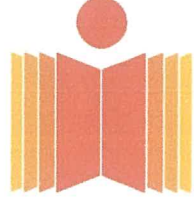


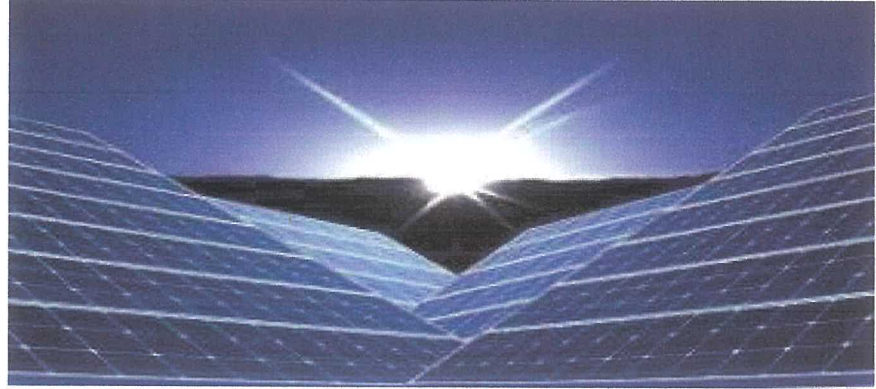
NIT No.: IITH/CMD/ELE/NIT/2024-25/07



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भारतीय प्रौद्योगिकी संस्थान हैदराबाद
Indian Institute of Technology Hyderabad

NOTICE INVITING TENDER (NIT)

Name of Project: Setting up of 3.5 MW (AC) In-house Captive Solar PV Plant at IIT Hyderabad campus which includes Planning, Design, Supply, Installation, Testing & Commissioning with 05 years Post commissioning Operation & Maintenance of Plant.




Executive Engineer - Electrical

సుశాంత్ వత్స్ / IIT Hyderabad

कार्यकारी अभियंता (विद्युत) / Executive Engineer (Electrical)

भारतीय प्रौद्योगिकी संस्थान हैदराबाद

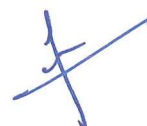
Indian Institute of Technology (IIT) Hyderabad

कंदी- ५०२२८४, सांगारेड्डी, तेलंगाना, भारत

Kandi- 502 284, Sangareddy, Telangana, India

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INDIAN INSTITUTE OF TECHNOLOGY HYDERABAD

NOTICE INVITING TENDER
NIT No. IITH/CMD/ELE/NIT/2024-25/07

Indian Institute of Technology (IIT) Hyderabad, an Autonomous Institute under Department of Higher Education, Government of India invites on behalf of President of India, an online bids on Engineering, Procurement and Construction (EPC) Mode I basis from the well-established, experienced and innovative companies for the Setting up of 3.5MW (AC) in-house Captive Solar PV Plant at IIT Hyderabad campus which includes Planning, Design, Supply, Installation, Testing & Commissioning with 05years Post commissioning Operation & Maintenance of Plant.

Copy of valid Registration of Firm (ROF) certificate, PAN card, GST Registration certificate & GSTIN should accompany the Bid and those certificates should be valid on the last date of submission of bid.

1.1	NIT No.:	IITH/CMD/ELE/NIT/2024-25/07	
1.2	Name of Work:	Setting up of 3.5MW (AC) in-house Captive Solar PV Plant at IIT Hyderabad campus which includes Planning, Design, Supply, Installation, Testing & Commissioning with 05years Post commissioning Operation & Maintenance of Plant	
1.3	Location of work:	Indian Institute of Technology (IIT) Hyderabad campus, Kandi-502284, Sangareddy, Telangana, India.	
1.4	Estimated Cost: (given merely as a rough guide)	Total : Rs. 16,00,00,000/- only ; [Part-A (Electrical and Mechanical works): Rs. 10,77,40,044/- only. Part-B (Civil Works): Rs. 3,79,96,000/-only. Part-C (Operation & Maintenance) : Rs. 1,42,63,956/-only.]	
1.5	Earnest Money Deposit (EMD)	Rs. 26,00,000/- only	
1.6	Period of Completion:	Original Works: 12 Months Post-Commissioning Operation & Maintenance: 05 years.	
1.7	Date of Online Publication/Download of Tender document.	17/09/2024 @ 15:00hrs	
1.8	Last Date & Time for receiving of Pre-Bid Queries and to email ID	Date & Time	26/09/2024 @ 15:00hrs
		email ID	ee.electrical@iith.ac.in
1.9	Date and Time of Pre-bid meeting at Conference Hall, CMD, IIT Hyderabad	27/09/2024 @ 11:00hrs	
1.10	Last Date for Submission of bids	14/10/2024 @ 15:00hrs	
1.11	Date and time for Opening of Technical bids	15/10/2024 @ 15:30hrs	
1.12	Date and Time for Technical Presentation	18/10/2024 @ 11:00hrs	
1.13	Date and Time for Opening of Financial bids (tentative and subject to change)	24/10/2024 @ 15:30hrs	
1.14	Website Link:	https://eprocure.gov.in/eprocure/app	

INSTRUCTIONS TO THE BIDDERS FOR ONLINE BID SUBMISSION

The bidders are required to submit soft copies of their bids electronically on the CPP Portal, using valid Digital Signature Certificates. The instructions given below are meant to assist the bidders in registering on the CPP Portal, preparing their bids in accordance with the requirements and submitting their bids online on the CPP Portal.

More information useful for submitting online bids on the CPP Portal may be obtained at: <https://eprocure.gov.in/eprocure/app>.

REGISTRATION

1. Bidders are required to enroll on the e-Procurement module of the Central Public Procurement Portal (URL: <https://eprocure.gov.in/eprocure/app>) by clicking on the link "Online bidder Enrollment" on the CPP Portal which is free of charge.
2. As part of the enrolment process, the bidders will be required to choose a unique username and assign a password for their accounts.
3. Bidders are advised to register their valid email addresses and mobile numbers as part of the registration process. These would be used for any communication from the CPP Portal.
4. Upon enrolment, the bidders will be required to register their valid Digital Signature Certificate (Class III Certificates with signing key usage) issued by any Certifying Authority recognized by CCA India (e.g. Sify / nCode / eMudhra etc.), with their profile.
5. Only one valid DSC should be registered by a bidder. Please note that the bidders are responsible to ensure that they do not lend their DSC's to others which may lead to misuse.
6. Bidder then logs in to the site through the secured log-in by entering their user ID/password and the password of the DSC / e-Token.

SEARCHING FOR TENDER DOCUMENTS

- 1) There are various search options built in the CPP Portal, to facilitate bidders to search active tenders by several parameters. These parameters could include Tender ID, Organization Name, Location, Date, Value, etc. There is also an option of advanced search for tenders, wherein the bidders may combine a number of search parameters such as Organization Name, Form of Contract, Location, Date, Other keywords etc. to search for a tender published on the CPP Portal.
- 2) Once the bidders have selected the tenders they are interested in, they may download the required documents / tender schedules. These tenders can be moved to the respective 'My Tenders' folder. This would enable the CPP Portal to intimate the bidders through SMS / e- mail in case there is any corrigendum issued to the tender document.
- 3) The bidder should make a note of the unique Tender ID assigned to each tender, in case they want to obtain any clarification / help from the Helpdesk.

