approved by the University based on IRC 75 codes.
4.	Kerb Stone	High grade concrete precast block M-35 Grade as per drawings approved by CPWD based on IRC Codes.
5.	Inter-locking pavers in internal drive ways & car parking areas	ISI Marked, Heavy duty pavers, shape & pattern, as approved, in cement colour (red, green, grey, yellow etc.) M-40 Grade ,thickness not less than 60mm laid on sand filling as per specification & as a sub base over 150 mm thick CC 1:3:6
6.	Road painting	75 mm wide thermo-plastic mark paint for indicating Parking spaces.
7.	Signature & Graphics	Stainless steel 316 having graphics & text in screen print for building name, traffic sign to be in channel letters, CRCA (Cold Rolled Close Annealed) sheet support structure having aluminium panels, powder coated with graphic and text for way as per IRC codes.

[B] SEWERAGE SYSTEM –

The Sewerage System should be designed and got approved from E-in-C ,by the consultant as appointed by the EPC contractor in accordance with relevant latest building bye laws and

latest CPWD Specifications. Buildings are to be connected with required manholes so that sewerage of the building should reach up to STP in most efficient manner. The treated water has to be utilized for toilet flushing water through dual plumbing system and also for irrigation of lawns and plants through separate pipe network & balance, if any, treated water should be pumped to the Central Sewer Lines of the remaining Campus. Required U/g and O/H sump & pump to be provided is in scope of work within rate quoted by the EPC bidder.

[C] WATER SUPPLY NETWORK –

The Water Supply Network should be designed and got approved from E-in-C ,by the consultant as appointed by the contractor in accordance with relevant latest building bye laws and latest CPWD Specifications. Buildings are to be connected with water supply lines by Ductile Iron pipe/G.I. pipes of appropriate diameter. So that water is supplied with adequate pressure at all points in the buildings.

[D] UNDERGROUND WATER TANK AND TUBE WELLS –

UG and O/H Sump for drinking, Toilet water of STP treated water & other purpose in the buildings to be constructed along with fire sump as per firefighting requirements in a way so that water in fire sump is always fresh but the minimum 2,50,000 liter capacity underground tank to be designed & constructed including firefighting reserve. The agency has to assess the requirement of water and bore minimum one No. deep tube wells of sufficient discharge with requisite RO Plant as approved by Engineer in charge for water supply of the buildings, kitchen, and firefighting & horticulture requirements, all within quoted cost of EPC bidder.

[E] LANDSCAPING AND HORTICULTURE WORKS

(1) The work shall be carried out as per “Schedule of Rates, Analysis of Rates and Specifications (Horticulture & Landscaping)-2020”, with up to date correction slips and as per CPWD Yard stick, NBC 2016, in absence of detail specification the standard horticulture practices for healthy growth of plants beautification should be followed. All design, drawing etc. shall be as approved by Engineer-in-charge.

(2) The contractor shall be responsible for arrangement of all necessary tools and plants required at site of work for which nothing extra shall be paid by the University.

(3) The Scope of work include preparation of landscaping plan including parks, planters and other details etc. for the horticulture works and execution of the same including providing unfiltered/recycled water supply lines from the proposed WTP/STP and installation of additional pumps if required, providing drip irrigation system for trees, shrubs and hedges, sprinkler system for lawns etc. complete will be responsibility of agency. Development of parks, providing MS railings (including painting), wicket gates, water hydrants, etc. shall be completed as per the specification and drawing approved by the Engineer-in-charge. Contractor has to do horticulture works as per approved landscaping plan including grassing, grass turfs, plantation of shrubs, plants, trees etc. This Landscaping and horticulture work is also part of EPC tender and no extra payment will be made on any account.

(4) Grassing will be done with selection No.1 grass including supplying good earth

including watering and maintenance of the lawn for One year after completion of the work.

(5) Grass turf will be provided with selection No.1 grass turf with earth 50mm to 60mm thickness of existing ground prepared with proper level and ramming with required tools wooden (Dhurmos) and then rolling the surface with light roller making the surface smooth.

(6) Plantation of tress at site will be done with healthy, well developed (minimum height as specified below) trees established at the site of following varieties including watering, removal of unserviceable materials etc. in quantity as per approved Landscaping drawings including replacement if needed and its maintenance for One year after successful completion of the work.

Sl. No.	Varieties of Trees with their specifications.
1.	Alstonia scholaris of height 150-165 cm
2.	Cassia fistula (Amaltash) of height 120-135 cm
3.	Delonix regia (Gulmohar) of height 150-165 cm
4.	Bauhinia Purpurea (Kachnar) of height 150-165 cm
5.	Azadirachta Indica (Neem) of height 120-130cm
6.	Mimusops Elengi (Maulsri) of height 180-195 cm, well developed with thick stem
7.	Callistemon Lanceolatus of height 120-135 cm
8.	Polyalthia Longifolia (Ashok) of height 150-165 cm
9.	Cassia Siamea of height 150-165 cm
10.	Plumeria Acutifolia of height 150-165 cm with 3-4 branches
11.	Plumeria Alba of height 165-180 cm with 3-4 branches and thick stem.
12.	Lagerstroemia Flosreginae of height 150-165 cm
13.	Ficus Infectoria (Pilkhan) of height 150-165 cm
14.	Ficus Benjamina (green) of height 150-165 cm, bushy with healthy branches and lush green foliage
15.	Ficus Ispatch well branched (bushy) of height 120-135 cm, well branched, bushy
16.	Ficus Starlite of height 75-90cm, well branched
17.	Bottle palm of height 150-165 cm
18.	Any other verities or modification of above list as per directions of the Engineer-In-Charge.

(7) Plantation of Shrubs at site will be done with healthy, well developed shrubs established at the site of following varieties including watering, removal of unserviceable materials etc. in quantity as per approved Landscaping drawings.

Sl. No.	Varieties of Shrubs with their specifications.
1.	Bougainvillea (named variety) of height 60-75 cm with 8-10 healthy branches

2.	Calliandra species of height 105-120 cm, well branched, bushy
3.	Cassia Biflora of height 90-105 cm, well branched, bushy
4.	Ficus Panda of height 60-75 cm., well developed, with healthy foliage, bushy
5.	Hamelia patens of height 90-105 cm. bushy
6.	Hibiscus Rosasinensis of height 90-105 cm, bushy
7.	Nerium Oleander (Kaner) of height 60-75 cm with 5-6 branches
8.	Thevetia Nerifolia of height 60-75 cm with 5-6 branches
9.	Tecoma Gaudichaudi of height 90-105 cm bushy
10.	Lagerstroemia Indica of height 90-105 cm, multi branched
11.	Seaforthia palm of height 105-120 cm with 3-4 suckers and healthy foliage
12.	Any other verities or modification of above list as directed by the Engineer-In-Charge

(8) Plantation of plants at site will be done with healthy, well developed plants established at the site of following varieties including watering, removal of unserviceable materials etc. in quantity as per approved Landscaping drawings.

Sl. No.	**Varieties of Plants with their specifications.**
1.	Tradiscantia, full of leaves
2.	Wadelia Trilobata, branched in poly bags
3.	Syngonium Butterfly of height 30-45 cm with healthy leaves
4.	Dianella variegated with 3-4 plants in each with ispatch leaves
5.	Asparagus Sprengerii of height 30-45cm in p. bags of size 20cm
6.	Dracaena (song of India) of height 45-60cm with healthy leaves
7.	Iresine Herbstii of height 20-30cm, full of branches well developed
8.	Syngonium Ispatch of height 30-45 cm with healthy leaves
9.	Chlorophytum (variegated) full of leafy suckers
10.	Portulacaria afra (Jade plant) with 5-6 branches
11.	Ophiopogon green full of green leaves
12.	Ophiopogon Jaburan (variegated) full of variegated leaves
13.	Bignonia Venusta (Golden shower) of height 30-45 cm
14.	Clerodendron Splendens of height 30-45 cm
15.	Quisqualis Indica of height 30-45cm
16.	Tecoma grand flora of height 30-45cm
17.	Hedge plants
18.	Clerodendron Inerme of height 25-32 cm multi branched
19.	Putranjiva Roxburghii of height 45-60cm
20.	Any other verities or modification of above list as directed by the Engineer-In-Charge

(9) Soil testing for texture, nutrient level, water retaining capacity, PH value and other essential test for healthy growth of plants shall be conducted at least 5 locations where horticulture/ Landscaping works are to be done, from Bihar Agricultural University, Bhagalpur, Bihar. Necessary recommendation for fertilizer requirement and water

consumption requirement shall be made available from the laboratories.

(10) Top good soil from the construction site shall be preserved for horticulture purposes. The soil not suitable for grasses and growth of trees shall be removed and good quality soil either from the preserved top soil or brought from outside the campus shall be used for horticulture purpose. Plinth area rate quoted by EPC bidder is inclusive of this work and No extra payment shall be made for same. The agency will be responsible for healthy growth of plants, trees, shrubs and grasses during construction stage and maintenance up to one year.

(11) **Manure and Fertilizers:** Cattle manure/ compost shall be well decayed (should be at least 6 months covered in dump), free from grits and any other unwanted materials. The contractor shall also provide and spread manure (cow dung manure/compost) for healthy growth the plants & trees under his maintenance.

Depending upon requirement to maintain the nutrients level of the soil necessary application of chemical fertilizers (NPK) and other micro nutrients should be done.

(12) Watering should be done in such any way that optimum level of moisture content for healthy growth of plants and trees is maintained, at no time moisture content should fall below the wilting point. Inadequate or excessive watering is to be avoided. During the dry season watering should be carried out at least daily in summer & twice a week in winter or as per requirement of the tree plant, shrub, water should be sourced from STP (Sewerage Treatment Plants) in case of emergency water source other than STP may be used provided that prior approval of the Engineer–in–Charge has been obtained.

(13) **Weeding and Hoeing:** The work includes maintaining areas close to the base of the trees and shrubs free from weeds within 300mm radius from the stem of the trees / 150mm radius from the stem of the plants. Weeding has to be carried out once in a month. All weeds are to be disposed of from the site with all leads and lifts.

(14) **Pruning and Trimming:** All dead or injured twigs, water shoots, unwanted branches are to be removed. Trees, shrubs and ground cover should be pruned to maintain natural shape. The hedges and shrubs shall be given special shapes and sizes to give aesthetic appearance of the greenery at regular intervals.

(15) **Pest and Disease control:** All trees/plants are to be inspected once in a month to determine any disease or pest infections. Once the infection is identified adequate control measures are to be taken.

(16) The trees and shrubs having height less than 3 metre in the median and planters shall be washed by sprinkler attached with water tankers on weekly basis. The contractor shall take utmost care of the trees and shrubs so that the casualty is brought to a minimum. The dead and fallen tree should be removed immediately from the site of work for smooth traffic movement and it should be brought to the notice of the University so that further survey and auction of the same can be done.

(17) The University shall not be responsible for any injury partial or permanent or death of any workers at site due to accident or mal-functioning of the equipment or by negligence of the staff.

(18) The contractor shall be responsible for removal of garden waste from the site and disposed of at a designated dumping area or any other composting yard as approved by the Engineer–in-charge.

(19) The contractor shall have to arrange all required tools & plants & other stock items like Bamboo, *Sutli*, and Hessian cloth. *Tokri* etc. for the proper development & maintenance of garden feature. Repair cost of tools & plant items shall be borne by the contractor & nothing shall be paid extra on this account.

(20) The Agency should ensure adequate *malie*s having experience of Horticulture work are deployed. In case of any deficiency the Engineer-in-Charge can issue the necessary direction to increase the staff and Agency should abide by order of Engineer–in-Charge.

(21) The contractor shall maintain the plants, hedges, trees, shrubs and lawns in good and healthy condition during construction period as well as free maintenance period of one year. This will include complete maintenance of the entire garden features of the garden area i.e. lawn, trees, shrubs, hedge, potted plants, flowers beds, creepers etc. and other garden feature including watering hoeing, making of plants basic manuring, trimming and cleaning of hedges / plants, Beds, spraying of insecticides, fungicides, weeding, mowing, and top dressing of lawn with good earth and manure and hedge clipping and removal of the garden waste, composting of green waste from plants, trees, lawn mowing, etc. as per direction and satisfaction of the Officer-in-charge.

a. The following activities are covered under this contract :

Sl. No.	Item of Work	Nos/Qty./Frequency Required
(i)	Pruning & trimming of trees/shrubs creepers etc.	Quarterly / need based as per directions of the Engineer-In-Charge
(ii)	Hedges Cutting	Monthly
(iii)	Any other item (Horticulture, Civil, Elect, Un-filtered water supply) required for proper maintenance	On need basis as directed by the Engineer-In-Charge
(iv)	Irrigation	On daily basis in all days except monsoon days and need based as per directions of the Engineer-In-Charge.
(v)	(a) Manuring (b) Fertilization	(a) Trees/palms – once in every three months (b) shrubs/grounds covers –monthly (c) Grass –once every three months.
(vi)	Lawn Mowing & trimming of shrubs	Monthly or as and when required.

(vii)	Plant Protection	(a) Pest control - Fortnightly (b) Disease control - Fortnightly during rainy season and monthly in other seasons (c) Need basis as directed by the Engineer-In-charge
(viii)	Cultivation & Weeding	Monthly or earlier as per the requirement and directions of the Engineer-In-charge
(ix)	Seasonal Flowers	Wherever feasible as per directions of the Engineer-In-charge
(x)	Top dressing with soil &/or manure	Once in 6 months
(xi)	Repair & replacement of plants, leveling etc.	As and when required.

b. Total Mali to be deployed for maintenance work: 2 Nos with 3 helpers and one supervisor.

c. The following conditions shall be followed:

(i) In case of any causality of shrubs, trees or any other plants has been found during maintenance the Agency should replace the trees/ shrubs/ other plants of the same height and specification by another at his risk and cost and nothing extra shall be paid for the same in this regard. In case of any delay recovery of Rs. 60/- per shrubs, Rs. 250/- per trees & plants, Rs. 140/- for other foliage/ decorative plants and Rs. 100/- per Sqm. for lawns per month shall be made. The decision of the Engineer-In-charge shall be final and binding in this regard.

(ii) In case, if it is observed that the maintenance is not healthy and not to the required standard, no payment shall be made of the specific area for the period over which the maintenance has been found to be neglected. The decision of the Engineer-In-charge shall be final and binding in this regard.

(iii) The required quantity of insecticides/ pesticides will be arranged by the agency for proper maintenance (only during the maintenance period) if needed.

(iv) The rejected & substandard material should be removed from the site of work immediately; the University shall not be responsible for any damage/ loss of rejected material. If the same will not be removed within five days after issuing notice in writing by Engineer-in-Charge, then necessary recovery shall be made @ Rs. 200 per day.

PART – B1

TECHNICAL SPECIFICATIONS

ARCHITECHTURAL CONSULTANCY

1 GENERAL CONDITIONS FOR PLANNING & DESIGN:

1.1 The bidder should engage a Firm / Consultant (whether titled as an Architectural firm or Engineering firm) which shall provide comprehensive consultancy services for detailed architectural, design and drawing of structural analysis, specialized civil work design and drawing like Façade ,design and detailing including designing and detailing of all E & M services, their drawings & approval, external development works, landscaping, etc. Consultant shall prepare and supply all the coordinated good for construction (GFC) drawings duly proof checked from reputed institute to be subsequently approved by Engineer-in-Charge. The Consultant (s) shall be associated till completion of the project and shall obtain all pre construction, during construction and Post construction all required statutory approvals from the concerned local body.

1.2 The Firms / Consultants should have completed following Similar Consultancy works during the last seven years ending previous day of last date of submission of bid:

Three similar Consultancy works of value of each costing not less than Rs. 36.76 Crore as work value and built up area of not less of 5300 sqm.

OR

Two similar Consultancy works of each costing not less than Rs. 56.63 Crore as work value and built up area not less of 8000 sqm.

OR

One similar Consultancy works of each costing not less than 72.41 Crore as work value and built up area not less of 10600 sqm.

Where, **"Similar work"** means:

"Architectural Planning, Designing, Structural analysis & design and preparation of structural drawings and all services design & drawings related to Civil, E & M services and Horticulture works."

1.3 The consultancy works completed up to the previous day of last date of submission of bids shall be considered.

1.4 The Firms / Consultants should have an average annual Financial Turnover of minimum Rs. 50 lacs for consultancy fee during immediate last three consecutive financial years. For this purpose, average of annual financial turnover shall be worked out for all the three years.

1.5 In case of non-availability of in-house capabilities in consultancy for any component of Engineering services or structural, the Firms / Consultants will submit intention to

engage/associate sub consultant/firms having domain specific specialization and submit the MOU/agreement with such specialized firms within fortnight of award of work. The Principle/Main Consultant shall engage/associate only those sub consultants/firms for consultancy of domain specific components, which have successfully provided consultancy work at least in two projects costing overall more than Rs. 56.63 Crores and Built up Area of 8000 sqm.

1.6 The bidder shall within 15 days of award of work, submit details of financial turnover of minimum three Firms / Consultants in Form “A” of Technical bid; the details of all Consultancy work of consultancy services of similar nature completed by these firms/ consultants during the last seven years in Form “C” of Technical bid; performance report of consultancy services in form “D” of Technical bid; Structure and Organization details in Form “E” of Technical bid. The competent authority at Nalanda University shall approve one of them considering the submissions mentioned above.

1.7 Associated firms/consultancy desirably may have his own office in Patna for proper functioning and coordination of work, otherwise they have to set up an office/ Branch office in Patna for smooth monitoring and execution of consultancy work during the contract period.

1.8 Consultant shall provide comprehensive consultancy services in Project Conceptualization covering space utilization, functional relations, preparation of master plan including obtaining its statutory and local bodies approval, detailed architectural drawings, detailed structural analysis, design and detailing including designing and detailing of all services, their drawings & approval, external development works, landscaping, etc. Consultant shall prepare and supply all the coordinated “good for construction” drawings duly proof checked and approved. The Consultant shall confirm to be associated with the project till completion of the project and obtain completion certificate from the concerned local body

1.9 In case, in house personnel of required experience is not available with the contractors or with the associated architectural/ Engineering firms for other specialized service like E &M, the main contractor shall have to enter into agreement with consultant for design of E&M subheads. Copy of such agreement/ MOU shall be submitted to AE (Electrical), Nalanda University, who is in-charge of the work as well as to AE (Civil), Nalanda University. In case of change of associate consultant, the main contractor has to enter into agreement with the new consultant to be associated by him. Agreement should be drawn as per Proforma for agreement between associate service consultant, and main contractor after suitably modifying the proforma for consultancy work.

1.10 If the performance of the consultant(s) is found to be not satisfactory in terms of quality and standard or they fail to adhere to the timeline specified in the bid document, the

main contractor will take timely suitable necessary action against the consultant(s) as per the terms and conditions of agreement between them. However this will not absolve the main contractor from the levy of liquidated damages due to delay in the project; and department will be free to take action as per relevant clauses of agreement. In the case of termination of the contract with the consultant(s) by the main contractor, the process of selection of new consultants(s) will be same as provided in the bidding document. All additional cost associated with this will be borne by the contractor. They will not be eligible for any extra time/ extension of time for delay in this process. Any loss of time in the process shall be made good within the milestones fixed in the bidding document.

2 CONSULTANT'S SCOPE OF WORK & RESPONSIBILITIES:

The Role of the Consultant is to provide consultancy services for **"Civil work for Construction of one 500 user capacity Yoga Center cum Meditation Hall, one 250 user capacity Cafeteria and one 2000 seater capacity Auditorium including all wired and piped services comprising of Internal Water Supply, Sanitary Installations, Roads, Pathways, Drainage, Internal Electrical Installations, Extra Low Voltage (ELV) Works, Fire Fighting, Fire Alarm system, HVAC, sewerage, lifts External Electrical installations, etc. all complete on EPC basis for Nalanda University Main Campus at Rajgir, District Nalanda, Bihar."** The scope of consultancy work will be for complete project as indicated in the **Section-I "Brief Particulars of Work"** and also Electrical Substation Building, AC Plant Room etc. The consultancy services shall also include Electrical Substation, DG Set capable for full load, Lifts, Fire Alarm System, UPS, Solar Water Heating System, Building Management System, Provision for LT panels, etc. The consultant shall be involved for the entire duration of the project till its final commissioning and handing over including obtaining statutory clearances/certificates for occupying the buildings by the University.

2.1 The Consultant shall:

a. Prepare a site plan of the entire parcel of land allocated for these three buildings and surrounding site development, showing all existing building(s)/ barracks, if any, features, services and facilities available; general layout of all such buildings and services, giving details of useful areas for rational utilization for construction activities together with services area and circulation area. The site plan will clearly indicate the envelope of construction as well as the temporary structures of the offices of the Contractor (s) including lockable stores;

Note: *All surveys and test reports if required to be conducted for the exercise of due diligence in the fulfilment of the scope of services by the consultant shall be the responsibility of the EPC Contractor within the quoted cost.*

b. Prepare a comprehensive plan of the building premises and the layout of all the buildings proposed to be covered under as stipulated under the Scope of Work clearly indicating all entrances and exits, roads, lanes and paths; the layout for all external services that include water supply, electricity, telephone and other communication including IT, WIFI relay towers etc.; all waste disposal (solids, liquids, sewage, rainwater, kitchen waste, other bio-degradable waste, vegetation from site, paper, electronic items waste incinerator and any other waste not specified here) including their collection points for management of waste; scheme for retention and storage of water; and the basic landscape arrangement.

c. Prepare preliminary drawings at all levels, for all buildings proposed to be covered under this EPC Contract, including details of envelope and covered area/ plinth area calculations together with all elevations and reasonable number of sections to comprehend the scheme in total. This preliminary set of drawings shall be developed as per the University's requirement (including changes and modifications suggested to the drawings and details submitted at the Competition Stage) and after double checking all the requirements of Building Bye-laws, Fire Bye-laws, GRIHA 5 star compliance and other BIS Codes' provisions and ensuring that the scheme is fully compliant thereof.

d. Prepare preliminary planning of all internal and external utility services like water supply, sewerage including determination of the capacity of the Sewage Treatment Plant (STP), storm water drainage including scheme for recharge pits and/ or collection and storage, Electrical System including both the high side and low side Heating, Ventilation & Air Conditioning systems (HVAC), Acoustical requirements, Internal Lighting, Mechanical Systems, Elevators /Ramps, External/ Façade/ Street/ Compound Lighting, Landscaping (soft and hard), Signage (External & Internal), Interior Layouts including identification of user spaces, External Development plans showing roads, paths, paved areas, drains, culverts, entrances, exits and modifications to the compound walls, etc. The preliminary planning will be consistent with the scope and provide the basic specifications and costs separately for each of the sub-heads.

e. Obtain the approval of the University to (a) to (d) and to any subsequent changes and deviations sought by the University, and to computations of all designs which shall be in accordance with current BIS Codes of Practice or other relevant or acceptable codes when BIS codes are not available and latest Building Bye-laws. Such detailed computation of all designs shall be made available to the University in duplicate, after getting the same proof check, for any scrutiny and approval of the University . The Consultant may employ Sub-Consultants on the project subject to conditions set forth in clause 1.9 above. The Consultant and his Sub-Consultants shall certify in writing that the designs are in accordance with the up to date and relevant BIS Codes of Practice. The overall responsibility for the sub-

consultant's work shall be that of the consultant appointed by EPC contractor.

Following the University's approval, all the buildings including all wired and piped services and site development works will be demarcated on site. This demarcation will help in better understanding of the location of the buildings on site, check on any site constraint, if present, and in the understanding of the scale. The setout drawings for the same will be provided by the Consultant and the cost of the survey and setting out shall be borne by the EPC Contractor.

f. Prepare all the required drawings and reports for submission to the various Municipal Authorities and Statutory Bodies (as may be required), obtain approvals from all the Municipal Authorities/ Fire Department/ Electrical Department/ any other Statutory Bodies in accordance with the Local Acts, Laws, Regulations, etc. Any statutory fees, as per actual payable to the local authorities/statutory bodies for obtaining such approvals shall be borne by the University. The Consultant will make any change desired by such authorities and resubmit the drawings and/ or reports as may be required at no extra cost.

g. Prepare layout plans for the landscape plans for soft and hard landscape integral with the buildings.

h. Prepare and submit to the University a Detailed Project Report and Design Basis Reports (DBR) of the Project in the form of a comprehensive report covering all aspects of the project – including the design philosophy and the design methodology, listing out relevant codes, related references, sound engineering practices etc. for Architectural, Structural, Façade, All Wired & Piped services, all E&M services, site development work , horticulture etc all complete. It will identify all special requirements pertaining to construction, covering the sub-structure and super-structure separately. Special equipment required, if any, either for the execution or for the operation should be highlighted. Items of work/ components requiring to be sourced from outside the country, if any, shall be separately identified.

i. The consultant/contractor shall have to get the structural analysis/design and design of E & M services and drawings/ any other design as required by university, checked from the proof consultant from reputed institute as approved by university.. The detailed design notes (DPR & DBR) shall be submitted along with design philosophy and detailed design calculations/computations to the Engineer-in-Charge in this regard.

j. After obtaining clearance from the proof checking agencies the consultant shall prepare detailed architectural and structural working drawings or Good For Construction (GFC) Drawings covering all levels, internal and external as covered

under 2.1 (b) & (c) above; detailed GFC drawings for all utilities and E & M services, internal and external, as mentioned in clause 2.1 (d) above, including incorporation of all revisions in the GFC drawings covered under 2.1 (e) & (f) and including details of specifications of all items of work.

k. All submittals along with drawings under 2.1 (a) to (j) above shall be submitted to the University in hard copies in 3-sets (drawings in A-0 or A-1 size or combination) and will also be supplied in soft copy form on a DVD. The drawings shall be prepared in AutoCAD latest version.

l. The consultant and his sub-consultant shall have constant and regular interaction with the University's in-house Engineering team for formulating the design philosophy and parameters, preparation of cost estimate, designs/ drawings and specifications.

m. The consultant shall have to carry out detailed topographical and contour survey and the radar survey of any U/G existing services obstructing and other constraints existing in and around the site for proper design of all the services.

n. The Consultant shall have to perform in an efficient, orderly and professional manner and shall deploy necessary qualified and skilled personnel according to the requirement of the services. A list of minimum of personnel to be deployed for the work is indicated in schedule A to F. The consultancy services shall be provided through a Team Leader supported by experienced professionals. The Consultant will deploy adequate number of professionals and other staff to deliver the requisite services as per time schedule. The Consultant shall have to submit an Organogram giving details of proposed team detailing the roles/work to be performed by each personnel, their tentative duration, interrelationships of each personnel etc..

o. The Consultant shall ensure that the nature, position, and appearance of all controls of piped services and electrical installation satisfy user and aesthetic requirements, and ensure that adequate coordination drawings are included. He shall also ensure that the various building/engineering services are designed without any discrepancies between the structure and finishes, and the requirements of service installation.

p. The Consultant shall have to co-ordinate with the University and attend meetings with the University as and when required including meeting with the contractors.

q. The consultant shall obtain pre and post construction fire clearance from CFO for the construction work after incorporating the modifications in the drawing and

services as suggested by them.

r. The Consultant shall maintain constant, regular and proactive interaction with the University, and civil/structural / E&M services proof checking consultants for formulating the design philosophy and parameters, preparation of preliminary designs/working drawings/ specifications etc.

s. During the construction stage the Consultant shall –

i. Supply to the contractors/ executing agencies such additional drawings, specifications and details that may be required for proper execution of the work.
ii. Obtain the University's approval for any material deviation in design or the working drawings or costs or schedule and specifications from the approved scheme.
iii. The Consultant and the Sub-Consultants shall visit the works during execution stage at least once in a month to ensure that the works are being executed as per approved scheme and render appropriate advice and carry out all site related modifications in the designs and drawings.
iv. The consultant shall have to assist the Engineer-in-charge in preparing presentations and presentation materials during execution of work.
v. Shall prepare detailed Shop Drawings or scrutinize fabrication drawings submitted by any agency or vendor and shall certify as fit for construction by the Consultant after obtaining approval from the Engineer-In-Charge.
vi. Submit to the University a monthly review report on the project, the quality of execution and its conformity with drawings, details and specification.
vii. Advice the University on changes required to be carried out, if necessitated due to any technical reasons.

t. Post completion of works the Consultant shall –

i. Prepare a set of Completion Drawings and as-built drawings including elevations and sections and structural details indicating details of building and all services and supply 3 sets of the completion drawings to the University, including one reproducible set using A-0 or A-1 size or combination. These drawings will also be supplied in soft copy form on a DVD. The drawings shall be prepared in AutoCAD. These are in addition to the drawings and details mentioned in clause 2.1 (k) above. The Consultant shall certify all the as-built drawings submitted by the contractors/ vendors including the compilation of all user manuals and operation manuals.
ii. Obtain Completion Certificate and Occupancy Certificate and any other statutory approval (if any and as required), including attending all meetings at Municipal and Statutory Bodies to be held for the purpose.

3. SCOPE OF SERVICES –

3.1 The consultant, as appointed by EPC contractor, shall provide Comprehensive Consultancy Services in the following areas. The consultant/agency shall appoint specialized consultants for which in-house arrangement is not available:

3.1.1 All Architectural Services including building plans/ all hard and soft Landscaping /Signage, AV equipment design.

3.1.2 All Quantity Surveying Services.

3.1.3 All Civil & Structural Engineering Services including getting all proof checking work done from university approved institute.

3.1.4 All Electrical Engineering Services i/c getting all proof checking work done from university approved institute.

3.1.5 All Mechanical Engineering Services i/c getting all proof checking work done from university approved institute.

3.1.6 All Public Health Engineering Services i/c getting all proof checking works done from approved institutes

3.1.7 All Waste Water treatment and Management System i/c getting all proof checking works from university approved institute. It includes all hardware's, software's and related systems. All movable system shall be QR based.

3.1.8 Green Building Concept (Norms to be followed as per 5 STAR TERI-GRIHA) to be certified by Accredited bodies and then obtaining GRIHA 5 star rating post construction including compilation of all required data.

3.1.9 The buildings should be designed for barrier free and accessibility as per hand book on "Barrier free and Accessibility" available on CPWD website with available latest guidelines and space standards for barrier free built environment for disabled and elderly persons.

3.1.10 Building should be designed based on CPWD guidelines for sustainable habitat available on CPWD website with available latest guidelines.

3.1.11 The landscape should be designed based on "a hand book of landscape – A guide" available on CPWD website with available latest guidelines.

3.1.12 The rain water harvesting shall be designed based on "rain water harvesting and conservation manual" available on CPWD website with available latest guidelines.

3.1.13 All equipment/fixtures/fittings/furniture for all buildings including rooms, halls, kitchens, lecture rooms, theatre type auditorium, etc.

3.1.14 All interiors and all acoustical treatments.

3.1.15 All art work and signage.

3.1.16 All water supply & drainage system.

3.1.17 All I.T. Service.

3.1.18 Any other services which are required but not specifically indicated.

3.1.19 The consultant shall provide comprehensive consultancy services broadly described hereinafter. However, it should be clearly understood that the description of services is only indicative and the Consultant shall be required to perform any other services which may be required whether or not expressly mentioned hereinafter in this contract document of this work up to the entire project requirement and satisfaction of the University.

3.1.20 The Consultant(s) shall perform all the Architectural, Structural design work,

design of façade work, design of acoustic treatment to buildings, landscaping, horticultural works and all E & M services by utilizing the effective and widely accepted engineering concepts/practices and as per the directions of the Engineer-In-Charge and shall at all times show a high degree of professionalism in his work.

3.1.21 The Consultant will be fully responsible for the design of all the Civil, Elect. & structural engineering works including landscaping and horticultural services. The services to be provided by the Consultant shall include all building & services for making the proposed buildings fully functional & occupation ready and shall not be limited what shown in the scope of work.

3.2 PRELIMINARY STAGE:

3.2.1 Carry out topographical and contour survey and the survey of all existing services if any and other constraints existing in and around the site.

3.2.2 Carry out soil investigation of the site to establish the soil characteristics and other parameters required for the foundation design of multi-story buildings. Types of investigation/test and their qualities shall be get approved from Engineer-in-Charge. Soil investigation agency should be experienced in carrying out the work of similar magnitude, specialized and should be got approved from Engineer-in-charge & before appointing by the contractor.

3.2.3 The contractor /consultant shall also get ascertained the liquefaction potential of soil to required depths using modern methodology e.g. Spectral Analysis of Surface Waves (SASW) test or any other method and combination of tests approved by Engineer-in-charge and suggest remedial measures and account for same while suggesting the foundation system and suggesting bearing capacity/load carrying capacity.

3.2.4 The soil report shall be got vetted/proof checked from the Institute of repute as described in the contract document or as approved by Engineer-in-charge.

3.3 LAYOUT PLAN:

3.3.1 Submission of the revised Layout Plan to local bodies and incorporating changes, if any, suggested by them and re-submitting the same.

3.3.2 Obtaining approval of the revised master Plan from local authorities for the work under this project.

3.4 CONCEPT DESIGN:

3.4.1 Interact with the University and finalize the functional plan.

3.4.2 Development of the concept design.

3.4.3 Submission of the draft concept design and make presentation of the scheme.

3.4.4 Modifications of the draft concept plans taking into account the comments, suggestions etc. of the University.

3.4.5 Submission of the final concept design along with models, photographs, 3D-walk through and as per the requirements & norms etc. The cost of such models, walk through, photographs, etc. shall be borne by the consultant/EPC Contractor.

3.4.6 Obtaining approval of the Concept design from the University.

3.5 APPROVAL STAGE:

3.5.1 Development of the Submission Plans.

3.5.2 Submission of the design, drawings and related documents to concerned local authorities

3.5.3 Modifications of the design, drawings etc. taking into account the comments, suggestions etc. of the local bodies.

3.5.4 Re-submission & obtaining approval of the design, drawings etc. from local bodies, if required.

3.5.5 Obtaining necessary approval of the project from Local authority.

3.6 DETAILED DESIGN STAGE:

3.6.1 Architectural Services –

Prepare drawings, schedules and specification of materials and workmanship, in sufficient detail. The drawings & documents shall include detailed site plan, detailed drawings for each building including floor plans, elevations, door & window schedules, finishing schedules, wall profiles, staircases, ramp and lift details, details of important building parts / areas, landscape & horticulture details etc. As far as possible standards of quality performance requirement and descriptive names shall be used rather than specific products or brand names.

Prepare and issue "Good for construction" drawings. Drawings shall be adequately detailed and shall contain enough information to enable construction, full measurement, pricing and production of bill for payment. The working drawing shall include –

Layout Plan showing:

1) All proposed buildings, green area, location of tank, STP, Sump, RWH, Elect. Sub-Station etc.
2) Blow up of road junction / parking area and other such area as required.
3) Coordinated External services

Detailed Drawings:

1) Floor plans, fully coordinated with all services/disciplines
2) Elevations
3) Sections
4) Wall profiles
5) Doors & Window details
6) Stairs/Ramps/Lifts details
7) Details of building parts, areas, critical special treatments.
8) Toilet details.
9) Flooring pattern and details
10) Dado details
11) Roof flow, drainage system including rain water harvesting system underground tank and overhead water tank.
12) Detailed design and drawings of all types of furniture's of Yoga & Meditation Halls, conference rooms, Auditorium Hall, VIP Lounge, Reception, and Restaurant, all kitchen, pantry, store, cupboard, counter, shelves etc. as per functional requirement of the area &

the requirement of the University.

13) Detailed drawing of art/mural work.
14) Any other detailed requirement by the engineer in charge.

15) Interior design including design of furniture & furnishing etc. all complete.
16) Landscape including soft & hardscape, waterbodies (if any) & Horticulture works around the buildings.
17) Drawings of landscape including blow up of critical areas / landscapes / plant-scapes in detailed coordination with all external existing services
18) Horticulture details
19) Checking and certifying the Architectural drawings, technical specifications, services and all other drawings to ensure their completeness/correctness
20) Finalizing finishing schedule, elevation treatment, fixtures, colour scheme of all buildings
21) Integration of design with the existing landscape including water bodies and suggest modification if any.
22) Any other details required for completion of the buildings/services.
23) Inspect the works and attend meetings during execution to give clarifications, if any, and to modify the drawings as per the site/construction requirements.

3.6.2 Civil & Structural Engineering Services –

Design Basis

1) Conduct surveys, tests and other investigations as required to determine the basis to accomplish safe designs as per latest specifications & codes.
2) Planning for the structural arrangements with the architectural design.
3) The Building shall be analyzed as a 'Space Frame'. The building shall be modified using structural engineering software package ETABS/ STRAP/ STAAD or any other standard proven software. SI units should be followed for entire analysis and design. The space frame should be analyzed for Dead Loads (DL), Live Loads (LL), Wind Loads (WL), Earthquake Loads (EQ), and their combinations as per IS 1893:2016 and other relevant latest IS codes / NBC. The Building should also be checked for storey drift/ soft storey. All supports (foundations) of Building columns and shear walls shall be considered as fixed joints for analysis. Effective length of columns shall be considered as per the standard codes of practice. This structure should be designed and detailed as per Indian codes of practice. All disaster management practices as brought out by National Disaster Management Authorities and also as specified in NBC shall be followed.

4) As the structures are larger in size and with considerable height, the lateral loads will be significant. Transfer of lateral loads is very important & special care must be taken to transfer these loads in super structure and foundation. Sufficient numbers of shear walls should be provided for force transfer in lateral direction & to control the deflection due to lateral loads.
5) As the vertical & lateral loads are quite high, reinforced concrete

Raft foundation/pile foundation/Isolated footing or any suitable foundation system shall be proposed for the columns and shear walls in multistoried buildings.

6) Co-ordination & finalization of structural arrangement –
   a. Foundation system
   b. Beam & Column location
   c. Beam & Column size
   d. Finalization Slab profiles
   e. All other detailing required for the finalization of design
7) Finalization of design basis & structural systems –
   a. Proof checking of structural design / drawings and issuing the "Good for construction" drawings. The consultant shall also submit the structural design / details (input / output) by the structural consultant and the proof checking thereof along with comments etc. of proof checking consultant. Proof Checking will be got done by reputed Institutes like IIT Patna/IIT Delhi/IIT Kharagpur/IIEST Shibpur as decided by the University. The EPC bidder will pay for such proof vetting charges.
8) Structural Design Development –
   a. Design of all the structural and non-structural elements
9) Drawing Stage –
   a. Foundation plans & details
   b. Column, walls and beam layout plans
   c. Floor framing plans, fully coordinated with all disciplines
   d. Floor slab structural details
   e. Column & beam structural details
   f. Staircases, ramps, lifts shafts and machine room details, rain water harvesting chamber.
   g. Requirement of Green Building Concept
   h. All other details and sketches required for proper execution of the works.

3.7 ELECTRICAL ENGINEERING SERVICES:

3.7.1 General –

The services to be provided by the Consultant shall include (Schedule of Quantities of various items involved in this work, Design, Drawings, Vetting and shop drawings):

a) Design of electrical installations including all electrical fittings/fixtures, water supply pumps, de-watering pumps etc., as necessary.
b) Design of Power Supply & Distribution system of HT and LT including emergency and backup supply, sub-station, DG set with AMF panel, HT Panel, LT panel, feeder pillars etc.
c) Building Management system.
d) Telephone system, intercom communications facilities, data cable/networking system.
e) Lightning protection and Earthing system.
f) External Lighting
g) UPS back up wherever indicated
h) Lifts, Escalators.
i) Firefighting, fire detection and PA system design

j) Solar Hot Water System.
k) Air conditioning / HVAC system, Ventilation, Smoke evacuation system etc.
l) Street light design with control panel
m) Planning of C.C.TV & equipment
n) Water supply submersible & booster pumps, dewatering pumps etc.
o) Proper coordination with civil engineering / mechanical engineering features /services including office services.
p) Any other services required for the buildings but not specifically indicated.
q) Liaising of other statutory agencies for obtaining the preconstruction and post construction clearances. The statutory payments to these agencies however will be paid by the University.

3.7.2 Services –

3.7.2.1 Carry out basic and detailed designs of comprehensive electrical power distribution scheme, indoor and outdoor lighting, lightning protection and earthing systems of all the buildings in accordance with the relevant Indian regulations and Standards. The work shall include, but not limited to the following services:

3.7.2.2 Design and draw up preliminary schemes on the electrical requirements.

3.7.2.3 Design the distribution systems and prepare single line diagrams with details of accessories and equipment.

3.7.2.4 Specify the details and capacities of HT panels, Transformers, LT panels, standby diesel generators and fuel intake, and to specify the type of supply arrangement for incoming power supply, interlocking arrangement between HT panel, transformer, L T panel & DG sets. All Panels and feeders with necessary SACDA/TCIP communicable meters for energy audit purpose.

3.7.2.5 Design the Sub-station comprising of the HT panel room, transformer room, L T panels room, generator room and to specify the necessary switchgear and control 'Changeover panels, capacitor banks, bus duct, essential and non-essential panels as necessary with the appropriate load shedding.

3.7.2.6 Make detailed specifications of all electrical items, essential and non - essential panels, power control centers, capacitor panels and the corresponding bill of quantities for the various items.

3.7.2.7 Design and prepare detailed layout drawings for the individual power. Indoor and outdoor lighting, lighting protection and earthing system as required.

3.7.3 Brief Description of Planning activities for E&M Services:

The verification of design and drawing by an institute of repute as defined in bidding document is also the scope of work.

3.7.3.1 Electrical & Instrumentation (EI) Work:

a) Design and planning of buildings, services, fittings etc. with most energy efficient to get 5 STAR GRIHA-LD rating of the installation.

b) Marking of various light, fan, plug points and other electrical EI services on the architecture drawing, preparation of inventory, their circuits, sub-main, DBs, SDBs, Panel etc.
c) Design and selection of EI fixtures to get the required illumination, air changes in toilets, air flow for the specific requirement as per CPWD/NBC/IS standards.
d) Designing of size and capacity of sub-mains, DBs, Panel, rising mains according to the electrical load.
e) Marking of various telephone outlets, krones and conduit lay out up to the EPBAX room.
f) Marking of various internet/LAN outlets, location of switches and conduit lay out up to the server room.
g) Marking of various Central call bell system outlets, location of central point and conduit lay out up to the nursing stations.
h) Electrical Sign boards and exit sign boards shall be provided for the various services at required place.
i) Marking and development of system including various points of CCTV and conduit lay out up to the Central control unit room.
j) Marking of various points of CCTV and conduit lay out up to the Central control unit room.
k) During the approval of design and drawing the consultant will submit the data sheet and catalogue of the various equipment in support of their design.
l) Preparation of inventory, BOQ, technical specifications.

3.7.3.2 Fire Fighting & Sprinkler System Work:

a) Marking of various firefighting accessories/equipment, i.e., location of sprinklers, internal & external hydrants on the architecture drawing, preparation of inventory as per latest CPWD specification/NBC guidelines/IS codes.
b) Design of plumbing to get the required pressure at various levels, location of various valves, drain pipes etc. as per specifications.
c) Designing of pump sets for firefighting & sprinkler system and their jocky pumps and layout in the pump house.
d) Providing fire-fighting portable fire extinguishers as per CPWD/NBC/IS codes specifications.
e) All the drinking water submersible, booster and dewatering pumps should be designed.
f) During the approval of design and drawing the consultant will submit the data sheet and catalogue of the various equipment in support of their design.
g) Preparation of inventory, BOQ, technical specifications.

3.7.3.3 Fire Alarm System Work:

a) Marking of various fire alarm accessories i.e., location of detectors, MCP, fault isolator, hooters/speakers, main panel, repeater panel on the architecture drawings, preparation of inventory as per CPWD specification/NBC/IS codes.
b) Design of loop circuits and its route marking on the drawing.
c) During the approval of design and drawing the consultant will submit the data sheet and catalogue of the various equipment in support of their design.
d) Preparation of inventory, BOQ, technical specification.