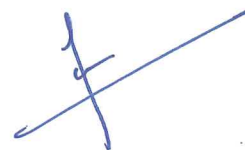
PREPARATION OF BIDS

- 1) Bidder should take into account any corrigendum published on the tender document before submitting their bids.
- 2) Please go through the tender advertisement and the tender document carefully to understand the documents required to be submitted as part of the bid. Please note the number of covers in which the bid documents have to be submitted, the number of documents including the names and content of each of the document that need to be submitted. Any deviations from these may lead to rejection of the bid.
- 3) Bidder, in advance, should get ready the bid documents to be submitted as indicated in the tender document/schedule and generally, they can be in PDF / XLS / RAR / DWF/JPG formats. Bid documents may be scanned with 100 dpi with black-and white option which helps in reducing the size of the scanned document.
- 4) To avoid the time and effort required in uploading the same set of standard documents which are required to be submitted as a part of every bid, a provision of uploading such standard documents (e.g. PAN card copy, annual reports, auditor certificates, etc.) has been provided to the bidders. Bidders can use the "My Space" or "Other Important Documents" are available to them to upload such documents. These documents may be directly submitted from the "My Space" area while submitting a bid, and need not be uploaded again and again. This will lead to a reduction in the time required for bid submission process.

Note: My Documents space is only a repository given to the Bidders to ease the uploading process. If Bidder has uploaded his Documents in My Documents space, this does not automatically ensure these Documents being part of Technical Bid.

SUBMISSION OF BIDS

- 5) Bidder should log into the site well in advance for bid submission.
- 6) Bidder should ensure that they can upload the bid in time i.e., on or before the bid submission time. Bidder will be responsible for any delay due to other issues.
- 7) The bidder has to digitally sign and upload the required bid documents one by one as indicated in the tender document.
- 8) The bidder has to select the payment option as "offline" to pay the tender fee/ EMD as applicable and enter details of the instrument.
- 9) The bidder should prepare the EMD (if any) as per the instructions specified in the tender document. The original should be posted/couriered/given in person to the concerned official, latest by the last date and time of bid submission or as specified in the tender documents. The details of the DD/any other accepted instrument, physically sent, should tally with the details available in the scanned copy and the data entered during bid submission time. Otherwise, the uploaded bid will be rejected.



- 10) Bidders are requested to note that they should necessarily submit their financial bids(if any) in the format provided and no other format is acceptable. If the price bid has been given as a standard BoQ format with the tender document, then the same is to be downloaded and to be filled by all the bidders. Bidders are required to download the BoQ file, open it and complete the white coloured (unprotected) cells with their respective financial quotes and other details (such as name of the bidder). No other cells should be changed. Once the details have been completed, the bidder should save it and submit it online, without changing the filename. If the BoQ file is found to be modified by the bidder, the bid will be rejected.
- 11) The server time (which is displayed on the bidders' dashboard) will be considered as the standard time for referencing the deadlines for submission of the bids by the bidders, opening of bids etc., The bidders should follow this time during bid submission.
- 12) All the documents being submitted by the bidders would be encrypted using PKI encryption techniques to ensure the secrecy of the data. The data entered cannot be viewed by unauthorized persons until the time of bid opening. The confidentiality of the bids is maintained using the secured Socket Layer 128-bit encryption technology. Data storage encryption of sensitive fields is done. Any bid document that is uploaded to the server is subjected to symmetric encryption using a system generated symmetric key. Further this key is subjected to asymmetric encryption using buyers/bid opener's public keys. Overall, the uploaded tender documents become readable only after the tender opening by the authorized bid openers.
- 13) The uploaded tender documents become readable only after the tender opening by the authorized bid openers.
- 14) Upon the successful and timely submission of bids (i.e., after Clicking "Freeze Bid Submission" in the portal), the portal will give a successful bid submission message & a bid summary will be displayed with the bid no. and the date & time of submission of the bid with all other relevant details.
- 15) The bid summary has to be printed and kept as an acknowledgment of the submission of the bid. This acknowledgment may be used as an entry pass for any bid opening meetings.

ASSISTANCE TO BIDDERS

- 16) Any queries relating to the tender document and the terms and conditions contained therein should be addressed to the Tender Inviting Authority for a tender or the relevant contact person indicated in the tender.
- 17) Any queries relating to the process of online bid submission or queries relating to CPP Portal in general may be directed to the 24x7 CPP Portal Helpdesk. The contact details of the helpdesk are 0120-4711508, 0120-6277787, 0120-4001002, 0120- 4001005 and support-eproc@nic.in.

SECTION-01

1. ELIGIBILITY CRITERIA

The interested firms should have the credentials to meet all of the following criteria to become eligible bidders for the selection process of contractor for the **Setting up of 3.5MW (AC) in-house Captive Solar PV Plant at IIT Hyderabad campus which includes Planning, Design, Supply, Installation, Testing & Commissioning with 05years Post commissioning Operation & Maintenance of Plant.**

A. BASIC ELIGIBILITY CRITERIA related to Technical and Financial Credentials

1. Bidders shall produce definite proof from the appropriate authority, in the form of a completion certificate which shall be to the satisfaction of the competent authority, of having satisfactorily completed similar works of magnitude specified below:

Experience of having successfully completed similar works during the last 07 years ending last day of the month previous to the one in which tenders are invited.

(i) **Three similar works completed each of rated capacity not less than 40% of the 3500kVA capacity Solar PV Plant**

OR

(ii) **Two similar works completed each of rated capacity not less than 60% of the 3500kVA capacity Solar PV Plant**

OR

(iii) **One similar work completed of rated capacity not less than 80% of 3500kVA capacity Solar PV Plant.**

“Similar Work” shall mean the work of Planning, Design, Supply, Installation, Testing, Commissioning, Operation & Maintenance (O&M) of Solar PV Plant of capacity not less than 1400kVA. However, the supply of Solar PV modules and O&M in the similar work is a desirable condition and not the essential one. The reference Solar PV Plant needs to be successfully commissioned and shall be fully functional for a minimum period of 01year (after commissioning), as on previous day of due date of submission of this bid.

Note: *The bidder shall submit on their letter head a statement of month-wise Solar Power generation of the eligible similar work/Plant (Post commissioning) duly signed & stamped by the bidders authorized signatory itself and / or countersigned by the IITH/Client Department of the Plant.*

2. Turnover: The Turnover Certificate shall be submitted by the Intending bidder for the same set of consecutive 03 financial years only as per below mentioned options:

a). The average annual financial turnover of the bidder should be at least Rs.4,80,00,000/- only during the immediate last three consecutive financial years ending 31st March 2024 (i.e., FY:2021-22, FY:2022-23, FY:2023-24).

OR

b) The average annual financial turnover of the bidder should be at least Rs.4,80,00,000/- only during the immediate last three consecutive financial years ending 31st March 2023 (i.e., FY:2020-21, FY:2021-22, FY:2022-23).

The value of annual turnover figures shall be brought to current value by enhancing the actual turnover figures at simple rate of 7% per annum. The certificate in this regard from the Chartered Accountant shall be enclosed with the bid.