3.7.3.4 Sub-station Work:

a) Preparation of electrical load calculation after getting EI & equipment loads of the building and electrical load of HVAC system, the total working capacity of the transformers shall be taken considering diversity factor of the system.
b) Planning & making SLD drawings for the distribution the sizes of cables as per loads and other sub-station equipment shall be prepared with justification.
c) 33/11 KV 3 phase supply shall be got available near the buildings premises within the campus and accordingly to HT underground cable as incomer shall be taken in the scope of work. The ring facilities shall be developed to ensure feeding from multiple sides. The suitable trench and route markers, stone size minimum 900 MM (3ft by 2ft) above finishing surface level or as per the approval of the engineer in-charge.
d) HT Panel shall have minimum 1 incomer and 3 outgoings as per design. The HT panel shall be extensible for future expansion.
e) The minimum capacity of the transformers shall be defined as per scope of work.
f) LT Panels shall be designed for non-essential, essential and UPS supply.
g) APFC Panel for each transformer shall be provided to improve power factor to minimum 0.95 lag.
h) Suitable size of sandwich bus trunking between transformer/DG Sets to different essential and non-essential panels.
i) Earthing for System and safety of equipment AS per latest CPWD specifications/IE rules.
j) Providing Safety equipment.
k) Layout of various equipment of Sub-station to accommodate in the service building.
l) The consultant will prepare the drawing of Distribution, SLD and layout of the equipment.
m) During the approval of design and drawing the consultant will submit the data sheet and catalogue of the various equipment in support of their design.

n) Preparation of inventory, SLD, BOQ, technical specification.
o) Fully Automated and SACDA system (Latest & Advance, Minimum IEC 60850, IET based system) shall be provided by the contractor on open protocol.
p) Chemical earthings shall be preferred over pipe and plate earthing.
q) Separate earthing pits for neutral, body, DC system, AC system shall be preferred.
r) Adequate size of the substation and building earthing's shall be provided.

3.7.3.5 DG Set Work:

a) Planning & making SLD drawings for the distribution and load calculation the size of cables/bus trunking.
b) The capacity of the DGs set shall be designed (both working) to feed the entire load of the buildings.
c) Essential Panels shall be designed with AMF consisting with bypass arrangement (in case of AMF failure).
d) Earthing for neutral and safety of equipment as per CPWD/EI rules.
e) The capacity of the inbuilt diesel tank shall be as per manufacturer standard.
f) The exhaust piping of the DG Set shall be extended as per the CPWD specification and suitable MS structure shall be provided to support the exhaust pipe.
g) The consultant will prepare the drawing of Distribution, SLD and layout of the equipment and sizes of the rooms as per site condition.
h) During the approval of design and drawing the consultant will submit the data sheet and catalogue of the various equipment in support of their design.
i) Preparation of SLD, BOQ, technical specification.

3.7.3.6 HVAC System Work with IBMS:

a) Preparation of heat load calculation after consultation with the University to get the equipment load, condition of various rooms and designing according to the required air changed, temperature, RH etc. and capacity of the chilling units however some guidelines are given in HVAC package.
b) Isolation of air-conditioned area according to the office requirement and designing the size of AHU/FCU for the zone.
c) Planning and designing of LV side i.e., ducting, plumbing etc. as per the structure and with co-ordination to other services.
d) Designing of hot water system during winter season/monsoon season by providing heat pumps of required capacity.
e) Calculation of CFM and TR capacity of the AHU/FCUs.
f) Designing of chilled water (primary & secondary), condenser water, hot water and drain system of the AC plant.

g) Designing of LT Panel and control panel and its cabling network from AC plant to various equipment.
h) IBMS for complete AC plant (Low & High end) i/c control of the system from AC plant.
i) Designing of mechanical ventilation fan of minimum air changes as per NBC 2016 per hour in case of fire or during distress call. However, for normal exhaust it should be as per NBC 2016.
j) Layout of various equipment of HVAC plant and accordingly designing of plant room in the service building.
k) During the planning and designing of HVAC system, requirement of the University shall be taken and accordingly the design will be made and get approved from the University.
l) The consultant will prepare the drawing of plumbing, ducting with design calculation and suitable sizes as per latest CPWD specifications & site conditions.
m) During the approval of design and drawing the consultant will submit the data sheet and catalogue of the various equipment in support of their design.
n) Preparation of inventory, BOQ, technical specification.
o) Provision for winter cooling shall be provided wherever required when main chilling unit of the plant will be closed during winter season.

3.7.3.7 Lift Work:

a) 15 passenger lift (G+2) – 2 Nos. and 2 Ton Goods lift (G+2) – 1 No. with minimum speed of 1.5 mtr./sec.
b) This is minimum requirement however as per the CPWD norms & functional requirement the size and speed of the lifts shall be designed & provided in the building as approved by E-in-C.
c) Necessary space shall be provided in the architecture drawing for these lifts.
d) During the approval of design and drawing the consultant will submit the data sheet and catalogue of the various equipment in support of their design.
e) Preparation of BOQ, technical specification.

3.7.3.8 Water Supply, Drainage & Sewage Pump:

a) Consultant has to design the requirement of water for the Institute and other services and accordingly design the pumps to get the raw water from ground and to supply to the various services.
b) Pump shall also be provided for the sewerage/dewatering at basement or any other places like AC plant, pump house etc. The purified water supply shall be considered for the HVAC system.
c) During the approval of design and drawing the consultant will submit the data sheet and catalogue of the various equipment in support of their design.
d) Preparation of BOQ, technical specification.

e) The STP shall be provided matching to the existing facility/system like DEWAT in the campus.

f) It includes all high side and low side pipes and pumps including storage system and connection from suitable /nearest Elevated Reservoir System.

3.7.3.9 Solar Water Heating and RO System:

a) Consultant will design the requirement of hot water and RO in the buildings and accordingly the solar water heating system shall be designed on the roof of the building with minimum 1000 LPD.

b) The solar water heating system shall have a backup electric source to heat up the water in case of cloudy weather including Planning & making SLD drawings for the distribution and load calculation the size of cables/bus trunking.

c) The system shall have an insulated storage tank for hot water on the top up the roof.

d) The consultant will prepare the drawing of water Distribution, and layout of the equipment as per site condition.

e) During the approval of design and drawing the consultant will submit the data sheet and catalogue of the various equipment in support of their design.

f) Preparation of BOQ, technical specification.

3.7.3.10 Signages:

a) Consultant has to design all signage for internal, external and road for guide maps and information, location identification sign, entry/exit signs, room nos., room/facility names, statutory signs, warning/prohibitory sign, way finding signs, doctor directory sign, evacuation plan, any other information required by the University. Inside building, the digital signage shall be provided in addition of the signage board/mechanical.

b) The firm will submit the 3 sets of documents of above planning and designing to the University within the stipulated time given in the agreement for the approval of Competent Authority. The Competent Authority will examine the documents and if need any correction /amendment shall be made by the firm again.

c) After the approval of design and drawing the work will be started accordingly and if during the execution it is found necessary to amend any parameter, the same shall be made by the firm.

d) The firm will prepare the co-ordination working drawing after getting all inputs of various services so that the work of any service should not hamper the progress of work. Before the start of work the firm will submit the RCP drawings showing all the services and equipment to get a proper aesthetic look of the buildings.

3.8 PUBLIC HEALTH ENGINEERING:

3.8.1 All the design and drawings should be well coordinated with Architecture, structure and other services drawings.

3.8.2 All designs shall be as per the latest Indian Standards, Local bye-laws and Statutory norms/regulation.

3.8.3 Design of Public Health & Engineering services taking into account various topographical, meteorological, Hydrological etc. reports, identify the source and quality of water, conduct survey of existing water supply system, Sewerage system, Drainage system, Fire-fighting system, other site development works etc. for planning of services. These existing systems are to be augmented if required as per the design.

3.8.4 The services shall include following major components:

3.8.4.1 Water Supply System including underground water tanks and pumps & tube well for fulfilling the requirement of the Buildings.

3.8.4.2 Sewerage System including sewerage treatment plant.

3.8.4.3 Drainage System including water harvesting, absorption trenches etc.

3.8.4.4 Fire Fighting & Fire Suppression System with peripheral grid around each building connected with fire main grid.

3.8.4.5 Dual plumbing system i/c untreated water supply system from STP for horticultural operations.

3.8.4.6 Soil waste management.

3.8.4.7 Institute/Work Management.

3.9 SERVICES –

3.9.1 Water Supply System –

3.9.1.1 Calculation of water requirements for the buildings under the scope of present bidding document.

3.9.1.2 Design and prepare working drawings of internal and external dual water supply system including Underground tank, Overhead tank, Water treatment plant, pumping stations, tube well, rising mains, distribution system and internal plumbing, recycling of treated waste water etc.

3.9.1.3 Untreated water supply system for horticultural works i/c design of sprinkler and drip irrigation system. If necessary, the supply to be augmented.

3.9.1.4 Prepare specifications.

3.9.1.5 Third party approval of detailed drawings and data sheets of suppliers/ manufacturers. Incorporation of suggestion /modification in the drawings.

3.9.1.6 Water flow SCADA communicable meter, Water SACDA for centralized monitoring and control, automatic audit of the water and motorized vales shall be considered & provided by the contractor.

3.9.2 Internal Sanitary Installations –

3.9.2.1 Design and prepare working drawings of internal sanitary installations. Identify, design and prepare working drawings of especially abled friendly toilets and sanitary installations. Low flow applicable for GRIHA rating fixtures shall be considered.

3.9.2.2 Prepare specifications.

3.9.2.3 Third party approval of detailed drawings and data sheets of supplies / manufacturers.

3.9.3 Sewerage System –

3.9.3.1 Calculation for quantity of waste water generated from different sources and design waste water treatment plant.

3.9.3.2 Design and prepare the drawings for pretreatment of waste water from kitchen and dining halls before connecting to sewage system i/c. management of solid wastes, oil & grease etc. by suitable treatment and disposal system.

3.9.3.3 STP and ETPs is to be provided for office campus. ETP to be provided wherever chemical effluent required to be treated. Most efficient STP and ETP technology requiring minimum operation and maintenance cost shall be designed.

3.9.3.4 Obtain approval from statutory and local bodies for waste disposal.

3.9.3.5 Prepare specifications.

3.9.3.6 Check and approve detailed drawings and data sheets of suppliers/ manufacturers.

3.9.3.7 Third party approval of detailed drawings and data sheets of suppliers/ manufacturers and incorporation of suggestion /modification in the drawings.

3.9.4 Drainage –

3.9.4.1 Design and prepare working drawings for storm water drainage including roof drainage, service area drainage and surface drainage.

3.9.4.2 Design and prepare working drawings for rain water harvesting system i/c. rain water harvesting pits, trenches and perforated absorption drains.

3.9.4.3 Obtain approval from statutory and local bodies for drainage connections and rainwater harvesting scheme etc.

3.9.4.4 Prepare specifications.

3.9.4.5 Third party vetting of detailed drawings and data sheets of suppliers/ manufacturers and incorporation of observation in the detail working drawings.

3.9.5 Solid Waste Management –

3.9.5.1 Survey, design and prepare the working drawings and system plan for solid waste collection, treatment and disposal through appropriate technology. Design and drawings for composting of organic waste for production of manure/compost for utilization for horticultural use.

3.9.5.2 Design and drawing for utilization for organic waste for other useful products.

3.9.5.3 Other ways for recycling and disposal of non-organic and organic waste.

3.9.6 Site development Works –

3.9.6.1 Design and prepare working drawings (longitudinal & cross section) for roads/ footpaths/ parking areas etc.

3.9.6.2 Design and propose working drawing for landscape & horticulture work for the campus i/c garden light, façade lighting etc. The landscape should be of both hard & soft type.

3.9.6.3 Design and prepare working drawings of irrigation system for horticulture including sprinkler and drip irrigation system.

3.10 OTHER SERVICES –

3.10.1 Project Documentation –

a) Prepare and submit required number of copies of monthly progress accomplishment reports of the project.

b) Ensure the preparation of AS-BUILT drawings and record all approved deviations and changes in drawings.

3.10.2 Provide any other services not explicitly mentioned but reasonably required for project development.

3.10.3 Design, calculations and drawings of all services shall be proof checked from IIT Patna/IIT Delhi/IIT Kharagpur/IIEST Shibpur as decided by the University or as approved by Engineer-in-charge.

3.11 GREEN BUILDING DESIGN –

3.11.1 The buildings are to be designed for 5 Star GRIHA-LD ratings.

3.11.2 The consultant has to develop a Green building Design as per 5 STAR GRIHA-LD evaluation procedure in conjunction with ECBC norms and National Building Code. All the fittings and fixtures (civil and electrical) to be used in the work shall be 5-Star GRIHA rated. The Building is targeted for 5-Star from GRIHA secretariat under 'GRIHA LD'. In order to secure these ratings, a high degree of responsibility and cooperation is necessary from the contractors. All materials and systems used in the project are intended to maximize energy efficiency for operation of Project throughout service life (substantial completion to ultimate disposition – reuse, recycling, or demolition) with an emphasis on top quality. Materials and systems are to maximize environmentally-benign construction techniques, including construction waste recycle, reusable delivery packaging, and reusability of selected materials. All vendors / contractors must adhere to best practices related to Green Buildings.

3.11.3 Consultant has to obtain GRIHA-LD 5 star rating post construction for these buildings.

3.12 DIFFERENTLY ABLED FRIENDLY BUILDING DESIGN –

3.12.1 The building shall be designed for differently abled persons and shall be as per the latest guidelines of Ministry of Social Welfare, Govt. of India. Necessary pre

&post audit of the building shall be got done by certified agencies.

4. NUMBER OF DOCUMENTS AND COPY RIGHTS:

4.1 All the documents/drawings, designs, reports and any other details envisaged under this agreement shall be supplied in five copies. All drawings as required for submission to all the local bodies and other authorities shall be submitted as per the requirement of local body. All the drawings for the comments, discussion and approval of employer shall be submitted in triplicate. Six copies of all the final drawings shall be submitted to the Engineer-in-Charge along with one reproducible in A-1 or large size along with a soft copy in DVD. If there is any revision in any drawing/document for any reason, six copies of drawing/document shall be re-issued along with soft copy in CD without any extra charges. All these drawings will become the property of the Engineer-in-Charge. The Engineer-in-Charge may use these drawings in part or full in any other work without any notice to the consultant and without any financial claim of the consultant.

4.2 The drawings cannot be issued to any other person, firm or authority or used by the Consultant for any other project. No copies of any drawings or documents shall be issued to anyone except the Engineer-in-Charge and / or his authorized representative.

4.3 Architectural Design should cover the following general requirements:

4.3.1 To cater for different functional requirements of user with creative indoor spaces, surroundings, better circulation and flexibility in space planning.

4.3.2 Integrated designs of electrical, mechanical and other services with structural system and construction methodology with low maintenance.

4.3.3 Climate responsive Architecture with integration of daylight and electric light, thermal comfort, ventilation and highest performance standards for work space efficiency.

4.3.4 Use of low embodied energy materials and local/reused materials and consideration of green building principles.

4.3.5 Water and solid waste management with waste water recycling, water conservation and rain water harvesting.

4.3.6 Development of surroundings with site terrain consideration, traffic circulation, indigenous vegetation and plantation.

4.3.7 The building(s) proposed to be developed should be amenable to latest systems of construction technologies for enabling repeatability and fast track and ease in construction, keeping in mind a lower embodied energy of material and lower energy consumption in the proposed complex.

4.3.8 All the spaces in the building provided shall be adequately ventilated for light and air.

4.3.9 Suitable escapes for fire shall be planned as per the requirement specified in NBC and other applicable standard codes of practice

4.3.10 The setbacks and height of the building shall conform to all regulatory authority rules.

4.3.11 Premium quality materials shall be provided for walls, floors, windows, doors etc. in tune with the industry standards of similar buildings.

4.3.12 Proper care shall be taken to plan movement logistics to avoid crisis – crossing of traffic.

4.3.13 The façade of the buildings shall be appealing, by judicially mixing the use of energy efficient glass, cladding materials, wall appropriate to the use of the building. The ratio of glass to wall shall vary depending the direction and as required for 5 STAR GRIHA-LD certification.

4.3.14 Space planning for required services shall be given importance.

4.3.15 Service routing and ducts shall be planned for easy access, maintenance and scalability.

4.3.16 Green building materials shall be used as far as possible for obtaining 5 STAR GRIHA-LD rating by the accredited bodies.

4.3.17 Sufficient space for parking of vehicles as per the norms shall be provided.

4.3.18 Vertical circulation shall be well planned to provide quick access to upper floors by suitable location of stairs and bank of elevators.

5. STRUCTURAL DESIGN SHOULD COVER THE FOLLOWING GENERAL REQUIREMENTS –

5.1 The structural design shall be carried out in terms of latest editions and up-to-date correction/amendment/errata of BIS Codes (Bureau of Indian Standards), other relevant seismic/other codes for making Building Earthquake Resistant, sound engineering practices and as desired by the University. The Contractor will also arrange proof checking of structural drawings by Reputed Engineering Institutes like IIT Patna/IIT Delhi/IIT Kharagpur/IIEST Shibpur or as approved by the Engineer-in-charge for proof checking of structural drawings/proposals prepared by the structural Engineer. The fee for proof checking shall be borne by the EPC contractor. The Contractor will liaison and co-ordinate with such Institute approved by Engineer-in- Charge as and when required and as per the direction of Engineer –in-charge. Any changes suggested at later stage in architectural/structural drawings shall be incorporated in the design and required structural drawing shall be proof checked without any extra cost.

5.2 Submission of all design calculations in hard and soft copies as per the direction of Engineer –in-charge.

5.3 Any other designing and detailing required for comprehensive planning and designing of the proposed buildings & campus.

5.4 The required buildings along with internal and external services have to be planned to achieve minimum cost of operation, minimum maintenance cost and lowest consumption of energy, water & electricity etc.

5.5 One combined integrated drawing of all services will be prepared. (For internal & external services separately). For services being laid in false ceiling, an integrated plan of all services will also be prepared to avoid interference from each other.

6. PRESENTATIONS AND MODELS –

6.1 Preparation of Model(s) to scale 1:200 or any other suitable scale decided by Engineer-in-charge.

6.2 Preparation of 3D views and blow ups of typical and critical areas and walk through.

7. APPROVAL FROM LOCAL AUTHORITIES:

7.1 The agency shall take all necessary statutory approval from all local authorities including Fire, City Planning, Electrical, Lift Inspector, Environment & Forest clearances etc. Preparation of all submission drawings (any numbers) / materials and models as per the required size/scale as required by local bodies.

7.2 The agency shall take all necessary statutory approval of 'Completion Plan' from all local authorities including local municipal authorities, Environmental Clearances, Lift inspection, NOC of Firefighting equipment etc. for occupation of the buildings after completion of construction. Consultancy works and preparation of all submission drawings (any numbers)/ materials and models for these approvals.

7.3 All statutory payments required for these approvals from local authorities shall be made by the Engineer-in-charge. For saving of time if the payment is required to be made urgently the contractor should make the payment and the amount will be reimbursed by the University after production of voucher & receipts.

8. SUBMISSION OF DATA SHEET:

8.1 Preparation of Data sheet showing Room wise and Building wise finishing, flooring and Door window, and other high-end Inventory schedule.

8.2 Preparation of Technical Specification for civil works, electrical works, services, equipment, furniture, furnishing etc. for all items and submit the data sheet.

PART B–2:

General and Additional Conditions for Works

GENERAL CONDITIONS FOR WORKS

General specifications, for construction

1. Except for the items, for which particular specifications are given or where it is specifically mentioned otherwise in the description of the items, the work shall generally be carried out in accordance with the "CPWD Specifications 2019 Vol-I & II and with up to date corrections slips for Civil work, CPWD specification 2013 Part-I(Internal) Part-II 1995 (External) for electrical works, CPWD General Specification for electrical work Part-VI Fire Alarm System – 2018, specification for horticulture works with up to date correction slips (hereinafter to be referred to as CPWD specifications). Wherever CPWD Specifications are silent, the latest IS Codes/Specifications, National Building Code 2016, Guidelines or AERB, MoRTH specification or any other specification shall be followed.
2. The order of precedence in case of any confusion/dispute will be as follows:
   - **(i)** GFC drawings as approved by University.
   - **(ii)** Description of nomenclature of items in bidding documents
   - **(iii)** Description of user requirement and technical specifications.
   - **(iv)** Particular specifications and special conditions for civil, electrical and horticulture works.
   - **(v)** CPWD Specifications with up-to-date correction slips for civil, electrical and horticulture works as applicable.
   - **(vi)** Indian Standard Specifications of B.I.S.
   - **(vii)** National Building codes 2016
   - **(viii)** Manufacturers specifications
   - **(ix)** CPWD GCC 2020 for EPC project
   - **(x)** Sound engineering practices
3. A reference made to any Indian Standard Specifications in this NIT, shall imply to the latest version of that standard, including such revisions / amendments as issued by the Bureau of Indian Standards up to last date of receipt of tenders. The Contractor shall keep at his own cost all such publications of relevant Indian Standard applicable to the work at site.
4. The agency shall construct suitable site office, laboratory, mock up for finishing approval & display room for samples to be used at work.
5. Agency shall make his own arrangement of water, electricity & generator to be used in work. The University will not provide the above facility.
6. Samples including brand / quality of materials and fittings to be used in the work shall be got approved from the University, well in advance of actual execution and shall be preserved till the completion of the work.

7. The cost of work shall be inclusive of pumping out or bailing out water if required for which no extra payment will be made. This will include water encountered from any source, such as rains, floods, and sub-soil water table being high due to any other cause whatsoever.
8. The work shall be executed and measured as per metric dimensions given in the Schedule of quantities, drawings etc. (F.P.S. units wherever indicated are for guidance only).
9. The following modifications to the above specifications shall however apply:
   - **(i)** All stone aggregates shall be of hard stone variety to be obtained from approved quarries at Nawada / Sheikhpura of Bihar.
   - **(ii)** Sand to be used for cement concrete work, mortar for masonry and plaster work shall be of standard quality. Sand shall be obtained from approved quarry at Nadriganj, Nawada District in Bihar and screened as required. The same shall be clean and consist of hard material.
   - **(iii)** Burnt clay brick of size 230 x 110 x 70 mm and Class 100 shall be obtained from the approved manufacturers in and around Rajgir, District – Nalanda, Bihar.
10. Unless otherwise specified in the schedule of quantities, the rates tendered by the contractor shall be inclusive of all cost, taxes, Royalty payable, seigniorage charges on Royalty and shall apply to all leads and lifts and nothing extra shall be payable on this account.
11. The rates for all items of work shall, unless clearly specified otherwise, include cost of all labour, material, tools and plants and other inputs involved in the execution of the item including the fee of consultancy etc.
12. The foundation trenches shall be kept free from water while works below ground level are in progress.
13. No foreign exchange shall be made available by the University for importing (purchase) of equipment, plants, machinery, materials of any kind or any other items required to be carried out during execution of the work. No delay and no claim of any kind shall be entertained from the Contractor, on account of variation in the foreign exchange rate.
14. All ancillary and incidental facilities required for execution of work like, stores, fabrication yard, offices for Contractor & Consultants, watch and ward, temporary ramp required to be made for working at the basement level (if required), temporary structure for plants and machineries, temporary boundary wall or fencing around the working sites, water storage tanks, installation and consumption charges of temporary electricity, telephone, water etc. required for execution of the work, liaison and pursuing for obtaining various No Objection Certificates, completion certificates from local bodies etc., protection works, testing facilities / laboratory at site of work, facilities for all field tests and for taking samples etc. during execution or any other activity which is necessary (for execution of work and as directed by Engineer-in-Charge), shall be deemed to be included in rates quoted by the EPC Contractor, for various items in the schedule of quantities. Nothing extra shall be payable on these accounts. Before start of the work, the Contractor shall submit to the Engineer-in-Charge, a site / construction yard layout, specifying areas for construction, site office, positioning of machinery, material yard, cement & other storage, fabrication yard, site laboratory, water

tank etc. Contractor shall not be permitted for construction of any type of temporary labour hutment in the working site.

15. For completing the work in time, the Contractor might be required to work in two or more shifts (including night shifts). No claim whatsoever shall be entertained on this account, not with-standing the fact that the Contractor may have to pay extra amounts for any reason, to the labourers and other staff engaged directly or indirectly on the work according to the provisions of the labour and other statutory bodies regulations and the agreement entered upon by the Contractor with them. The work in night shift and /or any holiday shall be done only after due approval of E-in-C and in presence of EPC contractor technical team.
16. All material shall only be brought at site as per program finalized with the Engineer-in-Charge. Any pre-delivery of the material not required for immediate consumption shall not be accepted and thus may not paid for.
17. The cost of flooring is inclusive of providing sunken flooring in bath-rooms, kitchen, etc. if provided and nothing extra on this account shall be payable.
18. Any legal or financial implications resulting out of carriage of earth from outside or disposal of earth shall be sole responsibility of the contractor. Nothing extra shall be paid on this account.
19. The work should be planned in a systematic manner so that chase cuttings in the walls, ceilings and floors are minimized. Wherever absolutely essential, the chase shall be cut using chase cutting machines. Chases will not be allowed to be cut using hammer / chisel. The electrical boxes should be fixed in walls simultaneously while raising the brick work. The contractor shall ensure proper coordination of various disciplines viz. sanitary & water supply, electrical, fire-fighting and any other services.
20. All the hidden items such as water supply lines, drainage pipes, conduits, sewers etc. are to be properly tested as per the design conditions submitted before covering.
21. Quality Assurance:
    - 21.1 The contractor shall ensure quality control measures on different aspects of construction including materials, workmanship and correct construction methodologies to be adopted.
    - 21.2 The contractor shall get the source of various raw materials namely aggregate, cement, sand, steel, water etc. to be used on the work, approved from the Engineer-in-Charge and trial mixes for controlled concrete shall be done using the approved materials. The contractor shall stick to the approved source unless it is absolutely unavoidable. Any change shall be done with the prior approval of the Engineer-in-Charge for which tests etc. shall be done by the contractor at his own cost.
    - 21.3 Similarly, the contractor shall submit brand/make of various materials to be used for the approval of the Engineer-in-Charge along with samples and once approved, he shall stick to it. Any change will have to be got approved from Engineer-in-charge in advance.
    - 21.4 The contractor shall submit shop drawings of staging and shuttering arrangement, stone cladding and other works including mock work as desired

by Engineer-in-Charge for his approval before execution. The contractor shall also submit bar bending schedule for approval of Engineer-in-Charge before execution.

21.5 The contractor shall depute Quality Manager exclusively for enforcement of quality control. Such Quality Manager should be a qualified engineer with minimum Eight years of similar experience. For other staff to be deployed for quality assurance, the contractor may refer to clause 36(i) under schedule "F" attached.

21.6 THIRD PARTY QUALITY ASSURANCE: In order to achieve a high standard of quality, it shall be required to go for Third Party Quality Assurance. For this purpose, a separate agency shall be appointed by the University who will carry out independent testing of materials and checking and ensuring overall quality procedures. The contractor shall be required to fully cooperate with agency and facilitate them in taking samples, transportation and examination of various activities including documentation at no extra time and cost to the University. In case of any adverse findings by the agency, the contractor shall do the needful rectifications at no extra time and cost to the University. The Engineer-in-charge shall be at liberty for getting quality assurance work done through agencies like IIT, NIT, Govt. Engineering College or any other agency approved by competent authority, the fee of third-party quality agency shall be borne by the University. The successful tenderer shall include the provisions of Quality Assurance while framing the proposed methodology for tests.

22. Safety Precautions – Contractor shall within two weeks of award of work, submit to the Engineer-in-Charge for his approval, list of measures for maintaining safety of manpower deployed for construction and avoidance of accidents. Contractor will be fully responsible to ensure safety of workers deployed at site.

23. Scaffolding – For facia work, outer finishing and other RCC works etc. double steel scaffolding having two sets of vertical supports with steel staircase for inspection of works by Engineer-in-charge or his/her representatives shall be used. The supports shall be sound and strong, tied together with horizontal piece and also secured horizontally with the building as per EHS norms, over which scaffolding planks shall be fixed.

24. SAMPLES FOR TESTING:

24.1 Samples of all materials required for testing is included in the cost of work. Similarly, all testing charges in house or through external lab shall be borne by the EPC contractor.

24.2 If any load testing or special testing is to be done for any sample whose strength is doubtful, the cost of the same shall also be borne by the contractor.

24.3 In case there is any discrepancy in frequency of testing as given in list of mandatory tests and that in individual sub-heads of work as per CPWD Specifications, higher of the two frequencies of testing shall be followed.

24.4 The contractor has to establish field laboratory at site as specified in CPWD Specifications and as per list under Appendix-III including all necessary

equipment for field tests at his own cost within one month from the award of work.

25. The contractor should submit for approval of Engineer-in-Charge workshop drawings, technical submittals and samples of the work to be performed under the specified items of work before actually commencing the mass execution of the work under the item. For this they will prepare a sample room / quarters and toilet blocks for each type of building for approval of Engineer-in-charge of work. Nothing extra shall be payable on this account.
26. Maintenance of Register of Tests –
    - 26.1 All the registers of tests carried out at construction site or in outside laboratories shall be maintained by the contractor which shall be issued to the contractor by Engineer-in-Charge.
    - 26.2 All samples of materials including cement concrete cubes shall be taken jointly with contractor by the representatives of NU Engineering Section and Engineers of PMC (MECON Ltd). All the necessary assistance shall be provided by the contractor. Cost of sampling & testing are to be borne by the contractor and he shall be responsible for safe custody of samples to be tested at site/ outside laboratory.
    - 26.3 All the tests in field lab at construction site shall be carried out by the Engineering staff deployed by the contractor and shall be 100% witnessed by JE and 50% of tests shall be witnessed by AE –in-Charge.
    - 26.4 At least 10% of the tests are to be witnessed by the E-in- C. Minimum 25% of all samples should be tested in outside approved laboratory/ Govt. Engineering colleges.
    - 26.5 All the entries in the registers will be made by the designated Engineering Staff of the contractor and same should be regularly reviewed by NU Engineering Section and Engineers of PMC.
    - 26.6 Contractor shall be responsible for safe custody of all the test registers.
    - 26.7 Submission of copy of all test registers, Material at site register and hindrance register along with each alternate Running Account Bill and Final Bill shall be mandatory. These registers should be duly checked by NU Engineering Section and Engineers of PMC and receipts of registers should also be acknowledged by the PMC.
    - 26.8 If all the test registers and reports are not submitted along with alternate R/A Bill & Final Bill, no payment will be released to the contractor.
27. Maintenance of Material at Site (MAS) Register – All the MAS Registers including cement and Steel Registers which shall be issued to the contractor by Engineer-in-Charge shall be maintained by Contractor at site and shall be open for inspection by the University.
28. The contractor shall submit to the Engineer-in-charge on the 7th day of each month, 2 hard copies and one on soft copy (CD) of monthly progress report of work. Such progress report will include the project progress, summary, work progress (planned vs actual), CPM chart, status of financial progress and achievement of milestone,

manpower deployment status, inventory of materials and photographs of important activities. For delay in submission of the report, compensation @ Rs. 2,000/- (Rupees Two Thousand only) per day of delay subject to maximum of Rs. 20, 000/- for each report will be recovered from the amount payable to the contractor.

29. Contractor(s) shall pay all fees, taxes and charges which may be levied on account of any construction activity including transportation of material in executing the contract.
30. The Contractor(s) shall take all precautions to avoid accidents by exhibiting necessary caution boards day and night, speed limit board, red flags, red lights and providing barriers and use of PPE gadgets as per EHS plan approved by E-in-C. He shall be responsible for all damages and accidents caused to existing/new work due to negligence on his part. No hindrances shall be caused to traffic during the execution of the work. In case of any accident of labours / contractual staff's the entire responsibility will rest on the part of the contractor and any compensation under such circumstances if becomes payable the same shall be entirely borne by the contractor and department shall have no role on this account.
31. The contractor(s) shall take instructions from the Engineer-in-Charge regarding collection and stacking of materials at any place. No excavated earth or building rubbish shall be stacked on areas where other buildings, roads, services and compound walls are to be constructed. The stacking shall take place as per stacking plan however, if any change is required, the same shall be done with the approval of Engineer-in-Charge.
32. Contractor(s) shall provide permanent bench marks, flag tops and other reference points for the proper execution of work and these shall be preserved till the end of the work. All such reference points shall be in relation to the levels and locations, given in the Architectural and plumbing drawings.
33. Contractor shall put up the barricading, at his cost, all around the buildings sites through suitable method for segregating the construction site and also to control the dust pollution in the campus. Entry to all the construction sites shall be controlled for proper security of man and materials and to avoid accidents.
34. On completion of work, the Contractor(s) shall submit at his own cost four prints of "AS BUILT" drawings to the Engineer-in-Charge. These drawings shall have the following information:
    - 34.1 Run off all piping and their diameters including soil waste pipes and vertical stacks.
    - 34.2 Ground and invert levels of all drainage pipes together with locations of all manholes and connections, up to outfall.
    - 34.3 Run off all water supply line with diameters, locations of control valves, access panels etc.
35. Water tanks, taps, sanitary, water supply and drainages pipes, fittings and accessories should conform to the specifications provided in bidding documents, if CPWD Specifications are not available, NBC – 2016, IS codes shall be followed. The contractor(s) should engage approved, licensed plumbers for the work and get the materials (fixtures/fittings) tested, by the municipal Body/Corporation authorities

wherever required at his own cost. The Contractor shall submit for the approval of the Engineer-in-Charge the name of the plumbing Agency proposed to be engaged by him.

36. The contractor shall give performance test of the entire installation(s) as per the specifications & codes in the presence of the Engineer-in-charge or his authorized representative before the work is finally accepted and nothing extra what-so-ever shall be payable to the contractor for the test.
37. Any cement slurry added over base surface for continuation of concerting for better bond is deemed to have been built in the items and nothing extra shall be payable and no extra cement considered in consumption on this account.
38. The Contractor shall bear all incidental charges for cartage, storage and safe custody of materials issued by department/arranged by the contractor.
39. WATER PROOFING TREATMENT OF ALL TYPES OF WORK:
    The water proofing work shall be carried out by specialized water proofing agencies. The Contractor shall submit for the approval of the Engineer-in-Charge, the names of specialized agencies, of repute along with their technical capability proposed to be engaged by him, who have executed satisfactorily a minimum of three works of value not less than 40% of corresponding value each or two works of value not less than 60% each or one work of value not less than 80% of corresponding amount in the last five years. For calculation purpose only, cost of waterproofing works will be taken as Rs. 1.00 Cr. The water proofing should be full proof & use of crystalline material may also be done in combination of other water proofing (modern and sound) method to be doubly sure.
40. PILE WORK:
    The pile work if provided in the drawings shall be carried out by specialized agency having experience in pile works. The Contractor shall submit for the approval of the Engineer-in-Charge, the names of specialized agencies, of repute along with their technical capability proposed to be engaged by him, who have executed satisfactorily a minimum of three works of value not less than 40% of corresponding value each or two works of value not less than 60% each or one work of value not less than 80% of corresponding amount in the last five years. For calculation purpose only, cost of pile works will be taken as Rs. 10.00 Cr.
41. ALUMINIUM/GLASS WORK:
    The aluminium/glass work shall be carried out by specialized agency having adequate workshop with necessary equipment and having the experience in aluminium/glass works. The Contractor(s) shall submit for the approval of the Engineer-in-Charge, the names of specialized agencies, of repute along with their technical capability proposed to be engaged by him, who have executed satisfactorily a minimum of three works of value not less than 40% of corresponding value each or two works of value not less than 60 % each or one work of value not less than 80% of corresponding amount in the last five years. For calculation purpose only, cost of aluminium/glass works will be taken as Rs. 3.00 Cr.
42. STRUCTURAL GLAZING WORK:
    The structural glazing work shall be carried out by specialized agency having adequate workshop with necessary equipment and having the experience in structural glazing

works. The Contractor(s) shall submit for the approval of the Engineer-in-Charge, the names of specialized agencies, of repute along with their technical capability proposed to be engaged by him, who have executed satisfactorily a minimum of three works of value not less than 40% of corresponding value each or two works of value not less than 60 % each or one work of value not less than 80% of corresponding amount in the last five years. For calculation purpose only, cost of structural glazing works will be taken as Rs. 1.25 Cr.

43. The work shall be carried out in accordance with the approved Architectural drawings and structural drawings, to be prepared and submitted by architectural/structural consultants engaged by the EPC contractor, duly vetted by the proof checking reputed institute and approved by the Engineer-in-Charge. Before commencement of any item of work the contractor shall correlate all the relevant architectural and structural drawings, nomenclature of items and specifications etc. issued for the work and satisfy himself that the information available there from is complete and unambiguous. The figure and written dimension of the drawings shall be superseding the measurement by scale. The discrepancy, if any, shall be brought to the notice of the Engineer-in-charge before execution of the work. The contractor alone shall be responsible for any loss or damage occurring by the commencement of work on the basis of any erroneous and or incomplete information and no claim whatsoever shall be entertained on this account.
44. Other agencies/sub-contractor will also simultaneously execute and install the works of & other specialized equipment as indicated in bid document, lifts, fire-fighting etc. of this work and the contractor shall extend necessary facilities for the same. The contractor shall leave such recesses, holes, opening etc. as may be required for the electric/ gas pipe lines and other related works and nothing extra shall be payable on this account.
45. The contractor shall conduct his work, so as not to interfere with or hinder the progress or completion of the work being performed by other contractor(s) or by the Engineer-in-Charge and shall as far as possible arrange his work and shall place and dispose of the materials being used or removed, so as not to interfere with the operations of other contractor simultaneously working or he shall arrange his work with that of the others in an acceptable and coordinated manner and shall perform it in proper sequence to the complete satisfaction of others.
46. PROGRAMME CHART - The contractor shall submit a Time and Progress Chart for each mile stone. The Engineer-in-Charge may within 15 days thereafter, if required modify, and communicate the programme approved to the contractor failing which the programme submitted by the contractor shall be deemed to be approved by the Engineer-in-Charge. The work programme shall include all details of balance drawings and decisions required to complete the contract along with material/equipment ordering & delivery plan with specific dates by which these details are planned by contractor without causing any delay in execution of the work. The chart shall be prepared in direct relation to the time stated in the contract documents for completion of items of the works. It shall indicate the forecast of the dates of commencement and completion of various trades of sections of the work and may be amended as necessary by agreement between the Engineer-in-Charge and the Contractor within the limitations of time imposed

in the Contract documents, and further to ensure good progress during the execution of the work, the contractor shall in all cases in which the time allowed for any work, exceeds one month (save the special jobs for which a separate programme has been agreed upon) complete the work as per mile stones given in Schedule 'F'.

47. In case of non-submission of construction programme by the contractor the program approved by the Engineer-in-Charge shall be deemed to be final.
48. The approval by the Engineer-in-Charge of such programme shall not relieve the contractor of any of the obligations under the contract.
49. The contractor shall submit the Time and Progress Chart and progress report using the mutually agreed software and format as decided by Engineer-in-charge for the work done during previous month to the Engineer-in-Charge on or before 5th day of each month failing which a recovery Rs. 5,000/- shall be made on per week or part basis in case of delay in submission of the monthly progress report.
50. If the work is carried out in more than one shift or during night, no claim on this account shall be entertained.
51. Existing drains, pipes, cables, over-head wires, sewer lines, water lines and similar service encountered in the course of the execution of work shall be protected against the damage by the contractor at his own expense. In case the same are to be removed and diverted. The same shall be payable to the contractor. The contractor shall work out the cost and the same shall be approved by Engineer-in-Charge. The contractor shall not store materials or otherwise occupy any part of the site in a manner likely to hinder the operation of such services.
52. The contractor shall be responsible for the watch and ward / guard of the buildings' safety, fittings and fixtures provided by him against pilferage and breakage during the period of installations and thereafter till the building is physically handed over to the University. No extra payment shall be made on this account.
53. SAMPLE OF MATERIALS - BIS marked materials except otherwise specified shall be subjected to quality test at the discretion of the Engineer-in-Charge besides testing of other materials as per the specifications described for the item/material. Wherever BIS marked materials are brought to the site of work, the contractor shall, if required, by the Engineer-in-Charge furnish manufacturer's test certificate or test certificate from approved testing laboratory to establish that the material/ procured by the contractor for incorporation in the work satisfies the provisions of specifications/BIS codes relevant to the material and / or the work done.

    For certain items, if frequency of tests not mentioned in the CPWD Specifications and then relevant IS code shall be followed and tests shall be carried out as per the frequency specified therein.
54. The contractor shall render all help and assistance in documenting the total sequence of this project by way of photography, slides, audio-video recording etc. nothing extra shall by payable to the contractor on this account. However, cost of photographs, slides, audio-videography etc. shall be borne by the University.

55. The contractor shall be fully responsible for the safe custody of materials brought by him/issued to him even though the materials may be under double lock and key system.
56. The contractor shall procure the required materials in advance so that there is sufficient time for testing of the materials and approval of the same before use in the work. The contractor shall provide at his own cost suitable weighing and measuring arrangements at site for checking the weight / dimensions as may be necessary for execution of work. The sealed samples are to be handed over to the testing lab by contractor in the presence of PMC representatives.

ADDITIONAL CONDITIONS FOR WORKS

1. The tenderer shall acquaint himself with the proposed site of work, its approach roads, working space available etc. before quoting his rates and no claim on this account shall be entertained by the University.
2. Clear site is available and no demolition of any existing structure is involved. However, removal of trees/plants and shifting them to a designated placed as per direction of the Engineer-In-Charge shall be the responsibility of contractor if coming in layout of roads and buildings.
3. The University does not bind himself to accept the lowest bid as the selection process is on QCBS mode, and reserves the right to reject any or all of the bids received, without assigning any reasons and there shall be no claims on this account.
4. The contractor(s) shall get himself acquainted with nature and extent of the work and satisfy himself about the availability of materials from kiln or approved quarries for collection and conveyance of materials required for construction.
5. The bidders shall study the Indicative Architectural drawings and soil investigation report for the site, enclosed along with this tender document and satisfy himself about complete characteristics of soil and other parameters at site. However, no claim on the alleged inadequacy or incorrectness of the soil data supplied by the university shall be entertained.
6. The tenderer shall see the approaches to the site. In case any approach from main road is required at site or existing approach is to be improved and maintained for cartage of materials by the contractor, the same shall be provided, improved and maintained by the contractor at his own cost. No payment shall be made on this account.
7. Contractor shall take all precautionary measures to avoid any damage to adjoining property. All necessary arrangement shall be made at his own cost.
8. The contractor shall take all necessary precautions to prevent any nuisance or inconvenience to the University or its occupiers of adjacent properties and to prevent any damage to such properties and any pollution of smoke, streams and water-ways. The Contractor shall make good at his cost and to the satisfaction of the Engineer-in-Charge, any damage to roads, paths, cross drainage works or any other University property whatsoever caused thereon by the contractor. All waste or superfluous materials shall be carried away by the contractor without any reservation entirely to the satisfaction of the Engineer-in-Charge.
9. Utmost care shall be taken to keep the noise level to the barest minimum so that no disturbance as far as possible is caused to the University occupants / users of the adjacent buildings/properties.
10. SETTING OUT –
    10.1 The contractor shall establish, maintain and assume responsibility for grids, lines, levels and bench marks. He shall report any errors or inconsistencies regarding grids, lines, levels, dimensions to the Engineer-in-Charge before

commencing work. Commencement of work shall be regarded as the contractor's acceptance of such grids, lines, levels and dimensions and no claim shall be entertained at a later date for any errors found.

10.2 If at any time, any error in this respect appears during the progress of the work, the contractor shall, at his own expense rectify such error if so required to the satisfaction of the Engineer-in-Charge.

10.3 Though the site levels may be indicated in the drawings the contractor shall ascertain himself and confirm the site levels with respect to GTS bench mark from the concerned authorities.

10.4 The approval by the Engineer-in-Charge of the setting out by the contractor shall not relieve the contractor of any of his responsibilities.

10.5 The contractor shall be entirely and exclusively responsible for the horizontal, vertical and other alignment, the level and correctness of every part of the work and shall rectify effectively any errors or imperfections therein. Such rectifications shall be carried out by the contractor at his own cost to the instructions and satisfaction of the Engineer-in-Charge.

11. The rates quoted by the contractor are deemed to be inclusive of site clearance, setting out work, profile, establishment of reference bench mark, spot levels, construction of all safety and protection devices, barriers, earth embankments, preparatory works, all testing of materials working during monsoon, working at all depths, height and locations etc. unless specified in the schedule of quantities.
12. Royalty including the seigniorage charges at the prevailing rates wherever payable shall have to be paid by the contractor on the boulders, metal, shingle, sand and bajri etc. or any other material collected by him for the work direct to revenue authorities and nothing extra shall be paid by the University for the same.
13. The contractor shall provide at his own cost suitable weighing, surveying and leveling and measuring arrangements as may be necessary at site for checking. All such equipment shall be got calibrated in advance from laboratory, approved by the Engineer-in-Charge. Nothing extra shall be payable on this account.
14. The contractor shall get the water tested with regard to its suitability and conforming to the relevant IS Code. The contractor shall obtain written approval from the Engineer-in-Charge before he proceeds by using the same for execution of work. The water testing charges shall be borne by the contractor.
15. Other agencies/sub-contractor under the EPC Contractor will also simultaneously execute and install the works of sub-station / generating sets, air-conditioning, lifts, etc. for the work and the contractor shall afford necessary facilities for the same. The contractor shall leave such recesses, holes, openings, trenches etc. as may be required for such related works for which inserts, sleeves, brackets, conduits, base plates, clamps etc. shall be supplied free of cost by the Contractor unless otherwise specifically mentioned and the contractor shall fix the same at time of casting of concrete, stone work and brick work, if required, and nothing extra shall be payable on this account.

16. All materials obtained from Govt. Stores or otherwise shall be got checked by the Engineer-in-Charge or his any authorized supervisory staff on receipt of the same at site before use.
17. All material shall only be brought at site as per programme finalized with the Engineer-in-Charge. Any delivery of the material not required for immediate consumption shall may not be accepted.
18. The Architectural drawings given in the tender other than those indicated in nomenclature of items are only indicative of the nature of the work and materials/fixings involved unless and otherwise specifically mentioned. However, the work shall be executed in accordance with the drawings prepared by the consultant and duly approved by the Engineer-in-Charge.
19. All materials and fittings brought by the contractor to the site for use shall conform to the samples approved by the Engineer-in-Charge which shall be preserved till the completion of the work. If a particular brand of material is specified in the item of work in Schedule of Quantity, the same shall be used after getting the same approved from Engineer-in-Charge. Wherever brand / quality of material is not specified in the item of work, the contractor shall submit the samples as per approved list of brand names given in the tender document / particular specifications for approval of technical sanctioning authority. For all other items, materials and fittings of ISI Marked shall be used with the approval of Engineer-in-Charge. Wherever ISI Marked material / fittings are not available, the contractor shall submit samples of materials / fittings manufactured by firms of repute conforming to relevant specifications or IS codes and use the same only after getting the approval. To avoid delay, contractor should submit samples as stated above well in advance so as to give timely orders for procurement. If any material, even though approved by Engineer-in-Charge is found defective or not conforming to specifications shall be replaced / removed by the contractor at his own risk & cost.
20. The contractor shall ensure quality construction in a planned and time bound manner. Any sub-standard material / work beyond set-out tolerance limit shall be summarily rejected by the Engineer-in-Charge & contractor shall be bound to replace / remove such sub-standard / defective work immediately.
21. The day-to-day receipt and issue accounts of different grade/brand of cement shall be maintained separately in the standard Performa by the PMC and which shall be duly signed by the contractor or his authorized representative & the PMC representative.
22. Cement bags shall be stored in two separate godowns, one for tested cement and the other for fresh cement (under testing) to be constructed by the contractor at his own cost as per sketches given in C.P.W.D Specifications – 2009 Vol. I to II with up-to-date correction slips having weatherproof roofs and walls. The size of the cement go down is indicated in the sketch for guidance. The actual size of godown shall be as per site requirements and nothing extra shall be paid for the same. The decisions of the Engineer-in-Charge regarding the capacity needed will be final. The account of daily receipt and issue of cement shall be maintained in a register in the prescribed proforma and signed daily by the contractor or his authorized agent and the PMC representative in token its correctness.

23. For construction works which are likely to generate malba / rubbish the contractor shall dispose malba, rubbish & other unserviceable materials and wastes at his own cost to the notified / specified Municipal dumping ground only and under no circumstances these shall be stacked / dumped even temporarily, outside the construction premises.
24. In the event of any restrictions being imposed by the Security agency, the University, Traffic or any other authority having jurisdiction in the area on the working or movement of labour /material, the contractor shall strictly follow such restrictions and nothing extra shall be payable to the contractor on this account. The loss of time on this account, if any, shall have to be make up by generating additional resources etc.
25. The proposed building work is a prestigious project and quality of work is of paramount importance. Contractor shall have to engage well experienced skilled labour and deploy modern T&P and other equipment to execute the work. Many items like stone masonry & stone cladding work, stone flooring & other specialized flooring work, wood work, precast RCC coffers, polysulphide / silicon sealant, etc. will specifically require engagement of skilled workers having experience particularly in execution of such items.
26. No payment shall be made for any damage caused by rain, flood or any other natural calamity, whatsoever during the execution of the work. The contractor shall be fully responsible for any damage to the University property and work for which the payment has been advanced to him under the contract and he shall make good the same at his own risk and cost. The contractor shall be fully responsible for safety and security of his material, T&P, Machinery brought to the site by him.

27. CONDITIONS OF CONTRACT SPECIFIC TO GREEN BUILDING PRACTICE –

The contractor shall strictly adhere to the following conditions as part of his contractual obligations –

A. SITE:

(i) The contractor shall ensure that adequate measures are taken for the prevention of erosion of the top soil during the construction phase. The contractor shall implement the Erosion and Sedimentation Control Plan (ESCP) provided to him by the Engineer in Charge as part of the larger Construction Management Plan (CMP). The contractor shall obtain the Erosion and Sedimentation Control Plan (ESCP) Guidelines from the Engineer in Charge and then prepare working plan for the following month activities as a CAD drawing showing the construction management, staging & ESCP. At no time soil should be allowed to erode away from the site and sediments should be trapped where necessary.

(ii) The contractor shall ensure that all the top soil excavated during construction works is neatly stacked and is not mixed with other excavated earth. The contractors shall take the clearance of the Engineer in Charge before any excavation. Top soil should be stripped to a depth of 20 cm (centimeters) from the areas to be disturbed, for example proposed area for buildings, roads,

paved areas, external services and area required for construction activities etc. It shall be stockpiled to a maximum height of 40 cm in designated areas, covered or stabilized with temporary seeding for erosion prevention and shall be reapplied to site during plantation, landscaping etc. of the proposed vegetation. Top soil shall be separated from subsoil, debris and stones larger than 50 mm (millimeter) diameter. The stored top soil may be used as finished grade for planting areas.

(iii) The Contractor should follow the construction plan as proposed by the Architect / Engineer in Charge to minimize the site disturbance such as soil pollution due to spilling. Use staging and spill prevention and control plan to restrict the spilling of the contaminating material on site. Protect top soil from erosion by collection storage and reapplication of top soil, constructing sediment basin, contour trenching, mulching etc.

(iv) No excavated earth shall be removed from the campus unless suggested otherwise by Engineer in Charge. All subsoil shall be reused in backfilling/landscape, etc. as per the instructions of the Engineer in Charge. The surplus excavated earth shall be disposed of by the contractor at his own cost from the campus after approval from E-in-

(v) The cost of disposal of surplus earth is inclusive in the cost of item no.2 of schedule of quantities.

(vi) The contractor shall not change the natural gradient of the ground unless specifically instructed by the Engineer in Charge. This shall cover all-natural features like water bodies, drainage gullies, slopes, mounds, depressions, etc. Existing drainage patterns through or into any preservation area shall not be modified unless specifically directed by the Engineer-in-charge.

(vii) The contractor shall not carry out any work which results in the blockage of natural drainage.

(viii) The contractor shall ensure that existing grades of soil shall be maintained around existing vegetation and lowering or raising the levels around the vegetation is not allowed unless specifically directed by the Engineer-in-charge

(ix) Contractor shall reduce pollution and land development impacts from automobiles use during construction.

(x) Overloading of trucks is unlawful and creates the erosion and sedimentation problems, especially when loose materials like stone dust, excavated earth, sand etc. are moved. Proper covering must take place. No overloading shall be permitted.

(xi) The dismantle material/building rubbish received from dismantling/demolishing shall be dumped to the dumping ground in properly covered truck with precaution. Agency shall submit the hard copy of photograph showing the properly covered truck disposing the dismantles material/building rubbish. Failure of which shall be sternly dealt and a penalty

@ Rs.500/- per trip of truck shall be levied and the decision of Engineer-in-Charge shall be final & binding.

(xii) Agency/contractor shall not dump the construction material on the road and shall keep the construction material on the physically demarcated space by the Engineer-in-Charge.

(xiii) All the building material responsible for pollution shall be brought at site from sources covered by tarpaulin and shall take all precautionary measure to ensure that no dust particles are permitted to pollute the air quality, failure of which Agency shall be liable to pay damages as decided by Engineer-in-Charge. The decision of Engineer-in-Charge shall be final & binding.

(xiv) There shall be no burning of leaves, plastic etc. at construction site.

B. CONSTRUCTION PHASE AND WORKER FACILITIES - The contractor shall specify and limit construction activity in preplanned/ designated areas and shall start construction work after securing the approval for the same from the Engineer in Charge. This shall include areas of construction, storage of materials, and material and personnel movement.

C. PRESERVE AND PROTECT LANDSCAPE DURING CONSTRUCTION –

(i) The contractor shall ensure that no trees, existing or otherwise, shall be harmed and damage to roots should be prevented during trenching, placing backfill, driving or parking heavy equipment, dumping of trash, oil, paint, and other materials detrimental to plant health. These activities should be restricted to the areas outside of the canopy of the tree, or, from a safe distance from the tree/plant by means of barricading. Trees will not be used for support; their trunks shall not be damaged by cutting and carving or by nailing posters, advertisements or other material. Lighting of fires or carrying out heat or gas emitting construction activity within the ground, covered by canopy of the tree is not to be permitted.

(ii) The contractor shall take steps to protect trees or saplings identified for preservation within the construction site using tree guards of approved specification.

(iii) Contractor should limit all construction activity within the specified area as per the Construction Management Plan (CMP) approved by Engineer in Charge.

(iv) The contractor shall avoid cut and fill in the root zones, through delineating and fencing the drip line (the spread limit of a canopy projected on the ground) of all the trees or group of trees. Separate the zones of movement of heavy equipment, parking, or excessive foot traffic from the fenced plant protection zones.

(v) The contractor shall ensure that maintenance activities during construction period shall be performed as needed to ensure that the vegetation remains healthy.

D. Contractor shall be required to develop and implement a waste management plan, quantifying material diversion goals. He shall establish goals for diversion from disposal in landfills and incinerators and adopt a construction waste management plan to achieve these goals. A project-wide policy of nothing leaves the Site, should be followed, in such a case when strictly followed, care would automatically be taken in ordering and timing of materials such that excess does not become waste. The Contractor ingenuity is especially called towards meeting this prerequisite/ credit (5 STAR GRIHA-LD). Consider recycling cardboard, metal, brick, acoustical tile, concrete, plastic, clean wood, glass, gypsum wallboard, carpet and insulation. Designate a specific area(s) on the construction site for segregated or commingled collection of recyclable material, and track recycling efforts throughout the construction process. Identify construction haulers and recyclers to handle the designated materials. The diversion may include donation of materials to charitable organizations and salvage of materials on-site.

E. Contractor shall collect all construction waste generated on site. Segregate these wastes based on their utility and examine means of sending such waste to manufacturing units which use them as raw material or other site which require it for specific purpose. Typical construction debris could be broken bricks, steel bars, broken tiles, spilled concrete and mortar etc.

F. The contractor shall provide potable water for all workers.

G. The contractor shall provide the minimum level of sanitation and safety facilities for the workers at their camp/labour site. The contractor shall ensure cleanliness of workplace with regard to the disposal of waste and effluent; provide clean drinking water and latrines and urinals as per applicable standard. Adequate toilet facilities shall be provided for the workman within easy access of their place of work. The total no. to be provided shall not be less than 1 per 30 employees in any one shift. Toilet facilities shall be provided from the start of building operations, connection to a sewer shall be made as soon as practicable. Every toilet shall be so constructed that the occupant is sheltered from view and protected from the weather and falling objects. Toilet facilities shall be maintained in a sanitary condition. A sufficient quantity of disinfectant shall be provided. Natural or artificial illumination shall be provided.

H. The contractor shall ensure that air pollution due to dust/generators is kept to a minimum, preventing any adverse effects on the workers and other people in and around the site. The contractor shall ensure proper screening, covering stockpiles, covering brick and loads of dusty materials, wheel-washing facility, gravel pit, and water spraying. Contractor shall ensure the following activities to prevent air pollution during construction:

   (i) Clear vegetation only from areas where work will start right away
   (ii) Vegetate / mulch areas where vehicles do not ply.
   (iii) Apply gravel / landscaping rock to the areas where mulching / paving is impractical

(iv) Identify roads on-site that would be used for vehicular traffic. Upgrade vehicular roads (if these are unpaved) by increasing the surface strength by improving particle size, shape and mineral types that make up the surface & base. Add surface gravel to reduce source of dust emission. Limit amount of fine particles (smaller than 0.075mm) to 10 - 20%.

(v) Water spray, through a simple hose for small projects, to keep dust under control. Fine mists should be used to control fine particulate. However, this should be done with care so as not to waste water. Heavy watering can also create mud, which when tracked onto paved public roadways, must be promptly removed. Also, there must be an adequate supply of clean water nearby to ensure that spray nozzles don't get plugged.

(vi) Water spraying shall be done on:

a. Any dusty materials before transferring, loading and unloading
b. Area where any demolition work is being carried out
c. Any un-paved main haul road
d. Areas where excavation or earth moving activities are to be carried out
e. Existing campus internal roads which are being used by the Contractor for hauling of materials/movement of construction vehicle/equipment.

(vii) The contractor shall ensure that the speed of vehicles within the site is limited to 20 km/hr.

(viii) All material storages should be adequately covered and contained so that they are not exposed to situations where winds on site could lead to dust / particulate emissions.

(ix) Spills of dirt or dusty materials will be cleaned up promptly so the spilled material does not become a source of fugitive dust and also to prevent of seepage of pollutant laden water into the ground aquifers. When cleaning up the spill, ensure that the clean-up process does not generate additional dust. Similarly, spilled concrete slurries or liquid wastes should be contained / leaned up immediately before they can infiltrate into the soil / ground or runoff in nearby areas

(x) Provide barricading as per direction of Engineer-in-charge, along the site boundary, next to a road, around batching plant or other public area.

(xi) Provide dust screens or netting to scaffold along the perimeter of the building

(xii) Cover stockpiles of dusty material with impervious sheeting

(xiii) Cover dusty load on vehicles by impervious sheeting before they leave the site

I. Contractor shall be required to provide an easily accessible area that serves the entire building and is dedicated to the separation, collection and storage of materials for recycling including (at a minimum) paper, corrugated cardboard,

glass, plastics, and metals. He shall coordinate the size and functionality of the recycling areas with the anticipated collections services for glass, plastic, office paper, newspaper, cardboard, and organic wastes to maximize the effectiveness of the dedicated areas. Consider employing cardboard balers, aluminium can crushers, recycling chutes, and collection bins at individual workstations to further enhance the recycling program.

J. The contractor shall ensure that no construction leachate (e.g., cement slurry etc.), is allowed to percolate into the ground. Adequate precautions are to be taken to safeguard against this including, reduction of wasteful curing processes, collection, basic filtering and reuse. The contractor shall follow requisite measures for collecting drainage water run-off from construction areas and material storage sites and diverting water flow away from such polluted areas. Temporary drainage channels, perimeter dike/swale, etc. shall be constructed to carry the pollutant-laden water directly to the treatment device or facility (in-campus existing sewer line).

K. Staging (dividing a construction area into two or more areas to minimize the area of soil that will be exposed at any given time) should be done to separate undisturbed land from land disturbed by construction activity and material storage.

28. The contractor shall comply with the safety procedures, norms and guidelines (as applicable) as outlined in the document Part 7 Constructional practices and safety, 2005, National Building code of India, Bureau of Indian Standards. A copy of all pertinent regulations and notices concerning accidents, injury and first-aid shall be prominently exhibited at the work site. Depending upon the scope & nature of work, a person qualified in first-aid shall be available at work site to render and direct first-aid to causalities. A telephone may be provided to first-aid assistant with telephone numbers of the office displayed. Complete reports of all accidents and action taken thereon shall be forwarded to the competent authorities.

29. The contractor shall ensure the following activities for construction workers safety, among other measures:

    (i) Guarding all parts of dangerous machinery.
    (ii) Precautionary signs for working on machinery
    (iii) Maintaining hoists and lifts, lifting machines, chains, ropes, and other lifting tackles in good condition.
    (iv) Durable and reusable formwork systems to replace timber formwork and ensure that formwork where used is properly maintained.
    (v) Ensuring that walking surfaces or boards at height are of sound construction and are provided with safety rails or belts.
    (vi) Provide protective equipment; helmets etc.
    (vii) Provide measures to prevent fires. Fire extinguishers and buckets of sand to be provided in the fire-prone area and elsewhere.
    (viii) Provide sufficient and suitable light for working during night time.

30. The storage of material shall be as per standard good practices as specified in Part 7, Section 2. Storage, stacking and Handling practices, NBC 2016 and shall be to the satisfaction of the Engineer in Charge to ensure minimum wastage and to prevent any misuse, damage, inconvenience or accident. Watch and ward of the Contractors materials shall be his own responsibility. There should be a proper planning of the layout for stacking and storage of different materials, components and equipment with proper access and proper maneuverability of the vehicles carrying the materials. While planning the layout, the requirements of various materials, components and equipment at different stages of construction shall be considered.
31. The contractor shall provide for adequate number of garbage bins around the construction site and the workers facilities and will be responsible for the proper utilization of these bins for any solid waste generated during the construction. The contractor shall ensure that the site and the workers facilities are kept litter free. Separate bins should be provided for plastic, glass, metal, biological and paper waste and labelled in both Hindi and English with suitable symbols.
32. The contractor shall prepare and submit spill prevention and control plans before the start of construction, clearly stating measures to stop the source of the spill, to contain the spill, to dispose the contaminated material and hazardous wastes, and stating designation of personnel trained to prevent and control spills. Hazardous wastes include pesticides, paints, cleaners, and petroleum products.
33. Contractor shall collect & submit the relevant material certificates for materials with high recycled (both post-industrial and post-consumer) content, including materials like RMC mix with fly-ash, glass with recycled content, calcium silicate boards etc.
34. Contractor shall collect the relevant material certificates for rapidly renewable materials such as bamboo, wool, cotton insulation, agrifiber, linoleum, wheat board, strawboard and cork etc.
35. Where possible, the contractor shall select materials/vendors, harvested and manufactured regionally, within an 800-km radius of the project site.
36. Contractor shall adopt an IAQ (Indoor Air Quality) management plan to protect the HVAC system during construction, control pollutant sources, and interrupt pathways for contamination. He shall sequence installation of materials to avoid contamination of absorptive materials such as insulation, carpeting, ceiling tile, and gypsum wallboard. He shall also protect stored on-site or installed absorptive materials from moisture damage.
37. The contractor shall ensure that a flush out of all internal spaces is conducted prior to handover. This shall comprise an opening of all doors and windows for 14 days to vent out any toxic fumes due to paints, varnishes, polishes, etc.
38. Contractor shall make efforts to reduce the quantity of indoor air contaminants that are odorous or potentially irritating harmful to the comfort and well-being of installer and building occupants. Contractor shall ensure that the VOC (Volatile Organic Compounds) content of paints, coatings and primers used must not exceed the VOC content limits mentioned below:

Paints

1) Non-flat - 150 g/L
2) Flat (Mat) - 50 g/L
3) Anti-corrosive/ anti rust - 250 g/L

Coatings / Clear wood finishes

1) Varnish - 350 g/L
2) Lacquer - 550 g/L
3) Floor coatings - 100 g/L
4) Stains - 250 g/L

Sealers

1) Waterproofing sealer - 250 g/L
2) Sanding sealer - 275 g/L
3) Other sealers - 200 g/L

The VOC (Volatile Organic Compounds) content of adhesives and sealants used must be less than VOC content limits mentioned:

Architectural Applications VOC Limit (g/l less water)

- Indoor Carpet adhesives - 50 g/L
- Carpet Pad Adhesives - 50 g/L
- Wood Flooring Adhesive - 100 g/L
- Rubber Floor Adhesives - 60 g/L
- Sub Floor Adhesives - 50 g/L
- Ceramic Tile Adhesives - 65 g/L
- VCT and Asphalt Tile adhesives - 50 g/L
- Dry Wall and Panel Adhesives - 50 g/L
- Structural Glazing Adhesives - 100 g/L
- Multipurpose Construction Adhesives - 70 g/L

Substrate Specific Application VOC Limit (g/l less water)

- Metal to Metal - 30 g/L
- Plastic Foams - 50 g/L
- Porous material (except wood) - 50 g/L

- Wood - 30 g/L
- Fiber Glass - 80 g/L

39. Wherever required, Contractor shall meet and carry out documentation of all activities on site, supplementation of information, and submittals in accordance with 5 STAR GRIHA-LD program standards and guidelines. Towards meeting the aforementioned building environmental rating standard(s) expert assistance shall be provided to him up on request.
40. Water Use during Construction - Contractor should spray curing water on concrete structure and shall not allow free flow of water. Concrete structures should be kept covered with thick cloth/gunny bags and water should be sprayed on them. Contractor shall do water ponding on all sunken slabs using cement and sand mortar.
41. The Contractor shall remove from site all rubbish and debris generated by the Works and keep Works clean and tidy throughout the Contract Period. All the serviceable and non-serviceable (malba) material shall be segregated and stored separately. The malba obtained during construction shall be collected in well-formed heaps at properly selected places, keeping in a view safe condition for workmen in the area. Materials which are likely to cause dust nuisance or undue environmental pollution in any other way, shall be removed from the site at the earliest and till then they shall be suitable covered. Glass & steel should be dumped or buried separately to prevent injury. The work of removal of debris should be carried out during day. In case of poor visibility artificial light may be provided.
42. The contractor shall provide O & M Manuals wherever applicable.
43. The contractor shall make himself conversant with the Site Waste Management Program Manual and actively contribute to its compilation by estimating the nature and volume of waste generated by the process/installation in question.
44. MATERIALS & FIXTURES FOR THE PROJECT –
    - 44.1 Contractor will produce wherever feasible certificate regarding distance of the source of the relevant material.
    - 44.2 Unless otherwise stated cement used at site for reinforced concrete, precast members, mortar, plaster, building blocks, etc. shall be PPC (Portland Pozzolana Cement). The PPC must meet the requirements of IS 1489 (Part I) as regards to fly ash content in cement. The contractor shall obtain from the PPC manufacturer the certificate regarding fly ash content in the PPC in each batch of consignment.
    - 44.3 The contractor has to comply as per MoEF issued notification 8.0.763(E) dated 14th Sept.1999 & latest notification of Jan. 2016 containing directive for greater fly ash utilization.
    - 44.4 The contractor shall ensure that all paints, polishes, adhesives and sealants used both internally and externally, on any surface, shall be Low VOC products. The contractor shall get prior approval from the Engineer in Charge before the application of any such material.

44.5 All plumbing and sanitary fixtures installed shall be as per the direction of the Engineer in Charge and shall adhere to the minimum LPM (liters per minute) and LPF (liters per flush) mentioned. The contractor shall employ 100% zero ODP (ozone depletion potential) insulation; HCFC (hydro-chlorofluorocarbon)/ and CFC (chlorofluorocarbon) for HVAC and refrigeration equipment and/halon-free fire suppression and fire extinguishing systems.

45. RESOURCES CONSUMED DURING CONSTRUCTION –

45.1 The contractor shall ensure that the water and electricity is not wasted during construction. The Engineer in Charge can bring to the attention any such wastage and the contractor will have to ensure that such bad practices are corrected.

45.2 The contractor shall install necessary meters and measuring devices to record the consumption of water, electricity and diesel on a monthly basis for the entire tenure of the project.

45.3 The contractor shall ensure that all run-off water from the site, during construction is collected and reused to the maximum.

45.4 The contractor shall use treated recycled water of appropriate quality standards for construction, if available.

45.5 No lights shall be turned on during the period between 6:00 AM to 6:00 PM, without the permission of the Engineer in Charge.

46. CONSTRUCTION WASTE –

46.1 Contractor shall ensure that wastage of construction material is within 3%.

46.2 All construction debris generated during construction shall be carefully segregated and stored in a demarcated waste yard. Clear, identifiable areas shall be provided for each waste type. Employ measures to segregate the waste on site into inert, chemical, or hazardous wastes.

46.3 All construction debris shall be used for road preparation, back filling, etc, as per the instructions of the Engineer in Charge, with necessary activities of sorting, crushing, etc.

46.4 No construction debris shall be taken away from the site, without the prior approval of the Engineer in Charge.

46.5 The contractor shall recycle the unused chemical/hazardous wastes such as oil, paint, batteries, and asbestos.

46.6 If and when construction debris is taken out of the site, after prior permissions from the Engineer in Charge, then the contractor shall ensure the safe disposal of all wastes and will only dispose of any such construction waste in approved dumping sites.

47. DOCUMENTATION –

47.1 The contractor shall, during the entire tenure of the construction phase, submit the following records to the Engineer in Charge on a monthly basis:

47.1.1 Water consumption in liters

47.1.2 Electricity consumption in kwh units

47.1.3 Diesel consumption in liters

47.1.4 Quantum of waste (volumetric/weight basis) generated at site and the aggregated waste types divided into inert, chemical and hazardous wastes.

47.1.5 Digital photo documentation to demonstrate compliance of safety guidelines as specified here and in the Appendix on Safety Conditions.

47.2 The contractor shall submit a document after construction of the buildings, a brief description along with photographic records to show that other areas have not been disturbed during construction. The document should also include brief explanation and photographic records to show erosion and sedimentation control measures adopted. (Document CAD drawing showing site plan details of existing vegetation, existing buildings, existing slopes and site drainage pattern, staging and spill prevention measures, erosion and sedimentation control measures and measures adopted for top soil preservation during construction.

47.3 The contractor shall submit to the Engineer in Charge after construction of the buildings, a detailed as built quantification of the following:

(i) Total materials used
(ii) Total top soil stacked and total reused
(iii) Total earth excavated
(iv) Total waste generated
(v) Total waste reused
(vi) Total water used
(vii) Total electricity, and
(viii) Total diesel consumed

47.4 The contractor shall submit to the Engineer in Charge, before the start of construction, a site plan along with a narrative to demarcate areas on site from which top soil has to be gathered, designate area where it will be stored, measures adopted for top soil preservation and indicate areas where it will be reapplied after construction is complete.

47.5 The contractor shall submit to the Engineer in Charge, a detailed narrative (not more than 250 words) on provision for safe drinking water and sanitation facility for construction workers and site personnel.

47.6 Provide supporting document from the manufacturer of the cement specifying the flyash content in PPC used in reinforced concrete.

47.7 The contractor shall submit the following information to the Engineer-in-charge at the end of construction, for all material brought to site for construction purposes, including manufacturer's certifications, verifying information, and test data, where Specifications sections require data relating to environmental issues including but not limited to:

47.7.1 Source of products: Supplier details and location of the supplier.

47.7.2 Project Recyclability: Submit information to assist Owner and Contractor in recycling materials involved in shipping, handling, and

delivery, and for temporary materials necessary for installation of products.

47.7.3 Recycled Content: Submit information regarding product post-industrial recycled and post-consumer recycled content, Use the Recycled Content Certification Form, to be provided by the Commissioning Authority appointed for the Project.

47.7.4 Product Recyclability: Submit information regarding product and products component's recyclability including potential sources accepting recyclable materials where ever applicable.

47.8 Provide final certification of well-managed forest of origin to provide final documentation of certified sustainably harvested status: Acceptable wood, certified sustainably harvested, certifications shall include:

47.8.1 Clean tech: Provide pollution clearance certificates from all manufacturers of materials

47.8.2 Indoor Air quality and Environmental Issues: Submit emission test data, sourced from the manufacturers, produced by acceptable testing laboratory listed in Quality Assurance Article for materials as required in each specific Specification section.

47.8.3 Certifications from manufacturers of Low VOC paints, adhesives, sealant and polishes used at this particular project site.

47.8.4 Certification from manufacturers of composite wood products/ agro-fibre products on the absence of added urea formaldehyde resin in the products supplied to them to this particular site.

47.8.5 Submit environmental and pollution clearance certificates for all diesel generators installed as part of this project. Provide total support to Engineer in Charge and Green Building Consultants appointed by the Engineer in charge in completing all Green Building Rating related formalities, including signing of forms, providing signed letters in the contractor's letterhead whenever required.

APPROVED MAKE OF MATERIALS (Civil)

Brands names of materials (Refer materials, whichever are applicable for the scope of work) as approved by the Engineer-in-Charge are listed below. However, approved equivalent material of any other specialized firms may be used, in case it is established that the brands specified below are not available in the market but only after approval of the alternate brand by the Engineer-in-Charge. (See also condition of contract)

Sl. No.	Materials	Approved make
1	ACOUSTIC TREATMENT: WALL PANELLING	ARMSTRONG / ECOPHON/ DEXUNE / ANUTONE / HIMALAYA / CREDENZE
2	CALSIUM SILICATE CEILING TILES	CUSTOM
3	READY MIX CONCRETE	ACC, L & T, GRASIM, ULTRA TECH
4	SKIRTING:	CUSTOM
5	SOUND ISOLATION & VIBRATION TREATMENT FOR CEILING:	BSW/ OCEANZ ACOUSTICS/ REGUPOL
6	DOUBLE SKIN INSULATED ROOFING SYSTEM :	MULTICOLOR/ KIRBY/ TIGER STEEL
7	STAGE FLOORING:	CUSTOM
8	CARPET FLOORING:	BLOOMSBURG/ OCEANZ ACOUSTICS/ STANTON
9	HEAVY DUTY PAVER TILES	JOHNSON-(ENDURA),SOMANY-(DURA STONE),PEVIT,
10	ACOUSTIC DOOR	ICA ACOUSTICS/ OCEANZ ACOUSTICS/ ACOUSTICAL SOLUTION INC.
11	POLY-SULPHIDE SEALENT	PIDILITE, TUFFSEAL, SIKA, FOSROC.
12	DAMP PROOF MATEIRAL	IMPERMO, DURASEAL, ACCO-PROOF.
13	STRUCTURAL STEEL SECTIONS	TATA, SAIL, RINL, JINDAL STEEL,
14	ADMIXTURE	FOSROC, SIKA.
15	WHITE CEMENT	J.K. WHITE, BIRLA WHITE.
16	WATER PROOFING COMPOUND	TAPCRETE, CICO, ACCOPROOF, IMPERMO, FOSROC.
17	BITUMEN	INDIAN OIL, HINDUSTAN PETROLEUM, BHARAT PETROLEUM
18	LOCKS/LATCH	GODREJ, HARRISON, LINK.
19	LAMINATES	MERINO. CENTRUY, GREENLAM
20	WIRE MESH	STERLING ENTERPRISES, TRIMURTY WELDED MESH.
21	PRELAMINATED PARTICLE BOARD	CENTURY, ACTION TESSA
22	ADHESIVE	PIDILITE, DUNLOP, SIKA, FOSROC, ENDURA, LATICRETE
23	EPOXY MORTAR	FOSROC, SIKA, PIDILITE
24	DASH FASTNERS	HILTI, FISHER, CANON, BOSCH.
25	FLUSH DOOR SHUTTERS (DECORATIVE/ NON DECORATIVE).	SWASTIC, CORBETT ,CENTURY, GREEN,ARCHID, JENA

26	PVC DOOR FRAME	POLYLINE, DUROPLAST, POLLYWOOD, ACCURA.
27	GLASS FRP DOOR SHUTTERS	POLYLINE, DUROPLAST, CACTUS.
28	BOARD & PLYWOOD	DURO, KITPLY, CENTURY. GREEN PLY
29	HYDRAULIC DOOR CLOSER/ FLOOR SPRING	HARDWYN, GODREJ. DORMA
30	S.S.STAIRCASE RAILING	CONNECT ARCHITECTURAL PRODUCTS PVT.LTD, JINDAL STAINLESS STEEL LTD., ICICH INDUSTRIES, ESSAR
31	FIRE CHECK DOOR	KUTTY DOOR, PROMAT,GODREJ, NAVAIR, SHAKTI, BHAWANI
32	SMOKE SEAL STRIP	PROMAT/ASTRO FLAME.
33	DOOR CLOSER LOCK	INGERSOLL RAND/DORMA.,HARDWYN
34	PANIC EXIT DEVICE	INGERSOLL RAND/MONARCH/DORMA.
35	DOOR COORDINATOR	UL LISTED /MONARCH/DORMA.
36	ANODISED ALUMINIUM HARDWARE (HEAVY DUTY)	HARDIMA, EVERITE, SIGMA (ISI MARKED).
37	TEMPERED / CLEAR / FLOAT / TOUGHENED GLASS	PILKINTON, SAINT GOBAIN, ASAHI.
38	POLYSTER POWER COATING SHADES	NEROLAC, BERGER, J&N.
39	ALUMINIUM SECTIONS	JINDAL, HINDALCO, INDALCO, NALCO
40	FRICTION STAY HINGES	EARL-BIHARI.
41	NUTS, BOLTS AND SCREWS, STEEL	KUNDAN.PRIYA ATUL.
42	EPDM GASKET	HANU/ANAND.
43	STRUCTURAL SILICON	DOW CORNING/WACKER.
44	WEATHER SILICON	DOW CORNING/WACKER.
45	GLAZED CERAMIC TILES	KAJARIA, SOMANY, JOHNSON, ORIENT BELL CERAMICS, /NITCO
46	CEMENT CONCRETE TILES/ HARDONITE TILES	NITCO, NTC, HINDUSTAN, PODDAR.
47	VITRIFIED TILES DOUBLY CHARGED QUALITY	KAJARIA, JOHNSON (MARBONITE), AGL, RAK CERAMIC,SOMANY
48	TILE ADHESIVE	CICO, PIDILITE,FOSROC, SIKA.,ENDURA,LATICRETE
49	CHEQUERED TERRAZO TILES	NITCO, BHARAT, PODDAR.
50	GRASS PAVER	UNISTONE, ULTRA.
51	WATER-PROOF CEMENT PAINT	SNOWCEM, ASIAN.
52	SYNTHETIC ENAMEL PAINT	BERGER, NEROLAC, ASIAN, ICI
53	ACRYLIC EMULSION PAINT	ASIAN, BERGER, NEROLAC, ICI, DULUX.
54	VITREOUS CHINA SANITARYWARE	PARRYWARE, HINDWARE, JOHNSON & JOHONSON, JAGUARE, CERA
55	STAINLESS STEEL SINKS	NILKANTH, AMC, CORBA, NIRALI, JYNA
56	C.P.BRASS FITTINGS	JAQUAR, MARC, PARRYWARE, JOHNSON, HINDWARE, CERA
57	LA(CI) PIPES	RIF, NECO,KAPILANSH
58	G.I.PIPES	TATA, JINDAL, HISSAR,PRAKASH SURYA
59	G.I.FITTINGS (MALLEABLE CAST IRON)	UNIK, ICS.
60	GUNMETAL VALVES	LEADER, SANT, ZOLOTO, KIRLOSKAR
61	STONEWARE PIPE & GULLY TRAPS	PERFECT, PARRY.
62	R.C.C. PIPES- (NP-2)	LAKSHMI SOOD & SOOD , JAIN & CO.
63	MS PIPES	KESORAM, ELECTRO STEEL.

64	C.I.DOUBLE FLANGED SLUICE	KIRLOSKAR, IVC, BURN.
	VALVES.	
65	UPVC PIPE	SUPREME, PRINCE, FINOLEX.
66	COPPER TUBES/PIPES	RAJCO, MAX FLOW ABC.
67	COPPER FITTINGS	YORKSHINE, IBP, BCONEX.
68	BALL VALVES	ZOLOTO, IBP, ARCO.
69	UNGLAZED VITRIFIED TILES	JOHNSON-(ENDURA), SOMANY –(DURA STONE),
		PEVIT.
70	SPIDER FITTINGS	DORMA, SEVAX.
71	INJECTION GROUTING	FOSROC, SIKA.
72	NION METALIC SURFACE HARDNER	FOSROC, SIKA, PIDLITE.
73	SOIL, WASTE & VENT PIPES &	NECO, KAPILANSH, HEPCO,SKF, BIC
	FITTINGS (A) HUBLESS CENTRIFUGAL	
	CAST IRON	
74	BUTTERFLY VALVES	AUDCO, ZOLOTO OR EQUIVALENT.
	FALSE CEILING MINERAIL FIBER	ANUTONE, ARMSTRONG, HIMALAYA, CREDENZE.
75	BAMBOO MAT BOARD FALSE CEILLING	TIMPACK GREENGOLD / SARU DÉCOR / KINZOK
76	BAMBOO MAT BOARD WALL PANELING	TIMPACK GREENGOLD / SARU DÉCOR / KINZOK
77	BAMBOO MAT ROOFING	TIMPACK GREENGOLD / SARU DÉCOR / KINZOK
78	GLASS MOSAIC TILES	BISAZZA, MRIDUL ENTERPRISES, OPIO MOSAICA, PALLADIO GLASS LTD, ITALIA GLASS PVT LTD, PIXEL MOSAIC (I) PVT LTD.
79	REINFORCEMENT STEEL/TMT BARS FE500D	SAIL, TATA, RINL, JINDAL STEEL & POWER, JSW STEEL
80	PPC/ CEMENT	ACC, ULTRATECH, VIKRAM,SHREE CEMENT, AMBUJA, JAYPEE CEMENT,CENTURY & JK CEMENT
81	IRRIGATION EQUIPMENTS	JAIN IRRIGATION, FINOLEX PLASSON, KISAN
82	UPVC DOORS &WINDOWS (PROFILE MAKERS & THEIR AUTHORISED FABRICATORS ONLY)	DUROPLAST, ALUPLAST, KOMMERLING, FINISTA
83	UPVC DOORS &WINDOWS HARDWARE	ROTTO, DORSET, KINLONG
84	HEAT RESISTANCE TITLES	SWASTIK, THARMA TECH
85	MIRROR GLASS	ATUL, MOGIGUARD, JAGUAR, CERA
86	TEXTURE PAINT	ASIAN,NEROLAC,
87	METAL GRID FALSE CEILING	ARMSTRONG, HUNTER DOUGLS.
88	SS ARCHITECHRAL HARDWARE	EBCO, HETTICH, HAFFLE
89	FACTORY MAKE WOODEN FLOORING	GREENLAM, ACTION TESSA
90	AUDITORIUM CHAIRS	HAWORTH, STEELCASE, GODREJ, FINE GRACE, HNI

PART C:

Electrical Works

PART – C1
GENERAL TERMS & CONDITIONS WITH QUALITY ASSURANCE

1.0 GENERAL

1.1 The work shall be executed on EPC (Engineering, Procurement & Commissioning) basis from conception to commissioning of E&M Services.

1.2 Scope of work covers planning, designing, supply, installation, testing and commissioning of all E & M services required to be provided in the said scheme. The work shall be executed as per scope & specifications of E & M works given hereafter and given in respective head / part of the scheme sub-head. If any services required to make the building/ scheme habitable, is not specifically mentioned in the scope of services, the same is deemed to be included within the scope of this tender and nothing extra shall be paid on this account.

1.3 Successful agency is to associate with an experienced firm/sub-consultant for Electrical & Mechanical construction works under Part C2 to C10 of this NIT, having successfully completed similar consultancy/ planning, design, drawing, estimation work of following magnitude:

One work of not less than 8000 sqm builtup area.

OR

Two works each of not less than 6000 sqm builtup area.

OR

Three works each of not less than 4000 sqm builtup area

Similar work shall mean "planning, design, drawings, Estimation of EI work, LAN, Substation, DG set, Lift, Fire Fighting, Fire alarm system & HVAC work . The firm/consultant should have experience certificate of any four out of the following eight services :

a) Internal Electrical Installations
b) Sub-station and DG set
c) Firefighting and automatic fire alarm system
d) HVAC air conditioning system
e) Lifts
f) CCTV, LAN, IPBAX,
g) PROVISSION of Audio Video system
h) IBMS System

NOTE: If one sub-contractor and sub-consultants does not have the requisite experience for all the services then individual sub-contractor and sub-consultants for specialized services may be associated having requisite experience for two building of minimum 8000 sqm.

1.4 The bidder/Agency should submit experience certificate of above mentioned firm/consultant with technical bid documents.

1.5 The successful bidder/Agency will submit the MOU/agreement to engage/associate domain specific specialized firm/consultant within fortnight of award of work. Consultant shall prepare and supply all the coordinated good for construction drawings duly proof checked to be subsequently approved by engineer in charge. The Consultant shall be associated till completion of the project and obtain completion certificate from the concerned local body.

1.6 The scope of works also covers the preparation of layout plans, drawings for E & M schemes, Inventories of Fittings, Fixtures, Equipment etc. and approval of the same from the respective local bodies / EI, CEA, CFO etc. and Engineer-in-Charge, before the commencement of work.

1.7 LT supply required for Installation, Testing & Commissioning shall have to be arranged by the tenderer at his own costs. Water required for testing of equipment is also in scope of contractor.

1.8 The contractor must study specifications and conditions carefully. The work shall be executed in close coordination with the progress of building work.

1.9 Engagement of agencies for execution of E & M works shall fully comply with amendment in CPWD works manual -2014; OM 363 dated 25/01/2018 for various E&M works.

1.10 **Specialized Works -** Contractor shall also be eligible to carry out himself any or all these works without associating specialized agency provided:

1.10.1 He fulfill eligible criteria respectively for these work(s)

OR

1.10.2 He directly procures the equipment of the approved make from manufacturer and gets it installed from authorized agency as per criteria mentioned in the NIT.

1.11 Eligible criteria of each such agency to be associated specialized agencies shall give required affidavit to confirm their association.

1.12 The Tender Accepting Authority may approve change of sub agency in case it is required during the currency of the contract.

1.13 List of Acceptable Makes of major items is attached herewith.

1.14 Only material bearing ISI/BIS certifications mark shall be used in the work. Where material bearing ISI/BIS certifications marks are not available, material conforming to relevant BIS/ISI shall be used with prior approval of Engineer-in-charge.

1.15 If the specifications of any item are not available then the decision of the Engineer-in-charge regarding quality shall be final & binding on the contractor.

1.16 All materials to be used at site shall be got approved from Engineer-in- Charge (Electrical) before using at site.

1.17 All equipment shall be delivered with (i) manufacturer's test certificate, (ii) manufacturer's technical catalogues, and installation / instruction (O&M) manuals.

1.18 All the LED fittings shall be supplied with LM 79 and LM 80 test report from NABL accredited laboratory. All LEDs should Digital addressable Lighting Interface (DALI) with key pads, DBs, KXN & DALI Cables, integrated, dimmable, lux adjustable system, dimmable sensor based.