3. Profit/loss : The bidder should not have incurred any loss (profit after tax should be positive) in more than two years during available last five consecutive balance sheets (balance sheet in case of private/public limited company means its standalone financial statement and consolidated financial statement both), duly audited and certified by the Chartered Accountant.

4. Banker's Certificate or Net worth Certificate (as per the prescribed format given in NIT): The bidder shall submit the Banker's certificate or Net-worth certificate as per the below:

Banker's Certificate of the amount equal to Rs. 6,40,00,000/-only issued by any scheduled bank,
or

Net worth certificate of minimum amount Rs.1,60,00,000/-only, issued by certified Chartered Accountant with UDIN .

NOTE: The Turnover Certificate and Networth certificate shall be submitted by the Intending bidder for the same set of consecutive 03 financial years only as per below mentioned options:

OPTION A: Turnover Certificate for the three consecutive financial years ending 31st March 2024 i.e., FY:2021-22, FY:2022-23, FY:2023-24 with Networth Certificate for the financial year, FY:2023-24 ending 31st March 2024

OR,

OPTION B: Turnover Certificate for the three consecutive financial years ending 31st March 2023 i.e., FY:2020-21, FY:2021-22, FY:2022-23 with Networth Certificate for the financial year, FY:2022-23 ending 31st March 2023.

5. Bidding Capacity : The bidder should have bidding capacity equal to or more than Rs.16,00,00,000/- only. The bidding capacity shall be worked out by the following formula:

$$\text{Bidding Capacity} = \{[AxNx1.5]-B\}$$

Where,

A = Maximum turnover in any one year during the last seven years taking into account the completed as well as works in progress. The value of completed works shall be brought to the current costing level by enhancing at a simple rate of 7% per annum.

N = Number of years prescribed for completion of work for which bids have been invited.

B = Value of existing commitments and ongoing works to be completed during the period of completion of work for which bids have been invited.

6. To become eligible, the tenderer shall have to furnish an affidavit as per Form 'J' of the NIT.

7. The bidder shall have Employees Provident Fund (EPF) enlistment and proof of the same shall be attached along with the Technical Bid clearly showing the Provident Fund Code number.

8. The bidder shall have the Employee State Insurance Corporation (ESIC) enlistment and proof of the same shall be attached with the Technical bid.
9. The bidder shall carry a mandatory site visit of IITH campus for the true assessment of this work before bidding and the same shall be acknowledged from the EE-Electrical, IITH as per the format given in Annex-IV
10. The bidder shall submit the Indemnity bond as per format provided in Annexure-II.

A. Basic Eligibility Criteria related to Incorporation of the Firm:

- a) The potential bidder must be having a support office in Telangana, before the execution of agreement after the finalization of successful bidder till the completion of contract agreement. Complete address, contacts and Documentary evidence for the same needs to be provided.
- b) The entity should have been operational in India at least for the last three financial years ending with 31.03.2024
- c) The potential bidder must not be a Joint Venture (JV) or consortium of firms.
- d) The potential bidder shall preferably be an ISO 9001-certified company.
- e) The potential bidder shall be preferably accredited by MNRE/ Govt. body / Local Authority.

Note: The bidder shall submit all the necessary documentation in support of the above eligibility criteria.

B. Basic Eligibility Criteria related to Project Technical details:

- a) Detailed Project Report including Technical feasibility of Solar Generation in the identified plazas, walkways, areas etc., indicating expected annual energy generation at target locations, annual degradation of PV modules, estimated annual savings to IIT Hyderabad, over existing tariff rate, Technical Presentation etc.
- b) Sources from where the hardware is manufactured along with the hardware specification and plant design, installation and commissioning time with projected cash flow based on current electricity tariff.
- c) The bidder shall submit the detailed technical specifications, including proposed makes of each and every component proposed to be installed in the Project along with their warranty terms.
- d) The bidder shall submit the detailed Electrical Plan i.e., Single Line Diagram etc. mentioning the technical details of each Electrical component proposed for the intended Project.
- e) Potential bidder must acquaint themselves fully about the assignment and the local conditions and usage before submitting the proposal. They may visit the campus with prior arrangement.
- f) Potential bidder may please note that this is a live site and the campus is fully operational. The selected agency shall ensure the safety of the existing structures, services, its occupants against disturbances and/or harm, without hampering operations of the organization while planning and execution of the Solar Power Plant.

Note: The bidder shall submit all the necessary documentation in support of the above eligibility criteria. Also, the Technical presentation may be given by the bidder (in Physical Mode) to the IITH explaining the above submitted details, on the specified date and time.

11 The description of the work is as follows:

Setting up of 3.5MW (AC) in-house Captive Solar PV Plant at IIT Hyderabad campus which includes Planning, Design, Supply, Installation, Testing & Commissioning with 05years Post commissioning Operation & Maintenance of Plant.

Tenderer are advised to inspect and examine the site and its surroundings and satisfy themselves before submitting their tenders 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 tender. A tenderer 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 tenderer 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 tender by a tenderer 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.

12. Tenders with any condition including that of conditional rebates shall be rejected forthwith.

13. Cost of EMD may also be remitted to Institute's account number as per bank particulars given below:

Name of the Account Holder	:	Indian Institute of Technology Hyderabad
Account Number	:	30412797764 (Current Account)
Name of the Bank	:	State Bank of India
Address of the Bank	:	IIT Kandi, IIT Hyderabad Campus, Kandi, Sangareddy, Telangana - 502284
Branch code	:	14182
IFSC code	:	SBIN0014182
MICR code	:	502002528
SHIFT code	:	SBININBB762

14. The competent authority on behalf of the President of India does not bind itself to accept the lowest or any other tender and reserves to itself the authority to reject any or all the tenders received without the assignment of any reason. All tenders in which any of the prescribed condition is not fulfilled or any condition including that of conditional rebate is put forth by the tenderer shall be summarily rejected.

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

16. The contractor shall not be permitted to tender for works if his near relative is posted a Divisional Accountant or as an officer in any capacity between the grades of Superintending Engineer and Junior Engineer (both inclusive). Any breach of this condition by the contractor would render him liable to be removed from the approved list of contractors of this Institute.
17. No Engineer of gazette rank or other Gazetted Officer employed in Engineering or Administrative duties in an Engineering Department of the Government of India is allowed to work as a contractor for a period of one year after his retirement from Government service, without the previous permission of the Government of India in writing. 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 had not obtained the permission of the Government of India as aforesaid before submission of the tender or engagement in the contractor's service.
18. The tender for the works shall remain open for acceptance for a period of Ninety (90) days from the date of opening of NIT bid. If any tenderer withdraws his tender before the said period, or makes any modifications in the terms and conditions of the tender which are not acceptable to the department, then the Government shall, without prejudice to any other right or remedy, be at liberty to forfeit 50% of the said earnest money as aforesaid. Further the tenderer shall not be allowed to participate in the re-tendering process of the work.
19. This Notice inviting Tender (NIT) shall form a part of the contract agreement. The successful tenderer/contractor, on acceptance of his tender by the Accepting Authority shall within 15 days from the stipulated date of start of the work, sign the contract consisting of :-
- a) The Notice Inviting Tender (NIT), all the documents including Terms and conditions, Special conditions of contract, additional conditions, Technical specifications and drawings, if any, forming the tender as issued at the time of invitation of tender and acceptance thereof together with any correspondence leading thereto.
 - b) Standard Contract form (General Conditions of Contract) as posted in the website of the Institute. The bidder is deemed to have gone through and understood the Standard Contract Form and the General Conditions of Contract.