1.19 **Code & Standards –**

Reference shall be made to the following codes & Standards in general:

1.19.1 CPWD General Specifications for Electrical Works Part I Internal – 2013,

1.19.2 CPWD General Specifications for Electrical Works Part II External –1994,
1.19.3 CPWD General Specifications for Electrical Works Part III (Lift & Escalator) – 2003,
1.19.4 CPWD General Specifications for Electrical Works Part IV Sub-Station–2013,
1.19.5 CPWD General Specifications for Electrical Works Part- V Wet Riser & Sprinkler System– 2006
1.19.6 CPWD General Specifications for Electrical Works Part VI Fire Alarm System – 2018,
1.19.7 CPWD General Specifications for Electrical Works Part VII DG Sets- 2013,
1.19.8 CPWD General Specifications for Electrical Works Part VIII Gas Based Fire Extinguishing System – 2013,
1.19.9 CPWD General Specifications for Heating, Ventilation & Air-Conditioning –2017
1.19.10 National Building Code of India- 2016
1.19.11 National Electrical Code of India -1985
1.19.12 Energy Conservation Building Code of India -2017
1.19.13 Relevant BIS Codes for equipment &installation
1.19.14 Various by-laws and norms of local bodies.

2.0 Climatic Conditions

2.1 All electrical equipment, accessories and fittings employed in electrical installation shall be specified, designed and derated for continuous and trouble free operation in the climatic conditions of the equipment location which are summarized as follows:

2.1.1 Maximum ambient air temperature: 47 º C
2.1.2 Minimum ambient air temperature: 13º C
2.1.3 Maximum relative humidity: 88 % RH
2.1.4 Indoor air temperature (not air-conditioned): 34ºC
2.1.5 Indian Metrological data for past 100 years + 20% of safety whichever will be more stringent.

4.0 The brief Scope of various E&M services are as under: -

4.1 Light Fittings, Emergency/UPS &Power wiring:

4.1.1 Illumination, ceiling fan as per Architectural Drawings subject to compliance to the CPWD Specification & NBC2016.

4.1.2 Only LED Light fittings (model & make approved by NU) to be provided. Switching of Light fittings to be managed with IP based Occupancy Sensors, Day Light Sensors along with load controllers for energy savings. All office, Common area, Corridor, & facade lights including new and innovating technology related specifications published by CPWD on 19.08.2019/latest, will be connected through BMS system except inside Guest rooms. Master/override control to be provided for complete lightings for all area except guest rooms. Suitable rating energy saving switch shall be fixed in all guest rooms to control lights & power. Building facade lighting should be done with LED luminaries and as directed by Engineer in charge.

4.1.3 Compound Lighting to be provided with modern stylish LED lighting placed on MS Poles (Colored PU paint) at suitable height & spacing along the Road and Boundary Wall. All external Lights will be RF controller and automation based based.

4.1.4 In office workstations 1 set (2 nos 6A socket & one no 15A socket with 2 nos 15A switch) switch & socket & 1 no LAN socket shall be considered and 2 sets of above sockets socket for each officers work station. Additional no of 15amp Power Plug, 5amp light plug outlet, CAT 6A/above cable-based LAN point outlet, Telephone outlet and cable TV outlet to be provided as per good engineering practice.

4.1.5 In all guest rooms decorative type LED wall bracket, basin light, foot light, LED batten light to be fixed as per interior design requirement. Two sets (One set -2 nos 6A switch & socket with 1 no LAN socket) socket outlet & 1 no 6/16A switch socket & 1 no telephone outlet shall be installed in guest bed room. In guest living room 1 nos IP based TV socket & 4 nos 6 A sockets shall be installed as per interior layout.

4.1.6 Other's area- 6/16 A switch& sockets or industrial sockets to be installed as per requirement or as directed by engineer in-charge.

4.1.7 IP based TV outlet to be provided as per good engineering practice.

4.1.8 DG power backup to be provided for all the lighting loads, & computer sockets of office building, essential power points and AHU loads including HVAC system and chillers.

4.2 UPS WITH COMMUNICATION CARD - Centralized UPS system for halls, rooms, corridors, common area inside buildings and office spaces to be considered The, UPS will be connected with IBMS system, Light/ Extra Low Voltage Systems, IT Racks, CCTV systems and all essential IT systems. Number of UPS (1+1, each full ratings and same size of another UPS for redundancy, + Battery Bank= 1+1, all with parallel operations).

4.3 Air Conditioning System: All office area of the building excluding toilet, lift lobby is to be provided with Central Air- conditioning system. Separate AHU/FCU shall be considered on the basis of utilization of the area. Chilled water from Central AC Plant shall be fed to each of the AHUs& FCUs. Precession Air conditioning system shall be preferred in the data/IT/ELV rooms.

4.4 Configuration of AC plant will be 2W+1S. It shall be water cooled type Screw AC System with COMMUNICABLE VFD OR Radiant Cooling System. The systems should be efficient and latest wrt BEE, Energy Conservation Building Code (Latest) with better IPLV. For detail, the CPWD specification to be followed. The AC system should be IBMS integrated system and supplier will be bound to integrate with the central control center (for entire campus) being developed by another agency. This includes all indoor & outdoor units, connecting pipes (all kind to make system functional), wires, cables and panels.

4.5 **Firefighting & Fire Alarm System:** Firefighting sprinkler system, Gas based fire suppression system, intelligent fire detection system, PA system, portable fire extinguisher, smoke management systems, lift lobby / lift well / stairs case pressurization system and other fire safety provisions to be made, as per NBC 2016, amended up to date and as per local-by-laws.

4.6 **Network:** One no network socket to be provided for each work stations & for each guest of guest room. Two numbers network socket for each officer's cabin & work station. IP based telephone system shall be installed for each officer's cabin, workstations, guest rooms & as requirement for site. All active & passive components supply installation testing & commissioning is in the contactor scope.

4.7 **CCTV:** IP based CCTV should cover all common passage area, inside lift, all entry points and as per requirement NVR & hard disk size should be selected for minimum 60 days video backup. The IP BASED CCTV will required to be integrated with exiting VMS including necessary manageable switches/routers.

4.8 Planning for Solar Panel (only planning, and architectural provision)

4.9 Planning for minimum 70KWp Roof Top based Solar Photo Voltaic Power Generation Units to be designed.

4.10 Planning for Sound & Conference system (only planning, and architectural, conduiting, better Cabling System & structural provision)

4.11 Planning for Projector, LED display board & audio system should be provided for conference room with sufficient numbers power sockets, IP based LAN, telephone outlet, communication cable, individual gooseneck microphone points etc. as required. Conference room should be designed for audio & video conferencing system. The points and wiring provision for Audio & projector system shall be installed in auditorium.

4.12 **Lift:** The Lifts are to be provided, as per the Architectural Drg. The speed of lift should be 1.50 mtr. / Sec.

4.13 **Access Control System:** Access control to be installed as per requirement in office area and RFID based door lock system for all guest room with energy saving switch. Sufficient no of RFID cards (Master & individual) /access control cards, card encoder, decoder shall be provided & installed as required.

4.14 **IBMS (Integrated Building Management System):** Integrated Building management shall cover all lighting, AC, Fire Pump, Fire alarm panel, Water pump, Sub-station, DG sets, UPS, Lift shall be connected with centralized Building Management system.

5. Layout Plans /Drawings

5.1 The layout plans / drawings / other documents pertaining to E&M services and information in the following format shall have to be submitted for evaluation & approval, within time frame given in mile stone or within this document.

Sl. No.	E&M Work including Building Management AND SCADA	Information to be furnished by the successful bidder
1.	Internal & External Electrical Installations	Layout Drawings, Inventory of Light / Fans Points, Power points, Fans & Fixtures envisaged
2.	Substation Equipment, SCADA SYSTEM & DG Set	Capacity calculations, Complete design details, schematic drawings, equipment specification of HT Panels, Transformers, MV Panels, Engine, Alternator, Enclosure, Exhaust Gas Pipe Line, etc. The substation should have SCADA center and this need to be further integrated with existing control center. The substation SCADA includes display unit size minimum 65 inch, control and monitoring through SCADA, and provision for RF communication for central control center of the SCADA.
3.	Lift	Detailed drawing complete with Nos. & capacity of passenger lifts i/c speed proposed to be installed.
4.	Firefighting and sprinkler system	Detailed Layout drawing, Inventory of Nos. & size of risers / down comer / sprinkler heads, Fire Fighting Pumps etc. Schematic diagram of Pumps, Pipelines, Hydrants, Sprinklers etc., wiring Diagram of MV Panels with SCADA.
5.	Fire Alarm System	Detailed Layout drawing, Inventory of detectors, MCB, Sounders, Talk Back System, and Control Panels of total area to be protected by Intelligent Addressable Fire Alarm system.
6.	Air-conditioning with IBMS	Heat Load Calculation, Complete design of Package Equipment, Fans, Plumbing, Ducting and other associated works. All valves and diverters should be motorized and SCADA/IBMS Compatible to ensure

		automatic operation, and remote control with monitoring.
7.	Design Provision for Solar PV System & SITC of Solar Heating System	Complete calculations, design capacity details, wiring schematic drawings, plumbing circuit, equipment specifications of Solar PV system and Solar heating system.
8.	Audio Video System	Complete design details, schematic drawings, Wiring
9.	Reinforcement, Stage Lighting, Power CCTV & Mechanical Car parking etc	Equipment specification of Audio Video System, Sound Reinforcement, Stage Lighting, Power Curtain, CCTV, etc.

5.2 The above schemes of all the E&M works shall have to meet all the requirements of local bodies / CEA/ NBC norms as applicable & also meet the technical specifications of various relevant CPWD specifications for electrical & mechanical services.

5.3 All the above schemes shall be got approved from respective local bodies / CFO etc. as applicable before commencement of execution of work at site. During execution, if the local bodies etc. require a modification, the same shall be executed without any extra cost. Finally, after execution, obtaining approvals / NOCs / clearances from local bodies etc. shall be the responsibility of successful bidder for which nothing extra is payable, in case any modification/Extra work is required. All statutory fees / charges required for obtaining clearances from CEA / Local Bodies shall be paid by the University.

6. INSPECTION BEFORE DISPATCH

6.0 All routine tests shall be conducted before dispatch of equipment. No equipment shall be dispatched from the manufacture's premises without such tests being conducted and test result recorded. These test certificates shall be given along with the supply of equipment. The Engineer In-charge shall, if he so desires inspect and witness the pre-delivery tests. For this purpose, the contractor shall give 15 days" advance notice. Agency shall arrange for inspection by the department. Department shall bear expenses for inspection as far as traveling, boarding and / lodging is concerned. However, waiver if any, for inspection shall be at the discretion of the Engineer-in-Charge without any cost implication but full ROUTINE TEST & TYPE TEST Certificates shall have to be submitted for equipment.

6.1 Prior to dispatch, all equipment shall be adequately protected & insured for the whole period of transit, storage and erection against corrosion and incidental damages etc. from the effect of vermin, sunlight, rain, heat and humid climate.

7. INSURANCE

7.0 The contractor shall include storage cum erection insurance including third party insurance right from the storage to commissioning of various equipment with beneficiary as Engineer In-charge. All insurance which the contractor is required to enter into under the contract shall be affected with any authorized general insurance company and the contractor shall produce the policies of insurance.

8. REMEDY OF FAILURE TO INSURE

8.0 If the contractor fails to effect and keep in force the insurance referred to in the preceding sub- clause the department may effect and keep in force any such insurance and pay such premium as may be necessary for that purpose and from time to time deduct the amount, so paid by the department, from any money due or which may become due to tenderer and recover the same as from the contractor's bill.

9. QUALITY OF MATERIAL AND WORKMANSHIP

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

10. INSPECTION AND TESTING AT SITE

10.0 The installation shall be subject to necessary inspection during every stage of erection, by the Engineer In-charge or his authorized representative. The successful tenderer shall provide all facilities and assistance for the purpose.

10.1 The completed installation shall be inspected and tested by the Engineer-in-Charge in the manner as will be laid down by him, in consultation with the contractor.

10.2 All instruments and facilities necessary for the tests shall be provided by the contractor.

10.3 All major items shall be inspected by the Engineer-in-charge or his authorized representative before dispatch from manufacturer's workshop.

10.4 Materials and Quality Assurance for E&M Services

10.5 General guidelines for Quality Assurance

10.6 Quality to be ensured at the execution stage and works to be executed as per contract conditions and CPWD General Specification for Electrical Works.

10.7 All the materials, equipment and work shall conform to the Agreement.

10.8 Makes of all the material and equipment etc. shall be strictly as per agreement and as approved by the University.

10.9 The model numbers of various equipment and work approved by Engineer-in-charge shall be checked for their conformity to the agreement.

10.10 The technical data sheet and manufacturing drawing for all equipment and materials as per contract specifications shall be prepared by the respective manufacturer's and will be submitted by contractor dully signed before placing the order or manufacturing the material. The engineer-in-charge shall approve as per contract conditions.

10.11 Generally total quantity of any item in the contract shall be supplied in not more than four lots. However, engineer-in-charge can decide number of lots in which quantities to be supplied as per site requirements.

10.12 The materials shall be tested from 3rd party laboratories. The laboratories shall preferably be Government Labs/ Government Autonomous bodies or as approved by competent authority.

10.13 The testing at manufacturer' works shall be clearly specified in the tender documents.

10.14 For the tests to be conducted at manufacture's works, the tests shall be conducted in the presence of engineer-in-charge or his authorized representative. The dispatch note shall be issued only after satisfactory completion of the test.

10.15 The layout/ working drawings/ shop drawings etc., shall be prepared in AutoCAD or equivalent software by the contractor for all the services as defined in CPWD Specifications along with automation requirement and agreement conditions. The engineer-in-charge shall approve all the drawings before start of execution of work. All the drawings of various equipment and works approved by Engineer –in-charge shall be checked for their conformity to the agreement.

10.16 The QA guidelines for various packages are as detailed below. The delivery challans of the materials may be checked for ascertaining the genuineness of the material.

10.17 The QA plan/ testing etc. for the other works, if required, shall be decided by Engineer-in-charge to ensure quality of materials, equipment and work etc. as per Agreement.

10.18 Testing plan in respective para, may be para 3, with policy is for guidance, and can be suitably amended by NIT approving authority.

11. QUALITY ASSURANCE PLANS:

11.0 Internal Electrical Installations

11.0.1 The detailed instructions on safety procedures given in BIS code no. 5216:1982 "Code of safety Procedures and Practices in Electrical works" shall be strictly followed. Safety procedures given in Chapter 10 of CPWD General Specifications for Electrical works Part-1(Internal) 2013 shall be followed. Safety recommendation as per IE rules 1956 as per Appendix "C" of CPWD General Specifications for Electrical works Part-1(Internal) 2013.

11.0.2 The materials shall be tested from 3rd Party laboratories are conduit, wires, cables etc.

11.0.3 Provisions and fixing of check-nuts for conduit work as per CPWD Specifications.

11.0.4 No. of wires in one conduit shall be ensure as per CPWD specifications.

11.0.5 Colour coding of wires to be ensure.

11.0.6 Legs and thimbles at cable/ wire ends in switch boxes as per CPWD Specifications.

11.0.7 Labeling of switch boxes shall be ensured.

11.0.8 Termination of earth terminals in earth pits, switch box, DBs and accessories to be ensured.

11.0.9 Earth chamber to be constructed and proper marking to be done.

11.0.10 Comprehensive schematic diagram is prepared starting from the main board up to the final DBs. All such boards are duly marked and numbered. The pre commissioning testing of the installation shall be carried out such as Insulation resistance test. Polarity test of switch. Earth continuity test. Earth electrode resistance test.

11.0.11 All the tests at site shall be carried out for the completed installations, in the presence of and to the satisfaction of the Engineer in Charge by the contractor. All the test results shall be recorded and submitted to the University.

11.0.12 On completion of an electrical installation (or an extension to an installation), a certificate shall be furnished by the electrical contractor, countersigned by the certified supervisor under whose direct supervision the installation was carried out. This certificate shall be in the prescribed form as given in Appendix "E" of CPWD General Specifications for Electrical works Part-1(Internal) in addition to the test certificate required by the local electric supply authorities.

11.1 Sub-Station (Indoor Type) with SCADA System:

11.1.1 **H.T. Panel -** HT panel shall be inspected and tested at manufacturer's works as per relevant BIS especially for insulation, operating mechanism, interlocking and contact resistance. CT ratio and accuracy class shall be checked as per agreement and IS 2705-1992. All system with SCADA. The valid Type test report shall be submitted by the contractor before its approval.

11.1.2 Pre Commissioning tests –

a) Relay calibration and setting tests by both secondary injection method and primary injection methods.

b) Operation checks and lubrication of all moving parts. Interlock function checks. Continuity checks of wiring, fuses etc. as required. Insulation test. Trip test and protection gear tests.

c) Complete panel shall be tested with meggar of voltage for which the panel is rated for insulation between poles and poles to earth. For of

CTs and PTs secondary side insulation shall also be tested using meggar of voltage for which it is rated. Any other test as may be required by the License/ inspector shall be conducted. Where specified, the entire switch board shall withstand high voltage test after installation.

11.1.3 **Transformer -** Pre-dispatch tests at manufacturer's works-The inspecting officers shall ensure all requisite accessories as per agreement have been provided on the transformers. Rating and diagram plate at appropriate location shall be ensured. Transformers shall be inspected and tested at manufacturer's works for all routine and other tests prescribed by, with particular attention to losses meeting ECBC norms given in CPWD Specifications. Type test certificate for exact same design for impulse withstand and short circuit withstand. Temperature rise test of one transformer of each design and capacity shall be done. Copies of the certificate for pressure test, test for bushings shall be supplied to the department.

Tests at site: - All relevant pre commissioning checks and tests shall be done before energization. The following tests are to be particularly done before cable jointing or connecting the bus bar trunking:

Insulation test between HV to earth and HV to MV. Insulation test between MV to earth. All tests are to be recorded and report should be submitted to the University. MV Panel (Total type tested panel, TTA). All SCADA compatible system and further implantation of the Automation System.

Drawings Stage: - Type test certificates to be submitted at the stage of drawing submission/ technical submittal for following: -

Verification of degree of protection. Verification of Temperature rise limits. Verification of short circuit strength.

Test at Manufacturer's Works: All routine tests shall be carried out and test certificates produced to the department. The following tests in particular shall be carried out:

Checking of bus bar & it supports for material, dimension and spacing, enclosure size of bus bar chamber etc. w.r.t. the report of independent lab for successful fault withstand test for the specified capacity and time in contract. Metal sheet thickness. Ratings of switchgear and accessories. Compartmentalization of panel. Proper earth connection facility as per specifications. Bus bar rating, colour coding and material quality. Insulators and insulating/ shroud sheets of proper quality. Insulation test. Earth test. High Voltage test. Test for proper operation of interlocking as per design.

Trip/ operation test of switchgear by secondary injection. Dimensional checking as per approved GA drawing. Phase to Phase & Phase to Earth clearances between links & the nuts & bolts on the links. Visual inspection of paint quality & shade.

Tests at site: -

a) All wiring checks and connections. Relay adjustments/setting. Operation checks and lubrication of all moving parts.

b) Interlock function checks. Continuity checks of wiring, fuses etc. as required. Insulation tests:

c) when measured with 500V meggar insulation resistance shall not be less than 100M Ohms.

Bus Trunking (Sandwich): -

Drawings Stage: -

Type test certificates to be submitted at the stage of drawing submission/ technical submittal for following: -

Degree of protection. Temperature rise limits. Short circuit withstand capacity. Dielectric Strength. Test at manufacturer's works: -

All routine tests shall be carried out and test certificates produced to the department. The following tests in particular shall be carried out:

Checking of bus bar & its supports for material, dimension and spacing, enclosure size of bus bar chamber etc. w.r.t. the report of independent lab for successful fault withstand test for the specified capacity and time in contract. Metal sheet thickness. Ratings of switchgear and accessories. Proper earth connection facility as per specifications. Bus bar rating, colour coding and material quality. Insulators and insulating sheets of proper quality. Insulation test. Earth test. High Voltage test. Dimensional checking as per approved GA drawing.

Pre-Commissioning Tests:

Verification of insulation resistance. Inspection of assemblies, interlocks, locks etc. Check on wiring if provided, Dielectric test.

Earthing: -

Earthing materials w.r.t. weight and size shall be checked at site. Termination of earth terminals in earth pits, switch box, DBs and accessories to be ensured. Earth chamber to be constructed and proper marking to be done. Earth electrode resistance to be tested and recorded. Earth continuity.

Cabling: -

Cable to be tested from 3rd party lab for meeting the relevant BIS and CPWD Specifications. The cable drums shall be stored properly to avoid damages. The cable route drawing shall be approved by Engineer-in-charge. Laying of cable including bends as per CPWD Specifications and necessary protection shall be provided as per agreement. The cable shall be tested for continuity and insulation resistance before laying as well as before covering. Extra loop cable shall be provided on each terminal end of the cable and joints. Suitable protection shall be provided for road crossing and cable entry to the building. Route marker shall be installed. Lugs and thimbles at cable/ wire ends in panels as per CPWD Specifications. Cables shall be tested after laying as per CPWD Specifications. Cables laid on cable trays to be provided with suitable marker tags for cable identification.

Cable Tray:-

Material to be tested in 3rd party laboratories. Visual inspection for dimensions & perforation area shall be done. Fastener & rods of adequate size and strength. Factory fabricated bends, reducer, tee/cross junctions shall be provided.

Cable tray shall be earthed at both ends. Proper painting to be ensured. Pre commissioning test such as phase sequence test, polarity test, Hi-pot test and earth resistance test. Setting of relays, timers, meters, interlocking (mechanical & electrical) etc., selection of tap of CTs in HT & LT Panels as required. The line diagram including schematic scheme and operation logics will be made and displayed in Sub- Station as well as control room. Shock treatment chart & safety equipment, insulating mats, etc. to be appropriately placed.

AIR CONDITIONING SYSTEM WITH IBMS: -

Chilling unit (Chiller): -

In **case** the chiller model is approved after the award of work, the chiller model selection sheet shall be got verified. One chilling unit of each capacity shall be tested for its capacity as well as IKW/TR at full load and IPLV etc. At contracted parameters at AHRI certified testbed.
The highest rating and energy efficient chillers as per ECBC and others norms for Rajgir area shall be considered. Preferably, the magnetic (brushless) and radiant type chillers will be preferred.

AHUs & FCUs: - It shall be tested at manufacturer's works as per CPWD General Specification for Electrical Works along with SCADA system. The factory test of fans w.r.t. Db level, static pressure, CFM and leaving velocity shall be done at manufacturer's works. The capacity test of one AHU in lot of 8units irrespective of capacity shall be done. Engineer in charge shall choose the capacity of AHUs to be tested.MS Pipes shall be tested in respect of thickness and weight at site with respect to relevant BIS standards. Pressure testing of pipes for 1.5 times of working pressure as per CPWD Specifications. Ducting material shall be tested at 3rd Party Laboratories as per relevant BIS. Leakage test in the duct shall be done as per relevant standards. Thermal insulation materials shall be got tested at 3rd Party Laboratories as per specifications mentioned in tender particularly for density and Kvalue. Inspection and testing of LT Panel shall be done as per given in Substation section. Inspection and testing of Bus Trunking shall be done as per given in Substation section. Cables shall be tested as per given in Substation section. Earthing shall be tested as per given in Substation section .Pre commissioning test such as insulation, earth continuity, Valve adjustments etc. shall be done. Post Commissioning tests such as air outlet velocity at grills, capacity test of all the major equipment such as chilling units, cooling towers, AHUs etc. During main season shall be done. Testing of inside condition at various locations achieved as defined in design conditions. Display of schematic with operation logic in AC plant room as well as control room. The pre-insulated pipes and ducts will be preferred.

Fire Fighting: -

Pipes shall be tested for thickness and weight as per Specifications and tender conditions. Pressure testing of the pipes shall be done as per relevant CPWD General Specification for Electrical Works after installation, welding etc. before commissioning of the system at 1.5 times the working pressure. Cable, LT Panel & Earthing shall be tested as given in Substation section. The auto operation of all pumps shall be tested as per the designed sequence and at required pressure drop. Fire conditions to be simulated and temperature of actuation of sprinkler to recorded. Checks for required Audio video signal as per agreement. The line diagram including schematic and operation logics will be made and displayed in Fire pump room as well as control room.
In addition to above, Adequate fire extinguishers (ABC & others) shall be installed.

Fire Alarms: -

Wires as per Section on EI. Pre commissioning tests:-

Insulation tests. Fire Alarm Activation and Zone identification on Fire Alarm panel and PC at Fire control room. On activation, PA system to be tested for annunciation at all Zones and individual zone as defined. Testing of talk back system for operation and clear communication with fire control rooms.

DG Sets: -

Load testing of DG Set at factory and site shall be done as per relevant CPWD General Specification for Electrical Works. AMF and/or synchronizing, as the case may be, panel shall be inspected and tested at manufacturer's works as per MV Panel given in the Sub-Station section. Workmanship of Pipe insulation, length and height of exhaust pipe and silencer type and its certificate as per agreement. This fuel storage tank provision for the functioning of the all DG set for the marked/designed location minimum 24 hours at full load.

Lifts:-

Controller simulation test at manufacturers works. General inspection as per CPWD Specifications. Post installation testing as per CPWD Specifications.

Street/ Compound Lighting with RF system: -

Proper alignment of poles to be ensured. Cables to be laid as per CPWD Specifications.

Makes and models of poles/ luminary shall confirm to technical specifications etc. as per agreement. Photometry test of each type of luminary shall be conducted at manufacturer's works. Cables, Feeder Pillar &Earthing shall be done as per sub-station section. Display of Schematic in control room as well as feeder pillars includes operations and logics etc. Poles shall be tested at manufacturer's works for the following tests: -

a) Tensile test,
b) Deflection test,
c) Permanent set test,
d) Drop test.
e) Visual inspection for dimensional check &finish.

TESTING PLANS

The testing plan for quality control for major E&M services is attached as **Annexure-A**. These plans are to be read along with following guiding notes:

The material to be supplied against the contract shall be not older more than 6 months from date of receipt at site. To procure the genuine material from suppliers/ authorized dealer etc shall be the responsibility of contractor who

shall preserve copies of invoice/ excise gate pass/ proof of dispatch and the same shall be made available for specially to engineer-in-charge for examination/ scrutiny/ verification as deemed fit by him. As per guideline only routine test as prescribed in IS/ CPWD specifications shall be carried at manufacture works/ third party labs. Type test/ special test/ optional test shall be carried out only if stipulated in Bid Document/Contract. All items to be used and workmanship shall be thoroughly checked physically and for their performance as per agreement. As per guideline only routine test as prescribed in IS/ CPWD specifications shall be carried at manufacture works/ third party labs. Type test/ special test/ optional test shall be carried out, wherever stipulated in Bid Document/Contract. All items to be used and workmanship shall be thoroughly checked physically and for their performance as per agreement.

STAGE OF PAYMENT:

Work	Work Value	%Age of Total Value	%Age of This Job Value
1. IEI			
(i) Installation of Light & Power Conduit & modular boxes, DBs			
(ii) Drawing wire, Fixing switch & sockets, MCBs			
(iii) Supplying of Light Fittings			
(iv) Supply of ring mains			
(v) Complete of all above installation job			
2. Sub station			
(i) Supply of Equipment (DG, Transformer, Panels, Busduct, Cables)			
(ii) Installation, testing commissioning of above items			
3. Airconditioning System			
(i) Supply of Chiller unit			
(ii) Supply of AHU/FCUs, Refrigerant pipe, Pumps, insulation, Valve etc.			
(iii) Installation of above items			

Work	Work Value	%Age of Total Value	%Age of This Job Value
4. Lift			
(i) Supply of Lifts			
(ii) After installation of lift			
5. Fire Fighting system			
(i) Supply of Fire pumps, Pump panel, Valves, Pipe etc.			
(ii) Installation of above items			
6. Fire alarm & CCTV			
(i) Supply of Detectors, alarm panels, CCTV, DVR, Rack etc.			
(ii) Installation of above items			
7. Network			
(i) Supply and laying of network cables			
(ii) Supply of network switch, Racks, IP phones, IPBX.			
(iii) Installation of above items			
8. BMS & Access control system			
(i) Supply of active components.			
(ii) Installation of system			
(iii) Integration of all systems			
9. Solar Panel			
(i) Supply of panels, inverter, GI support structures etc.			
(ii) Installation of above item.			

Annexure-A (for details – please refer to the CPWD QAP guidelines)

Stage /Sl. no	Material / Process	Standard Applicable/ Test Required to be Done	Total Qty (each type) reqd. in agreement or lot size whichever is less	Whether Proof of Dispatch required	Whether Manufacturer's test certificates required	Sample Size	Location of Test	
							At manufacturer works	At third Party Lab
A	**INTERNAL EI**							
1.	LT Panels with ACB	CPWD specs. part IV/QA Plan: Construction, Ratings of SWG, air gaps between phases, phase to body, IP rating, Short Circuit ratings etc.	Any	Y	Y	100%	Y	N
2.	LT Panels with incomer of more than 200A	CPWD specs. part IV/QA Plan: Construction, Ratings of SWG, air gaps between phases, phase to body, IP rating, Short Circuit ratings etc.	Up to 2	Y	Y	0	N	N
			>2 and < 10	Y	Y	1	Y	N
			>10	Y	Y	2	Y	N
3.	Rising Main and Bus Trunking	CPWD specs part IV/QA Plan	Length up to 500 mtr	Y	Y	10% length and fittings	N	N
			Length > 500 mtr	Y	Y	10% length and fittings	Y	N
4.	Rigid MS Conduit	IS 9537 Pt I &2	up to 2500 mtr	Y	N	N	N	N
			>2500 mtr	Y	Y	1 piece of 1 mtr for every 1000mtr	N	Y
B	**STREET /COMPOUND LIGHTING**							

Stage /Sl. no	Material / Process	Standard Applicable/ Test Required to be Done	Total Qty (each type) reqd. in agreement or lot size whichever is less	Whether Proof of Dispatch required	Whether Manufacturer's test certificates required	Sample Size	Location of Test	
							At manufacturer works	At third Party Lab
1	LT Panels with ACB	CPWD specs. part IV/QA Plan: Construction, Ratings of SWG, air gaps between phases , phase to body ,IP rating, Short Circuit ratings etc.	Any	Y	Y	100%	Y	N
2.	LT Panels	CPWD specs. Part IV/QA Plan: Construction, Ratings of SWG, air gaps between phases , phase to body ,IP rating, Short Circuit ratings etc.	Up to 2	Y	Y	0	N	N
			>2 and < 10	Y	Y	1	Y	N
			>10	Y	Y	2	Y	N
3.	Poles	Whether in conformity with tender specs	up to 100	Y	Y	N	N	N
			>100	Y	Y	2%	Y	N
4.	LT Cable	IS 1554 Part 1	up to 2500 mtr	Y	N	N	N	N
			>2500 mtr	Y	Y	1 piece for every 2500 mtr	N	Y
5.	DWC/ Corrugated HDPE pipe	IS 14930, Check for thickness, material, Mechanical Strength and smoothness	Length up to 500 mtr	Y	N	N	N	N
			Length > 500 mtr	Y	Y	One piece for every 500 mtr	N	Y

Stage /Sl. no	Material / Process	Standard Applicable/ Test Required to be Done	Total Qty (each type) reqd. in agreement or lot size whichever is less	Whether Proof of Dispatch required	Whether Manufacturer's test certificates required	Sample Size	Location of Test	
							At manufacturer works	At third Party Lab
6.	Fittings	Whether in conformity with tender specs	>100	Y	Y	NA	N	N
C	**SUB STATION, DG SET, UPS**							
1.	HT Panel	CPWD specs part IV/QA Plan: CT ratio and accuracy Class should be invariably checked	Any	Y	Y	1	Y	N
2.	HT Panel: metering and protection devices	Check CT ratio and accuracy Class, Relays and Meters	Any	Y	Y	1	Y	N
3.	LT Panels with ACB	CPWD specs. part IV/QA Plan: Construction, Ratings of SWG, air gaps between phases, phase to body, IP rating, Short Circuit	Any	Y	Y	1	Y	N
4.	LT Panels with incomer of more than 200 A	CPWD specs. part IV/QA Plan: Construction, Ratings of SWG, air gaps between phases , phase to body ,IP rating, Short Circuit ratings etc.	Up to 2	Y	Y	0	N	N
			>2 and < 10	Y	Y	1	Y	N
			>10	Y	Y	2	Y	N

Stage /Sl. no	Material / Process	Standard Applicable/ Test Required to be Done	Total Qty (each type) reqd. in agreement or lot size whichever is less	Whether Proof of Dispatch required	Whether Manufacturer's test certificates required	Sample Size	Location of Test	
							At manufacturer works	At third Party Lab
5.	Capacitor Panel	CPWD specs part IV/QA Plan: Check for type of capacitors used, operation of relay, settings. Change the load and its type and check functionality	Any	Y	Y	1	Y	N
6.	Rising Main and Bus Trunking	CPWD specs part IV/QA Plan	Length up to 500 mtr	Y	Y	10% length and fittings	N	N
			Length > 500 mtr	Y	Y	10% length and fittings	Y	N
7.	Cable Tray	CPWD Specs. Part I/II: Check for perforation area, paint/Galvanizing thickness and Material Composition	Length up to 500 mtr	Y	Y	N	N	N
			Length > 500 mtr	Y	Y	One piece for every 500 Mtr	N	Y
8.	DWC/ Corrugated HDPE Pipe	IS 14930 , Check for thickness, material, Mechanical Strength and smoothness	Length up to 500 mtr	Y	N	N	N	N
			Length > 500 mtr	Y	Y	One piece for every 500 Mtr	N	Y

Stage /Sl. no	Material / Process	Standard Applicable/ Test Required to be Done	Total Qty (each type) reqd. in agreement or lot size whichever is less	Whether Proof of Dispatch required	Whether Manufacturer's test certificates required	Sample Size	Location of Test	
							At manufacturer works	At third Party Lab
9.	Transformer	CPWD Specs. Part IV/QA Plan: Physical verification of accessories as per agreement and Routine tests as per IS:2026/IS 11171:1985 (whichever applicable), with particular attention to losses meeting ECBC norms / as per agreement, Type test certificate for exact same design for impulse withstand and short circuit withstand shall be made available by Manufacturer, Temperature rise test of one transformer of each design shall be done. Copies of the certificate for pressure test, test for bushings shall be supplied to the department.	Any	Y	Y	100%	Y	N
10.	DG set	Load testing as per CPWD specs	Any	Y	Y	100%	Y	N
11.	UPS	Load testing and operation logic as per CPWD specs , Check for input and output power quality as per agreement	Any	Y	Y	100%	Y	N
12.	HT Cable	IS 1554 Part II	Up to 500 mtr.	Y	Y	1	N	N

Stage /Sl. no	Material / Process	Standard Applicable/ Test Required to be Done	Total Qty (each type) reqd. in agreement or lot size whichever is less	Whether Proof of Dispatch required	Whether Manufacturer's test certificates required	Sample Size	Location of Test	
							At manufacturer works	At third Party Lab
			>500 mtr.	Y	Y	1 Piece for every 500 mt	N	Y
13.	LT Cable	IS 1554 Part I	up to 2500 mtr	Y	N	N	N	N
			>2500 mtr	Y	Y	1 piece for every 2500 mt	N	Y
D	**AIR CONDITIONING**							
1.	Chiller	CPWD specs part VI/ECBC Code/Agreement/QA Plan: COP, Capacity, IKW/TR, IPLV/ NPLV	Any	Y	Y	1	Y*	N
2	Package AC Unit	CPWD specs part VI/ECBC Code/Agreement/QA Plan: COP, Capacity, IKW/TR	Any	Y	Y	1	Y*	N
3.	Split/WT AC	As per tender specs. And BEE ratings.	Up to 50	Y	Y	NA	N	N
			>50	Y	Y	1 for every 50	Y*	N
4.	Pumps	As per tender specs.	Any capacity	Y	Y	100%	N	N
5.	MS Pipes	To be tested for thickness and weight as per applicable IS	Any	Y	Y	1 for every 100 mtr	N	N
6.	Insulation / Acoustics material	To be tested for Density and K value as per tender specs.	up to 1000 Sq mtr	Y	Y	NA	N	N

Stage /Sl. no	Material / Process	Standard Applicable/ Test Required to be Done	Total Qty (each type) reqd. in agreement or lot size whichever is less	Whether Proof of Dispatch required	Whether Manufacturer's test certificates required	Sample Size	Location of Test	
							At manufacturer works	At third Party Lab
			>1000 sqm	Y	Y	1 Sample for every 1000 Sqm	N	Y
7.	Fans for AHU	CPWD specs. part VI/QA Plan: Fans to be tested for Ventilation and Pressurization	up to 20 fans	Y	Y	NA	N	N
			>20 fans	Y	Y	1 for every 20 fans	Y	N
8.	AHU's	CPWD specs. part VI/QA Plan: To be tested for capacity in assembled condition, Fabrication, Cooling coil and filters material & workmanship to be inspected critically.	Up to 20 AHUs	Y	Y	NA	N	N
			>20	Y	Y	1 for every 20 AHUs	Y	N
9.	Ducting material	As per relevant BIS	up to 1000 Sqm	N	N	NA	N	N
			> 1000 Sqm	Y	Y	1 Sample for every 1000 sqm	N	Y
10.	Valves	Flow and controls as per data sheet	up to 20	Y	N	NA	N	N

Stage /Sl. no	Material / Process	Standard Applicable/ Test Required to be Done	Total Qty (each type) reqd. in agreement or lot size whichever is less	Whether Proof of Dispatch required	Whether Manufacturer's test certificates required	Sample Size	Location of Test	
							At manufacturer works	At third Party Lab
			> 20	Y	Y	1 for every 20	N	Y
11.	LT Panels with ACB	CPWD specs. part IV/QA Plan: Construction, Ratings of SWG, air gaps between phases , phase to body ,IP rating, Short Circuit ratings etc.	Any	Y	Y	1	Y	N
12.	LT Panels with incomer of more than 200 A	CPWD specs. part IV/QA Plan: Construction, Ratings of SWG, air gaps between phases, phase to body, IP rating, Short Circuit ratings etc.	Up to 2	Y	Y	0	N	N
			>2 and < 10	Y	Y	1	Y	N
			> 10	Y	Y	2	Y	N
13.	Cable Tray	CPWD Specs. Part I/II: Check for perforation area, paint/Galvanizing thickness and Material Composition	Length up to 500 mtr	Y	Y	N	N	N
			> 500 mtr	Y	Y	1 piece for every 500 mtr	N	Y
Y = Yes N = No/Not Applicable Y* = Tested for its capacity at AHRI certified test bed (either at manufacturer's work or at IIIrd Party Lab)								
E	**FIREFIGHTING**							
1.	Pumps	As per tender specs.	Any capacity	Y	Y	100%	N	N

Stage /Sl. no	Material / Process	Standard Applicable/ Test Required to be Done	Total Qty (each type) reqd. in agreement or lot size whichever is less	Whether Proof of Dispatch required	Whether Manufacturer's test certificates required	Sample Size	Location of Test	
							At manufacturer works	At third Party Lab
2.	MS Pipes	To be tested for thickness and weight as per applicable IS	Any	Y	Y	1 for every 100 mtr	N	N
3.	Valves	Flow and controls as per data sheet	up to 20	Y	N	NA	N	N
			> 20	Y	Y	1 for every 20	N	Y
4.	LT Panels with ACB	CPWD specs. part IV/QA Plan: Construction, Ratings of SWG, air gaps between phases , phase to body ,IP rating, Short Circuit ratings etc.	Any	Y	Y	1	Y	N
5.	LT Panels with incomer of more than 200 A	CPWD specs. part IV/QA Plan: Construction, Ratings of SWG, air gaps between phases , phase to body ,IP rating, Short Circuit ratings etc.	Up to 2	Y	Y	0	N	N
			> 2 and < 10	Y	Y	1	Y	N
			> 10	Y	Y	2	Y	N
6.	Cable Tray	CPWD Specs. Part I/II: Check for perforation area, paint/Galvanizing	Length up to 500 mtr	Y	Y	N	N	N

Stage /Sl. no	Material / Process	Standard Applicable/ Test Required to be Done	Total Qty (each type) reqd. in agreement or lot size whichever is less	Whether Proof of Dispatch required	Whether Manufacturer's test certificates required	Sample Size	Location of Test	
							At manufacturer works	At third Party Lab
		thickness and Material Composition	Length > 500 mtr	Y	Y	One piece for every 500 Mtr	N	Y
Y = 'Yes' N = 'No/Not Applicable'								

COMPLETENESS OF WORK

The installations shall be completed in all respects and put in to operation even where certain details are not specifically mentioned in these specifications and the same is deemed to be included within the scope of this tender.

COMPLETION PLAN

Contractor shall periodically submit completion drawings for all the E&M services as and when work in all respects is completed in a particular area. These drawings shall be submitted in the form of four sets of CD"s / Pen Drive and four in hard copy (300 x 450 mm) each containing complete set of drawings on approved scale indicating the work as - installed. These drawings shall clearly indicate following:

(1) Location and details of equipment and other particulars.

(2) Complete wiring diagram, as installed and scheduled showing all connections in the complete electrical system.

(3) Single line diagram, power schematic, control schematic with detailed bill of materials, showing makes, types and description of all components and accessories.

(4) Successful contractor shall also furnish the Manufacturer's instructions on Installation, Operation & Maintenance for all the capital items.

GUARANTEE

All equipment shall be guaranteed for a period of 24 months from the date of acceptance and taking over of the installation by the department. The equipment or component or any part thereof so found defective during the guarantee period shall be repaired or replaced free of cost to the satisfaction of the Engineer in-charge. In case it is felt by the department that undue delay is being caused by the contractor in doing this, the same will be got done by the department at the risk and cost of the contractor. The decision of Engineer-in-charge in this regard shall be final.

All E&M services such as Internal Electrical installations, Substation, DG Set, Air-conditioning Plant, lifts, firefighting system & Addressable fire alarm system shall be declared as completed only after successful commissioning and completion of trial run of 1 month. However, maintenance of these installations during the warranty period of 12 months shall be carried out by the agency. During trial run of 1 month, cost of all consumable items shall also be borne by the main contractor, including POL & Electricity.

All electrical & mechanical fittings / fixtures / appliances, to be provided for the work, should have latest minimum 5 star rating (of BEE), as available in market. Since, the proposed construction is for 5 star GRIHA LD rating, all fittings and fixtures shall be provided which suits to the GRIHA rating.

OEM Qualification Criteria	
1.	The OEM should have office in Patna/Bihar.
2.	The OEM of the equipment's quoted for should be profitable in the last 3 consecutive financial Years.

3.	The OEM of the equipment's quoted for should have a minimum of 10 custom paid spare depots in India (one of which must be in Kolkata) to support failure of equipment's.
4.	The OEM should support next business day delivery against defective spares in major locations in India. OEM should have 24x7x365 support in India
5.	The OEM should support registered office in India at least from last 10 Years.
6.	The Network Solution i.e. Core and Access Switches should be from single OEM. This is done to have better integration between all products. The OEM must be in latest report of the Gartner's leader's quadrant for Wired and Wireless LAN. Documentary evidence for the same should be provided.
7.	The IP EPABX solution should be from single OEM. The OEM must be in latest report of the Gartner's leaders quadrant for Unified Communication. Documentary evidence for the same should be provided.
8.	The Physical Security Solutions i.e., Video Surveillance Software, IP Cameras should be from single OEM. This is done to have better integration between all products.
9.	The OEM shall have certification ISO 9001:2000 & ISO 14001.
10.	OEM should have at least one reference in India of Integrated physical security system with video surveillance system having minimum deployment of 200 cameras for Campus Surveillance.

PART – C2
INTERNAL ELECTRIC INSTALLATION

The work will be carried out in recessed Steel conduit wiring system with FRLS copper cables in accordance of CPWD General Specifications for Electrical Works Part-I (Internal)-2013 and Part-II (External)-1994 with amendments up to the date of opening of tenders and the governing specifications, which are mandatory including makes for some of the important materials to be used in the work. In case of ambiguity between the two, the governing specifications shall prevail.

FRLS PVC insulated Copper conductor wires in steel conduits will be used for points, circuit & sub-main wiring.

All internal electrification work will be carried out as per CPWD Specifications, NBC 2016, NEC 2011, IE Rules 1956, IS Codes etc. as amended up to the date of tender. In case for any part of the work specification is not available in the aforesaid mentioned documents then part of the work will be carried out in accordance with sound engineering practice and as per directions of Engineer-in-charge.

The Electrical & Mechanical services, Fans, Fittings, Fixtures in non-residential buildings is to be designed & provided as per CPWD General Specifications for Electrical Works Part-I (Internal)-2013 and Part-II (External)-1994, NBC 2016, NEC 2011, relevant IS codes.

Lighting.

Lighting of Non-residential Areas, Common Areas, Utility Rooms & Basements shall be done with energy efficient LED 328enture328iz having Luminous efficacy not be less than 100 lumen / watt. The requirements of illumination level, as per NBC 2016 is asunder:

Area/Space	Average illumination level in Lux	Type of Lamps preferred	Type of Fixtures
Office Rooms	300 – 500 – 750	LED Luminaires	Square modular Type (system efficacy not less than 125 lm/watt)
Conference Rooms	500-750	LED Luminaires	Square modular type(system efficacy not less than 125 lm/watt)
Staircases & Corridors	50 – 100 – 150	LED Luminaires	Surface mounted fixture (system efficacy not less than 100 lm/watt)

Area/Space	Average illumination level in Lux	Type of Lamps preferred	Type of Fixtures
Lift Lobbies	150 – 200 – 300	LED Luminaires	Surface mounted / Recessed LED fixture down lighter (system efficacy not less than 100 lm/watt)
Service Areas / Utility Areas Such as Electrical Room, Pump Room, Plant, Room	100 – 150 – 200	LED Luminaires	Surface mounted fixture (system efficacy not less than 100 lm/watt)
Parking areas (if any)	20 – 30 – 50	LED Luminaires	Surface mounted fixture

External / Landscape Lighting

Security Lights, Road Lighting, Parking and Area lighting shall be provided as per codal provisions & functional requirements. Pathways, Garden, Water Bodies & Landscape lighting shall be designed keeping in mind architectural features / Aesthetic considerations. As a general practice, following type of fixtures / poles shall be used:

Area/Space	Average illumination level in Lux	Type of Lamps/ Fixtures preferred
Boundary Wall, Road, Parking Areas	30 – 50 – 100	LED Lamps Street light fixtures Mounted on poles.
Pathways, Garden, Water Bodies & Landscape lighting	Aesthetical Consideration	Bollards with LEDs / Other Luminaires, as per aesthetical Consideration

IP based Telephone outlet point wiring for all hostel rooms & offices shall be terminated in suitable size of G.I. Junction box , Rack, switches etc. as required , conduit for telephone wiring may be provided through branching by providing suitable size of G.I. box along with suitable tag block at each floor. The inter connections of all junction boxes fixed at all floors shall be done properly making proper distribution system with the prior approval of Engineer-in-charge. Providing incoming television / telephone cables from the site boundary of each building is not covered in the scope of this tender. However, pipes for laying of these cables shall be provided by the tenderer as per direction of Engineer-in-Charge.

Note: Providing incoming television / telephone / internet cables from the site boundary is not covered in the scope of this tender.

Energy efficient Ceiling fans, Exhaust fans and other fixture of suitable wattage, call bell in these buildings shall also be provided by the contractor as per direction of Engineer-in-charge. Lightning arresters as per IS; 2309 -1989 as amended upto date

.RFID Card based door lock system to be provided in hostel & guest house building. Meter Boards & Main Distribution Boards as per local supply company specification / requirement shall also be provided by the contractor. Separate shaft for each blocks shall be provided for laying of Electrical, mechanical & fire services. HDPE / DWC pipes for taking L.T. cables along with brick masonry chambers of suitable size shall be provided by the contractor wherever required. Laying of HDPE / DWC / SW /Hume pipes for road crossing or in pucca portion & CC path etc. for electric / telephone / street lighting cables complete with adequate number of cable chambers shall be provided by the contractor. Contractor has to provide race way & necessary wiring as per the furniture layout plan along with necessary screed concrete before laying the flooring.

Note: Number& size of pipes to be used shall be got approved from Engineer-in-charge.

After completing the work, necessary test results as envisaged in CPWD General Specifications Part-I (Internal)-2005 & Indian Electricity Rules 1956, shall be recorded and submitted to the department. The results shall be within the permissible limits. Test report forms duly signed by authorized person for obtaining electric connections (energy meters) from Power Distribution Company by the contractor shall be given to the allottees.

PART – C3
SUBSTATION AND DG SETS

1. Design Philosophy

The electrical system networks shall be designed to:

(1) Comply with applicable codes and standards.

(2) Maximize energy efficiency &responsiveness.

(3) Maximize life cost effectiveness.

(4) Ensure flexibility for future expandability.

(5) Ensure system durability and reliability.

(6) Ensure redundancy of critical components.

(7) Ensure ease of maintenance and bypass arrangement for urgency case.

(8) Basis of Load Estimation

The preliminary demand load to be estimated on the basis of actual loads of Electrical & Mechanical Services, ECBC 2017/latest. The diversity factor to be, as per the National Electric Code 2005. The electric substation should be designed as per suitable capacity one working and one standby transformer.

2. Electric Supply and operational concept:-

The power supply company shall provide a single/multiple HT net metering connection at the entrance of the site with bulk HT metering. From the meter room, the HT cable shall be taken to the Substation, thereafter power shall be fed to main substation, which will act as a Step-down Transformer 11/0.433 KV for further feeding to the buildingloads.LT supply from the substation shall be fed to the Main LT cum DG Panel, proposed to be kept in the Utility Services Building, with the help of 1.1 KV LT Sandwitch type Compact Bus Trunking. In case of power failure DG sets will run as per load requirement basis. DG Panel should be suitable for DG power synchronization at any instant.LT supply from the DG Sets shall be fed to the Main LT Cum DG Panel. The changeover between the normal supply (from transformers) & DG Set supply shall take place at the Main LT Cum DG Panel through Load Management System. Further distribution shall be made to LT Panels, utilities with the help of 1.1 KV LT XLPE Insulated, PVC sheathed aluminium conductor armoured cables, to be laid inground.

Power distribution shall be made in the inside the Building at various floors with the help of suitable capacity prefabricated Sandwiched type bus Trunking suitable for use on 3 Phase, 4 Wire, 415 Volts,50Hz AC supply with metal clad enclosures made of 1.6 mm thick steel sheet duly powder coated with 4 Nos. Aluminium bus bars, necessary joints, elbow joints and, expansion joints(tinned copper flexible connection at expansion joints and at both ends of the bus Trunking shall be provided), fire barriers at regular interval of 3 Meter, Continuous earthing with two Nos. copper strip of suitable size(one each side) including GI.

Clamping brackets, suspenders, angle iron brackets, steel fasteners, connecting to earthing system. Separate Rising Mains to be used for Normal, DG Set & UPS supply at

suitable locations. Power from the Main LT Cum DG Panel shall be fed to all the other loads i.e., Plumbing Panel, Fire Pump Panel, Elevators Panel &Common Area lighting by 1.1KV LT XLPE Insulated PVC Sheathed aluminium conductor armoured cables to be laid in trenches / over GI cable trays.

3. SCADA communicable Energy Metering

Utility power Supply Company shall meter power at incoming at HT and charge the builder/ developer for bulk power. Digital multifunction meters shall also be installed at various main panels such as plumbing panel, fire pump panel, lifts panel, chillers panel, ventilation fans panel, AHU Panels, common area lighting, power panels, all lighting& power DBs feeders to monitor, voltage, current & KWH Consumptions .Panels & Boards: All LT distribution panel shall confirm to IEC 60439 (TTA) comprise the following:

Main LT cum DG Panel Board: It receives LT power from transformers secondary side & from DG Sets & supplies power to building /utilities.

4. Power Factor Control

Automatically controlled power factor capacitors shall be installed for each transformer LT feeder at the Main LT Cum DG Panel to maintain Power factor above 0.95 (as per ECBC 2007 – para8.2.3). Capacitor banks shall automatically be brought in and out of the circuit in steps, according to load & PF variation with the help of an APFC Relay, soft switching.

5. Codes: The capacitors shall generally conform to IS: 13341-1992, IS: 13340-1993 and IEC:831.1 and 831.2.

6. Construction:

The panel shall be indoor type, free standing, and floor mounting with IP 54 degree of protection. It shall be completely made of 2mm thick CRCA sheet steel. The enclosure shall have sturdy support structure with angle supports as necessary and shall be finished with powder coating in the approved colour shades after 7 tank treatment process of sheets. Suitable provisions shall be made in the panel for proper heat dissipation. Air aspiration louvers for heat dissipation shall be provided as necessary. The front portion shall house the switchgear and the rear portion shall house capacitors and series reactors. The enclosure is to be suitable sized to accommodate all the components, providing necessary air clearance between live and non-live parts, providing necessary working clearance.

7. System Configuration & Features:

The capacitors units shall be indoor type-air cooled with low viscosity impregnated paper dielectric hermitically sealed. The impregnation used shall be non-inflammable, non-oxidizing, lower freezing points type synthetic compound. Each individual cell shall be provided with pressure sensitive dis-connector/ devices. .Main connections from the active elements shall be brought out through porcelain bushings. Care shall be taken to solder the bushing to the cover to ensure perfect hermetic sealing. Capacitor unit shall be provided with externally mounted discharge resistor to reduce the residual voltage to less than 50 volts within few seconds of switching off. Individual units shall be provided with semiconductor fuse/adequate capacity of MCCBs, thyristor switches (capacitor duty), bus bars and terminal chambers to make bank of required KVAR. Terminal chamber shall be suitable for Top Entry Bus Trunking/Cable System. To earth terminals shall be provided to teach capacitor bank

.Capacitor voltage must be rated @ 550 V for system voltage at 433Volt.APFCpanel shall be capable to keep the PF of the system within range of 0.99 Lead to 0.95 Lag.

The capacitor shall be of low loss having power loss << 0.2W/KVAR excluding the loss in discharge resistor.

8. Detuned filter:

The aluminum conductor used shall have vacuum impregnated insulation capable of withstanding temperature exceeding 180oC. Tolerance of inductance should not be more than 5%.

9. System Controller:

Control Module technology should be advanced with digital signal processor (DSP). It should have clear backlit LCD graphic display wherein each phase data can be seen separately i.e. Power factor of all the 3 phases can be viewed at the same time. In order to have complete system and network control, it should have 7 input channels, 4 voltage (for star Connection) 3 main network current. It should be capable of doing fast Fourier Transformation and calculating Power Factor and harmonics on all phases. It should give true RMS measurement (taking into account upto 31st Harmonic). It should have dual P.F control setting for Reactive Power Compensation of Utility supply and DG supply. The System Controller should have Data Logging facility with Real Time Clock to record all the important power quality and electrical parameters for checking system performance. The system controller should be capable of measuring and displaying following parameters for each phase:

(1) Currents
(2) Voltages
(3) Power Factor
(4) Active Power
(5) Reactive Power
(6) Apparent power
(7) THD-I (%)
(8) THD-V (%)
(9) Individual Current and Voltage Harmonics up to 31st
(10) Current & Voltage Waveforms
(11) Bar Chart for various parameters & harmonies

10. Earthing (Grounding):

(1) The earthing shall be based on the Indian TN System.

(2) The design of the system shall be as per the CPWD General Specification for Electrical Works Part-I Internal -2013 and specification for Indian Standard Specifications Code of Practice IS 3043: 1987 with latest amendments.

(3) Hot dip galvanized iron i.e. GI strips / tapes shall be used for earthing.

(4) Earth pits shall be either, GI pipe or GI plate electrode. Alternatively, chemical earthing pits may be employed, if preferred by the client.

(5) Adequate number of earth pits need to provide to limit the earth resistance to less than one ohm & to meet the statutory requirements:

(6) For each generator & transformer, total four earth pits (2 nos. for body earthing & 2 nos. for neutral earthing).

(7) The body earthing for transformers, generators, HT & LT Panels shall be connected to a common/mesh earth bus. DC earthing will be separately provided by the contractor.

(8) All the cable trays shall have 2 nos. of GI Earth tapes of required size, throughout the entire length.

(9) All electrical equipment, panels, DB's & Fixtures & noncurrent carrying metallic parts shall be effectively earthed with GI tapes / wires as required.

(10) Single earth wire / tape shall be used for 1 phase & double earth wire / tape shall be used for 3 phase equipment earthing respectively.

11. Lightning Protection System

(1) The structures shall be protected against lightning in accordance with the requirement of IS 2309: 1989 with latest amendments. The risk factor requires provision of lightning protection and in addition considered necessary for the safety of tall buildings and human life.

(2) The lightning protection system shall comprise of a grid of horizontal air terminations and vertical finials provided at the terrace of each high rise tower at the highest point and that of the low rise buildings which are not within the protective angles of the high rise terminations.

(3) The horizontal & vertical air terminations shall be connected through a series of down earth conductors running along the sides of the building with earth tapes to the Pipe type earth electrodes / earth stations. Earth test points shall be provided.

(4) The lightning protection system shall be based on use of hot dip galvanized iron i.e. GI strip conductors and GI earth stations.

12. Energy Conservation Measures

(1) The equipment, fixtures & systems which are having better energy efficiency to be used.

(2) Use of transformers with NO LOAD & ON LOAD watt losses as per ECBC.

(3) Using energy efficient light fixtures with good photometric properties.

(4) As far as using LED lights in all places including Internal & external applications.

(5) Use of Light / movement sensors for switching on / off light fixtures in Administrative Block, Academic & Faculty Building, Library, Seminar & Conference, Institutional

Hostel – I, Institutional Hostel – II Putting external lighting control on time switch / timer control / Light Sensors.

(6) Using time switch control / timer control for basements lighting.

13. Solar Water Heating

(1) Using high efficiency motors EF1 for pumps & ventilation fans.
(2) Capacitors should have a long life in excess of 150,000 hours with low losses in the range of 0.2 watt /KVAR.
(3) Electrical Safety Features
(4) Following electrical safety features shall be built in while designing:
(5) For Neutral isolation, 4 Pole switches should be provided in the incomer of all the panels & boards.
(6) All final MCB distribution boards should have 30mA sensitivity ELCB"s in the incomer along with MCB.
(7) Outgoing MCB's should not be of less than 10KA fault withstand capacity in the final DB's.
(8) All panels & boards shall be designed as per the expected short circuit level at that point.
(9) For the protection of equipment & feeders, switchgear shall be provided with required O/C, S/C & E/F releases. Selection of switchgear rating shall be made on the basis of load current &fault withstand capacity.
(10) Neutral bus bar to be sized as per CPWD General Specifications for Electrical Works Part I Internal –2013,
(11) Lighting & Power rising mains shall be with 100% sized neutral.
(12) All electrical equipment & not current carrying metallic parts shall be effectively earthed.
(13) Separate SCADA Compatible (remote operation & control) feeders from the Main LT Panel shall be provided for (as per NBC2016):

(a) Fire fighting pumps
(b) Lifts
(c) Plumbing pumps
(d) Alternate / Standby feeders shall be provided for following, as per NBC2016
(e) Lifts
(f) Staircases & corridors lighting shall be on separate circuits & shall be operable from ground floor and shall be MCB DB controllable.
(g) DG Set & UPS backup shall be available to staircases & corridor lighting.
(h) Escape route lighting shall essentially be laid out covering following areas:
(i) All staircases
(j) Near staircase
(k) Corridors
(l) Near Exit doors
(m) Change of direction in escape route
(n) Near fire alarm call points
(o) Near fire hose cabinets
(p) For fire detection system, fire survival cable to be laid.
(q) Manual CO2 gas flooding shall be provided in the HT Panel & Main LT Panel.
(r) Harmonics Mitigation

(14) With the increased use of HF electronic ballasts with the light fixtures, VFD's with motors, dimmers for lighting controls, computers & UPS system for office automation, the electrical systems are encountering harmonics, hence wherever required, the Harmonic Filters to be provided in the substation. The design of the same is to be got approved from the Engineer-in-Charge.

(15) It shall have a dual 5% impedance DC link reactor (harmonic filters) on the positive and negative rails of the DC bus to minimize power line harmonics and to protect from power line transients. The chokes shall be non-saturating. Swinging chokes that do not provide full harmonic filtering throughout the entire load range are not acceptable.

(16) IEEE519, 1992 recommendations shall be used for the basis of calculation of total harmonic distortion (THD) at the point of common coupling (PCC). On request VFD manufacturer shall provide THD figures for the total connected load. The contractor shall provide details of supply transformer rating, impedance, short circuit current, short circuit impedance etc. to allow this calculation to be made.

14. Surge Protection Device

(1) Critical and expensive electronic equipment should be protected from Surge by SPD. The selection of surge protective devices typically depends on the location of the device.
Equipment Selection

(2) The standard equipment selections shall be as follows:

EQUIPMENT	TYPE/GENERAL SPECIFICATION
11KV HT Switchgear	Vacuum circuit Breakers.
11KV/433V Transformers	Cast Resin Type Dry Transformer with on load tap changer.
415V MV Switchgear	ACBS & MCCBs for isolation & protection with inbuilt releases for O/C, E/F & S/C
Load Management System	For management of the outgoing feeders in case of DG Set Operation and Transformer operation
LT Cables	1.1KV grade XLPE insulated, PVC Sheathed, armored, aluminum/copper conductor outside buildings and copper/aluminum conductor inside buildings.
Final Distribution Boards	DB"s with MCB provided as incomer & MCB"s for outgoing circuits. MCB"s of not less than 10KA fault withstand capacity.
Internal Wiring	1.1KV grade FRLS PVC insulated unsheathed stranded copper conductor wires as per IS: 694.
Cable tray	Suitable size of perforated with powder coating M.S. cable trays / Hot Dipped Galvanized Iron cable tray (Galvanization thickness not less than 50 microns) with perforation not more than 17.5%, in convenient sections, joined with connectors, suspended from the ceiling with M.S. / GI suspenders including bolts & nuts.

15. DG Set:

a. DG Sets Installation –
DG sets outdoor type with radiator cooled, as per CPWD General Specifications for Electrical Works Part VII DG Set – 2013. Two nos. of suitable capacity for synchronization considered for power backup. DG Set shall be within an acoustic hood as per CPCB norms and both has to be electronically synchronized. Each DG Set shall be provided with its own day oil tank suitable for at least 10 hrs. operations.

b. DG Set Flue Stack –

(1) As per CPCB norms, flue pipes of DG Sets need to be taken above the roof top of the building, as per CPWD General Specifications for Electrical Works Part VII DG Set – 2013,

(2) The flues shall be adequately thermally insulated and properly cladded so as to prevent heat transfer to the supporting walls and adjacent areas.

(3) DG exhaust shaft shall be required for the purpose of installing flue pipes for taking them above rooftop.

c. Standby Power Generation –

(1) The capacity of DG set should be worked out with following considerations-
Total connected Electrical Loads as per clause 5 of Part-I. Power Factor –0.80

(2) Provision for Future expansion / addition – 20% of the connected load

(3) The diversity factor to be, as per the National Electric Code 2005.

(4) Loading factor, asper requirement.

(5) The number of DG Set shall be two or more with aggregate capacity, more than that worked out under para (i) above, suitable for parallel operation.

(6) DG Set Start / Stop & change over shall be fully automatic through PLC's/Controller. DG sets shall start automatically within 10-30 seconds in the event of a power failure and shall transfer power to emergency / critical loads automatically. DG Sets operation through PLC shall in corporate:

(a) Auto Start / Stop of DG Sets i.e. auto mains failure.
(b) Auto synchronization of DG Sets.
(c) Auto load management i.e. auto load sharing.

(7) UPS: Uninterrupted Power Supply Unit is proposed to provide continuous, no break power to life safety circuits as per NBC 2016 and Local-Bye-Laws, other sensitive equipment. At least 30 Minutes backup with the help of maintenance free batteries shall be provided. The number of units shall be N+1. The capacity of the UPS should be suitable for Life Safety Circuits & other essential loads, as under:

(a) Life Safety circuit shall be:
(b) 100% lighting in stair cases
(c) 100% Exit signage's

Part lighting in:

(a) Lift lobbies & Escape corridors.
(b) Lift machine room
(c) Electrical Rooms of each floor
(d) Meter rooms
(e) Electrical shafts of each floor
(f) LT Panel Room

(g) Pump room, Fire pump room
(h) AHU Rooms
(i) Fire control room
(j) Security room
(k) BMS Room
(l) Fire & Smoke detection system
(m) Security system,
(n) CCTV etc.
(o) BMS System
(p) Computer / LAN system
(q) EPABX /IPBAX Machines
(r) Audio Video Equipment

PART – C4
LIFTS

1. General

1.1. The Lifts shall be provided as per the Architectural Drawings.

1.2. Provision of lifts in the building will be kept as per NBC 2016 as amended up to the date considering no of floors, height of the building and speed of elevators. At least one lift is made barrier free, serving on every floor, as per CPWD Handbook on Barrier Free and Accessibility, 2014.

1.3. Detail of lift, and their speeds etc. as per NBC 2016 shall be submitted to Engineer-in- charge for approval before commencement of work.

1.4. Provision for control buttons in brail for blind peoples as per norms, door size suitable for wheel chairs

1.5. Work of supplying and installation of lifts will be carried out by the contractor as per provisions contained in General Specifications for Electrical Works (Part –III Lifts& Escalators)-2003 and local bylaws as amended up to date.

1.6. Scope of work of the successful tenderer shall be inclusive of the following and shall be done by the contractor at no extra cost.

1.7. Providing, Installation, Testing and Commissioning & putting into operation of lifts in various with all control equipment & accessories for the required nos. of landings/openings and speed of lifts in accordance with NBC 2016 as amended up to the date.

1.8. All electrical works including interconnections from TP& N Switch (including TP&N Switch) and loop earthing from the earth bar provided in the machine room.

1.9. Provision of adequate lighting in the machine rooms, lift shafts and all endings. Provision of proper ventilation in machine rooms, lift wells and water proof lift pits including lighting.

1.10. Provision of hoisting beam or hook above the lift well and trapdoor Architrave work at lift entrance

1.11. Temporary barricades with caution boards at each landing to prevent accident during execution of work

1.12. Electric supply to individual lift shall be given by two independent feeders (one working & other stand by) from main electrical panel through change over switch in the machine room / ground floor panel room.

1.13. Contractor shall furnish the following drawings and data to the Engineer-in-charge in triplicate, for approval.

1.14. General arrangement drawing.

1.15. Detail of foundations for equipment, load data of various assembled equipment. Data will include breaking load on guides, reactions on buffers, reaction on support in machine room, lift well etc. Dimensions for every unit and group of units for erection purpose, as required. The correction/changes, if any, intimated by the Engineer-in- charge shall be incorporated and three sets of such corrected drawing shall be furnished to the Engineer- in-charge within 15 days from the date of approval of drawings. The work shall be executed in accordance with the approved drawings.

2. Inspection and testing at site:

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

2.2. On completion of the installation, all adjustments as necessary shall be made for the satisfactory performance of the lifts. The completed installation shall be inspected and tested by the Engineer-in-charge in the manner as will be laid down by him, in consultation with the contractor. All tests necessary for satisfying the reliable performance of the safeties, smooth running of the cars under normal and over load conditions, level doors operation, uniformity in rope tension, functioning of individual units like controller, and general performance of the lift installation as a whole shall be conducted. All instruments and facilities necessary for the tests shall be provided by the contractor. After Satisfactory final inspection contractor, shall demonstrate the trouble-free running, maintenance of lifts till department takes over the lifts.

3. Technical Specification

3.1. The lift shall work on micro-processor based control system with self-diagnostic features, site programming to suit the changing need of the user. The lift shall be silent in operation & shall have smooth and controlled acceleration and de-acceleration with entire accuracy of +5mm.

3.2. TECHNICAL PARTICULARS:

3.2.1. Type of lift: Passenger Rated Speed & Rated load shall be as per approval of Engineer – In – Charge. Type of operation: Automatic group supervisory control with/without attendant Type of control – A.C. drive variable voltage variable Frequency with Microprocessor based group control system

3.2.2. Type car doors: Centre opening stainless steel sliding door in the moon rock finish.

3.2.3. Door Operation: Automatic power operated Construction design & Stainless body with moon rock / Honey Comb finish finishing of car body.

3.2.4. Landing doors: Centre opening sliding power operated stainless steel doors in moon rock / honeycomb finish & shall have a fire resistance of not less than one hour.

3.2.5. The car shall be complete with PVC flooring & toe guard of adequate depth cabin fan light fittings with lamps and false ceiling. Stainless steel hand rails shall also be provided on 3sides.

3.2.6. Disabled friendly lift in each lobby shall be suitable for handicapped persons. Type of signal system: All signal & operating fixtures shall be provided with stainless steel faceplates.

3.2.7. Call registration indication in buttons of operating panel.

3.2.8. Digital car position indicator in car.

3.2.9. Digital car position indicator with up & down direction on all floors separately for each lift.

3.2.10. Luminous hall call buttons on all floors.

3.2.11. Maintenance free re-chargeable battery operated alarm bell & emergency light.
3.2.12. Fire man's switch at ground floor for each group of passenger lift.
3.2.13. Over load warning with visual indication, OVER LOADED and audio beep of overloading
3.2.14. Voice announcement system having standard features.
3.2.15. Intercom system in each lift for communication between the passengers in the elevator & fire control room & machine room (press & speak type) with rechargeable maintenance free battery backup.
3.2.16. Elevator should be equipped with manual as well as Automatic Rescue Devices. Infrared beam type door safety device shall be provided for full height of door Pressurization of lift shaft shall be provided if required as per approved scheme by Local Fire Service.

PART- C5
FIRE FIGHTING SYSTEM AND DRINKING WATER PUMPSETS

Fire Protection System including Sprinkler System wherever required shall be designed and provided as per CPWD General Specifications for Wet riser & Sprinkler System (Part-V) 2006 as amended up to date and CPWD General Specifications of Electrical Works Part-I 2013 as amended up to date, relevant IE rules 1956, NBC 2016, IS standard & Local Bye Laws. NOC for the scheme has to be obtained from Local Fire Service.

Scope of work shall be asunder:

1. To get the firefighting scheme proposal as per NBC 2016, CPWD General Specifications for Wet riser & Sprinkler System (Part-V) 2006 and approved first from Local Fire Service before taking up execution of work.
2. Gaseous Total Flooding Systems are to be used for suppression of Class A and Class B type of fires. These are useful in specific hazards or equipment and in occupancies where an electrically non-conductive medium is essential or where cleanup of other fire suppression agents/ material/ media is not possible. Thus, in building construction industry, such Gaseous Total Flooding Systems applications, due to the high cost of such system, are being provided at present for protection of high value electronic equipment, rare books etc., where water based firefighting systems cannot be provided. It shall be provided as per CPWD General Specifications for PART-VIII Gas Based Fire Extinguishing System, 2013, wherever required. To execute the work as per approval of Local Fire Service.
3. Agency shall arrange for obtaining clearance certificate from Local Fire Service for the installations of Fire Fighting system. Statutory fees / Payments required to be deposited for processing the case, shall be borne by the department.
4. Components like landing valve, hose coupling, branch pipes, Fire Brigade Inlet Connection (FBIC) etc. should be made of Gunmetal.
5. The contractor has to provide the necessary fire hydrant along the roads as per requirement of the fire fighting in accordance with NBC, 2016.
6. The agency shall be getting the fire clearance certificate from the local body after completion of the mandatory firefighting works; this is in the scope of successful bidder.

DRINKING WATER PUMPSETS: Drinking water pumping system shall be designed as per the Water Supply Scheme. The booster pumps wherever provided, should be with one no additional pump as standby. Scope of work includes supplying installation, testing & commissioning of Booster Pumps / Submersible pumps, associated Plumbing, Control Panels, and Cabling etc.

PART- C6
FIRE ALARM SYSTEM WITH IBMS

1. The work shall consist of supplying, installation, testing & commissioning of Automatic Intelligent Addressable Fire alarm system. It shall be as per NBC 2016 and Local bylaws and as per approval of Local Fire Service. The work shall also include planning, designing, preparing drawings and getting the drawings approved from the Engineer-in-Charge and its subsequent execution. Scope work also includes integration of Automatic Intelligent Addressable Fire alarm system provided among various buildings, as per NBC 2016,& as per CPWD General Specification of Electrical Works Part – VI, Fire detection and alarm system 2018, requirements to the main control room, located at the one of the main gate.

2. References for installation:

a) Indian Standard IS / NBC and Fire Bye Laws issued by local Fire Authorities

b) British Standard Institute / European Standards / all applicable codes and standards including BS EN 54 / NFPA- 72 National Fire Protection Association

c) All major components of fire alarm system shall be product of a single manufacturer as per the list of approved make and shall conform to the requirement of EN54 / VDS / UL / IS approved and designed according to DIN VDE-14675 and VDE- 0833 Fire Alarm Systems, CODE OF PRACTICE FOR SYSTEM DESIGN, INSTALLATION AND SERVICING

3. BASIS OF DESIGN

4.1 An Addressable Fire Alarm System (AFAS) shall be provided to effect total control over the life safety services required in the building. The AFAS shall be of the digital, distributed processing, real time, multi-tasking, multi-user and multi-location type.

4.2 The AFAS provided shall be able to tie-up the following:

4.2.1 Mechanical, Electrical & Low Voltage

4.2.2 Services into an integrated system.

4.2.3 Public address system.

4.2.4 Lifts

4.2.5 Firefighting system

4.2.6 Mechanical Ventilation system / Pressurization System / Smoke Management System

4.3 The system shall be provided with Addressable fire alarm initiating, annunciating and control devices. The addressable and intelligent system shall be such that smoke sensors detectors, thermal sensors, manual call points, etc., can be identified with point address. The system shall be capable of:

4.4 Setting smoke sensor sensitivity remotely (from the Fire Work Station) to either high sensitivity manually or on a pre-programmed sequence e.g. occupied/unoccupied period. The FAS shall be able to recognize normal and alarm conditions, below normal sensor values that reveal trouble condition, and above normal values that indicate either a pre-alarm condition or the need of maintenance.

4.5 Read-out or address an actual space temperature at thermal detector points. The operator shall also be able to adjust alarm and pre-alarm thresholds and other parameters for the smoke sensors. Provide a maintenance/pre-alert alarm

capability at smoke sensors to prevent the detectors from indicating a false alarm due to dust, direct.

4.6 Provide alarm verification of individual smoke sensors. Systems that perform alarm verification on a zone basis shall not be acceptable. Alarm verification shall be printed on the printer at the Control Station's printer to enhance system maintenance and identify possible problem areas.

4.7 Provide local numeric point address and LED display of device and current condition of the point.

4.8 Local annunciation shall not interfere with annunciation from the Fire Control System.

4.9 Provide outputs that are addressable, i.e. outputs shall have point address. The operator shall be able to command such points manually or assign the points to Logical Point Groups (Software Zones) for pre-programmed operation.

4.10 In the event of a fire alarm, but not in a fault condition, the following action shall be performed automatically.

4.11 The System Alarm LED on the main fire alarm control panel shall flash.

4.12 A local piezo-electric sounder in the control panel shall be sounded.

4.13 The LCD display on the main fire alarm control panel shall indicate all information associated with Fire Alarm condition including the type of alarm point and its location within the premises.

4.14 Printing and history storage equipment shall log the information associated with the Fire Alarm Control Panel condition, along with the time and date of occurrence.

4.15 All system output programs assigned via control-by-event programs that are to be activated by a particular point in alarm shall be executed, and the associated system outputs (alarm notification appliances and/or relays) shall be activated.

4.16 The audio portion of the system shall direct the proper signal (tone or voice) to the appropriate speaker circuit.

4.17 All lifts initiated through the systems will automatically be returned to Ground Floor.

4.18 Pre-recorded alarm messages shall be played through interface with Public Address system.

4. FIRE ALARM CONTROL PANEL(FACP) WITH IBMS

4.1 The distributed Intelligent Fire Alarm Control Panel (FACP) shall function as fully stand-alone panel as well as providing a communication interface to the central station. FACP shall has its own microprocessor, software and memory and should be listed under UL864. In the event of failure of the central or communication breakdown between the central station and the FACP, the FACP shall automatically operate on stand-alone mode without sacrificing any functions.

4.2 The memory data for panel configuration and operation shall reside in non-volatile memory (EEPROM). Removal of the board shall not cause loss of memory. If such removal can cause loss of memory, then the card containing the memory shall have battery back-up for upto 100 hours on the board itself.

4.3 FACPs shall supervise detection circuits and shall generate an alarm in case of abnormal condition. FACPs shall provide general purpose inputs for monitoring such functions as low battery or

4.4 Ac power failure .FACP s shall provide tamper protection and commendable outputs ,which can operate relays or logic level devices. Output commands shall take any of, but not limited to, maintained command, Momentary Command, Alarm Follow, or Alarm latch as required. Any relay in the FACP which is intended to be removable shall be supervised against removal.

4.5 Smoke detectors shall be powered using the FACP-based smoke detection circuits. FACPs shall provide for resetting smoke detectors, fault-isolation and

sensor loop operation. It shall be possible to mix different fire devices within the same FACP to optimize field wiring.

4.6 FACPs shall provide indication for communication with the central console and alarm/trouble conditions in each sensor loops.

4.7 FACPs shall provide monitoring and control of one floor or area or for multiple floors or areas.

4.8 FACPs shall meet the following requirements to assure the integrity and reliability of the system:

4.9 The FACP shall be UL or FM listed independently as a fire alarm control panel.

4.10 FACP electronics shall be contained in an enclosure made of minimum 16 gauge steel. Access to FACP switches and electronics shall be by key-lock.

4.11 Usage of no other tools should be required. Visual indicators of FSP status for each zone shall be visible without opening the key-locked cover.

4.12 All hardware and software to allow the FACP configuration and operation to be changed shall be provided. Memory data shall be contained in non-volatile memory (EPROM).

4.13 Alarm verification with field-adjustable time from 0 to 60 seconds for individual smoke detector shall be provided. During the alarm verification, the panel shall retard the alarm until the end of the period. If the alarm is only a transient smoke alarm, the panel shall automatically reset the alarm. Only a verified alarm shall initiate the alarm sequence for the software zone (Logical Point Group) or point. Final time setting shall be as per approval of the fire authorities. When alarm verification is being performed on a smoke detector, the action shall be printed on the listed printer(s).

4.14 Digital numeric display at the FACP shall be provided to indicate point in alarm or trouble. In such systems, means for manually scanning the points in trouble shall be provided and a trouble and alarm LED shall be used to indicate that there are points in alarm/trouble. The alarm/trouble LED shall only extinguish when all alarm/troubles are cleared from the loop.

4.15 It shall be possible to command test, reset and alarm silence from both the FACP and the central console.

4.16 FACP switches shall allow authorized personnel to accomplish the following, independent of the central console:

4.16.1 Initiate a general alarm condition.

4.16.2 Silence the local audible alarm.

4.16.3 It shall be possible to acknowledge (Silence the local FACP audible without silencing the alarm indicating devices (hooters).

4.16.4 Reset all zones (Logical Point Group) / points, after all initiating devices have returned to normal. Perform a complete operational test of the microprocessor and memory with a visual indication with each board.

4.16.5 Test all panel LEDs for proper operation without causing a change in the condition of any zone

4.16.6 (Logical Point Group)

4.16.7 Walk Test

4.16.8 Software zones/loops shall be circuited and protected by Fault Isolation Modules such that in the event of a zone/loop short-circuit, not more than twenty (20) devices shall be left non- functional. Intelligent Smoke and thermal sensors shall be located as shown and shall report sensed levels in analog form.

4.16.9 Monitor modules shall be provided to monitor and address contact-type input devices. The monitor module shall be supervised by FACP.

4.17 The FACP shall process the true continuous analog signal from the sensors. System using step setting to represent analog signal will not be accepted. The FACP shall be able to set dual alarms threshold for occupied and unoccupied periods. During unoccupied period, the alarm threshold shall automatically be lowered to facilitate quicker response. In addition, the FACP shall further process all analog values for pre-alarm limits to prompt the operator for early maintenance. If a sensor value increases to an above normal level or a pre-alarm limit for an extended duration, the FACP shall communicate a maintenance pre-alarm.

4.18 Any time sensor value transitions beyond the secondary and higher limit value, an alarm initiation and report shall be issued .Limits and sensor values shall be displayed, modifiable, and reported in decimal values. The FACP shall have Drift Compensation facility to compensate for environment. The FACP shall have the ability to recalibrate Pre-alarm and Alarm limits if required, after comparing each sensor's operating characteristics with the set sensitivity. This should be carried out at least once in every 24 hours. FACP should annunciate trouble conditions when sensor(s) is beyond compensation range (excessively dirty sensor).

4.19 The FACP should be UL listed or FM approved to provide the sensitivity measurement and documentation required by NFPA72E.

4.20 FACP shall be backed up with it's built in UPS power and shall also be connected to central DG Power available in the building.

4.21 FACP shall be provided with following features : Charger Rate Control Control-by-Time Non-Alarm Module Reporting Day/Night Sensitivity Periodic Detector Test Device Blink Control Remote Page Drift Compensation Trouble Reminder NFPA 72 Sensitivity Test Verification Counters System Status Reports Walk Test

4.22 Security Monitor Points Maintenance Alert Alarm Verification System Configuration Report r inter Interface System Point Report Event Historical log Programmable Automatic Time and Manual Signal Silence.

4.23 Programmable Manual Signal Control-By-Event with Boolean Logic Silence Inhibit Timer and Timer Control

4.24 FACP shall have real-time clock to prevent loss of time and date in case of failure of power supplies.

4.25 The display on FACP shall provide indication for AC Power, System Alarm, System Trouble/Security Alarm, Display Trouble and Signal Silence.

4.26 Minimum two different password levels will be provided to prevent unauthorized System control or programming.

4.27 Operator control switches for Signal Silence, lamp Test, Reset, System Test and Acknowledge shall be provided.

4.28 The FACP should truly field programmable. This would mean that in the event of change of any logic, detector / zone sequence alteration, the operator can initiate these by use of the alpha-numeric keys on the FACP panel to reconfigure the above parameters. Panels, which require external programming devices to perform the above function, will not be acceptable.

4.29 The FACP should have a degraded mode of operation. In the event of the CPU failure the field devices (detectors & modules) should report the condition on a simple digital communication mode to ensure reliability even during failure.

4.30 Power supply unit of FACP shall have following characters:

4.31 The main power supply shall be 230 VAC±10%, 50 Hz±1% and shall in turn provide all necessary power of the FACP.

4.32 It shall provide a battery charger for 24 hours for standby power using dual-rate charging technique for fast battery recharge.

4.33 It shall provide a very low frequency sweep earth fault detect circuit, capable of detecting earth faults on sensitive addressable modules.

4.34 It shall be power-limiting using Positive Temperature Coefficient (PTC) resistor.

4.35 It shall provide indication for battery voltage and charging current.

4.36 For ease of service, all wiring terminal blocks shall be plug-in type and shall have sufficient capacity for 18 to 12 AWG wire termination. Fixed terminal blocks shall not be acceptable.

5 DETECTORS & ADDRESSABLE DEVICES –

5.1 GENERAL FEATURES COMMON TO ALL DETECTORS WITH IBMS

5.1.1 **Compatibility:** All automatic fire detectors shall be inter changeable without requiring different mounting bases or alterations in the signal panel.

5.1.2 **Response Spectrum:** Combustion gas detectors shall respond to both visible and invisible aerosols; size and colour of the aerosols shall not have a decisive influence on the response of the detector. Sensitivity: On average 30 mgs of burned material per cu.m. (as measured in a 1 cu.m. chamber) shall release an alarm sensitivity which shall be adjustable according to the use of the space.

5.1.3 **Power Consumption:** Each detector shall use the minimum of power, for economic circuits, so that it shall have capacity to connect at least 99 detectors, 50 modules and 20 fault isolator modules in one loop.

5.1.4 **Built-in-response indicator:** Each detector shall incorporate indicator “LED” at the detector which shall blink during normal condition and light up on actuation of the detector to locate the detector which is operated. The detector shall not be affected by the failure of the response indicator lamp.

5.1.5 **Maintenance:** All detectors shall be fitted either with plug-in system or bayonet type connections only, from the maintenance and compatibility point of view.

5.1.6 **Construction:** The detector shall be vibration and shock proof. When disassembling for cleaning purposes, its components must not be damaged by static overvoltage.

5.1.7 **Atmospheric and Thermal Disturbance:** The detector shall so designed, as to be practically immune to environmental criteria such as air currents, humidity, temperature fluctuations, pressure and shall not trigger false alarm, due to the above conditions.

5.1.8 **Continuous Operation:** An alarm release shall not affect a detector’s functioning. After resetting the alarm, the detector shall resume operation without any readjustment.

5.1.9 **Adaptability to ambient conditions:** Detectors shall be designed for adaptability to humid locations.

No performance deterioration shall be acceptable.

6 ADDRESSABLE PHOTOELECTRIC SMOKE DETECTORS

6.1 Smoke detectors shall be intelligent and addressable devices, and shall connect with two wires to one of the Fire Alarm Control Panel loops. Minimum to 100 intelligent detectors should connect to one loop. The detectors shall use the photoelectric (light-scattering) principal to measure smoke density and shall, on command from the control panel, send data to the panel representing the analogue value for smoke density. The detectors shall be ceiling mounted type and shall include a twist-lock base.

6.2 The detectors shall provide Remote a test means whereby they will simulate an alarm condition and report that condition to the control panel. Such a test may be activated remotely on command from the control panel.

6.3 The detectors shall provide address-setting means on the detector head using rotary decimal switches. Systems which use binary jumpers or DIP switches to set the detector address shall not be acceptable. The detectors shall also store an internal identifying code, which the control panel shall use to identify the type of detector. Detectors providing address setting through hand held programmers shall also be accepted.

6.4 The detectors shall provide dual alarm and power LEDs. Both LEDs shall flash under normal conditions, indicating that the detector is operational and in regular communication with the control panel. Both LEDs may be placed into steady illumination by the control panel, indicating that an alarm condition has been detected. An output connection shall also be provided in the base to connect an external remote alarm LED.

6.5 The detector sensitivity shall be set through the Fire Alarm Control Panel, and shall be adjustable in the field through the field programming of the system. Sensitivity may be automatically adjusted by the panel on a time-of-day basis. It shall have self diagnostic capabilities & Automatic Rate compensated sensitivity.

6.6 Using software in the FACP, the detectors shall compensate for dust accumulation and other slow environmental changes which may affect their performance. The detectors shall be listed by UL as meeting the calibrated sensitivity test requirements of NFPA Standard 72. & FM approved. The area covered by each smoke detector shall be as per IS-2189.

7 MULTI-SENSOR PHOTO THERMAL DETECTOR:

7.1 The multi-sensor or multi-tech smoke detector which will have both photoelectric as well as thermal detection elements shall have inbuilt microprocessor, and shall be capable of taking an independent alarm decision. The scattering of smoke particles shall activate the photo sensor. Each intelligent addressable smoke detector's sensitivity shall be capable of being programmed electronically from Control Panel without any extra tools as: most sensitive, more sensitive, normal, less sensitive or least sensitive.

7.2 In addition to the five sensitivity levels the detector shall provide a pre alarm sensitivity setting, which shall be settable in 5% increments of the detector's alarm sensitivity value. The detector should continue to give TRUE alarms even if the loop controller on the main panel fails. Alarm condition shall be based upon the combined input from the photoelectric and thermal detection elements.

7.3 Each detector shall be capable of transmitting pre-alarm and alarm signals in addition to the normal, trouble and need cleaning information. It shall be possible to program control panel activity to each level. Each smoke detector may be individually programmed to operate at any one of five (5) sensitivity settings.

7.4 Each detector microprocessor shall contain an environmental compensation algorithm that identifies and sets ambient "environmental thresholds approximately six times an hour.. The microprocessor shall monitor the environmental compensation value and alert the system operator when the detector approaches 75% and 100% of the allowable environmental compensation value.