**Executive Engineer - Electrical
IIT Hyderabad**

(Signature of bidder)

SECTION-02

PROJECT DETAILS

2.0 OBJECTIVE OF THIS NIT:

IIT Hyderabad is in the process of selecting well-established, experienced and innovative companies for **Setting up of 3.5MW (AC) in-house Captive Solar PV Plant at IIT Hyderabad campus which includes Planning, Design, Supply, Installation, Testing & Commissioning with 05 years Post commissioning Operation & Maintenance of Plant**, through a competitive bidding process to attain the highest feasible levels of Clean Energy with maximizing Energy savings for the Institute.

The objective of this document is to Invite tender from the interested parties, who satisfy the eligibility criteria set out in this document and who can offer, Plan, Design, Supply, Install, Commission, Operate and Maintain the Solar Plant for a period of 05 years.

Based on the evaluation of bids received, interested parties found acceptable by IIT Hyderabad as per the selection criteria set out, will be short-listed for further evaluation process to award the work to the eligible bidder.

It is expected that only the System Integrators /Original Equipment Manufacturers (OEMs)/ EPC contractors/Specialized agencies having proven experience in Planning, Design, build, operation and maintenance of Solar PV installation projects and must have executed Solar PV power Plant projects will respond to this Notice Inviting Tender.

2.1 PROJECT DETAILS:

The Project site is the IIT Hyderabad campus. The Indian Institute of Technology Hyderabad (IITH) is a premier institute of science and technology established in 2008. IITH has been consistently ranked in the top 10 institutes in India for Engineering according to NIRF making it one of the most coveted schools for science and technology in the country. The IIT Hyderabad campus is spread across 600 acres of campus in the Kandi Village of Sangareddy District, Telangana, India.

Currently, the IIT Hyderabad campus is being fed from the 33kV supply given by the Southern Power Distribution Company of Telangana Ltd. (TGSPDCL). This supply is received at the Main Receiving Station (MRS) located in IITH campus and further step down to 11kV through 33/11kV Step-Down Power Transformers. The 11kV supply is further distributed among 14 different substations located across the IITH campus for feeding different set of buildings. In each downstream 11kV substations, the voltage levels are further step-down to 11/0.433kV by Step Down Transformers and further LT supply is given to different buildings. The aforesaid MRS substation also consists of 03Nos. x 2MVA, 11KV DG sets which are used for Captive DG backup in case of Mains Power supply failure from the TSSPDCL.

The IIT Hyderabad campus is currently having a 0.95MW (AC) capacity Net Metering system Solar PV Plant inside it's campus in a fully functional state. In addition to this, the IIT Hyderabad intends to **Setting up of 3.5MW (AC) in-house Captive Solar PV Plant at IIT Hyderabad campus which includes Planning, Design, Supply, Installation, Testing & Commissioning with 05years Post commissioning Operation & Maintenance of Plant**, through this proposal to attain the highest feasible levels of Clean Energy with maximizing Energy savings for the Institute. With the commissioning of 3.5MW New Captive Solar Plant, the existing 0.95MW Net Metering grid-connected Plant will also be converted into Captive Generation.

Through the current NIT, IIT Hyderabad indents to:

- Install the PV modules to cover the existing parking plazas situated in different locations across campus as per the generation feasibility.
- Install the PV modules across the Walkways/ Pathways of IITH campus in an elevated mode as per the generation feasibility.
- Install the PV modules across any other Plazas on IITH campus as per the generation feasibility.
- To set up a ground-based and elevated solar power plant for the balance generation capacity to sum up the total approved capacity of 3.5 MW AC.

NOTE: The above requirements are tentatively listed in the Table no. 'B' in the NIT Document and separately shown in the Solar plan drawing attached as Annexure-VI.

The bidder has to do a basic feasibility study to fulfil the above-stated requirements of IITH and submit the detailed feasibility report along with the Tender bid to IITH for further evaluation as per the criteria set out in the tender document.

The Existing Parking Plaza Plans and Master Plan of the IIT Hyderabad campus is attached herewith for the reference of the intending bidders as Annexure-VI and Annexure-VII respectively.

The month-wise Annual Electricity consumption details of IITH campus is also attached herewith as Annexure-V for ready reference of the intending bidders.

Note:(i) In case of non-feasibility of Solar PV installations among above indicated Plaza or areas etc. or due to getting lesser Energy Efficiency in these areas, the bidder may propose the alternative locations to IITH as per the feasibility report, indicating the Energy generation details along with technical bid. However, the total proposed Captive generation capacity shall not be less than 3.5MW (AC).

(ii) The IIT Hyderabad reserves the right to reduce the proposed Captive Solar PV Plant capacity from 3.5 MW to 2.5 MW at its discretion based on the actual site conditions.

2.2 SCOPE OF THE REQUIREMENT:

The Scope of the work includes, but not limited to the following:

- a) Site survey, Technical feasibility, regulatory & policy assessment.
- b) Securing all necessary permits and approvals, from all local authorities (Central & State Govt.), DISCOM, and IITH authorities as applicable.
- c) The whole installation should be in conformity with Central Electrical Authority Regulations and those of State Government and the TGTRANSCO and TGDISCOMs as applicable.
- d) The Solar PV system shall be Designed, supplied, install and commission strictly as per applicable Govt. of India Guidelines.
- e) Providing all necessary labour, material, services, tools, plant and equipment for the works ;
- f) Offer a range of viable project delivery options and extensive proposals, including but not limited to:
 - i. Planning, design, construct, Operate and maintain the power plant to the best of its performance during the Liability Period.
 - ii. Any other value addition feature to the proposed Solar PV Plant.

PREFERRED PROPOSED LOCATIONS FOR SOLAR PV MODULES INSTALLATIONS (INDICATIVE ONLY)

TABLE NO. B

S.Nos.	Parking Plaza No.	APPROX. SOLAR Proposed Installed Capacity in kW (DC)	Clubbed Proposed Capacity in kW (DC)	Proposed Power Evacuation Voltage Level in kV	Nearest Substation	Remarks
1	P1 Parking	550	680	11	MRS 11 kV Panel	SOLAR PLAZA ZONE-01
2	Walkway-01 (Entry side)	65				
3	Walkway-02 (Exit side)	65				
4	P4 Parking	360	1315	11	ESS 6A	SOLAR PLAZA ZONE-02
5	P24 Parking	205				
6	Complete walkway Plaza from Admin block towards DoD and so on.	400				
7	Complete walkway Plaza from Admin block towards Chemistry Building till end of C-Block (Mechanical Eng.)	350				
8	P20 Parking	220	1206	11	SV-15 ESS-4A & 4B-1	SOLAR PLAZA ZONE-03
9	Complete road side walk way from Girls hostel circle to Existing solar Plant circle.	500				
10	P26 Parking	238				
11	P25 Parking	248				
12	Walkway-03 (from Ramanuja to TiHAN)	250				
13	Complete road side walkway from SnCC Complex to TiHAN Complex	500	750	11	SV-18	SOLAR PLAZA ZONE-04
Total Proposed Solar Installed capacity (in DC) for above locations		3951	3951			

Note: (i) The above table shall be read in conjunction with the Solar PV Panels indicative Master Plan enclosed as Annexure-VI.