8 ADDRESSABLE THERMAL DETECTORS

8.1 Thermal detectors shall be intelligent and addressable devices, and shall connect with two wires to one of the Fire Alarm Control Panel loops. Minimum 99 intelligent thermal detectors may connect to one loop.

8.2 The detectors shall use an electronic detector to measure thermal conditions caused by a fire and shall, on command from the control panel, send data to the panel representing the analog level of such thermal measurements. The detectors shall be ceiling-mounted type and shall include a twist-lock base.

8.3 The detectors shall provide a test means whereby they will simulate an alarm condition and report that condition to the control panel. Such a test may be initiated remotely on command from the control panel.

8.4 The detectors shall provide address-setting means on the detector head using rotary decimal switches. Systems which use binary jumpers or DIP switches to set the address shall not be acceptable. Detectors providing address setting through hand held programmers shall also be accepted.

8.5 The detectors shall provide dual alarm and power LEDs. Both LEDs shall flash under normal conditions. In certain applications, LEDs may be selected to be polled without flashing through system programming. Both LEDs may be placed into steady illumination by the control panel, indicating that an alarm condition has been detected.

8.6 An output connection shall be provided in the base to connect an external remote alarm LED.

9 ADDRESSABLE MANUALSTATIONS

9.1 Addressable manual stations shall be provided to connect to the Fire Alarm Control Panel loops. Minimum 99 addressable manual stations may be connected to one loop. The manual stations shall on command from the Control Panel send data to the panel representing the state of the manual station.

9.2 Press/break stations with resettable capability are also acceptable.

9.3 Manual stations shall be constructed of high impact LEXAN sheet with clearly visible operating instructions provided on the cover. The word FIRE shall appear on the front of the stations in raised letters.

9.4 Stations shall be suitable for surface mounting as shown on the plans, or semi-flush mounting, and shall be installed not less than 42 inches, nor more than 48 inches above the finished floor unless otherwise specified by applicable building codes.

10 ADDRESSABLE MONITORMODULE

10.1 The monitor module shall provide address-setting and shall also store an internal identifying code which the Fire Alarm Control Panel shall use to identify the type of device. Modules using binary jumpers are not acceptable. An LED shall be provided which shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel.

11 CONTROL MODULE

11.1 The control module shall provide address-setting and shall also store an internal identifying code which the control panel shall use to identify the type of device. Modules which use binary jumpers are not acceptable. An LED shall be provided

which shall flash under normal conditions, indicating that the control module is operational and is in regular communication with the control panel.

12 ADDRESSABLE HOOTERS

12.1 All field hooters should preferably be addressable and software configurable. All hooters should be able to provide at least a minimum of 3 different tones, which should be user configurable. The minimum decibel level of each hooter should be 74 to 84 db. All hooters should be UL/F Misted. IP BASED TELEPHONE HANDSETS -PREEARBLY SAME AS EXITING SYSTEM, CISCO -8800, 8841/EQUIVALENT

12.2 The contractor shall provide firefighter's telephone handsets for use with the firefighter's telephone jack stations. The telephone handsets shall be red in color and have a 5 ft (1.5m) coiled cord. TELEPHONE JACKS

12.3 The contractor shall provide stainless steel firefighter's telephone jack stations at the locations shown on the drawings. The jack station shall be clearly identified with the words "FIRE FIGHTER'S TELEPHONE" for use with portable fire fighter telephone handsets. CABLES

12.4 All PVC insulated FR twin twisted copper conductor stranded cables shall be 650 volts grade and shall generally conform to IS and meet the signal cabling requirement of the system manufacturer.

13 EMERGENCY VOICE EVACUATION (EVAC)

13.1 The FACP shall contain all equipment required for audio, communication, signaling and supervisory functions. This shall include speaker zone indication, digital voice units, and microphone.

13.2 Function: The EVAC system equipment shall perform following functions:

- 13.2.1 Operate as a supervised dual channel emergency voice communication system.
- 13.2.2 Operate as a two-way emergency communication system control center.
- 13.2.3 Supervise condition of every connection circuit.
- 13.2.4 Audibly and visually annunciate any trouble condition of tone generators and digital voice units required for normal operation of the system.
- 13.2.5 Provide all-call activities through activation of a single control switch. Provide selectable zone calling.
- 13.2.6 Provide automatic, digitally-recorded voice messages or field-programmed through the microphone.
- 13.2.7 The system shall be modular in construction and shall be capable of being field programmable without requiring the return of any components to the manufacturer.
- 13.2.8 The system and associated equipment shall be protected against unusually high voltage surges or line transients.

14 FUNCTIONAL REQUIREMENTS INTELLIGENT SYSTEM DEVICES

14.1 Each device shall be assigned a unique address via easily understood decade (01 to 99) switch. Address selection via binary switches is not acceptable. Devices which take their address from their position on the circuit are unacceptable.

14.2 Devices shall receive power and communication from the same pair of conductors.

14.3 SENSORS -

- 14.3.1 All fire sensors shall mount on a common base to facilitate the changing of sensor type if building conditions change. The base shall be

incompatible with conventional detectors to preclude the mounting of a non-intelligent device.

14.3.2 Each sensor shall contain an LED which shall blink each time the sensor is scanned by the FACP. If the FACP determines that the sensor is in alarm, the FACP shall command the sensor LED to get latched on.

14.3.3 Each sensor shall be capable of being tested for alarm via command from the FACP.

14.3.4 Each sensor shall respond to FACP scan for information with its type identification to preclude inadvertent substitution of another sensor type. The FACP shall continue operation with the detector installed but shall initiate a mismatch (trouble) condition until the proper detector is installed.

14.3.5 Each sensor shall respond to FACP scan for information with an analog representation of measured fire related phenomenon (smoke density, particles of combustion, temperature). Systems which only monitor the presence of conventional detector in an addressable base shall not be acceptable.

14.3.6 Photoelectric smoke sensors shall contain an optical sensing chamber with nominal sensitivity of 2.3% foot obstruction.

14.3.7 Ionization smoke sensors shall contain a unipolar dual chamber with nominal sensitivity of 2.3% Foot obscuration.

14.4 INPUT DEVICES

14.4.1 The input device shall provide an addressable input for N.O. or N.C. contact devices such as manual stations etc.

14.4.2 The input device shall provide a supervised initiating circuit. An open-circuit fault shall annunciate at the FACP (subsequent alarms shall be reported).

14.4.3 The device shall contain an LED which will blink upon being scanned by the FACP. Upon determination of an alarm condition, the LED shall be latched on.

15 AUTOMATIC FUNCTIONS AT FACP

15.1 The alarms shall be displayed at the FACP on an LCD display. The display shall indicate the device in alarm by ID number, the appropriate alarm state, and the current time and date. It shall also display a point description of minimum 32 characters and, the respective analog value. The display shall also contain a minimum 40 characters alarm message. It shall be possible to see the number of acknowledged alarms, number of current fire alarms, number of trouble conditions and number of other miscellaneous alarms in the system. The FACP printer shall print out same information displayed on the LCD display. The LCD display and printer shall be powered directly from the panel.

16 MANUAL FUNCTIONS AT FACP

At any given time, operator shall have the following manual capabilities at FACP by means of switches located behind a key-locked cover:

16.1 Initiate an alarm summary display on the FACP LCD display. This display shall step through all currently active alarms in the system.

16.2 Initiate a summary printout of all currently active alarms on the FACP printer.

16.3 Initiate an “all-point summary” printout on the FACP printer recording the status of each system point (initiating circuits, indicating circuits etc.)

16.4 At any time, the operator shall have following manual capabilities at the FACP under password control; Operator privileges and ID numbers of upto four digits shall assignable by the main operator or designated alternate. Actions taken by operators shall automatically be printed on the FACP printer with operator initials, time and date.

16.5 Commands output points to different mode. Such commands shall be printed with selected descriptors ON/OFF/AUTO, OPEN/CLOSE, DAY/NIGHT etc. In addition, command shall be used to ISOLATE or DISCONNECT points. When isolated, alarms and troubles shall be received but not acted upon.

16.6 Modify system parameters. Alphanumeric key pad shall be provided for operators to modify the following parameters:

16.6.1 Change sensor alarm and pre-alarm threshold
16.6.2 Update date and time
16.6.3 Change point descriptors
16.6.4 Change action message
16.6.5 Disable venture
16.6.6 Change sensor verification time
16.6.7 Change password
16.6.8 Activate/deactivate indicating output control point
16.6.9 Control-by-event programs on line
16.6.10 Select a system status report for printing on the printer from the control station. The following real
16.6.11 time reports shall be provided:
16.6.12 All point log.
16.6.13 Alarm summary
16.6.14 Trouble summary
16.6.15 Status summary
16.6.16 Sensitivity log
16.6.17 Disabled points log.
16.6.18 Isolated points log
16.6.19 Disconnected points log
16.6.20 Logical group points log
16.6.21 The sensitivity log shall print the analog value of each addressable analog sensor.
16.6.22 Select printing of a trend sensitivity log which when enabled, shall print minimum last 24 analog values for every addressable analog sensor taken at predetermined intervals. Systems which limit the number of addressable analog sensors which can be trended are not acceptable.
16.6.23 Select a sequence of programmed commands which can be automatically executed, in sequence, via a single command.

16.7 Perform a walk-test function such that an operation can be periodically checked out for all initiating devices on a zone. In walk test mode, all initiators on the selected zone shall automatically be isolated. As each device is placed into an alarm or trouble condition, the FACP shall print the condition and automatically reset the device. No audible signals shall be initiated from the zone to prevent disruption of building occupants. If a zone is inadvertently left in the walk-test mode, it shall automatically reset to normal after a five-minute idle time is exceeded.

17 SYSTEM SUPERVISION

17.1 In the normal supervisory condition, only the “POWER” ON, and “RUN” conditions, shall be illuminated. The LCD display shall display “System Normal” and the current time and date.

17.2 The LCD display shall indicate the loss of power condition and the printer shall record the same. Following restoration of normal AC power, the trouble indicators shall be automatically reset and the printer shall record the return to normal condition.

17.3 The LCD display shall indicate the loop in trouble and the printer shall record same.

17.4 The LCD display shall indicate trouble and the printer shall record same.

17.5 Operation of a momentary “Silence” switch shall silence the audible trouble signal but the visual “Trouble” LEDs shall remain ON until the malfunction has been corrected and the system has reset. The FACP printer shall record this action.

18 PROGRAMMING OF FACP

18.1 The LCD display and printer programming shall be accomplished on site by means of lap-top personal computer which shall plug into the FACP. Modules requiring off-site programming are not acceptable. LCD shall initiate test of all addressable sensors in the system.

18.2 Programming functions shall include alarm/trouble type assignment, point descriptor assignment, alarm message assignment etc. Data file for the LCD display and a printer shall be stored in EEPROM.

19 OTHER DEVICES

Fault-isolation of fire zones (Logical Point Group) / circuit modules shall be provided to enable part of a fault-tolerant loop to continue operating when a short occurs in the loop.

20 FIRE ALARM GRAPHICS SOFTWARE (FAS)

20.1 The status of each detector shall be monitored by the FAS.

20.2 Using the FAS, the operator shall be able to adjust the sensitivity of any detector.

20.3 Using the FAS, the operator shall be able to define the entire database for the file system. Fire system which are not field programmable shall not be accepted.

20.4 The FAS operator shall be able to acknowledge alarms or trouble messages at the FAS.

20.5 It shall be necessary for all alarm or trouble conditions to be acknowledge at the fire system central panel.

20.6 FAS software shall be upload/download type as well as with graphic facilities.

20.7 The contractor shall list out the graphic facilities being provided by him.

20.8 All devices & detectors shall be visible on building plans superimposed in FAS software.

21 FIRE CONTROL SEQUENCES

Upon activation of fire alarm devices:

21.1 FACP will display the exact address & alarm in the panel.

21.2 The Central Control Station shall switch OFF the AHUs of the affected floor fire damper and toilet exhaust fans while the AHUs on the other floors shall remain operational so as to keep the area under positive pressure.

21.3 Staircase pressurization fans shall be operated through the fire alarm system.

21.4 Appropriate fire messages shall start to broadcast automatically (synthesized voice) after time delay.
21.5 Activate the fire alarm signaling devices.
21.6 Capture the lifts and return them to the ground floor.
21.7 The lifts and escalators alarms (provided by lift and escalator contractor) shall be tied to the Fire Alarm System.
21.8 The Fire Alarm System shall function as follows:
21.8.1 In the event of a fire, a signal will be provided by the Fire Alarm System to return all lifts to ground floor.
21.8.2 Should an emergency alarm originate from an individual lift, an audible alarm shall sound at both Fire Control Stations, and print out at the printers.
21.8.3 When an alarm is detected all including annunciating devices on the floor one above and one below shall sound.
21.8.4 Stairwell pressurization fans shall be started.
21.8.5 The air handling unit for the floor shall best opted.
21.8.6 The air handling unit on the floor above and the floor below shall be started unless those floors are also in alarm.
21.8.7 Smoke extraction from Exhibition Hall.
21.8.8 If the alarm has not been acknowledge at the central panel within one minute, all audible annunciating devices on the floor above and the floor below shall sound. It the alarm has not been acknowledged at the central panel within three minutes, all audible annunciating devices on the building shall sound.
21.8.9 It shall be possible to accomplish the following, independent of the central console:
21.8.10 Initiate a general alarm condition.
21.8.11 Silence the local audible.
21.8.12 Silence the alarm signals. It shall be possible to acknowledge (silence) the local FACP audible without silencing the alarm indicating devices (hooters).
21.8.13 Reset all zones, after all initiating devices have returned to normal.
21.8.14 Perform a complete operational test of the microprocessor and memory with a visual indication of satisfactory communication with each board.
21.8.15 Test all panel LEDs for proper operation without causing a change in the condition of any zone.
21.8.16 Print reports of all points based on Historical data.
21.8.17 Read the status of each point based on LCD display and print the status information.
21.8.18 Change passwords.
21.8.19 Disable points/zones.
21.8.20 Change sensitivity of sensors.
21.8.21 Perform a walk test and generate walk test report.

22 FIRE FIGHTERS' TELEPHONE SYSTEM

Firefighter telephone system shall be as follows:
22.1 Firefighter telephone communication system shall have with complete, common talk, closed circuits. The system shall include, but not be limited to, a master control station mounted in the fire alarm control panel, a power supply and standby battery system, and remote telephone stations.
22.2 Master control station which shall provide power, supervision, and control for wiring, components, and circuits. The act of lifting any remote telephone hand

set from its cradle shall cause both a visual and audible signal to annunciate at the master control station. Removing the hand set at the master control station and depressing a button at the remote telephone hand set shall cause the automatic silencing of the audible signal. Communication between the master control station hand set and any/or all remote handsets shall require the depressing of a push-to-talk switch located on any/all remote handsets. During the time that the master control hand set is removed from its cradle it shall be possible to communicate between five remote hand sets and the master control station. Handsets shall be able to monitor any conversation in progress and join the conversation by pressing the push-to-talk button. It shall not be possible to communicate between two or more remote handsets with the master control station hand set in its cradle. The master control station hand set shall be red in color and equipped with a 5-foot long strain-relieved coiled cord. Wiring connections shall be made to terminal strips. The master control station shall monitor wire and connections for any opens, shorts, or grounds which would render the system inoperable or unintelligible. The master control station shall be equipped with a silencing switch and ring-back feature such that any audible trouble signal can be silenced and shall be so indicated by the lighting of an amber LED. Once any trouble condition has been corrected, the amber LED shall be extinguished and the silencing switch shall sound again until the switch is restored to its original position. The master control station shall be equipped with a separate, LED annunciated switch for each telephone circuit. In addition, LEDs shall provide for the annunciation of operating and supervisory power. The loss of operating or supervisory power shall cause an audible and visual indication at the master control station and shall also cause the fire alarm trouble signal to sound on the FACP. Switches, LEDs, and controls shall be fully labelled.

22.3 Each station shall be equipped with a hinged door that is magnetically locked. Each hand set shall be permanently wired in place with a coiled cord. Each hand set shall be red high-impact cycolac and shall be equipped with a push-to-talk switch which, when operated, shall signal the master control station and a switch-equipped, storage cradle.

22.4 Provide operating and supervising power from the same supply circuit(s) utilized for the fire alarm control panel. The emergency telephone circuit control panel shall include visual indication of active and trouble status for each telephone circuit in the system.

22.5 The telephone circuit control panel shall include switches to manually activate or deactivate each telephone circuit in the system.

23 SPEAKERS

23.1 All speakers shall operate on 70 VRMS or with field selectable output taps from 0.5 to 2.0 Watts .Speakers in corridors and public spaces shall produce a nominal sound output of 84 dBA at 10 feet (3m).

23.2 Frequency response shall be a minimum of 400 HZ to 4000 HZ.

23.3 The back of each speaker shall be sealed to protect the speaker cone from damage and dust.

23.4 System paging from emergency telephone circuits shall be supported.

23.5 The audio message generator shall have the following indicators and controls to allow for proper operator understanding and control:

23.5.1 LED Indicators

23.5.2 Lamp Test

23.5.3 Trouble
23.5.4 Off-Line Trouble
23.5.5 Microphone Trouble
23.5.6 Phone Trouble
23.5.7 Busy/Wait
23.5.8 Page Inhibited
23.5.9 Pre/Post Announcement Tone
23.5.10 Controls with associated LED Indicators:
23.5.11 Speaker Switches/Indicators

23.6 The speaker circuit control switches/indicators shall include visual indication of active and trouble status for each speaker circuit in the system.

23.7 The speaker circuit control panel shall include switches to manually activate or deactivate each speaker circuit in the system.

24 Intelligent Emergency Escape Lighting & Exit Signage System

24.1 **General -** The emergency lighting system & Exit signage shall be designed in accordance with the NBC 2016 & Local Fire Norms and will be a fully addressable, self-test system using self-contained luminaires and comply with the requirements of BS5266 and all other related standards. All luminaires and exit signs shall incorporate an LED light source and Lithium Polymer battery technology to improve operational efficiency, reduce costs and protect the environment. Luminaires incorporating fluorescent lamp technology, nickel cadmium or nickel metal hydride batteries will not be accepted.

24.2 The system shall be designed to meet the requirements of BS5266 pt1 and a certificate of compliance shall be issued on completion.

24.3 System Requirements –

24.3.1 Each lighting final sub-circuit shall be individually monitored by use of a DIN rail mounted phase monitor. The phase monitor shall be microprocessor controlled and detect the presence or absence of the mains supply in accordance with the parameters laid down in BS EN 60598- 2-22.

24.3.2 The Emergency Lighting Control Panel shall be capable of supporting up to two circuits of emergency lighting luminaires. Each of these circuits shall be capable of supporting up to 127 devices.

24.3.3 Where more than 254 luminaires are required it shall be possible to install a second Emergency Lighting Control Panel and interface them via a graphics package and an IEEE802.3 Ethernet network. It shall be possible to connect up to 15 panels onto a single network.

24.3.4 The user interface shall consist of a keypad with a 2line by 40character LCD display. It shall be possible to connect up to eight user interfaces onto each ELCP.

24.4 Luminaires –

24.4.1 Each luminaire shall be self-contained and consist of a single LED light source – with a specially designed lens to provide optimum light

distribution, electronics and battery, all contained within a single plug-in housing.

24.4.2 Each luminaire shall be of the self-contained type and be connected via a 2 core data communication cable to a control panel. The power to charge the batteries in each self- contained luminaire shall also be delivered through this cable. Luminaires requiring a local 230V ac mains supply to charge the batteries shall not be permitted.

24.4.3 Each luminaire shall be microprocessor controlled and allocated an individual address within the system. This address will be programmed into the microprocessor of the luminaire using a hand-held programming tool. Setting address by use of switches shall not be permitted. Each luminaire and exit sign shall be capable of a minimum of 3hrs continuous operation in an active mode. Each luminaire shall be fitted with a bi-colour Red/Green LED to indicate its status.

24.4.4 Each luminaire shall be site programmable for operation in a maintained or non-maintained mode and shall provide a minimum of 3 hours continuous operation in the event of a mains power supply failure.

24.4.5 When a luminaire is operating in the maintained mode, it shall be possible to set the light output to seven different levels of brightness. Should the main supply fail, the luminaire shall automatically switch to maximum brightness.

24.4.6 To assist in servicing and maintenance, each luminaire shall plug-in to a common base. This base shall be free of any electronic components, addressing devices or batteries.

24.4.7 To avoid entropized removal it shall be possible to lock the luminaire into the base with removal only possible by use of a special tool.

24.5 Battery Technology –

24.5.1 The standby batteries incorporated into each luminaire shall be Polymer Lithium Ion technology and incorporate over voltage, over current and deep discharge protection circuitry. Additional protection shall also be provided in case of a short circuit across the battery terminals.

24.5.2 End of Life Disposal - Luminaires shall be WEEE and RoHS compliant and suitable for recycling. Luminaires shall not contain any heavy metals which require special handling for disposal, such as mercury, lead or cadmium.

24.5.3 Range of Luminaires - A range of products shall be available covering all types of emergency lighting application. All of the luminaires shall use LED technology. The range shall include the following:

a) LED Down-light with specially designed lens for corridor area applications. Both surface and semi-flush mounting models shall be available.
b) LED Down-light with specially designed lens for open area applications. Both surface and semi-flush mounting models shall be available.
c) A weatherproof housing shall be used for outdoor installations.
d) LED “swing frame” exit signs which allows the same sign to be either ceiling or wall mounted. These signs shall enture the same

"plug-in" base as the luminaires. Two blade sizes shall be available for 20M and 40M viewing distances.

e) LED recessed mounting exit signs.
f) All of the above luminaires and exit signs shall be soft addressable via a handheld programming tool.

24.6 Emergency Lighting Control Panel (ELCP) –

24.6.1 The ELCP shall consist of a sheet steel enclosure with a white powder coat finish and contain an internal termination board for all incoming and outgoing cables. The panel shall be designed for surface mounting

24.6.2 The panel shall derive its power from an externally mounted 220V/35V a.c. transformer. The transformer shall have a protection rating of IP44.

24.6.3 The ELCP shall not incorporate any user controls. User controls shall be provided via a separate combined keypad and display unit. The panel shall support up to two circuits of addressable luminaires, exit signs and Input/output modules. Each circuit shall be able to support 127 addresses.

24.6.4 The ELCP shall have a transactions log of the last 512 events. Subsequent events should overwrite the log on a FIFO principle. The data shall be held in non-volatile memory. The ELCP shall have a reports log of at least the last 12 months activity. Subsequent activity should overwrite the log on a FIFO principle. The data shall be held in non-volatile memory. Serial Outputs

24.6.5 The ELCP shall include a minimum of two RS232 serial data ports, with an expansion card for an additionaltwoRS232/485ports.The ELCP shall include an RS485 port for communication with up to eight combined keypad and display units. One serial port shall be dedicated for uploading and downloading the programmed data to and from a PC, or to provide data to a network interface module.

25 Panel Networking - The ELCP shall include a serial output which will allow up to 15 panels to be connected via an existing or dedicated TCPIP Ethernet network to a graphical interface.

26 Power Supply - Each ELCP shall be supplied via an external 220V/35Va.c. transformer. Each ELCP shall contain 1x 7Ah Sealed Lead Acid batteries to support panel and keypad operation during a mains failure condition.

27 User Interface - The user interface shall consist of an illuminated alpha-numeric membrane keypad, with a group of "soft keys" to be used in conjunction with a graphic based 128x64 pixel backlit LCD display in a surface mounting enclosure measuring 147W x 144H x 29D.It shall be possible to connect up to eight user interfaces on an RS485 bus to the ELCP.

28 The LCD shall be menu driven and incorporate the following capabilities:

28.1 Output Relay Card - It shall be possible to connect up to four 8way relay cards on a single RS485 Port. These relays shall be used for interfacing to other systems within the building.

28.2 Panel Programming Software - The Control Panel shall be fully site configurable and programmable using a PC-based programme and allow the data to be backed-up to a disc for archiving purposes. This programme shall also include the facility to produce reports of all the system programming in a printable format.

28.3 Monitoring of General Lighting Mains Supplies - Each lighting final sub-circuit shall be monitored at the lighting distribution board by a DIN rail mounting phase monitor. The phase monitor shall be microprocessor controlled and detect the presence or absence of the mains supply in accordance with the parameters laid down in BS EN 60598-2-22. And incorporate a voltage free change of state relay.

28.4 Each phase monitor shall be connected via an addressable input module to the ELCP to signal the presence or absence of its monitored supply.

PART- C7
AIR-CONDITIONING SYSTEM, VENTILATION, IBMS

Section-I (Air-Conditioning System, Ventilation System)

1 General

The work shall got executed as per CPWD GENERAL SPECIFICATIONS for HEATING, VENTILATION & AIR-CONDITIONING WORKS 2017, General Specification of Electrical Works (Part – I) Internal 2013, General Specification of Electrical Works (Part – II) Internal 1994 General Specification of Electrical Works (Part – IV) Substation 2013 and additional specifications given hereto. The minimum IOs list as per CPWD and as per the design requirement or fully automated system will be applicable.

2 Introduction

2.1 Areas to be Air Conditioned are as per Clause 5 of Part-I or relevant. Successful tenderer is to calculate the heating / cooling load calculations for the areas to be air-conditioned and package type air-conditioning system to be designed accordingly.

2.2 It is proposed to provide Water Cooled Screw Central Air conditioning system.

2.3 It shall have mod bus communication card to replicate all chiller parameter over BMS terminal. Up and down swing flaps and tropical rotary compressor indoor unit with wide angle louvers.

2.4 Automatic air flow adjustment.

2.5 Sleep timer, coil dry and auto-changeover

2.6 Anti-corrosion treatment for ODU and heat exchanger fins

2.7 Power air flow dual flaps and dry function

2.8 Power coated outdoor unit

2.9 Wireless remote controller, economy mode and quiet operation Suitable Cooling Heating Capacity

2.10 Toilets to be provided with separate supply air and exhaust air, ducted ventilation in Administrative Block, Academic & Faculty Building, Library Building, Seminar & Conference building. Pressurization & Smoke management system to be provided in the buildings including basement, fire escape staircase & fire escape route, basements etc. as per NBC2016.

3 Basis of Design for Rajgir

3.1

Ambient Summer Conditions: (as per ISHRAE-2007, Handbook Table-1)	DBT	110^0F /Actual
	WBT	75^0F /Actual
	RH	70% /Actual
Ambient Monsoon Conditions: (as per ISHRAE-2007, Handbook Table-1)	DBT	95^0F /Actual
	WBT	83^0F /Actual
	RH	60% /Actual
Ambient Monsoon Conditions: (as per ISHRAE-2007, Handbook Table-1)	DBT	45^0F /Actual
	WBT	41^0F /Actual
	RH	70% /Actual

Latitude and longitude of Rajgir	25.0173° N, 85.4162° E
Daily Range	25^0F
Indoor Temperature & RH	(As per NBC 2016, Part-8, Section-3)
Occupancy	As per Interior layout and As per NBC2016
Equipment Load	As per actual
Lighting Load	As per system design
Fresh Air	As per NBC 2016, Part-8, Section-3

3.2 U values and other coefficient for calculating the cooling loads to be based on latest ASHRAE handbook.

3.3 AHU Design: Maximum face velocity across filters, maximum face velocity across cooling, maximum fan outlet velocity shall be as per CPWD General Specifications for Ventilation & Air-Conditioning – 2017. Maximum fan motor speed should be 1450 RPM.

3.4 Design Parameters for Chillers, Duct, Plumbing etc. shall be as per CPWD General Specifications for Heating, Ventilation & Air-Conditioning – 2017

3.5 Codes and Standards

a) CPWD General Specifications for Electrical Works Part I Internal – 2013,
b) CPWD General Specifications for Electrical Works Part II External –1994,
c) CPWD General Specifications for Electrical Works Part IV Sub Station– 2013,
d) CPWD General Specifications for Heating, Ventilation & Air-Conditioning -2017,
e) NBC - National Building Code
f) ISHRAE - Indian Society of Heating, Refrigerating and Air Conditioning Engineers
g) ASHRAE- American Society of Heating, Refrigeration and Air-Conditioning Engineers
h) ARI - Air-conditioning and Refrigeration Institute
i) NFPA - National Fire Protection Association
j) UL - Under writers Laboratories
k) AMCA - Air Movement and Control Association

3.6 SYSTEM -

1) Conditioned air from the AHUs will be taken through the 180 GSM or above G.S.S. ducting and will be supplied to conditioned areas through false ceiling mounted diffusers/ grills. Return air will be collected through similar diffusers/ grills mounted on false ceiling and will be taken to AHUs for reconditioning. The total length of supply air ducting will be thermally insulated except initial section. The initial section of all the supply air ducts will be provided with acoustic lining on inside to prevent transmission of noise to air-conditioned area.
2) The AC ducting system will be provided with a Variable Air Volume system for single occupancy areas / room. This system is a very important energy saving tool. The AHUs are equipped with Variable Frequency Drives. This makes the system capable of reducing the Load on the AHUs if the

occupancy is low and also empowers the occupants to change the temperature in their rooms as desired.

3) Each AHU room shall have fresh air intake system with fresh air damper.
4) For fire safety, smoke cum fire dampers with electric actuators interlocked with blowers will be provided in the initial sections of both supply air duct and return air path in each floor mounted AHU room. The AHU motor will be interlocked with the central fire alarm system of building, such that in case of detection of smoke or fire by fire alarm system, the AHU shall automatically shut off.
5) All AHU rooms have been acoustically treated by providing 50 mm thick insulation covered with 0.8 mm thick perforated aluminium sheet to prevent transmission of noise to adjoining air- conditioned areas. The Air-conditioning plant shall consist of Energy Efficient Water Cooled VFD Screw Chiller with primary variable (Evaporator) of suitable Capacity 3 Nos. (2 working + 1 stand by) to be installed in the plant room. The proposed chiller is with mono/Twin Screw compressors. The minimum COP and minimum IPLV at ARI conditions should compliance with Super ECBC – 2017 code. Two Nos. Primary Pump with VFD (1 working +1 stand by), 2 Nos. Secondary Pumps with VFD (1 working + 1 stand by) and 2 Nos. condensers with VFD (1 working + 1 stand by) are placed in AC plant room.
6) Pressurized expansion tank with air separator shall be placed in the plant room. 3 Nos. Induced draft cooling tower (2 working + 1 standby) are proposed to cool the condenser water. Individual floor mounted AHU in each AHU rooms shall be provided to meet the Air-conditioning requirements of the relevant areas.
7) Hot water Generator shall be reverse cycle (water source type, if client permit then air source may also be designed) based with `410/ 134A refrigerant. Minimum nominal COP shall be 4.0. Make of reverse cycle hot water generator shall be that of chilling machine.

4 ROOF INSULATION: All exposed roofs of the areas to be air-conditioned shall be thermally insulated to achieve U value = 0.45 W / m^2K (minimum).

5 PERFORMANCE GUARANTEE: The contractor shall guarantee that the air conditioning plant shall maintain the designed inside Temperature within +2° F tolerance and shall not exceed the specified limit at any point in the given area. The contractor shall guarantee that the capacity of various components as well as the whole system shall not be less than the specified capacity, as per system design.

6 NOISE LEVEL: All refrigeration and air conditioning equipment and materials, (like motors, compressors, pumps, etc.) shall be selected, designed and installed in such a manner that the inside noise criterion for all conditioned spaces shall be in the range of NC-30 to NC-35.Thus the noise level in conditioned occupied spaced due to all refrigeration and air conditioning equipment shall not exceed 52 DB at 150 Hz when measured at any point in the occupied spaces less than 1.5 meter from any supply air grills or 60 cm from any return air grille. The outdoor noise criterion for cooling towers, at a distance of 50 meters from the fan shall be NC-45. Therefore, noise level in open areas 50 meters away from towers in any direction shall not exceed 60 DB.

7 **SHOP DRAWINGS:** The contractor shall prepare and supply the following drawings (4 sets) to the University within 15 days from the date of award of work –

a. Duct Layout for all floors
b. Piping layout for all floors
c. Plant Room Equipment Layout
d. Foundation drawing for all equipment in the plantroom Fixing details for cooling tower
e. Single Line diagram for chilled water circulation system
f. Single Line diagram for electrical distribution system
g. Fabrication Drawings for all electrical panels
h. Control wiring details

The contractor shall re-submit 4 sets of all the drawings to the CPWD within 05 days from date of receiving comments if any from the CPWD after incorporating the comments.

8 **INSPECTION AND TESTING**

9 The CPWD's authorized representative shall have full power to inspect drawings of any portion of the work, examine the materials and workmanship of the contractor's works or at any other place from which the material or equipment is obtained. Acceptance of any material or equipment shall in no way relieve the contractor of his responsibility for meeting the requirement of the specifications, but shall have to be replaced at its own cost by the contractor in case the equipment or work is found defective or of inferior quality.

10 Routine / Type tests for the various items of equipment shall be performed at the contractor's works and tests certificates furnished. The contractor shall permit the departments authorized representative to be present during any or all of these tests. After notification to the department that the installation has been completed, the contractor shall make under the direction of and in the presence of CPWD such tests and inspection as have been specified or as the CPWD shall consider necessary to determine whether or not, the full intent of requirements of the plans and specifications have been fulfilled. In case the work does not meet the full intent of specifications, it shall be rectified by the contractor at no extra cost and the contractor shall bear all expenses for any further tests considered necessary.

11 All tools, instruments, plants and labour /operating personnel for the test shall be provided by the contractor at his own cost.

12 **WATER CHILLING UNITS -** The scope of this section comprises the supply erection, testing and commissioning of the water chilling units conforming to these specifications and in accordance with the requirements of system design. Only chillers units operating on `134a refrigerant & having full load IKW/ TR of less than or equal to 0.70 shall be acceptable.

13 CHILLER SELECTION/ DESIGN CONDITIONS

The chiller shall be selected at the following conditions.

a. Chilled Water Leaving Temperature : 6.7^0C
b. Chilled Water Entering Temperature : 12.20C
c. Evaporator Fouling factor : 0.0001 hr sqmt °C temp diff /Kcal
d. Chilled Water Circulation Rate : suitable LPM (as per design)
e. Maximum Pressure Drop in Evaporator : 5 mtr of Water.
f. Condenser Water Leaving Temperature : 36.4^0C
g. Condenser Water Entering Temperature : 32.2^0C
h. Condenser Fouling factor : 0.0002 hr sqmt ^{0}C temp diff /Kcal
i. Condenser Water Circulation Rate : suitable LPM (as per design)
j. Maximum Pressure Drop in Condenser : 7 mtr of Water.
k. Suitable for Refrigerant : R-134a

14 Motor shall be suitable for 415 Volts ± 10%, 50Hz AC supply. Control wiring between various components of chiller package and control panel board of the chiller unit shall be provided. The machine should be complete with factory wired, machines mounted microprocessor based control panel with necessary interlocking & safeties as per specifications i/c 4 point testing of one chiller, BMS card etc. as required. Automatic Plant Manager is included.

15 The minimum IKW/TR should not be more than 0.65 and as per ECBC Code 2017. Compressor with VFD shall not exceed IPLV 0.40 at ARI conditions, should be complied by the Chiller manufacturer.

16 **COMPRESSOR:** Each unit shall consist of evaporator, condenser, Mono/Twin Screw compressor, semi- hermetic/Hermetic type motor lubrication system, R-134a Refrigerant, full view control center, and all interconnecting unit piping and Wiring. The chiller will be painted prior to shipment. Performance will be certified in accordance with ARI Standard 550/590. Only chillers that are listed in the ARI Certification Program for Centrifugal Chillers are acceptable. The magnetic type brushless chillers and/OR radiant chillers will be preferred.

17 Capacity control will be achieved by use of pre-rotation vanes to provide fully modulating control from maximum to minimum load. The unit will be capable of operating with lower temperature cooling tower water during part-load operation in accordance with ARI Standard 550/590. Pre-rotation vane position will be automatically controlled by an external electric actuator to maintain constant leaving chilled water temperature.

18 **MOTOR DRIVELINE:** The compressor motor will be semi-hermetic/Hermetic type operating with VFD. The Semi-hermetic/Hermetic type motor shall include arrangement to prevent overheating. Motor drive shaft will be directly connected to the compressor shaft with a flexible disc coupling. Coupling will have all metal construction with no wearing parts to assure long life, and no lubrication requirements to provide low maintenance.

19 **EVAPORATOR:** Evaporator will be of the shell-and-tube, flooded type with 2 Pass designed for 150 psig working pressure on the refrigerant side. Shell will be fabricated from rolled carbon steel plate with fusion welded seams; have carbon steel tube sheets, drilled and reamed to accommodate the tubes; and intermediate tube supports spaced no more than four feet apart. The refrigerant side will be designed & tested in accordance with ASME Or other applicable Boiler and Pressure Vessel Code. Tubes shall be high-efficiency, internally and externally enhanced type having plain copper lands at all intermediate tube supports to provide maximum tube wall thickness at the support area.

20 Each tube will be roller expanded into the tube sheets providing a leak-proof seal, and be individually replaceable. Water velocity through the tubes will not exceed 3 m/s. Two liquid level sight glasses will be located on the side of the shell to aid in determining proper refrigerant charge. Aluminum mesh eliminators will be located above the tube bundle to prevent liquid refrigerant carryover to the compressor. The evaporator will have a refrigerant relief device sized to meet the requirements of ASHRAE 15 Safety Code for Mechanical Refrigeration.

21 **CONDENSER:** Condenser will be of the shell-and-tube type, 2 Pass and designed for 150 psig working pressure on the refrigerant side. Shell will be fabricated from rolled carbon steel plate with fusion welded seams; have carbon steel tube sheets, drilled and reamed to accommodate the tubes; and intermediate tube supports spaced no more than four feet apart. The refrigerant side will be designed & tested in accordance with ASME or other applicable Boiler and Pressure Vessel Code. Tubes shall be high-efficiency, internally and externally enhanced type having plain copper lands at all intermediate tube supports to provide maximum tube wall thickness at the support area. Each tube will be roller expanded into the tube sheets providing a leak-proof seal, and be individually replaceable. Water velocity through the tubes will not exceed 3 m/s.

22 **REFRIGERANT FLOW CONTROL:** Refrigerant flow to the evaporator will be controlled by a slide valve /variable orifice for improving unloading capabilities.

23 **MICROPROCESSOR CONTROL CENTER:** General: The chiller shall be controlled by a stand-alone microprocessor based control center. The chiller control panel shall provide control of chiller operation and monitoring of chiller sensors, actuators, relays and switches.

24 **ISOLATION MOUNTING:** Included with the unit are four vibration isolation mounts, consisting of 1” thick neoprene isolation pads, for field mounting. The pads are to be mounted under the steel mounting pads on the tube sheets. It shall be suitable for basement/ground floor installation.

25 **WATER CIRCULATING EQUIPMENTS:** The various items of the water circulating system shall be complete in all respects and comply with the specification given below. The total sound intensity with all fans in operation shall not practically exceed 60 DB at a distance of 50meters.

26 **PUMP SETS:** Various pumps shall be of type and capacity, as per system design.

27 **VARIABLE SPEED PUMPING SYSTEM:** Variable speed pump should provide stable and predictable flow rate over a wide variation of head pressure. The control system shall include as a minimum, the programmable logic pump controller, adjustable frequency drive(s) and remote sensor/ transmitters as indicated on the drawings. Provide additional items as specified or as required to properly execute the sequence of operation.

28 **Pump Logic Controller:** The Technologic pump logic controller assembly shall be listed by and bear the label of underwriters Laboratory, Inc. (UL). The controller shall meet part 15 of FCC regulations pertaining to class – A computing devices. The controller shall be specifically designed for variable speed pumping application. The controller shall function to a proven program that safeguard against damaging hydraulic conditions including Motor overload, Pump flow surges, Hunting, End of Curve. The pump logic controller shall be capable of receiving up to 7 remote process variable signals. It will then select the analogue signal that has deviated the greatest amount from its set point. This selected signal will be used as the commend feedback input for a hydraulic stabilizing function to minimize hunting. Each input signal shall be capable of maintaining a different set point value. Controller shall be capable of controlling up to two pumps in parallel.

29 **PUMPS SUITABLE FOR VARIABLE SPEED:** Pumps shall be single stage, end suction design with a foot mounted volute to allow servicing of the impeller and bearing assembly without disturbing piping connections. Pump volute shall be class 30 cast iron with integrally cast pedestal support feet. The impeller shall be cast bronze enclosed type, dynamically balanced keyed to the shaft and secured by a locking cap screw. The liquid cavity shall be sealed off at the pump shaft by an internally flushed mechanical seal with ceramic seal seat and carbon seal ring, suitable for continuous operation at 225o F.A. replaceable bronze shaft sleeve shall completely cover the wetted area under the seal.

Pump shall be rated for minimum of 175 psi working pressure. Volute shall have gauge tapings at the suction and discharge nozzles and vent and drain tappings at the top and bottom. Base plate shall be structural steel or fabricated steel channel with fully enclosed sides and ends, and securely welded cross members. Grouting area shall be fully opened. A flexible type, centre drop-put design coupler, capable of absorbing tensional vibration shall be employed between the pump and motor. Coupler shall be shielded by a coupler guard securely fastened to the base. Motor shall be energy efficient, totally enclosed fan cooled, class „F" insulation and suitable for operation on AFD (only for secondary side). Motor shall be specially designed for quite operation and its speed shall not exceed 1450 RPM. The motor rating shall be such as to ensure non-overloading of the motor throughout its capacity range. Motor shall be suitable for 415 ± 10% volts, 3 phase, 50 cycles AC power supply.

30 **COOLING TOWER (INDUCED DRAFT) –** The cooling towers shall have capacity as specified and shall be induce draft type to meet the specified conditions of service. The cooling tower & basin shall be of F.R.P. The spray system shall consist of G.I. pipe main and branch headers with brass nozzles. The cooling tower shall be complete with

suction screen float valve, make up, overflow and drain connections as well as required hardware and material for assembly. Fiber-reinforced plastic cooling towers shall be suitable for outdoor use. Tower shall be vertical, induced draft, up flow draw through type, fiber-reinforced plastic construction, in round/ square shape, complete with fan, motor, surface and spray sections, eliminators, automatic controls and sound attenuation equipment, if required. Side casing shall be made out of FRP in a number of equal segments with both side smooth surfaces for minimum resistance to air flow. It shall have sufficient structural strength to adequately with stand high wind velocities and vibrations. The casing shall be installed in the Fiberglass reinforced basin. The tower supporting structure shall be made out of hot dipped galvanized steel frame. Air intake shall be all along the base circumference of cylindrical FRP casing so that tower can be installed quite independent of prevailing wind direction. A hot dip galvanized expanded metal mesh screen shall protect the air intake. Sufficient clearance between casing and water basin shall be provided to enable service personnel to enter the tower comfortably and carry on periodic cleaning and inspection. Cold water basins shall be deep fiber glass reinforced sump on which cooling tower super structure shall be supported. Suction tank with easily removable double brass strainer shall be provided.

31 Basin fittings shall include the following:

a. Bottom Outlet.
b. Screened suction assembly bolted to the casing.
c. Drain bolted to underside of suction side sheet.
d. Overflow bolted to inside of casing side sheet.
e. Built in bleed off attached to inlet header discharging through PVC tube into overflow pipe.
f. Ball types automatic make up water valve.
g. Quick fill connected to inside of casing side sheet.

32 **Hot water distribution** shall be by sprinkler system consisting of PVC sprinkler pipes screwed into a rotating head and mounted on top of the vertical pipe installed centrally in the tower. Sprinkler head shall be made out of aluminum and fitted with ball bearings to take thrust and radial loads. Fillings shall be made of corrosion proof and fire safe rigid PVC film in honey comb design and arranged circular form to facilitate easy replacement. They shall be arranged in such a manner to ensure negligible resistance to air flow and to eliminate back water spots and prevent fouling through scales that may form. The crossing of air and water streams in close proximity shall create a diffused turbulence, which is essential for evaporation and heat transfer. In order to reduce carry over losses through entrapment of moisture drops in air streams, multiple rotary drift eliminators shall be installed. It shall also be designed to allow air flow without appreciable resistance.

33 **Fan** shall be of the propeller type, cast aluminum, low weight rotor fitted with multiple aero foil blades. The entire fan assembly shall be statically and dynamically balanced. Fan shall be directly driven by a 415 ± 10% volts, 3 phase, 50 cycles A/C supply electrically motor. Fan motor shall be totally enclosed fan cooled weather proof construction, designed and selected to operate in humid air stream. Fan shall be protected by a fan guard and shall be easily accessible for inspection and maintenance. A service ladder shall also be provided for greater convenience.

34 The structure of the cooling towers shall be designed for wind and other loads as per IS: 875.

35 **AIR HANDLING UNITS (AHUs)** – The scope of this section comprises the supply, erection, testing and commissioning of double skin construction, air handling units as per CPWD General Specifications for Heating, Ventilation & Air-Conditioning 2017 amended upto date. The air handling units shall be double skin construction, draw-thru type comprising of various sections such as mixing box, (wherever the return air and fresh air are ducted), pre-filter section, coil section and fan section as per system engineering.

36 **CASING -** Double skinned panels to be fabricated with anodized extruded aluminum section framework bolted together with sandwich panel having 0.8 mm pre-painted outer skin and 0.8 mm plain GI inner skin with thermal break profile 23 mm thick injected PU foam insulation having density of 38 kg/ m3 material to be sandwiched between two skins. The entire frame shall be mounted on a M.S. channel base of 100 mm height. The panels shall be sealed to the framework by heavy duty O ring gaskets held captive in the framed extrusion. All panels shall be detachable or hinged. Hinges shall be made of die cast aluminum/ engg. Nylon plastic with stainless steel pivots, handles shall be made of hard nylon and be operational from both inside and outside of the unit. Units supplied with various sections shall be suitable for onsite assembly with continuous foam gasket. All fixing and gaskets shall be concealed. Units shall have hinged quick opening access doors in the fan and filter section. Access doors shall also be double skin type. Condensate drain pan shall be fabricated from 18 gauge stainless steel sheet. It shall be isolated from bottom floor panel through PU foam insulation.

37 **MOTOR AND DRIVE –** Supply air & return air fan motors shall be highly efficient 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 with VFD driver. Drive to fan shall be provided through V belt-drive arrangement. Belts shall be of the oil-resistant type.

38 **FAN AND MOTORS –** Fans shall be backward curve DIDW centrifugal. Fan casing shall be made of galvanized steel sheet. Fan wheels shall be made of galvanized steel. Fan shaft shall be grounded C40 carbon steel and supported in self-aligning Plummer block operating at less than 75% of first critical speed, grease lubricated bearings. Fan wheels and pulleys shall be individually tested and precision balanced dynamically. Motors shall be mounted inside the AHU casing on slide rails for easy belt tensioning, and be totally enclosed, fan cooled, to be class „F' insulation. Motors shall drive heavy duty flat belt (for energy efficiency), constant pitch, drive selected at 110% of motor horsepower. Both fan and motors assemblies shall be mounted on a deep section aluminum alloy base frame. Isolation shall be provided from the unit casing by combination spring and rubber anti- vibration mounts and flame retardant, waterproof neoprene impregnated flexible connection on the fan discharge.

39 **COOLING COILS:** As per CPWD General Specifications for Heating, Ventilation & Air-Conditioning works 2017 amended up to date.

40 **FILTERS:** Each unit shall be provided with a factory assembled filter section containing washable synthetic type air filters having anodized aluminum frame. The media shall be supported with HDP mesh on one side and aluminum 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 aluminum alloy. Filter banks face velocities shall not exceed 170 mtr/ minute efficiency of pre-filters (EU-4) should be 90% down to 10 micron. Rest of the features shall be as per CPWD General Specifications for Heating, Ventilation & Air-Conditioning works 2017 amended up to date. Each air handling unit shall be provided with manual air vent at high point in the cooling coil and drain plug in the bottom of the coil. In addition, the following accessories shall be required at air handling units, their detailed specifications are given in individual sections, and quantities separately identified in Schedule of Quantities.

41 Insulated butterfly valves, 'Y' strainer, union and condensate drain piping up to sump or floor drain in air handling unit room, as described in section "Piping" (Priced separately). Thermometers in the thermometer wells and pressure gauge (with cocks) within gauge ports in chilled water/hot water supply and return lines.

42 **ISOLATORS:** Vibration isolators (Cushi-foot mount type) shall be provided with all air handling units.

43 **FRESH AIR ARRANGEMENT:** Fresh air louvers with bird screen, volume control dampers with modulating motors & actuators shall be provided in the clear openings in masonry walls for fresh air supply to AHU room. The actuators are activated through Co2 sensor mounted AHU room. Fresh air dampers shall be of the interlocking, opposed-blade louver type. Blades shall be made of extruded aluminum.

44 **TESTING -** The air-handling unit shall be tested to measure air quantity and coil performance by measuring temperature difference, water pressure drop across coil and then calculating the capacity by using the above measurements.

Before painting the air-handling units, these shall be inspected by the authorized representative/s of the University.

45 **VARIABLE FREQUENCYDRIVES COMPATIBLE WITH IBMS –** This specification covers complete variable frequency drives (VFDs) designated on the drawing schedules to be variable speed. All standard and optional features shall be included within the VFD. The frequency converter shall not be a general purpose product, but a dedicated HVAC engineered design. The VFD shall be tested to UL 508C. The appropriate UL label shall be applied. VFD shall be manufactured in ISO 9000, 2000 certified facilities.

46 The VFD shall be CE marked and conform to the European Union Electro Magnetic Compatibility directive. The VFD shall be UL listed for a short circuit current rating of 100 kA and labeled with this rating. The frequency converter shall be supported locally by the manufacturer who will provide full technical support, spares holding and troubleshooting capability from their own local facility. A training course shall be

provided by the manufacturer to the Engineer-in-charge / contractor / maintenance engineers.

47 TECHNICAL REQUIREMENTS –

47.1 The VFD shall convert incoming fixed frequency three- phase AC power into an adjustable frequency and voltage for controlling the speed of three-phase AC motors. The motor current shall closely approximate a sine wave. Motor voltage shall be varied with frequency to maintain desired motor magnetization current suitable for the driven load and to eliminate the need for motor de-rating when properly sized, the VFD shall allow the motor to produce full rated power at rated motor voltage, current, and speed without using the motor's service factor. VFDs utilizing sine weighted / coded modulation (with or without 3rd harmonic injection) must provide data verifying that the motors will not draw more than full load current during full load and full speed operation.

47.2 The VFD shall include an input full-wave bridge rectifier and maintain a fundamental (displacement) power factor near unity regardless of speed or load. The VFD shall have a dual 5% impedance DC link reactor (harmonic filters) on the positive and negative rails of the DC bus to minimize power line harmonics and protect the VFD from power line transients. The chokes shall be non-saturating. Swinging chokes that do not provide full harmonic filtering throughout the entire load range are no acceptable. VFDs with saturating (non-linear) DC link reactors shall require an additional 3% AC line reactor to provide acceptable harmonic performance at full load, where harmonic performance is most critical.

47.3 IEEE519, 1992 recommendations shall be used for the basis of calculation of total harmonic distortion (THD) at the point of common coupling (PCC). On request VFD manufacturer shall provide THD figures for the total connected load. The contractor shall provide details of supply transformer rating, impedance, short circuit current, short circuit impedance etc. to allow this calculation to be made. All VFDs upto 90 KW shall contain integral EMC Filters to attenuate Radio Frequency Interference conducted to the AC power line. The VFDs shall comply with the emission and immunity requirements of IEC 61800-3: 2004, Category C1 with 50m motor cable (unrestricted distribution). The suppliers of VFDs shall include additional EMC filters if required to meet compliance to this requirement. The VFD's full load output current rating shall meet or exceed the normal rated currents of standard IEC induction motors. The VFD shall be able to provide full rated output current continuously, 110% of rated current for 60 seconds and 120% of rated torque for up to 0.5 second while starting. The VFD shall provide full motor torque at any selected frequency from 20 Hz to base speed while providing a variable torque V/Hz output at reduced speed. This is to allow driving direct drive fans without high speed de-rating or low speed excessive magnetization, as would occur if a constant torque V/Hz curve was used at reduced speeds. Breakaway current of 160% shall be available. A programmable automatic energy optimization selection feature shall be provided as standard in the VFD. This feature shall automatically and continuously monitor the motor's speed and load to adjust the applied voltage to maximize energy savings. The VFD must be able to produce full torque at low speed to operate direct driven

fans. Output power circuit switching shall be able to be accomplished without interlocks or damage to the VFD.

47.4 An Automatic Motor Adaptation algorithm shall measure motor stator resistance and reactance to optimize performance and efficiency. It shall not be necessary to run the motor or de-couple the motor from the load to perform the test. Galvanic isolation shall be provided between the VFD's power circuitry and control circuitry to ensure operator safety and to protect connected electronic control equipment from damage caused by voltage spikes, current surges, and ground loop currents. VFDs not including either galvanic or optical isolation on both analog I/O and discrete digital I/O shall include additional isolation modules. VFD shall minimize the audible motor noise through the use of an adjustable carrier frequency. The carrier frequency shall be automatically adjusted to optimize motor and VFD operation while reducing motor noise. VFDs with fixed carrier frequency are not acceptable. The VFD shall allow up to at least 100 meters of SWA (Single Wire Armour) cable to be used between the FC and the motor and allow the use of MICS (Mineral Insulated Copper Sheath) cable in the motor circuit for fire locations.

48 PROTECTIVE FEATURES –

48.1 A minimum of Class 20 I2t electronic motor overload protection for single motor applications shall be provided. Overload protection shall automatically compensate for changes in motor speed. Protection against input transients, loss of AC line phase, output short circuit, output ground fault, over voltage, under voltage, VFD over temperature and Protect VFD from input phase loss.

48.2 The VFD should be able to protect itself from damage and indicate the phase loss condition. During an input phase loss condition, the VFD shall be able to be programmed to either trip off while displaying an alarm, issue a warning while running at reduced output capacity, or issue a warning while running at full commanded speed. This function is independent of which input power phase is lost. Protect from under voltage. The VFD shall provide full rated output with an input voltage as low as 90% of the nominal. The VFD will continue to operate with reduced output, without faulting, with an input voltage as low as 70% of the nominal voltage.

48.3 VFD shall include current sensors on all three output phases to accurately measure motor current, protect the VFD from output short circuits, output ground faults, and act as a motor overload. If an output phase loss is detected, the VFD will trip off and identify which of the output phases is low or lost. If the temperature of the VFD's heat sink rises to 80°C, the VFD shall automatically reduce its carrier frequency to reduce the heat sink temperature. It shall also be possible to program the VFD so that it reduces its output current limit value if the VFD's temperature becomes too high.

48.4 In order to ensure operation during periods of overload, it must be possible to program the VFD to automatically reduce its output current to a programmed value during periods of excessive load. This allows the VFD to continue to run the load without tripping.

48.5 The VFD shall have temperature controlled cooling fan(s) for quiet operation, minimized losses, and increased fan life. At low loads or low ambient temperatures, the fan(s) may be off even when the VFD is running. The VFD

shall store in memory the last 10 alarms. A description of the alarm, and the date and time of the alarm shall be recorded.

48.6 When used with a pumping system, the VFD shall be able to detect no-flow situations, dry pump conditions, and operation off the end of the pump curve. It shall be programmable to take appropriate protective action when one of the above situations is detected.

49 SERVICE CONDITIONS

49.1 Ambient temperature at full speed, full load operation with continuous drive rated output current:

(a) 10°C to 45°C for ratings up to 90 kW without de-rating
(b) 10°C to 40°C for ratings 110 kW and higher without de-rating Relative Humidity: 0 to 95%, non-condensing. Elevation: Up to 3,300 feet without de-rating.
(c) AC line voltage variation: + 10% of nominal with full output.
(d) VFDs upto 90 KW rating Enclosure protection: IP 55, integral, with Mains Disconnect with no additional cabinets.
(e) Side Clearances: No side clearance shall be required for cooling. All power and control wiring shall be done from the bottom.
(f) All VFDs shall be plenum rated.

50 FANS

50.1 The ventilation fans, blowers and air washer shall be complete in all respects with AMCA certification and shall generally comply with the specifications given below. Except following specifications rest of the specification shall be as per specifications mentioned in CPWD specifications for HVAC – 2017 amended up to date. Axial flow fans: The Axial Fan Blades shall be of Cast Aluminium of aerofoil design for high efficiency and high static pressure. The blades shall be joined together on cast aluminium hub. The mounting ring shall be of CRCA / sheet steel with steel brackets to connect the frame, with the Fan/Motor assembly. Rubber mounts shall be provided between the mounting frame and the mounting brackets. The fan assembly shall be statically and dynamically balanced. The fan motor shall be totally enclosed Fan cooled type. It shall have painted G.I. wire mesh on both sides.

50.2 **Centrifugal blowers:** The centrifugal blowers shall be double/single inlet, double/single width, non-overloading type, of suitable construction. The blower performance must be rated in accordance with approved test codes and procedures. The centrifugal fans should conform to IS-4894-1987 (Revised to Date). The blower housing comprising of scroll & side plates shall be accurately cut be of heavy gauge all welded sectional construction and reinforced with angle bracings. Outlets shall be flanged to assure proper duct connections. Inlet cones shall be spun enture type, or curved vane type, to ensure smooth air entry. The base frame shall be of angle iron in bolted/welded construction. Impeller shall be fabricated from sheet steel with backward curved, properly designed. Blades, with heavy C.I. Hub and shall be both dynamically and statically balanced, to a close tolerance for quiet and vibration free performance. Shaft shall be of hot rolled steel or forged steel, sized adequately, but in no case of less than 40 mm diameter and shall be

accurately ground and polished to a close tolerance. Bearings shall be self-aligning, heavy duty ball or tapered roller type with integral dust and grease seals. After assembly, the complete fan shall be painted with rust proof primer and two coats of synthetic enamel paint. Fan having wheel diameter of 1220 or more, shall be supplied with split, bolted housing for convenience of handling and installation. Blower drive assembly: Drive assembly for each blower shall consist of blower pulley, motor pulley, a set of V belts, belt guards, and belt tension adjusting device. Pulleys shall be selected to provide the required speed. They shall be multi-groove type, with section and grooves selected to transmit 33% more load than the required power and shall be statically balanced. The belt guards shall be of M.S. Sheet with angle iron reinforcements and expanded metal screen.

50.3 **Motors and starters:** The motor for each blower shall be squirrel cage induction type and conform to specifications as given under section on control panel, motors and switchgear. The motor HP shall be at least 20% more than the limit load of fan and of minimum rating as given under „Schedule of Equipment. The Motors shall be as per IS-325-1996 (Revised to date) with F-Class of Insulation. The air velocity should not exceed 10.16 M/s (2000 FPM) at blower outlet and 5.08 M/S (1000 FPM) at blower Inlet.

51 DUCT WORK AND OUTLETS (FACTORYFABRICATED) - It shall be as per CPWD General Specifications for Heating, Ventilation & Air-Conditioning – 2017 amended up to date.

52 VENTILATION/ EXHAUST SYSTEM

52.1 Following areas shall be mechanically ventilated & exhausted.

52.2 The ventilation rates for mechanical ventilation of various areas are generally as under. However, the same is to be rechecked w.r.t. NBC 2016 and Local bylaws.

AREA / SPACE	AIR CHANGES PER HOUR
Pump Room	12 Air changes per hour
STP Room	20 Air changes per hour
LT Panel Room	12 Air changes per hour
HVAC Plant room	12 Air changes per hour
Toilets	12 Air changes per hour
Kitchen	ACPH as per kitchen consultant, Fresh air through air washer and exhaust through air Scrubber
Cafeteria	Considered 15 Air changes per hour

52.3 Fresh air & Exhaust air fans & duct work shall be employed for ventilating the respective areas.

52.4 AMCA certified double inlet, double width, class-I Forward Curved Blades Centrifugal Supply/ Exhaust air Single Skin ventilation machine for basement ventilation consisting of fans, high efficiency (efficiency-1) TEFC squirrel cage 3 phase 50 Hz, 415 Volt, Class H insulated with IP 54 protection fan motor, V- belt Drive package consisting of Motor Pulley, fan Pulley, V- belt, belt Guard and other

accessories required at site, vibration isolators, floor mounted enclosures made of minimum 18 gauge GI sheet with is foundation etc. as required. The fan impeller shall be mounted on MS shaft, the assembly shall be statically and dynamically balanced. The Impeller assembly supported on housing with heavy duty ball bearings. Fan housing and motor shall be mounted on common base with anti-vibration mounting. Fan pulley dia. shall be less than ½ of fan dia. and fan rpm shall be less than 1000 rpm. Fan motor and cabinet shall be suitable for smoke exhaust application having thermal rating of 2500C for 2 hrs. as per EN-12101-3-2002. The out let velocity shall not exceed 12mtr/sec. TP/6P isolator of suitable capacity with its enclosure shall be provided. AMCA certified Supply / Exhaust Air Tube Axial Flow Fan with Powder coated MS casing and alluminium alloy impeller with high efficiency aero-foil sections blades, impeller directly driven by high efficiency (efficiency-1) TEFC squirrel cage 3 phase 50 Hz, 415 Volt, Class H insulated with IP 54 protection fan motor for pressurization & other smoke management requirements etc. as required. The assembly shall be statically and dynamically balanced. The casing shall be of minimum 18 gauge GI sheet. Motor mounting plate shall be minimum 15mm thick. Fan motor and casing shall be suitable for smoke exhaust application having thermal rating of 2500 C for 2 hrs. as per EN-12101-3-2002. The Fan rpm shall not exceed 2900 RPMforUPTO4900CMHfancapacity, 1450 RPM for 5000 to 19500 CMH fan capacity and 100 RPM for 20000 CMH and above fan capacity. The out let velocity shall not exceed 12mtr/sec. DP/TP/6P isolator of suitable capacity with its enclosure shall be provided.

Section-II (Integrated Building Management and Control System)

1. General –

Work under this section includes the Design, supply, installation, testing and commissioning of an integrated building management system in Academic & Faculty Building, Library, and Seminar & Conference. The work under this system shall consist of furnishing all materials, labour, equipment, electronic components and other appliances necessary to make the system totally functional and operative including interfacing and integration with control panels of various services being executed by other agencies.

2. System Design Philosophy –

The BMS system is intended to monitor and/or control the operation of major equipment and systems pertaining to:

a. HVAC system (monitor and control)
b. Ventilation /exhaust systems of basement, Pressurizations system, smoke extraction system of Corridors etc. (monitoring and control)
c. Electrical system such as Sub Station etc.(monitoring)
d. Utilities like DG sets, its fuel storage & cooling system(monitoring)
e. Lifts, etc.(monitoring)
f. Firefighting system(monitoring)
g. Solar Panel, Solar Water Heating (monitoring /controlling)

3. TECHNICALSPECIFICATIONS

a. As per the CHAPTER-18 (BUILDING MANAGEMENT SYSTEM), CPWD General Specifications for Heating, Ventilation & Air-Conditioning – 2017
b. Pipes – Two wire Pre-Insulated pipes will be acceptable.
c. Thermal Image sensing camera (2nos) with readable software shall be provided by the contractor or leak detection in addition of two wire system.
d. Air Ionizer Plasma Air System UL & NABL certified shall be supplied.

PART- C8
TRANSFORMER

TECHNICAL SPECIFICATION OF DISTRIBUTION TRANSFORMER

(CAST RESIN DRY TYPE TRANSFORMER WITH SCADA COMMUNICABLE & SCADA SYSTEM AT SUBSTATION)

1. SCOPE – This Technical specification covers the detailed requirements of design, manufacture, testing at the manufacturer's works and delivery up to the workshop of the manufacturer of 11kV Sub-Station. The cast resin dry type transformers shall comply with ECBC Norms. Complete with all the accessories and fittings for efficient and trouble-free operation.

2. CODES & STANDARDS - Transformers, their accessories and fittings shall conform to latest editions of IS-2026 (Part I to IV) and IS-11171 or equivalent international standards IEC. In case of any conflict, the requirements of this specification shall be binding. The equipment covered by this specification shall, unless otherwise stated to be designed, constructed and tested in accordance with the latest revisions of relevant Indian standards / IEC publications.

IS 1271	Classification of Insulating Materials.
IS 2026	Power transformers (part I - IV)
IS 2099	Bushing for alternating voltages above 1000 V
IS 2705	Current transformers
IS 3202	Code of practice for climate proofing
IS 3639	Power transformer fittings and accessories
IS 4257	Porcelain bushings for transformers
IS 11171	Dry type Transformer
IS 8478	Application guide for tap-changers
IS 10028	Code of practice for selection, installation and maintenance of transformers

3. GENERAL REQUIREMENTS – Following are to be furnished by the Tenderer along with the tender / offer

(a) Make / type and catalogue number (Doc, to be provided) considered and the overall dimensions wherever it is relevant are to be furnished A brief description of the system along with relevant control schematics Filled up copies of Guaranteed Technical Particulars (GTP) as enclosed.

(b) Spares (Qty. and Unit rate) for two years normal trouble free operations. Along with Tender, the Tenderer shall indicate the performance guarantee period and the technical particulars for various equipment / materials.

4. GENERAL DESIGN FEATURES –

(a) All transformers shall be of the latest design only.

(b) The type of cooling shall be Natural Air cooled (AN) and the corresponding ratings for each transformer shall be as indicated in the specific requirements.

(c) Each transformer shall be suitable for operation at full rated power on all tapings without exceeding the applicable temperature rise.

(d) It shall be possible to operate the transformer satisfactorily, with the loading guide specified in IS-6600. There shall be no limitations imposed by bushings, tap changers, auxiliary equipment to meet this requirement.

(e) The transformers shall be designed to be capable of with-standing, without injury, the thermal and mechanical effects of short-circuits between phases or between phase and earth at the terminals of any winding with full voltage applied across the other winding for periods given in relevant standards. There shall be no limitations imposed by any part/component of the transformer/off load tap links to meet the short circuit level Specified.

(f) Each transformer shall be designed for minimum no-load and load losses within the economic limit and shall be able to have minimum loss at the rated load condition.

(g) All electrical connections and contacts shall be of ample cross sections for carrying the rated current without excessive heating.

(h) The transformer shall be capable of continuous operation at full load rating under the following conditions:

(i) Voltage variation = + 5%

(ii) Frequency variation = + 5%

(iii) Combined voltage and frequency variation (Absolute sum) = +5%

5. CONSTRUCTION –

5.1 **Core -** The core shall be built up with high-grade non-ageing low-loss and high permeability cold rolled grain oriented silicon steel laminations with double sided insulation. After being sheared the laminations shall be treated to remove all burrs and shall be re-annealed to remove all stresses. The material shall conform to the latest edition of relevant Indian Standard.

The core shall be rigidly clamped and bolted to ensure adequate mechanical strength and to prevent vibration/noise during operation. The bolts used in the assembly of the core shall be so constructed that eddy current flow is minimum.

The core shall be provided with lugs suitable for lifting the complete core and coil assembly of the transformers.

Following points shall be taken care by the transformer manufacturer

1) Core shall be purchased Directly from Manufacturer or from their accredited Marketing organization of Repute & not through any agent. Bidder has to submit proper documents in support of this along with the offer.

2) Transformer manufacturer should have in-house core cutting facilities for proper control & monitoring of quality & to avoid mixing of Prime core with Second grade /defective core materials. Transformer Manufacturer should have in house slitting Machine so as; core is cut to width & stacked with minimum air gap thus ensuring Burr level less than 10Microns.

3) The insulation structure for the core to bolts and core to clamp plates shall be such as to withstand a voltage of 2000V for one minute.

4) The core of the transformers shall be coated with resin coat not less than 1 mm thick for protection against corrosion.

5) All iron parts of the transformer except the core shall be hot dip galvanized.

5.2 WINDINGS –

5.2.1 LV windings:

a) The LV winding is produced using copper conductor in order to cancel out axial stress during short circuit; this foil will be insulated between each layer using a heat-reactivated class F pre impregnated epoxy resin film.

b) The ends of the winding are protected & insulated using a class F insulating material.

c) The whole winding assembly shall be polymerized throughout by being autoclaved for 2 hours at 130°C, which will ensure:

- High level of resistance to abnormal environments
- Excellent dielectric withstand
- Very good resistance to radial stress in the instance of a bolted short circuit. 5.2.2 HV windings

5.2.2 HV Windings:

a) They will be separated from the LV windings to give an air gap between the MV and LV circuits in order to avoid depositing of dust on the spacers placed in the radical electrical field and to make maintenance easier.

b) These will be made of copper wire or foil (according to the manufacturer's preference) with class F insulation.

c) The HV windings will be vacuum cast in a class F fireproof epoxy resin casting system composed of:

(i) an epoxy resin
(ii) an anhydride hardener with a flexibility additive
(iii) a flame-retardant filler.

d) The casting system will be of class F. The interior and exterior of the windings will be reinforced with a combination of glass fibre to provide thermal shock withstand.

6. TERMINAL CONNECTIONS

The H.V terminals of transformer shall be suitable for connections to XLPE cable & the L.V terminals of the transformer shall be suitable for connections to L.T bus duct.

7. OFF-CIRCUIT TAP CHANGING LINKS

Off circuit tapings are provided on HV windings. Tap changing is done by means off circuit links. Use of tap changing links eliminates any moving parts as against a manually operated tap changer.

8. Tapings: Tapping will be provided for voltage adjustment on the HV winding with adjustment of high voltage of +5% to –7.5% in steps of 2.5%.

9. SAFETY INTERLOCK - A safety interlock shall be provided to ensure that the enclosure door can be opened only when transformer is de-energized.

10. GUARANTEE ON LOSSES - The no load losses in KW at rated voltage and rated frequency and load losses (Total losses – no load losses) in kilowatts at rated output,

rated voltage and rated frequency shall be guaranteed under penalty for each transformer. For the purpose of penalty computations, the test figures of the no load and the load losses will be compared with the corresponding guaranteed values / figures.

11. FITTING & ACCESSORIES - The transformers in addition to any other fittings/accessories recommended by manufacturer shall be provided with the following:

a. Rating plates bearing the data as per Clause No.12.
b. A diagram plate showing the internal connections and also the vector relationship of the windings in addition to the plan view of the transformer giving the correct physical relationship of transformer.
c. Suitable HV & LV terminals as per details mentioned in technical specification
d. Winding temperature indicator (RTD – PT – 100)
e. Bi-directional rollers.
f. Inspection Cover
g. Jacking lugs
h. Eye bolts and lugs in all parts for ease of handling.
i. Temperature sensors and relay suitable for giving alarm and trip commands. These alarm and trip signals will be used as digital input signal to the RTU. Over temperature alarm and trip signals shall be provided for HV & LV windings independently.

12. RATING PLATES – Each transformer shall be provided with rating plate as per clause 15 of IS – 2026 (Part – I) of weather proof material fitted in visible position showing the appropriate items as given below:

a. Type of Transformer
b. No. of Year of Manufacture
c. Manufacturer's name
d. Manufacturer's serial number
e. Year of Manufacture
f. No. of phases
g. Rated power
h. Rated Frequency
i. Rated Voltage
j. Rated Current
k. Impedance Voltage at rated current.
l. Type of Cooling
m. Connection diagram
n. Insulation Level
o. Total weight & dimensions
p. Temperature class of insulation.
q. Type of Tap changer
r. No. of steps on Tap changer/ link

13. PAINTING - All steel surfaces shall be thoroughly cleaned by sand blasting or chemical agents as required to produce a smooth surface free of scale, grease and rust. The external surface, after cleaning, shall be given a cost of high quality red oxide or yellow quoted primer, followed by filler coats.

14. CO-ORDINATION WITH THE OTHER SUPPLIERS

For dry type Transformer, the supplier shall co-operate with supplier of low voltage side bus duct and high voltage side cable Supplier so as to ensure proper co-ordination of all related aspects

15. ELECTRICAL TESTS

The transformers shall be tested at manufacturer's works in presence of Engineer in Charge's authorized representative(s) as per latest edition of IS – 2026 / Part I & III or equivalent International standard.

16. FACTORY ACCEPTANCE TESTS (FAT)

Transformer shall comply with requirements of following tests/reports as per Govt. /NABL (National Accreditation Board for Laboratories) approved shall be carried out during the inspection. The following shall constitute the Factory Acceptance Test:

a. Measurement of winding resistance.
b. Measurement of voltage ratio and check of voltage vector relationship.
c. Measurement of impedance voltage (principal tapping), short circuit impedance and load losses.
d. Measurement of no load losses and current.
e. Measurement of insulation resistance.
f. Separate source voltage withstand test.
g. Induced over voltage withstand test.
h. Vector Group.
i. When transformers are equipped with a protection enclosure, they will be tested in their enclosure.

17. SITE ACCEPTANCE TESTS (SAT)

The following shall constitute Site Acceptance test:

a. Measurement of winding resistance.
b. Measurement of voltage ratio and check of voltage vector relationship.
c. Measurement of no load losses and current.
d. Separate source voltage withstand test.
e. Induced over voltages withstand test.
f. Measurement of insulation resistance.
g. Magnetic balance.

The Engineer in Charge or his representatives reserves the right to having other reasonable tests carried out at his own expense either before dispatch or at site to ensure that the transformer complies with the requirement of the specification.

18. TYPE TEST

The manufacturer should produce along with their offer the copies of Test Certificates on the following TYPE TESTS, which were already carried out at CPRI or at any other reputed testing house for similar or higher rating of Transformer.

(a)
(a) Dynamic Short Circuit Test.
(b) Lightning Impulse Test
(c) Temperature Rise Test.
(d) Noise Level Measurement

19. GUARANTEED TECHNICAL PARTICULARS (GTP) OF DRY TYPE TRANSFORMER

SL. NO.	DESCRIPTION	REQUIREMENT
1.	Type	Cast Resin Dry type transformer, indoor, ANAN
2.	Rating (KVA)	Designed KVA
3.	No load voltage ratio	11 / 0.433 kV
4.	Frequency	50 Hz ± 3%
5.	Vector group	Dyn 11
6.	Insulation Class (Min)	Suitable for class-F
7.	Impedance Voltage	5% on principal tap at rated kVA, 75^{o}C
8.	No. of Phases	3
9.	Fault Level at HV side	20 kA for 3s
10.	Insulation level	
	(i) Impulse withstand Voltage -	
	HV	75 kvp
	LV	-
	(ii) Power Frequency withstand Voltage	
	HV	28 kVrms
	LV	3 kVrms
11.	System Ground	Effectively earthed
12.	Type of Tap Changer for giving voltage variation to HV	Manual Off ckt. tap links at HV side
13.	Tapping range	+5% to – 7.5% in steps of 2.5%
14.	Temperature rise winding over ambient temperature	90^{o}C
15.	Class of Insulation	Class F
16.	Enclosure	IP 00 (Without Enclosure)
17.	Method of Cooling	ANAN
18.	No load losses at rated voltage & frequency (IS Tol.)	2.4 KW
19.	Termination HV LV	Cable Busbar Trunking
20.	Fittings for Dry type	2 Numbers Earthing Terminals, Rating and Diagram Plate, Bi-Directional Rollers, Lifting Lugs, Winding Temp Scanner.
21.	Paint	Enamel-RAL 7032

PART- C9

SOLAR WATER HEATER WITH INBUILT ELECTRICAL ELEMENT AS BACKUP

1. REFERENCESTANDARDS

IS: 12834:1989 (reaffirmed 2000)	Solar Photovoltaic Energy Systems – Terminology
IEC : 61215 Ed 2 or latest	Crystalline silicon terrestrial photovoltaic (PV) modules– Design qualification and type approval
IEC: 61730 Pt 1 & 2	Photovoltaic (PV) module safety qualification - Part 1: Requirements for construction Part 2: Requirements for testing
IEC: 61701	Salt mist corrosion testing of photovoltaic (PV) modules
IEC:60904-1(2006)	Photovoltaic Devices- Part-I: Measurement of Photovoltaic current-Voltage Characteristic.
IS: 9000	Basic environmental testing procedure for Electronic and electrical items.
IEC:60068	Environmental testing
IEC 61723 Ed1.0	Safety Guidelines for grid connected photovoltaic systems mounted on the buildings.

Note: Latest version of the specification shall be referred to.

2. SYSTEM DESCRIPTION - Solar Photovoltaic (SPV) grid connected system shall consist of mainly the following:

a) Module mounting structure (GI make with PU paint)
b) Junction boxes GI make with PU paint.
c) Power conditioning unit (PCU)
d) Metering& data logger.
e) Cable and other accessories

3. SOLAR WATER HEATING SYSTEM WITH SCADA COMMUNICABLE (FOR REMOTE MONITORING, CONTROL AND DATA ACQUISITION)

3.1 BASIS OF DESIGN: Solar Hot Water System shall be designed to cater the hot water requirement for Bath Rooms & Kitchen in the Hostel Buildings.

3.2 DESIGN CRITERIA - System to be designed at the Environmental Conditions at RAJGIR

3.3 All equipment, especially electrical components & pumps shall be guaranteed to perform satisfactorily under ambient conditions and under worst conditions without undue deterioration.

3.4 System voltage shall be 415V + 10%, 3 phase A.C. or 240V single phase.

4 COLLECTORS - HEAT COLLECTION EFFICIENCY

4.1 The heat collection efficiency of the collectors being of prime importance; hence following shall be considered while designing the system. Construction of the collector shall be preferably marine grade aluminum for tray and copper risers for capillaries to facilitate high transmittance.

4.2 High absorber surfaces with absorptivity more than 94% shall be selected.

4.3 Insulation with high heat retention to the extent of at least and better material like poly derivatives shall be used.

5 STORAGE TANK

It is perceived to have a Storage tank with copper coil inside the tank. The tank shall also be provided with solar pump so that effective exchange of heat can take place. This would facilitate, Effective energy storage, Availability of energy in the non-sunny hours, less heat loss, More Heat Transfer. In the storage tank, the cold water enters into the tank through a Copper coil which will be immersed in the solar thermic fluid. The cold water shall exchange heat from the hot solar thermal fluid and leave the hot water storage tank. The solar thermic fluid is also continuously entering and leaving the hot water storage tank with the help of solar pump from collector panels after exchanging the heat with the cold water running in the coil. The Capacity of the solar pump and the rate of flow of cold water shall be so equally balanced so as to achieve maximum heat transfer.

6 PUMPS

Primary solar thermic fluid circulating pumps shall be of suitable rating as per the system requirement. The parameters are subject to required flow rate of thermic fluid, required Heat Exchange ratios and correct time spacing & operations. Thus, the system shall be integrated and configured to work on its own.

7 WORKMANSHIP

The workmanship shall be superior & conform to the specifications, and subject to approval of the Engineer –in-Charge. All materials and/or Workmanship which in the opinion of the Engineer-in-charge is defective or unsuitable shall be removed immediately from the site and shall be substituted with proper materials and/or workmanship forthwith.

8 MATERIALS

All materials shall be best of their kind and shall conform to the latest Indian Standards. All materials shall be of approved quality as per samples and approved by the Engineer –in-charge. As and when required by the Engineer-in-charge, the contractor shall arrange to test the materials and / or portions of works at his own cost to prove their soundness and efficiency. If after tests any materials, work or portions or work are found defective or unsound

by the Engineer-in-charge, the contractor shall remove the defective material from the site, and re- execute the works at his own cost to the satisfaction of the Engineer-in-charge. To prove that the materials used are as specified the contractor shall furnish the original vouchers on demand.

9 "LC"COLLECTOR

Casing shall be of folded Aluminium tray and Marine grade Aluminium H3004 Temper H32, thickness of 0.7 mm. Drain/ Vent holes shall be formed recess one in each corner 15 mm in from each edge and dia of hole shall be 4 mm.Glass shall be of one sheet of low iron, tempered glass and max iron content shall be 0.4 %. Minimum solar radiation transmittance shall be 94% as per ANS 1297-1-1975, BS 6206 A and JIS R3206 standards. Insulation:

Back insulation shall be of Glass wool with minimum 55 mm thickness and 10 Kg/ m3 density. Edge insulation shall be polyester with 13 mm thickness and 23 Kg/ m3 density. Thermal conductivity of insulation of minimum 0.59 W/m degree C @ 23degree C

Glass to tray seal: Glass to tray seal shall be of closed cell PVC foam tape with Acrylic adhesive on both sides.

Glazing angle: Glazing angle shall be of Aluminium Extrusion Alloy 6060 Temper T5. Weather

Proofing: Weather proofing shall be done through silicon sealant in folded corners and Collector connections shall be done through Moulded Polypropylene.

Absorber: Absorber shall be Flat Plate tube type and fin material shall be Aluminum alloy 5005 temper H34 or approved equivalent. Absorber plate surface finish shall be black polyester powder coat, non-selective surface.

Tube Array: Header to riser joints shall be silver solder, Header and riser material shall be copper tube.

Collector Corner Block: Collector corner block shall be of Black Polypropylene.

Collector: Collectors maximum working pressure shall be at least 1450 kPa and flow rate shall be approximately 1.25 LPM. Suitable No. of collectors shall be installed based on heat required (which is mentioned in schedule of quantities.

10 STORAGE TANK:

Pre-Heater storage tank shall be of MS construction. The tank shell shall be of minimum 6mm thick and front and back plate shall be at least 10 mm thick. The tank shall be provided with minimum 12.7 mm dia and 0.91 mm thick copper coil inside the tank. The tank shall be provided with the following connections:

a) Hot Water Outlet
b) Cold water Inlet
c) Solar Flow Inlet
d) Solar Flow Return.
e) Temperature Gauage
f) Solar Probe
g) Spare.

The tank shall be insulated with 50mm thick fiberglass insulation of density not less than 48kg/cum. The tank shall be mounted on MS base frame. The tank shall have working pressure of at least 400kPA.

11 VALVES:

All valves (gate, globe, check, safety) shall be of gun metal suitable for the particular service as specified. All valves shall be of the particular duty and design as specified. Valves shall either be of screwed type or flanged type, as specified, with suitable flanges and non-corrosive bolts and gaskets. Tail pieces as required shall be supplied along with valves. Gate, globe and check valves shall conform to Indian Standard IS: 776 and non- return valves and swing check type reflux to IS: 5312.

Sluice valves, where specified shall be flanged sluice valves of cast iron body. The spindle, valve seat and wedge nuts shall be gunmetal. They shall generally have non-rising spindle and shall be of the particular duty and design as specified. The valves shall be supplied with suitable flanges, non-corrosive bolts and asbestos fiber gaskets. Sluice valves shall conform to Indian standard IS: 780 andIS:2906.

Ball valves with floats to be fixed in storage tanks shall consist of cast brass lever arm having copper balls (26 SWG) screwed to the arm integrally. The copper ball shall have bronze welded seams. The closing/opening mechanism incorporating the piston and cylinder shall be non- corrosive metal and include washers. The size and construction of ball valves and float shall be suitable for desired working pressure operating the supply system. Where called for brass valves shall be supplied with brass hexagonal back nuts to secure them to the tanks and a socket to connect to supply pipe.

Globe valves on Hot-water line shall be union bonnet with stem/disc and body seat ring of SS. Suitable for temperature up to 80° C. All valves shall be suitable for the working pressure involved.

12 PRSSURE/ TEMPRATUREGAUGES

The pressure gauge shall be constructed of die cast aluminium and stove enameled. It shall be weather proof with an IP 55 enclosure. It shall be a stainless steel Bourden tube type pressure gauge with a scale range from 0 to 16 Kg / cm square and shall be constructed as per IS:3524. Each pressure gauge shall have a siphon tube connection. The shut off arrangement shall be by Ball Valve.

Temperature gauges shall be constructed of die cast aluminium and stove enameled. It shall be suitable for the working temperature.

Thermometers on Hot Water lines shall be with long stem. Thermometer socket shall be extended up to insulation thickness so that the thermometer shall be removable without damaging the insulation.

13 COMMISSIONING & GUARANTEE

13.1 SCOPE OF WORK

Work under this section shall be executed without any additional cost. The rates quoted in this tender shall be inclusive of the works given in this section.

Tenderer shall provide all tools, equipment, metering and testing devices required for the purpose.

On award of work, Tenderer shall submit a detailed proposal giving methods of testing and gauging the performance of the equipment to be supplied and installed under this contract. All tests shall be made in the presence of the Engineer –in-charge. At least five working days notice in writing shall be given to the inspecting parties before performing any test.

Three copies of all test results shall be submitted to the Engineer in A4 size sheet paper within two weeks after completion of the tests.

13.2 PRE COMMISSIONNIG

(i) Solar water heating System
(ii) Check all the collector/ absorbers
(iii) Check all the piping under hydro test.
(iv) Check the Heat Store cylinders, it is correctly fixed.
(v) Check primary and secondary pumps are properly aligned.
(vi) Check rotation of each motor after decoupling and correct the same if required.
(vii) Check Control panel and its termination and wiring and earthing is complete in all respect.
(viii) Check interconnection with hot and cold water supply systems.

13.3 FINAL ACCEPTANCE TESTS

Following commissioning and inspection of the entire installation, and prior to issue of the Completion Certificate, the Tenderer shall carry out final acceptance tests in accordance with a programme to be agreed with the Engineer –in-charge.

Should the results of the acceptance tests show that plant, systems and/or equipment fail to perform to the efficiencies or other performance figures as given in this Specification, the Tenderer shall adjust, modify and if necessary replace the equipment without further payment in order that the required performance is obtained.

Where acceptance tests are required by the relevant Authorities having jurisdiction, these tests shall be carried out by the Tenderer prior to the issue of Completion Certificate to the acceptance of the Authorities.

14 REJECTION OF INSTALLATION /PLANT

Any item of plant or system or component which fails to comply with the requirements of this Specification in any respect whatsoever at any stage of manufacture, test, and erection or on completion at site may be rejected by the in whole or in part as he considers necessary/appropriate. Adjustment and/or modification work as required by the Engineer-in- charge so as to comply with the Authority's requirements and the

intent of the Specification shall be carried out by the Tenderer at his own expense and to the satisfaction of the Engineer- in-charge.

After works have been accepted, the Tenderer may be required to carry out assist in carrying out additional performance tests as reasonably required by the Engineer-in-charge.

15 HANDING OVER OF DOCUMENTS

All testing and commissioning shall be done by the Tenderer to the entire satisfaction of the Engineer-in-charge and all testing and commissioning documents shall be handed over to the Engineer-in-charge. The Tenderer shall also hand over all maintenance and operation manuals, all certificates and all other documentation as per the terms of the contract to the Engineer-in- charge.

PART- C10
IP BASED CCTV

Close Circuit TV (CCTV):
Scope of work involves suitable nos of Day / Night cameras including its support around the boundary wall at suitable intervals and all the main gates with suitable mounting arrangement in a Vandal Proof Housing. Laying, terminating & connecting copper cables with redundancy between cameras & control room. Establishing control rooms for configuration, operation, monitoring & maintenance with one high resolution 65" LED display along with one workstation.

Installation, configuration & customization of Network Video Recorder (NVR) will support up to 32 channels at a time from the Main Control Room. Installation & commissioning NVR with 60 days storage capacity for cameras, MANAGEABLE Switches, Signal / Power cables, Centralized UPS of suitable capacity to power the entire CCTV System, poles for camera, Power to camera and weather proof enclosure and Surge & lightening protection for each camera etc. Cameras should be of outdoor/indoor application, Day Night mode /IR Range 50 Meter IR Distance or more, Mim Illumination Colour - 0.2 Lux, B/W - 0.002 Lux, Resolution 1280 x 1024 pixels: 1.3MP @ 30fsp PAL compatible.