(ii) The IITH desires to Power evacuation at 11kV Voltage level using Compact secondary substation with Dry Type transformer and HT switchgears as per the specifications defined in this NIT document.

2.3 PROJECT CRITICAL TIMELINES (DATES)

The indicative Project timelines cum critical dates are given as below:

S. No.	Stages	Critical Dates
1	Publishing of Notice inviting Tender (NIT)	17 th Sep 2024
2	Pre-bid Meeting	27 th Sep 2024
3	Uploading of Pre-bid query responses by IITH	30 th Sep 2024
4	Receipt of NIT bids (Technical and Financial bids)	14 th Oct 2024
5	Opening of Technical Bids	15 th Oct 2024
6	Technical Presentation	18 th Oct 2024
7	Evaluation of Technical bids i/c Clarifications	23 rd Oct 2024
8	Opening of Financial bids (Tentative date)	24 th Oct 2024
9	Evaluation of Financial bids and award of work to successful bidder (tentative date)	28 th Oct 2024
10	Project Completion & Commissioning Date	18 th Nov 2025
11	Post Commissioning O & M (05 years)	19 th Nov 2025 to 18 th Nov 2030
12	Defect Liability Period (DLP)	05 Years

Note: The above critical time-lines are for the reference purpose only to the intending bidders and are subject to any modifications at the discretion of IITH during the tendering process.

2.4 EVALUATION METHODOLOGY:

The Procurement Process:

The activities leading to the procurement of the services of the well-established, experienced and innovative companies/contractors for the **Setting up of 3.5 MW (AC) in-house Captive Solar PV Plant at IIT Hyderabad campus which includes Planning, Design, Supply, Installation, Testing & Commissioning with 05years Post commissioning Operation & Maintenance of Plant** will consist of the following key activities:

1. Invitation for Tender : The IIT Hyderabad invites intending bidders to submit the bids for consideration in the subsequent tendering process for selection of well-established, experienced and innovative company for the **Setting up of 3.5MW (AC) in-house Captive Solar PV Plant at IIT Hyderabad campus which includes Planning, Design, Supply, Installation, Testing & Commissioning with 05years Post commissioning Operation & Maintenance of Plant.** A Notice inviting Tender will be published in the Central Public Procurement Portal (CPP Portal) of Govt. of India (www.eprocure.gov.in) and also will be uploaded on the IIT Hyderabad website (www.iith.ac.in), as per the standard procedure of IITH. This document with key details of the project and response formats is available for all potential and interested bidders through aforesaid websites.

2. Receipt of bids: The bids from the potential bidders who are interested in participating in the selection process will be received in online mode, on a designated date and time as specified in this document.

3. Evaluation of bids: The information provided by the potential bidders in their bids, as part of the response to this tender will be evaluated against the eligibility criteria specified in the tender to qualify for the subsequent processes of selection. Based on this evaluation, the potential bidders who meet the qualifying (eligibility) criteria will be short-listed. The eligibility conditions have been formulated to assess the competence and capability of the potential bidding firms to meet the requirements of IIT Hyderabad for providing the required services. **For a bidder to be shortlisted for next stage of the evaluation, he must secure at least fifty percent (50%) marks in each attribute (given in the technical evaluation criteria) and sixty percent marks (60%) in aggregate.**

The financial bids of the above-shortlisted cum technically qualified bidders as per the above criteria will be opened at the designated date and time and accordingly evaluated further for award of work to the successful eligible bidder.

2.5 RIGHT TO TERMINATE THE PROCESS:

- IIT Hyderabad makes no commitments, explicit or implicit, that this process will result in a business transaction with anyone.
- This NIT does not constitute any offer by IIT Hyderabad. The bidder's participation in this process may result in IIT Hyderabad selecting the bidders to engage in further responses, discussions and negotiations towards execution of a final contract. The commencement of any subsequent procurement activity resulting out of this NIT does not signify a commitment by IIT Hyderabad either to continue the activities or to culminate such activities with a definitive contract.
- IIT Hyderabad reserves the right to withdraw this tender if it determines that such action is in the best interest of the organization without assigning any reason whatsoever.

2.6 Authenticity of the Information and Right for Verification:

- IITH reserves the right to verify all statements, information and documents submitted by the potential bidder in response to the NIT. Any such verification or lack of such verification by the IIT Hyderabad shall not relieve the bidder of its obligations or liabilities hereunder nor will it affect any rights of the IITH thereunder.
- In case it is found during the evaluation of the responses or at any time during the subsequent procurement process or before signing of the contract or after its execution and during the period of project execution resulting out of the contract thereof, that one or more of the pre-qualification conditions have not been met by the bidder, or the bidder has made material misrepresentation or has given any materially incorrect or false information, the bidder shall be disqualified forthwith if not yet awarded the contract either by issue of the letter of intent or entering into a contract.

2.7 Additional Conditions:

- Timing and sequence of events resulting from this tender shall be as determined by IITH.
- Responses are subject to rejection if they limit or modify any of the terms and conditions or specifications of this tender.
- Neither the bidder nor any of bidder's representatives shall have any claims whatsoever against IITH or any of its respective officials, agents, or employees arising out of or relating to this NIT or these procedures (other than those arising under a definitive service agreement with the bidder in accordance with the terms thereof).
- The Bidder shall not bid under any Consortium or Joint Ventures. Bids from a Consortium/Joint venture shall be summarily rejected.
- The bidder should not be under a declaration of ineligibility for corrupt and fraudulent practices issued by Government of India or any State Governments in the country of India. (To be furnished under Notarized Affidavit).
- The bidder must not have any history of defaulting in execution of work orders issued by Government of India or any State Government in the country of India. A self-declaration certificate to this effect should be enclosed. (To be furnished under Notarized Affidavit).
- The bidder hasn't been blacklisted by any Central/State Government institution and there has been no pending litigation with any government department on account of similar services. (To be furnished under Notarized Affidavit).
- No Criminal Proceedings in any Court of Law should pending against the bidding Firm Or its Promoters Or its Directors Or its Executives. (To be furnished under Notarized Affidavit).

SECTION-03

TECHNICAL SPECIFICATIONS

3.0 CHAPTER 1: INTRODUCTION

IITH desires to install 3.5 MW (AC) Captive use solar PV power plant on parking lots and pathways in addition to existing 0.95MW rated Net metering solar power plant.

3.1 PROJECT INFORMATION

The proposed Solar Photo Voltaic plant shall be located at IITH (Kandi). Some of the particulars of the site are:

TABLE 1: PROJECT INFORMATION

a.	Nearest Town	Hyderabad
b.	Nearest Railway station	Tellapur
c.	Nearest Port	Vishakapatanam
d.	Nearest airport	Hyderabad
e.	Nearest High way	Close to Hyderabad - Mumbai highway
f.	Height above MSL	+ 542 mtr
g.	Max. Temp / Min Temp	50°C / 9.4 ⁰ C
h.	Rain fall	Annual average 1035 mm Monsoon period July to Sept.
i.	Prevailing wind direction	Predominantly south-west (43.1 %)
j.	Longitude	78.12 ⁰ E
k.	Latitude	17.59 ⁰ N

3.1.1 LOCATION

The details of parking plazas and other locations available for installation of SPV power units are attached to this document.