NVR should be of suitable nos of video channels, having storage capacity for 60 days, Full DNA support, sophisticated failover and mirroring strategies amongst multiple NVRs for increased resilience and redundancy, Policy based management options for automatic deletion or protection of old footage, Recording Hard Drive 3.5in SATA Seagate SV35 Series optimized for 24x7 Complete system is to be designed as per above requirements and an scheme along with layout and inventory is to be submitted to the Engineer-in-Charge for approval, before taking up the installation work.

APPROVED MAKE OF MATERIALS
MEP ITEMS

Sl. No.	Description of item	Acceptable Makes
SH : Electrical Works		
1.	Steel conduit pipe & accessories	AKG/ BEC/ RMCON/ NIC with ISI marked
2	PVC conduit pipe & accessories	Precission / AKG/ BEC/ Avon Plast
2.	PVC insulated copper wire(FRLS Type with ISI marked)	Finolex/ Polycab/ Rajanigandha / Havells/ KEI /Mescab /RR Kabel/ L&T
3.	Modular Switches & Sockets, Fan Regulator, RJ-45(cat-6)/ RJ-11 outlets including modular boxes & plates	Legrand - ARTEOR / Schneider-Opale / Panasonic –Vision/ MK-Element/North West-Stylust
4.	Telephone DP boxes	Krone / D-Link / ITL
5.	MCBs / RCCB / RCBO/MCB DBs, Industrial Sockets and accessories.	Legrand DX3 /Seimens Betaguard/L&T Exora /Schneider Acti9 / Hager-H3 / ABB-S200M
6.	Sensors for lighting	Havells/Crompton/ Philips/ Honeywell/Legrand / Schneider
7.	Rising main / Bus Trunking	Schneider / Siemens/ Legrand / L&T
8.	LED Luminaires	Philips / Wipro/Trilux /Halonex/Osram /LT
SH :Fitting and fixtures		
9	BLDC Ceiling Fan (5 Star rated)	Crompton / Orient/Havells/Polycab/Atomberg Gorrila/Usha
10	Exhaust fan	Havells/ Crompton/ Orient /Usha
11	Lamps	OSRAM / Philips / Wipro / Crompton/ Surya
12	Street light fittings	Philips / Wipro/Trilux /K-Lite/NERI
SH: Substation Equipment.		
13	33/11 KV HT Panel/VCB panel	ABB/Schneider/Crompton/L&T
14	Transformer	Kirloskar / Raychem / Voltamp-Vadodara/ Energypac/ Pristine/ABB
15	ACB	Legrand(DMX3)/Siemens(3WL)/ L&T(U-power)/Schneider(Easypact HVS)
16	Panel Board Mounting switches / MCCBs / SDFU/ Contactor / Single Phase Preventer / Timer	Siemens / ABB / GE / Schneider / L&T /Legrand Siemens / ABB / GE / Schneider / L&T for LT Panel TTA SI of ABB
17	Electrical MV panel & APFC Panel (TTA as per IEC 60439)	SI of ABB//Legrand AC Power, Masstech Switchgear Pvt. Ltd, Technomac, OPG,Pristine,Roy Co Engineering, Tricolite, Adleck, Associated Switchgears & Projects

Sl. No.	Description of item	Acceptable Makes
		Ltd.(The manufacturers must have CPRI test certificate of appropriate rating not older than 5 years from the date of call of tender.)
18	Meters/ Electrical Measuring Instruments	AE / L&T / Conzerv / Trinity / Rishav
19	Multifunction meter	Conzerv / Secure / Trinity / L&T
20	CTs (LT)	Kappa / AE / L&T / Pragati
21	Indication lamps / push buttons / selector switch	L&T / Siemens/Schneider/ AE/ Kaycee / IMP
22	Cable lugs / Glands	Dowells / Wago/ Gripwel / Johnsons / Comet/ Smi
23	Battery Charger Panel	Chloride Power/Emerson /Amara Raja /Chhabi Electricals
23		
24	1.1 KV / 11 KV Cable UG Cable / Control Cable (ISI marked)	Polycab / Havells / CCI / Finolex/ Universal /Gloster/ KEI / Crystal
25	11 KV Joints / End termination	Xicon (CCI) / M-Seal / Raychem
26	Battery	Exide / Amara raja / Panasonic / Global & Yuasa
27	Power Capacitors	EPCOS / Siemens / L & T / GE / Schneider/Legrand
28	HDPE Pipe	Duraline / Rex Polyextrusion / Plato / Tijaria / Tirupati Plastomatics / AJAPLAS
29	Cable Tray	Patny Systems / IndmarkFormtech / UCIC / Kanade Anand / VATCO/RM Con
30	UPS	APC / Emerson Liebert / Numeric Power / Uniline Energy
31	Insulating Mat	Tata /Vardhman/Zenith/Kiran/Raychem/Elstomer
SH : Telephone and LAN		
32	PIJF underground telephone cable	Polycab/Delton / Finolex / KEC/ Paramount
33	Optical Fiber Cable	Finolex / KEC/ Paramount / Birla Ericsson / Aksh Optifibre
34	LAN / Data/ Voice Networking components	D-Link / Digilink / Molex / Ponduit /Systimax / Tyco / HP /CISCO
SH :Firefighting installations		
35	Sluice valve / non return valve	Kirloskar of Class PN 1.6 / Audco/Leader/ Advance
36	Gun Metal Valve (ISI marked)	Kirloskar / Sant/Leader
37	Butterfly Valve	Kirloskar /Audco/Leader/ Advance
38	Pressure Switch	Danfoss / Honeywell / Indfos / Fiebig / HGuru
39	Fire fighting equipments such as single headed/double headed hydrant valves, Fitting, Nozzles, Fire Brigade Inlet/ Outlet	Newage/ Minimax / Ceasefire / Omex/Safeguard./Mitras

Sl. No.	Description of item	Acceptable Makes
	Connection, Siamese Connections, Landing Valve, Branch pipe etc.	
40	Hose reel (ISI marked)	Dunlop / Newage/ Minimax / Ceasefire/Safeguard/Mitras
41	RRL Hose pipe (ISI marked)	Dunlop / Newage/ Minimax / Ceasefire / Mitras/Safeguard
42	First aid hose reel drum	Dunlop / Newage/ Minimax / Ceasefire / Mitras/Safeguard
43	Portable Fire extinguishers	Ceasefire / Safex / Minimax / Fire shield/Safeguard
44	Cushy foot / Anti vibration pads	Dunlop / Resistoflex / GERB
45	MS Pipe 'C' class	Tata/Zindal (Hisar)/
SH : DG set		
46	Diesel Engine	Cumins/ Caterpilar/ Perkins/ Mitsubishi/ Kirloskar
47	Alternator	Kirloskar/Stamford/Leroy Somer/NGEF/Crompton
SH : Fire Detection and Alarm System		
48	Analog Addressable fire alarm system (Panel / Sounder / Manual Call box & accessories)	Notifier (Honeywell) / Edwards (United Technologies) /Cerberus (SIEMENS) / BOSCH
49	UL approved Fire alarm detector (smoke / heat / optical / multi-function etc.)	System Sensor/Apollo/ Edwards / Notifier
50	Lifts	OTIS/KONE/SCHINDLER/MITSUBISHI
SH : Air-conditioning, Ventilation		
51	Split type Air conditioner (5 star marked)	Daikin / Blue Star / Toshiba/ Mitshubishi/ O-General/Voltas / LG/ Carrier / Hitachi
52	Ductable Split A.C.	Daikin / Blue Star / Toshiba/Mitshubishi/O-General/ Voltas / LG/ Carrier / Hitachi
53	VRF / VRV system	Hitachi / Daikin / LG/ Mitsubishi/ O-General
54	Chilling Machine	Carrier / York / Trane / Daikin / Blue Star/ System Air / Flaktwood / Zeco Aircon /
55	Air Handling Units Fan Coil unit	Voltas/Daikin /Carryaire
56	Centrifugal/Axial/In-line fans	Nicotra / Kruger / Greenheck / System Air
57	Chilled Water / Condenser Water Pump Set	Grundfos / Wilo / ITT / Armstrong / Mather & Plate / Kirlosakar / Beacon
58	Cooling Tower	Paharpur / Mihir / Bell/Advance
59	Hot Water Generator/ Pan type Humidifier	Rapid Cool / Emerald / KEPL/Daikin
60	Air Washer	Zeco / Ambassador / System Air/Roots Cooling
61	Dry Scrubber	Trion / Honeywell / Waves Aircon / Espair
62	G.I. Sheet	TATA / SAIL / Jindal hissar
63	Pre-Fabricated Duct (With GI sheets of above makes)	Zeco/Rollastar/Ductofab

Sl. No.	Description of item	Acceptable Makes
64	PUF Pipe Support	Malanpur / Lloyd / Best Puf/Beardsel
65	Variable Frequency Drive	Allen Bradley/ Danfoss / ABB / Honeywell / Siemens
66	Control Valve (PID) / 3 way valve with proportionate thermostat	Danfoss / Honeywell / Johnsons Control / Belimo /Flocon
67	CO2 Sensor	Danfoss / Honeywell / Johnsons Control / Belimo
68	Modulating Motor	Danfoss / Honeywell / Johnsons Control / Belimo
69	Room thermostat / Humidistat	Danfoss / Honeywell / Johnsons Control / Belimo
70	Butterfly Valve / Balancing Valve / Non Return Valve / Ball valve with & without stainer	Audco / Advance / Belimo / Kirloskar/Zoloto
71	Pot / Y Strainer	Emerald / Rapid Cool / Sant
72	Motorized Butterfly valve	Honeywell / Advance / Danfoss/ Belimo
73	Thermometer / Pressure Gauge	Fiebig / Taylor / H-Guru/ Emerald
74	Auto air vent with stop valve	Rapid Cool / Anergy / Honeywell /
75	Grille / Diffuser	Titus / Trox / System Air /Carryaire / Conair / Mapro / Airmaster/Daynacraft
76	Motorized Fire Damper	Titus / Trox / System Air /Carryaire / Conair / Mapro / Airmaster/Daynacraft
77	Volume Control Damper, Fresh/ Exhaust air louver	Titus / Trox / System Air /Carryaire / Conair / Mapro / Airmaster
78	Actuator for fire damper	Siemens/ Honeywell / Belimo /System air
79	VAV Box	Honeywell / Trox / Belimo / Ruskin Titus
80	Air curtain	Dynamic Engineers/
81	Fibre Glass insulation	Beacon/Magneto/Hygiene Air Products UP-Twiga / Owens Corning / Llyod
82	Vibration isolator / Rubbed pad/Duct support Arrangement	Dunlop / Emerald / Resistoflex
83	Pre-filter	Anfilco / Thermodyne / Purolator / Spectrum
84	Pressurized Expansion Tank / Air separator	Anergy / Emerald / Rapid cool / KEPL
85	Motor for AHU	Siemens / ABB / Crompton / Bharat Bijlee
86	BMS Operator Work Station	HP/ Dell/ Lenovo/Acer
87	BMS Controller and Power Supply / Software	Siemens /Honeywell EBI / Sauter / TAC (Schneider) / ALC
88	BMS Controller Housing	Enclotek / Rittal / Siemens
89	LAN Cable	Lucent / AT&T / AMP / Fusion Polymer / D-link / Belkin/legrand
90	Personal Computer	Dell / IBM / HP / Compaq
91	Laser jet Printer	HP / Canon / HCL
S.H: Miscellaneous Items		
92	MS / GI Pipe (ISI marked)	SAIL/ Jindal (Hisar)/ Tata
93	STEEL	SAIL / IISCO / TISCO / JINDAL
94	Rails ,Steel channels, angles	TATA / SAIL / JINDAL
95	GSS Sheet	TATA / SAIL / JINDAL

Sl. No.	Description of item	Acceptable Makes
96	Aluminium Sheet	Hindalco / Balco / Nalco
97	Paint	ICI / Asian / Berger / Nerolac
98	CI Valves	H Sarker / Kalpana / Venus / Audco / Kirloskar
99	G M Valves	Leader/Kitz/Zoloto / Kirloskar / Audco/ L&T / Sant
100	Pump	Kirloskar/Mather & Platt/ KSB/ Best & Crompton / Beacon Weir / Jyoti
101	Motor	SIEMENS / NGEF/ KIRLOSKAR / GECA /BHARAT BIJLI / ALSTOM / ABB / CROMPTON
102	CPVC PIPE	Finolex / Varun / Trubore / Ashirvad
103	Water Cooler	Voltas / Blue Star / Usha Sriram
104	Water Purifier	Eureka Fobes / Kent / Kenstar / Whirlpool
105	CCTV	Sony/ Bosch/Honeywell/PELCO/TYCO
106	Desktop Document Camera	Lumen/ Elmo/Wolfvision
107	Camera, Joystick Controller	Sony/ Panasonic/ Bosch/Honeywell
108	LED TV/Display	Samsung/ Panasonic/ Sharp/ Sony
109	Video Conferencing Units	Polycom/Sony/Cisco –Tandberg
110	LAN Cable	Lucent / AT&T / AMP / Fusion Polymer / D-link / Belkin/legrand
111	Personal Computer	Dell / IBM / HP / Compaq
112	Laser jet Printer	HP / Canon / HCL
113	RFID Door Lock	Godrej/Samsung
114	Any other item	To be decided by Engineer-In-Charge

PAYMENT – SCHEDULE FOR ORIGINAL WORK

All running / intermediate & final payments shall be made to the agency in accordance with the following schedule:

1. Unless explicitly stated otherwise in the Tender Documents, the Contract shall be for the whole Works, based on the milestones and payment shall be as accepted in the Contract.

2. The design notes, calculations, specifications, dimensioned drawings and milestone schedules prepared by the tenderer in respect of his technically acceptable proposal shall be for limited purpose of tender evaluation and for enabling its technical acceptability, price and construction time to be prima facie assessed.

3. Irrespective of the estimated quantities and /or dimensioned details for various items of work as furnished in the design notes, calculations, specifications or outline /dimensioned drawings accompanying the tender for the work, the successful tenderer shall carry out all changes, modifications or alterations that may, during the scrutiny of the detailed designs and working drawings, or during construction be considered necessary in the opinion of the Engineer for compliance with the Employer's Requirements.

4. All duties, taxes, fees, octroi and other levies, payable by the Contractor under the Contract shall be included in the total Contract Price submitted by the Tenderer. The evaluation of the Tender by the Employer shall be made on the basis of quoted price only.

5. The Payment shall be in accordance with the provisions of Clauses of the schedule of payment.

SCHEDULE OF PAYMENT FOR EPC WORK

All running / intermediate & final payments shall be made to the EPC Contractor in accordance with the following schedule

Sl No		ACTIVITY	Percentage of Total Quoted Amount	
			Breakup of % of Sub-Head against Contract Value	% of Item against Contract Value
STAGE OF PAYMENT FOR CIVIL WORKS COMPONENT				
1		**Planning, Designing and obtaining statutory approvals from local bodies**		
	A	Submission and approval of site survey report including topographical survey, site plan, conceptual drawings, 3-D views/walkthrough, Building Model with cover ,SS stand and lighting complete of suitable scale etc.		0.10%
	B	Soil Investigation report		0.15%
	C	Submission of Detailed Project Report (DPR) and Design Basis for all Civil & MEP works		0.25%
	D	Approval of Architectural Drawings		0.20%
	E	Approval from following local bodies / proof checking		
		(i) Fire Safety Department		0.15%
		(ii) Approval of building plans including any other relevant statutory approval including Green Building certification	**3.00%**	0.20%
		(iii) Approval of Structural Drawings		0.15%
	F	Approval of all Civil works Drawings		0.15%
	G	Approval of all E & M Services Drawings		0.10%
	H	Approval of landscaped drawings(Internal and external)		0.10%
	I	Submission & approval of macro & micro level work completion schedule in primavera/MS Project software		0.15%
	J	Submission & approval of detailed Quality Assurance Plan for Civil and MEP (services) works		0.10%
	K	Submission of Good for Construction Drawings for Execution of Works -		
		(i) all Architectural Drawings		0.30%
		(ii) all Structural Drawings		0.30%
		(iii) all E & M Services Drawings		0.30%
		(iv) all landscape/horticulture work drawings including softscaping / hardscaping and irrigation works		0.30%

2		**Pile work**	**8.00%**	
	A	RCC work complete for Pile work Including any pumping out water		3.50%
	B	Earthwork in excavation		1.00%
	C	PCC below raft/pile cap foundation and water proofing		1.00%
	D	RCC work for pile cap, tie beam ,raft		2.50%
3		**Foundation Work**	**10.00%**	
	A	RCC work complete including reinforcement, shuttering, etc. for Columns, tie beams, retaining wall (if any), Lift well, shear wall , Fire Tank, UG Tank and misc. structures including water proofing works		3.75%
	B	Brick work		1.00%
	C	Sleeves for Plumbing/Sewerage Connections/HVAC along with chambers		1.00%
	E	Filling below the floors		0.50%
	F	RCC work for Plinth Beams & Grade Slab		3.75%
4		**Level G (Ground Floor) Works**	**10.00%**	
	A	RCC work complete i/c Reinforcement, shuttering, staging for Columns, beams, slabs, staircase, shear walls, lift walls, water proofing works etc.		2.50%
	B	Masonry works, Brick work, partition walls		1.50%
	C	Stone work.		1.50%
	D	Water supply work, plumbing works, sanitary works,Toilet cubicle, Counters, partition wall/dado works and other associated misc. works.		0.75%
	E	Wood work, door and windows , Fire check doors i/c hardware fitting , fire resistant glass on fire check doors, Steel work, painting /polishing works, railings and other associated misc. , works complete.		0.75%
	F	Plastering, painting, Flooring, other interior finishing work and other associated misc. works complete.		2.00%
	G	Storage units, fittings, complete.		0.50%
	H	Sanitary fittings complete.		0.50%
5		**Level G+1**	**7.00%**	
	A	RCC work complete i/c Reinforcement, shuttering, staging for Columns, beams, slabs, staircase, shear walls, lift walls, water proofing works etc.		2.00%
	B	Masonry works, Brick work, partition walls		1.00%
	C	Stone work		1.00%
	D	Water supply work, plumbing works, sanitary		0.50%

		works, Toilet cubicle, Counters, partition wall/dado works and other associated misc. works.		
	E	Wood work, door and windows , Fire check doors i/c hardware fitting , fire resistant glass on fire check doors , Steel work, painting /polishing works, railings and other associated misc. , works complete		0.50%
	F	Plastering, painting, Flooring, other interior finishing work and other associated misc. works Complete.		1.00%
	G	Storage units, fittings, complete.		0.50%
	H	Sanitary fittings complete		0.50%
5		**Terrace Level**		
	A	RCC complete for Terrace level Column, beam, slab, roof covering, Mumty, Lift Machine Room, any structural steel work and all related structure complete.	**2.00%**	1.00%
	B	Brick /AAC/Masonry work		0.25%
	C	Water supply work including RCC/PVC overhead tank on Terrace level complete		0.50%
	E	Water Proofing and levelling complete		0.25%
6		**External Dry stone cladding, Structural Glazing, Texture Paint & GRC/WPC Jali**	**9.00%**	
	A	External Dry stone cladding i/c frame works		3.25%
	B	Structural Glazing with hermetically sealed high performance double glass units ,Entrance structural canopy, Glass partitions		3.75%
	C	GRC/Stone/WPC Jali/ aluminium louvers i/c frame		1.00%
	D	Texture Paint		1.00%
7		**Other Works**		
	A	Internal and External Signages and Logos, motorized roller blinds		0.20%
	B	Plinth protection of buildings, Landscape, horticulture works and all related works complete		0.90%
	C	Rainwater drainage from roof to ground and Rainwater harvesting structure (RWH) .		0.20%
	D	PQC Road work from buildings entrance to other existing roads as per approved plans including approach up to the Buildings, and Roads around the building, Entrance/wicket gate with security railing as boundary wall around the buildings .	**8.00%**	2.25%
	E	Covered pathways , Accessible measures as per GOI guidelines etc complete		1.25%

	F	External Water supply line , drainage with all roof and road side drainage connected with RWH structure , Sewer line up to STP		1.25%
	G	Carpeting, Acoustics in Seminar Hall, conference hall etc of auditorium and other relevant buildings		1.50%
	H	Final Finishing work and any other remaining works to complete the building for handing over to client.		0.45%
7		**Handing over of the building/premises after completion of entire work with the satisfaction of client department/Engineer-in-charge.**	**3.00%**	
	A	Obtaining Final approval/NOC from various local bodies and other miscellaneous approvals required for handing over of buildings to client department.		1.50%
	B	Commissioning of buildings including all civil work services including deep cleaning and minor woks required during handing over and occupation of building by client .		1.50%
		Total % of CIVIL Works cost components =	**60.00%**	**60.00%**

Note : Payment of any part work of the above components may be made on Pro-rata basis for the work done of construction components of the above mentioned respective percentages of Floor area and floor level as decided by Engineer-in-charge.

E & M Service: STAGES OF PAYMENT FOR ELECTRICAL & MECHANICAL WORKS COMPONENT				
8		**Internal Electrical Installation**		
	A	Supplying and laying of conduits and boxes of all floors	**12.50%**	1.00%
	B	Supplying and drawing of wires for all floors		1.50%
	C	Supply of DBs ,MCBs, switches ,rising mains along with accessories		1.50%
	D	Supply of electrical indoor light fittings, fans, Exhaust /fresh air fans , sensors, lighting controls, raceways etc.	**12.50%**	2.50%
	E	Supply street light poles, bollard, landscape lighting, cabling, panels etc.		2.50%
	F	Supply of contour LED light fittings, Façade lighting, cabling, panel etc.		1.50%
	G	Installation of above equipments		1.00%
	H	Testing, commissioning of all equipments including earthing & handing over to the department for beneficial use.		1.00%
9		**Sub-Station**		
	A	Supply of sub station equipment ie HT Panel, transformers etc. i/c inspection at factory		0.75%

	B	Supply of LT panels and sub LT panels, APFC panels etc.	**3.00%**	0.75%
	C	Supply other related works like cabling, bus duct etc.		0.50%
	D	Installation of above equipments		0.50%
	E	Testing and commissioning including earthing of all above equipment		0.50%
10		**Fire Alarm System**		
	A	Supplying and laying fire survival cable/wire i/c conduits/cable tray etc.		0.25%
	B	Supply of detectors, MCBs, speakers and other accessories etc.	**1.00%**	0.25%
	C	Supply of main Fire alarm panel, repeater panel, PA system with accessories etc.		0.15%
	D	Installation of above equipment		0.15%
	E	Testing, commissioning, trial run and handing over to the client/E-in-C for beneficial use including fire inspection.		0.20%
11		**CCTV**		
	A	Supply of CCTV cameras, server/NVR and other allied accessories		0.125%
	B	Supply of boom barrier	**0.50%**	0.125%
	C	Supply of flap barrier		0.070%
	D	Installation of above equipment		0.08%
	E	Testing and commissioning of all equipment		0.10%
12		**Building Management System**		
	A	Supplying of materials	**0.50%**	0.30%
	B	Installation of equipment, wiring, testing and commissioning of all equipment		0.20%
13		**HVAC including Ventilation**		
	A	Supplying of chillers, chiller pant optimizer, pumps with VFD panel, hot water generator , expansion tank, air separator Auto tube cleaning system, radiant cooling Panels i.e all high side equipment i/c inspection at factory		2.0%
	B	Piping works and valves	**12.50%**	1.25%
	C	Supplying of cooling towers, pumps etc.		2.00%
	D	Supplying of AHUs, FCUs		1.00%
	E	Supplying of electrical panels, cabling, cable tray, earthing, VFD etc.		1.00%
	F	Factory Fabrication and installation of ducts, grills, duct insulation , dampers etc		1.50%
	G	Supply of ventilation and pressuring fan		1.50%

	H	Installation of above equipments		1.75%
	I	Testing and commissioning of all equipment		0.50%
	J	On completion of major one seasonal test		0.50%
14		**Firefighting System**		
	A	Supplying and laying of pipe, fittings and valves, seismic bracing	**1.50%**	0.25%
	B	Supplying Fire pumps, diesel engine etc.		0.25%
	C	Supplying Fire curtain pumps, engine etc		0.25%
	D	Supply of cables, panels and fire extinguishers, Exit sign board, electrical signages		0.25%
	E	Installation of above equipments		0.25%
	F	Testing, commissioning of all above equipments , trial run and handing over to the client/E-in-C for beneficial use including fire inspection.		0.25%
14		**Lift**		
	A	Supply of all Lift materials i/c inspection at factory	**2.00%**	1.50%
	B	Installation of Lift		0.25%
	C	Testing and commissioning of all Lifts		0.25%
15		**DG set**		
	A	Supply of DG Set i/c inspection at factory		1.00%
	B	Supply of DG Set Panel		0.25%
	C	Supply other related works like factory fabricated MS Structure for exhaust piping, earthing etc.	**2.00%**	0.25%
	D	Installation of equipments		0.25%
	E	On commissioning and completion of successful running in period & taking over of the DG set by the client.		0.25%
16		**UPS**		
	A	Supply of UPS & Batteries	**0.25%**	0.10%
	B	Installation of UPS i/c batteries		0.10%
	C	Testing & Commissioning of all equipments		0.05%
17		**Access Control**		
	A	Supply of Access Control System	**0.30%**	0.15%
	B	Installation of Access Control System		0.10%
	C	Testing & Commissioning of all equipments		0.05%
18		**Local Area Network (LAN)**		
	A	Supply of LAN equipments	**1.00%**	0.40%
	B	Installation of LAN & Next Gen Firewall		0.40%
	C	Testing & Commissioning of all equipments		0.20%
19		**Water Supply Pumping System**		
	A	Supply of Water Supply pumping System i/c panel , water softening plant and other	**0.20%**	0.15%

		associated works etc complete		
	B	Installation, Testing & Commissioning of Water Supply equipments		0.05%
20		**SITC of Solar water heating system i/c all associated frame and other works**	**0.25%**	0.25%
21		**Handing over of the building/premises after completion of entire E & M services work with the satisfaction of client department/Engineer-in-charge.**	**2.50%**	
	A	Obtaining Final approval of all local bodies		1.50%
	B	Commissioning of buildings including all MEP works comprising of all wired & piped services.		1.0%
		Total MEP Works =	**40.00%**	
		Total CIVIL + MEP Works =	**100.00%**	
		(NOTE: For above all E&M services pro- rata payment will be made for supply/ execution in parts)		

Note:

(a) For above all Civil and Electrical works prorata payment will be made as assessed during execution by Engineer in Charge and will be final.

(b) The payment stages is tentative and it can be rescheduled depending upon work exigency/requirement, as recommended by concerned Engineer for Civil & E/M services work in consultation with Engineer-in-Charge and agency.

GUARANTEE BONDS

ANNEXURE-I

GUARANTEE TO BE EXECUTED BY THE CONTRACTOR FOR REMOVAL OF DEFECTS AFTER COMPLETION IN RESPECT OF STRUCTURAL WORK.

The agreement made this..... day of ..... Two Thousand ..... between.....S/o .....(hereinafter called the GUARANTOR on the one part) and the NALANDA UNIVERSITY (hereinafter called the University on the other part)

WHEREAS THIS agreement is supplementary to a contract (Hereinafter called the Contract) dated ..... and made between the GUARANTOR ON THE ONE PART AND the Government on the other part whereby the contractor inter alia undertook to render the building and structures in the said contract completely structurally defect proof.

AND WHEREAS THE GUARANTOR agreed to give a guarantee to the affect that the said work will remain structurally defect proof, for Ten years to be reckoned from the date after the expiry of maintenance period prescribed in the contract.

NOW THE GUARANTOR hereby guarantee that work executed by him will render the structures completely defect proof and the minimum life of such defect liability shall be Ten years to be reckoned from the date after the expiry of maintenance period prescribed in the contract.

The decision of the Engineer-in-Charge with regard to nature and cause of defect shall be final.

During this period of guarantee, the guarantor shall make good all defects and in case of any defect being found render the building structurally proof to the satisfaction of the Engineer-in-Charge calling upon him to rectify the defects failing which the work shall be got done by the University by some other contractor at the Guarantor's cost and risk. The decision of the Engineer-in-Charge as to the cost payable by the Guarantor shall be final and binding.

That if the guarantor fails to execute the rectification of defect or commits breach there under, then the guarantor will indemnify the principal and his successor against all loss, damage, cost expense or otherwise which may be incurred by him by reason of any default on the part of the GUARANTOR in performance and observance of this supplementary agreement. As to the amount of loss and/or damage and or cost incurred by the University, the decision of the Engineer-in-Charge will be final and binding on both the parties.

IN WITHNESS WHEREOF these presents have been executed by the obligator .....and ..... by.....for and on behalf of the NALANDA UNIVERSITY on the day, month and year first above written.

SIGNED, sealed and delivered by OBLIGATOR in the presence of :-

1. ..... 2. .....

SIGNED FOR AND BEHALF OF THE NALANDA UNIVERSITY BY .....in the presence of:-

1. ..... 2. .....

ANNEXURE-II

GUARANTEE TO BE EXECUTED BY THE CONTRACTOR FOR REMOVAL OF DEFECTS AFTER COMPLETION IN RESPECT OF STONE WORK/ TILE WORK.

The agreement made this..... day of ..... Two Thousand .....between .....(hereinafter called the GUARANTOR on the one part) and the Nalanda University (hereinafter called the University on the other part).

WHEREAS THIS agreement is supplementary to a contract (Hereinafter called the Contract) dated ..... and made between the GUARANTOR ON THE ONE PART AND the University on the other part whereby the contractor inter alias undertook to render the work in the said contract structurally stable, workmanship, finishing and use of sound materials.

ANDWHEREAS THE GUARANTOR agreed to give a guarantee to the affect that the said work will remain structurally stable and guaranteed against faulty workmanship, finishing and materials.

NOW THE GUARANTOR hereby guarantee that work executed by him will remain structurally stable after the expiry of maintenance period prescribed in the contract for the minimum life of five years to be reckoned from the date after the expiry of maintenance period prescribed in the contract.

The decision of the Engineer-in-Charge with regard to nature and cause of defect shall be final.

During this period of guarantee, the guarantor shall make good all defects to the satisfaction of the Engineer-in-Charge calling upon him to rectify the defects failing which the work shall be got done by the University by some other contractor at the Guarantor's cost and risk. The decision of the Engineer-in-Charge as to the cost payable by the Guarantor shall be final and binding.

That if the guarantor fails to make good all the defects, commits breach there under, then the guarantor will indemnify the principal and his successor against all loss, damage, cost expense or otherwise which may be incurred by him by reason of any default on the part of the GUARANTOR in performance and observance of this supplementary agreement. As to the amount of loss and/or damage and or cost incurred by the University, the decision of the Engineer-in-Charge will be final and binding on both the parties.

IN WITHNESS WHEREOF these presents have been executed by the obligator.....and ..... by ..... for and on behalf of the Nalanda University on the day, month and year first above written.

SIGNED, sealed and delivered by OBLIGATOR in the presence of :-

1. ..... 2. .....

SIGNED FOR AND BEHALF OF THE NALANDA UNIVERSITY BY..... in the presence of :-

1. ..... 2. .....

ANNEXURE-III

GUARANTEE TO BE EXECUTED BY THE CONTRACTOR FOR REMOVAL OF DEFECTS AFTER COMPLETION IN RESPECT OF WATER-PROOFING WORKS.

The agreement made this..... day of ..... Two Thousand .....between .....(hereinafter called the GUARANTOR on the one part) and the Nalanda University (hereinafter called the University on the other part).

WHEREAS THIS agreement is supplementary to a contract (Hereinafter called the Contract) dated ..... and made between the GUARANTOR ON THE ONE PART AND the University on the other part whereby the contractor inter alia undertook to render the building and structures in the said contract completely water and leak-proof.

ANDWHEREAS THE GUARANTOR agreed to give a guarantee to the affect that the said work will remain water and leak proof, for Ten years from the date of giving water proofing treatment.

NOW THE GUARANTOR hereby guarantee that work executed by him will render the structures completely leak proof and the minimum life of such water proofing treatment shall be Ten years to be reckoned from the date after the expiry of maintenance period prescribed in the contract.

The decision of the Engineer-in-Charge with regard to nature and cause of defect shall be final.

During this period of guarantee, the guarantor shall make good all defects and in case of any defect being found render the building water proof to the satisfaction of the Engineer-in-Charge calling upon him to rectify the defects failing which the work shall be got done by the Department by some other contractor at the Guarantor's cost and risk. The decision of the Engineer-in-Charge as to the cost payable by the Guarantor shall be final and binding.

That if the guarantor fails to execute the water proofing or commits breach there under, then the guarantor will indemnify the principal and his successor against all loss, damage, cost expense or otherwise which may be incurred by him by reason of any default on the part of the GUARANTOR in performance and observance of this supplementary agreement. As to the amount of loss and/or damage and or cost incurred by the Government, the decision of the Engineer-in-Charge will be final and binding on both the parties.

IN WITHNESS WHEREOF these presents have been executed by the obligator.....and ..... by ..... for and on behalf of the NALANDA UNIVERSITY on the day, month and year first above written.

SIGNED, sealed and delivered by OBLIGATOR in the presence of :-

1. ..... 2. .....

SIGNED FOR AND BEHALF OF THE UNIVERSITY BY .....in the presence of :-

1. ..... 2. .....

ANNEXURE-IV

GUARANTEE TO BE EXECUTED BY THE CONTRACTOR FOR REMOVAL OF DEFECTS AFTER COMPLETION IN RESPECT OF SANITARY INSTALLATIONS / WATER SUPPLY / DRAINAGE WORK AND ALUMINIUM WORK

The agreement made this..... day of ..... Two Thousand .....between .....(hereinafter called the GUARANTOR on the one part) and the Nalanda University (hereinafter called the University on the other part).

WHEREAS THIS agreement is supplementary to a contract (Hereinafter called the Contract) dated.....and made between the GUARANTOR ON THE

ONE PART AND the University on the other part, whereby the contractor inter alia, undertook to render the work in the said contract structurally stable, leak proof and sound material, workmanship, anodizing, colouring, sealing etc.

ANDWHEREAS THE GUARANTOR agreed to give a guarantee to the affect that the said work will remain structurally stable, leak proof and guaranteed against faulty material and workmanship, defective anodizing / Powder coat colouring and finishing for ..... years from the date of completion of work.

NOW THE GUARANTOR hereby guarantee that work executed by him will be free from any leakage, seepage, cracks in pipes and guaranteed against faulty material and workmanship, defective galvanizing for five years to be reckoned from the date after the expiry of maintenance period prescribed in the contract.

The decision of the Engineer-in-Charge with regard to nature and cause of defect shall be final.

During this period of guarantee, the guarantor shall make good all defects and in case of any defect to satisfaction of Engineer-in-Charge at his cost and shall commence the work for such rectification within seven days from the date of issue of the notice from the Engineer-in-Charge calling upon him to rectify the defects failing which the work shall be got done by the Department by some other contractor at the guarantor's cost and risk. The decision of the Engineer-in-Charge as to the cost payable by the Guarantor shall be final and binding.

That if the guarantor fails to make good all defects or commits breach there under, then the guarantor will indemnify the principal and his successor against all loss, damage, cost expense or otherwise which may be incurred by him by reason of any default on the part of the GUARANTOR in performance and observance of this supplementary agreement. As to the amount of loss and/or damage and or cost incurred by the Government, the decision of the Engineer-in-Charge will be final and binding on both the parties.

IN WITHNESS WHEREOF these presents have been executed by the

obligator.....

..... and ..... by ..... for

and on behalf of the UNIVERSITY on the day, month and year first above written.

SIGNED, sealed and delivered by OBLIGATOR in the presence of :-

1. ..... 2. .....

SIGNED FOR AND ON BEHALF OF THE NALANDA UNIVERSITY BY ..... in the presence of :-

1. ..... 2. .....

ANNEXURE-V

FORM OF PERFORMANCE SECURITY/ BANK GUARANTEE BOND

1. Whereas the Registrar, Nalanda University, on behalf of Nalanda University (hereinafter called "The Owner") has entered into an agreement bearing number …….. with.....(name and address of the contractor) (hereinafter called "the contractor") for the execution of the work… ..... (name of the work)…….. The Owner has further agreed to accept an irrevocable Bank Guarantee for Rs…….(Rupees…..... only) valid up to……..(date)…..... as Performance Guarantee/Security Deposit/Mobilization Advance (Strikeout whichever is not applicable) from the said Contractor for compliance of his obligations in accordance with the terms and conditions of the agreement.

2. We,……..(indicate the name of the bank)… .....(hereinafter referred to as "the Bank"), hereby undertake to pay to the Owner an amount not exceeding Rs……. (Rupees…..... only) on demand by the Owner within 10 days of the demand.

3. We,…….. (indicate the name of the bank)……, do here by undertake to pay the amount due and payable under this guarantee without any demur, merely on a demand from the Owner stating that the amount claimed is required to meet the recoveries due or likely to be due from the said Contractor. Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this Guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs…….. (Rupees… .....only).

4. We,…… (indicate the name of the bank)… ..... , further undertake to pay the Owner any money so demanded notwithstanding any dispute or disputes raised by the contractor in any suit or proceeding pending before any Court or Tribunal, our liability under this Bank guarantee being absolute and unequivocal. The payment so made by us under this Bank Guarantee shall be a valid discharge of our liability for payment there under and the Contractor shall have no claim against us for making such payment.

5. We,……. (indicate the name of the bank)……, further agree that the Owner shall have the fullest liberty without our consent and without affecting in any manner our obligation here under to vary any of the terms and conditions of the said agreement of to extend time of performance by the said Contractor from time to time or to postpone for any time of from time to time any of the powers exercisable by the Owner against the said contractor and to forbear or enforce any of the terms and conditions relating to the said agreement and we shall ne be relieved from our liability by reason of any such variation or extension being granted to the said Contractor of for any forbearance, cat of omission on the part of the Owner or any indulgence by the Owner to the said Contractor or by any such matter or thing whatsoever which under the lay relating to sureties would, but for this provision, have effect of so relieving us.

6. We,…… (indicate the name of the bank)……, Further agree that the Owner at its option shall be entitled to enforce this Guarantee against the Bank as a principal debtor at the first instance without proceeding against the Contractor and notwithstanding any security or other guarantee the Owner may have in relation to the Contractor's liabilities.

7. This guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor.

8. We,……. (indicate the name of the bank)……, undertake not to revoke this guarantee except with the consent of the Owner in writing.
9. This Bank Guarantee shall be valid up to..... unless extender on demand by the Owner. Notwithstanding anything mentioned above, our liability against this guarantee is restricted to Rs…… (Rupees… .....only) and unless a claim in writing is lodged with us within the date of expiry or extender date of expiry of this guarantee, all our liabilities under this guarantee shall stand discharged.

Date: ……

Witnesses:

1. Signature……..
Name and Address

Authorized Signatory

Name:

Designation:

Staff Code No:

Bank Seal:
2. Signature……
Name and Address

ANNEXURE-VI

FORMAT OF AGREEMENT

This agreement is executed at _____ (place of execution) on the _____ day of_____, 20___
BETWEEN

_____
_____, which expression shall mean and include its successors and assigns (name and address of the Owner) ("Owner") of the FIRST PART
AND

_____
_
_____
_____,
(name and address of the successful bidder) ("Contractor") of the SECOND PART

The Owner and the Contractor shall be individually referred to as the "Party" and collectively referred to as the "Parties"

Whereas the Owner is desirous of **"Construction of one 500 user capacity Yoga Center cum Meditation Hall, one 250 user capacity Cafeteria and one 2000 seater capacity Auditorium including all wired and piped services comprising of Internal Water Supply, Sanitary Installations, Roads, Pathways, Drainage, Internal Electrical Installations, Extra Low Voltage (ELV) Works, Fire Fighting, Fire Alarm system, Air Conditioning, External Electrical installations, etc. all complete on EPC basis for Nalanda University Main Campus at Rajgir, District Nalanda, Bihar"** and had invited tenders by issuing Notice Inviting Tender ("Tender") for selection of a contractor for constructing the said campus. The Contractor has submitted its tender pursuant to the issuing of the Tender by the Owner. WHEREAS the details of the work proposed to be executed by the Contractor is more particularly specified in the Tender for Construction of one 500 user capacity Yoga Center cum Meditation Hall, one 250 user capacity Cafeteria and one 2000 seater capacity Auditorium including all wired and piped services comprising of Internal Water Supply, Sanitary Installations, Roads, Pathways, Drainage, Internal Electrical Installations, Extra Low Voltage (ELV) Works, Fire Fighting, Fire Alarm system, Air Conditioning, External Electrical installations, etc. all complete on EPC basis for Nalanda University Main Campus at Rajgir, District Nalanda, Bihar (name and identification number of Contract) ("Works") and the Owner has accepted the Tender submitted by the Contractor for the execution and completion of the Works and the remedying of any defects therein, at a contract price of Rs..... ..... (Rupees_____(in words))

WHEREAS the Owner is now desirous of laying down the terms and conditions governing the execution of the Works and has therefore, requested the Contractor to execute the present Agreement.

NOW THIS AGREEMENT WITNESSETH as under:

1. In this Agreement, words and expressions shall carry the same meanings as are ascribed to them in the Conditions of Contract as more particularly mentioned in the Tender. The Parties agree that the Tender shall form an integral part of this Agreement and shall be read and construed accordingly.

2. In consideration of the payments to be made by the Owner to the Contractor as the consideration for execution of the Works ("Consideration"), the Contractor hereby covenants with the Owner to execute and complete the Works and remedy the defects therein in conformity in all aspects with the provisions of the Tender and this Agreement.

3. The Owner hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and in the remedying the defects wherein the Contract Price or such other sum as may become payable under the provisions of the Tender and this Agreement at the times and in the manner prescribed under the Tender.

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

i) Letter of Acceptance;
ii) Notice to proceed with the Works;
iii) Contractor's Tender;
iv) Contract Data;
v) Conditions of Contract as per CPWD GCC 2020 for EPC Works (including Special Conditions of Contract);
vi) Specifications;
vii) Drawings;
viii) Bill of Quantities; and
ix) Any other documents listed in the Contract Data as forming part of the Contract.

In witness whereof the Parties have caused this Agreement to be executed on the day and year first written above.

The Common Seal of _____
_____
_____
was hereunto affixed in the presence of:

Signed Sealed and Delivered by the said _____
_____
__
Binding Signature of Owner

_____
Binding Signature of Contractor

_____
in the presence of _____
_____
__

ANNEXURE-VII

AFFIDAVIT FOR SITE VISIT

GENERAL INSTRUCTIONS FOR THE AFFIDAVIT:

- The affidavit shall be executed on appropriate non-judicial stamp paper of minimum value as applicable in the State of Bihar and notarized by a Notary Public;
- Scanned copy of the affidavit shall be uploaded at the time of submission of the tender in soft copy.

AFFIDAVIT FOR SITE VISIT

I,_____, aged_____years, son/daughter of_____, presently residing at _____and authorized by_____ (name of bidder) ("Bidder") to solemn this affidavit on behalf of the Bidder, solemnly affirm on oath as hereunder:

The Bidder confirms that the Bidder has duly undertaken the visit of the proposed project site of Nalanda University, located at Rajgir, Bihar.

The Bidder has inspected and examined its surroundings and has satisfied itself about the site conditions and site logistics. The Bidder confirms that it is aware of the ground conditions and nature of the site, means of access to the site and the accommodation area required for establishing the labour camp. The Bidder agrees and confirms it shall be solely responsible for arranging and maintaining the afore-mentioned at its own cost including all materials, tools & plants, water, electricity, access, facilities for workers and all other services required for executing the Work unless otherwise specifically provided for in the contract documents.

The Bidder confirms and agrees that the submission of the tender implies that the requisite site visit has already been undertaken and that the Bidder has acquainted itself with the local conditions and other factors having a bearing on the execution of the Work.

DEPONENT

VERIFICATION

I,_____, aged_____years, son/daughter of_____, presently residing at _____and authorized by Bidder verify that the information mentioned above is true and correct to the best of my knowledge and belief.

DEPONENT

ANNEXURE-VIII

SOIL REPORT & INDICATIVE SITE PLAN

(As Enclosed Separately)