3.1.2 SCOPE OF WORK

Setting up of 3.5MW (AC) In-house Captive Solar PV Plant at IIT Hyderabad campus which includes Planning, Design, Supply, Installation, Testing & Commissioning with 05 years Post commissioning Operation & Maintenance of Plant. The scope of work shall include the following but not limited to:

- (i) Design & Engineering
- (ii) Supply Items
- (iii) Site Activities
 - (a) Civil and mechanical
 - (b) Electrical & Instrumentation
 - (c) Integration, Testing & Commissioning
- (iv) Quality Assurance and testing
- (v) Training of IITH's personnel
- (vi) Assistance for Clearances from Statutory Authorities
- (vii) Comprehensive operation & maintenance for 5 years including existing 0.95 MW Solar power plant.

3.1.4 DESIGN & ENGINEERING

The Design and Engineering shall include, but not be limited, to the following:

Civil & Mechanical: Design & development of drawing of plant lay out, path ways, foundation of PV module and equipment, panel mounting structure, cable trenches lay out, fencing, water supply for cleaning & drainage system etc. as applicable.

Electrical & Instrumentation: Shadow analysis, design and development of drawing for plant array, single line diagram, earthing, string monitoring, battery system, power evacuation, protection, lightening arrestor, metering etc., sizing of the various equipment, cable scheduling, development of scheme for SCADA, etc as applicable

Quality Assurance: Detailed Quality Assurance Plan and Inspection & Testing Procedures for Bought Out Items, Site Works, and Performance Guarantee test run etc.

3.1.5 SUPPLY ITEMS

Supply of all the items within the Battery Limit of the Package is in the scope of this tender. The Supply Items shall include, but not be limited, to the following:

- i. Crystalline PV module panels & their mounting structure
- ii. PCUs (Power conditioning Unit) / Inverters
- iii. String monitoring system & string combiner boxes
- iv. Transformers
- v. Power evacuation system
- vi. Earthing & lightning system
- vii. HT & LT cable
- viii. Metering system
- ix. Environment monitoring system
- x. SCADA
- xi. Protective devices
- xii. Spares
- xiii. Packing, Forwarding, Transport, Safe Delivery at Site, Unloading at Site Stores.
- xiv. Safe storage of equipment at site
- xv. Construction material for civil jobs.
- xvi. Other misc. items to complete the project

3.1.6 SITE ACTIVITIES

A. CIVIL CONSTRUCTION:

The contractor has to develop and to do leveling of the land as required, construction of solar parking sheds, foundation of various equipment and PV module panel etc.

Civil jobs includes, but not limited, to the following:

- a. Required Material (Cement, Steel etc)
- b. Mounting structure job of module panels
- c. Floor Chipping & Flooring as required
- d. Support Foundations

B. ELECTRICAL & INSTRUMENTATION:

- a. Entire electrical works like mounting of panels, interconnection of PV panels, formation and combining of strings, laying of cables, installation of PCUs, inverters, transformers, switch boards, breakers, metering system, earthing, protection, etc as applicable.
- b. Installation of weather monitoring systems, SCADA, communication etc. as applicable.
- c. Supply of latest version of PVSyst software (premium) for two users.

3.1.7 INTEGRATION, TESTING & COMMISSIONING:

- a. Hook-up at the Battery Limit.
- b. Performance Guarantee Testing.
- c. Stabilized operation
- d. Trial run, Performance test run and long-term extended performance test run

3.1.8 QUALITY ASSURANCE & TESTING:

- a. Detailed Quality Assurance Plan for solar PV power plant inclusive Bought-Out Items, Spares, and Site Activities etc.
- b. Arrange Testing & Inspection as per approved Quality Assurance Plan and tender specification.
- c. Beside above, testing of one PV module at IEC / NABL accredited laboratory.

3.1.9 TRAINING OF IITH PERSONNEL

Training to at least six personnel of IITH for minimum period of 05 (five) days at his works or at site for erection, testing, commissioning & O&M. Expenses towards travel, stay, lodging, and boarding and other expenses for the IITH personnel shall be borne by IITH.

3.1.10 CLEARANCES FROM STATUTORY AUTHORITIES:

Documentation, Technical Support & Coordination for getting clearance from statutory authorities like TGERC, TGS LDC, TGTRANSCO, TG DISCOM, REC registry etc. as required from CEA, TGTRANSCO etc.

All statutory clearances for commissioning and operation of system are in the scope of Supplier. However formal application along with necessary statutory fees shall be done by IITH but subsequent follow up and coordination and getting clearances is responsibility of Supplier.

1.3.11 COMPREHENSIVE OPERATION & MAINTENANCE

- a. After final acceptance of the system comprehensive operation and maintenance of the plant for a period of five years excluding existing 0.95MW Solar Power plant.
- b. The Bidder shall be responsible for providing all materials, equipment and services, specified or otherwise (unless specifically excluded) which are required to fulfill the intent of ensuring quality, operability and reliability of the complete system covered under this specification.

The scope of the contractor shall be deemed to include all such items which although are not specifically mentioned in the bid documents and/or in contractor's proposal but are needed to make the system complete in all respects for its safe, reliable, efficient and trouble free operation and the same shall be furnished and erected unless otherwise specifically excluded as per Section Terminal Points & Exclusions.

4.0 DESIGN AND ENGINEERING

- a. The bidder should carry out Shadow Analysis at the site and accordingly design strings & arrays layout considering optimal usage of space, material and labour. The bidder should submit the array layout drawings along with Shadow Analysis Report to IITH for approval.
- b. The bidder has to plan and design the Array Yard in a proper manner. Bidder has to develop general layout drawing of Array Yard, drainage system (ensuring no water logging in the Array Yard area). All design & drawings have to be developed based on specification given in the tender, and relevant BIS unless otherwise specified.

5.0 INSPECTION OF WORK SITE:

The bidder or his representatives shall examine the site and surroundings before submission of the tender and they should attain the necessary knowledge regarding all the risk / problem associated with the work which may influence or affect his work and accordingly he should take this factors while quoting. Our site can be inspected with approval of competent authority between 0900 Hrs. to 1500Hrs.

6.0 ACCOMMODATION, TRANSPORT & MEDICAL FACILITIES:

The contractor shall make his own arrangement for providing all facilities like accommodation and transport for his employees / laborers at his own cost. No medical assistance / facilities will be given to the employees of the contractor in any form by the department. The contractor is not permitted to set up any labour camps within IITH Campus.

7.0 WORKING HOURS :

The General Shift working hours of the plant is from 0900 hours to 1730 hours. The contractor should follow this working hour. If a particular job could not be completed within the stipulated period, contractor can continue beyond the above mentioned hours with the permission of the concerned authority. No extra charges will be paid for such jobs. The estimated rate has to take care of such provisions.

8.0 TOOLS & TACKLES:

All the Tools & Tackles required for the above work are in contractor's scope.

9.0 WARRANTEE & GUARANTEE:

All the equipment and component parts including mechanical structures, electrical works (modules, PCU/ inverters, MPPT, transformers, switchgears, boards, meters, etc.) and over all workmanship of the SPV power plants / systems must be warranted against any manufacturing / design / installation for a minimum period of five years from date of commissioning/ trial run. Also 5 year comprehensive operation and maintenance is also responsibility of the bidder.

If any mal performance / deterioration or defect occurs during the above guarantee and warrantee period, contractor shall make all alternations, repairs and replacement free of cost within reasonable time, avoiding downtime.

CHAPTER 02

TECHNICAL SPECIFICATION- ELECTRICAL

2.1. SPV AND ITS ACCESSORIES

2.1.1. SPV Module

Only Crystalline SPV cells shall be used in the Solar Photovoltaic module. Peak power rating, as per IEC, of the module shall not be less than 500 W.

- a. The module efficiency shall be more than 20% at standard test condition and the cell should have minimum fill factor of 0.7. Bidder shall mention and maintain a guarantee **minimum AC energy in MWhr (annually) at 11kV feeders at substations**. Bidder shall also furnish the month wise generation in the datasheet corresponding to the radiation data provided by IITH.
- b. All materials used shall have a proven history of reliability and stable operation in external applications. It shall perform satisfactorily in relative humidity up to 100% with temperatures between -10° C and +50° C and shall withstand gust up to 200 km/h on the surface of the panel. **The panel installation shall be suitable for seismic zone III**. Each and every SPV module shall be checked for conformity with relevant standard and no negative tolerance shall be accepted.
- c. The PV modules used must qualify to the latest edition of IEC 61215 for PV module qualification test. In addition, PV modules must qualify to IEC 61730 for safety qualification testing. For the PV modules to be used in a highly corrosive atmosphere through out their lifetime, they must qualify to IEC 61701.
- d. The Bidder should provide the data sheet of technical specifications for modules/panels for approval.
- e. PV modules must qualify (enclose test reports / certificate from IEC / NABL accredited laboratory) as per relevant IEC standard. Additionally, the performance of PV module at STC conditions must be tested and approved by one of the IEC / NABL accredited laboratory.
- f. Surge protection device to be provided at junction box and module shall be provided.
- g. The bidder shall carefully design & accommodate requisite numbers of the modules in the available area to achieve the rated power in his bid.
- h. Each Solar PV modules used in solar power plants/ systems must be warranted for their output peak watt capacity, which should not be less than 90% at the end of 10 years and 80% at the end of 25 years from the completion of the trial run.
- i. The supplier should warrant the Solar Module(s) to be free from the defects and/or failures specified below for a period not less than five (05) years from the date of sale to the original customer ("Customer"). Defects and/or failures due to manufacturing. Defects and/or failures due to materials, non-conformity to specifications due to faulty manufacturing and/or inspection processes. If the solar Module(s) fails to conform to this warranty, the manufacturer will replace the solar module(s), at the IITH's sole option.
- j. The bidder shall provide the sample solar PV module electrical characteristics including current-voltage (I-V) performance curves and temperature coefficients of power, voltage and current.

- k. Modules shall be provided with a junction box with provision of external screw terminal connection and with arrangement for provision of external & adequate capacity by-pass diode. The box should have hinged, weatherproof lid with captive screws and cable gland entry points.

2.1.2. TESTING:

The bidder has to arrange following test on PV module: The offered PV module must qualify (submit test reports / certificate from IEC/NABL accredited laboratory) as per relevant IEC standard.

2.1.3. SUPPLY OF PV SYST SOFTWARE

The supply and installation of genuine PV system software (latest version) for minimum of two users shall be in the scope of the bidder.

2.2. POWER CONDITIONING

- a. Power Conditioning Unit (PCU) consist of an electronic Inverter along with associated control, protection, circuit breakers and data logging devices. The system shall incorporate a unit-directional inverter and should be designed to supply the AC power to the grid at load end. The power conditioning unit shall adjust the voltage & frequency levels to suit the Grid. The inverter rating (output) at ambient of 50⁰C should have 10 % design margin over peak rated value (at STC) of connected solar PV module. All three phases shall be supervised with respect to rise/fall in programmable threshold values of frequency. PCU shall confirm to IEC 60068-2 standards for Environmental Testing.
- b. The efficiency of the PCU shall be equal to or more than 97 % at 75% load as per IEC 61683. The bidder shall specify the conversion efficiency at different load say 25%, 50%, 75% and 100% in his offer.
- c. The PCU shall have internal protection arrangement against any sustained fault in the feeder line and against lightning in the feeder line
- d. The PCU shall have the required protection arrangements against earth leakage faults.
- e. Specifically, the PCU should be three phase power conditioning unit using static solid state components. DC lines shall have suitably rated isolators to allow safe start up and shut down of the system. DC lines side of PCU should have isolator of suitable rating.
- f. Each Sub-Array Junction Box (if any) will have Suitable Reverse Blocking Diodes or fuse with suitable rating.
- g. Internal surge protection shall be provided which consist of three Metal Oxide Varistor (MOV) type arrestors connected from positive and negative to earth. During earth fault condition surge protection device shall safely disconnect and interrupt during short circuit condition through integrated in-built bypass DC fuse during failure of MOV and against fire hazards.
- h. The PCU inverter shall have provision for galvanic isolation. Each solid state electronic device shall have to be protected to ensure long life of the inverter as well as smooth functioning of the inverter.
- i. The PCU should be suitably designed for parallel operation. Each solid state electronic device shall have to be protected to ensure long life of the inverter as well as smooth functioning of the inverter.
- j. The PCU shall have anti islanding protection.

- k. The PCU must have the feature to work in tandem with other similar PCU's and be able to be successively switched "ON" and "OFF" automatically based on solar radiation variations during the day.
- l. The PCU front panel shall be provided with a display (LCD or equivalent) of all important parameter such as DC input voltage, DC input current, AC input voltage, AC input current, AC output power, frequency.
- m. Nuts & bolts and the PCU enclosure shall have to be adequately protected taking into consideration the atmosphere and weather prevailing in the area.
- n. The PCU shall include appropriate self-protective and self-diagnostic feature to protect itself and the PV array from damage in the event of PCU component failure or from parameters beyond the PCU's safe operating range due to internal or external causes. The self-protective features shall not allow signals from the PCU front panel to cause the PCU to be operated in a manner which may be unsafe or damaging.
- o. The complete inverter panel should be of adequate size to accommodate the DC bus, DC breaker, Inverter module, O/G breaker/isolator, protections and any other required system.
- p. The inverter panel should be well ventilated and 2 x 100% panel cooling fan to be provided. While designing the system contactor must take care that in any case the temperature difference of inlet and outlet air should not go more than 10 deg C. Proper ducting arrangement to be made for discharging the outlet air to atmosphere.
- q. AC converted by the inverter through VCB (Output of the inverter) is to be transmitted through the appropriate cables to the transformer (secondary is 11KV) of suitable rating. AC panel should be equipped with an adequate Protection Relays, fuses, annunciations and remote operating and controlling facility from the Main Control Room.
- r. DC or AC bus system should be aluminum of current density 0.75 A / mm^2

2.2.1 Modes of PCU

a. STANDBY MODE:

The control system shall continuously monitor the output of the solar power plant until pre-set value is exceeded & that value to be indicated.

b. BASIC SYSTEM OPERATION (FULL AUTO MODE):

The system shall automatically 'wake up' in the morning and begin to export power provided there is sufficient solar energy and the grid voltage and frequency is in range.

c. MAXIMUM POWER POINT TRACKER (MPPT):

MPPT control algorithm shall adjust the voltage of the SPV array to optimise solar energy fed into the grid.

d. SLEEP MODE

Automatic 'sleep' mode shall be provided so that unnecessary losses are minimized at night. The power conditioner must also automatically re-enter standby mode when threshold of standby mode reached.

2.2.2 Maximum Power Tracking

Maximum power point tracker shall be integrated in the power conditioner unit to maximize energy drawn from the Solar PV array. The MPPT should be microprocessor-based to minimize power losses. The details of working mechanism of MPPT shall be mentioned by the bidder in his offer. The MPPT must have provision for constant voltage operation. The MPPT unit shall confirm to IEC 62093 for design qualification.

2.2.3 INVERTER

The inverter output shall always follow the grid in terms of voltage and frequency. This shall be achieved by sensing the grid voltage and phase and feeding this information to the feedback loop of the inverter. Thus control variable then controls the output voltage and frequency of the inverter, so that inverter is always synchronized with the grid. The inverter shall be self-commutated with Pulse width modulation technology.

Minimum Efficiency at 75% load is	96%
Inverter to follow grid voltage, frequency up to +/-5% of the nominal output frequency during normal operation	
Maximum Input	1000 V DC voltage
THD	Less than 3 %
Ambient temperature	0 to 50 deg C (Inverter should be suitably derated for ambient panel temp. of 50 deg C)
Humidity	95 % non-condensing
Enclosure	IP 42 (Indoor type)

The Inverter shall have following features:

- a. No load loss < 1% of rated power and maximum loss in sleep modes shall be less than 0.05%
- b. Sinusoidal current modulation with excellent dynamic response.
- c. Optional VAR control
- d. Unit wise & integrated Data logging.
- e. Dedicated Prefabs / Ethernet for networking
- f. Protection against
 - Over current
 - Sync loss
 - Over temp.
 - DC bus over voltage
 - Cooling Fan failure (If provided) should have 100% standby with auto start logic
- g. Power regulation in the event of thermal overloading
- h. Set point pre-selection for VAR control
- i. Bus communication via -interface for integration
- j. Remote monitoring via telephone modem or mini web server
- k. Integrated protection in the DC and three phase system
- l. Insulation monitoring of the PV array with sequential fault location
- m. Ground fault detector - which is essential for large PV generators in view of appreciable discharge current with respect to ground.
- n. Over voltage protection against atmospheric lightning discharge to the PV array is required. The power conditioner must be entirely self-managing and stable in operation. A self-diagnostic system check should occur on start up. Functions should include a test of key parameters on start up.

2.3. PROTECTIVE RELAYS

The Solar PV system and the associated power evacuation system shall be protected as per Indian Standards. Over current relays, reverse power relays, differential protection relays and earth fault relays, as applicable, have to be provided. All relay should be numeric type of approved make and model only.

Detailed design calculations shall be provided on fault power computations and the philosophy of protective relaying with respect to short circuit kVA calculations. Design & Drawing of protection relay, relay coordination etc. should be approved by IITH.

2.4. STRING MONITORING SYSTEM:

Monitoring of various parameters at string level should be made possible in the Main Control Room at site by installing the suitable string monitoring system any fault at string level could be recognizable by that system. To optimize the system the bidder can install the string monitoring system on the group of multiple strings. However string monitoring unit for whole system should not be less than 180 nos.

2.5. ENERGY METER

- a. Required nos of Digital Energy Meters shall be provided for the each 11 kV outgoing feeder as per approved system of TGERC/ TGSLDC / CERC.
- b. Shall carry out measurement of active energy (both import and export) and reactive energy (both import and export) by 3-phase, 4wire principle suitable for balanced/ unbalanced 3 phase load as applicable.
- c. The active and reactive energy shall be directly computed in CT & VT primary ratings.
- d. Shall compute the net MWh and MVARh during each successive 15 -minute block metering interval along with a plus/minus sign, instantaneous net MWh, instantaneous net MVARh, average frequency of each 15 minutes, net active energy midnight, net reactive energy for voltage low and high conditions at each midnight.
- e. Each energy meter shall have a display unit with a seven digit display unit. It shall display the net MWh and MVARh with a plus/minus sign and average frequency during the previous metering interval.
- f. Shall have a built in clock and calendar with an accuracy of less than 15seconds per month drift without assistance of external time synchronizing pulse.

2.6. CABLES AND ACCESSORIES

- a. **LT cable:** All LT power and control cables shall be flame retardant low smoke type. Power cables shall be with multi stranded aluminum conductor for above 6 sq. mm, XLPE insulated, (ST-2) PVC inner sheathed, armoured & FRLS (C2 category type FRLS) (ST-2) PVC outer sheathed. Copper conductor (multi strand) shall be used for sizes up to and including 6 sq. mm. All control cable shall be with the same specification with copper conductor and size of the control cable should not be less than 1.5 sq mm. All LT power and control cable should be suitable for voltage level 1.1 KV.
- b. **HT cable :** All HT power cable shall be flame retardant low smoke type. XLPE insulated, HRPVC inner sheathed, armoured & outer sheath HRPVC with FRLS (C2 FRLS) properties as per relevant Indian Standard. The HT cable should be suitable for 11 KV rating.

- c. While sizing of HT cables derating of 0.65 should be considered. Other cables also to be de-rated in view of 50 deg ambient, grouping, underground, harmonics etc. The voltage drop should not be more than specified limit as per standards.
- d. All wires (panel and building wiring) should have FRLS properties.
- e. The cables shall be suitably colour coded for the required services.
- f. The cables shall be tested in presence of representative of IITH for routine & acceptance test as per relevant standards.
- g. Only terminal cable joints shall be accepted. No cable joint to join two cable ends shall be accepted.
- h. The suitable size of Hume pipe to be used for cable laying where ever road crossing is required.
- i. The outdoor cable should be UV resistant.
- j. Solar cables as applicable as per relevant international standards shall be used for solar PV system.
- k. The minimum depth from finished earth to be 900 mm (HT cable) and 750mm (LT power and control cable) for underground cabling in the out door area. . Proper brick boxing and sand cushioning to be done. The cable route marker also to be provided at proper interval (every 25 M and all turnings).

2.6. TRANSFORMER:

The AC output of the inverter to be connected to the step up transformer of suitable rating to raise the voltage level to 11 KV. The transformer may be either dry type transformer (with class H insulation but temperature rise to class F) or oil filled but should be suitable for inverter operation (with suitable K factor). The transformer may be a dual primary (ddY11 or ddY1) type to connect the AC O/P of both the inverter of a zone. Proper grounding to be done either solid or resistive, the SLD of east S/S is also enclosed.

The transformers shall be preferably natural air-cooled(ONAN in case of Oil filled transformer). HV off-circuit tap changing links shall be provided and shall have a range +/- 5 % in five equal steps. Under conditions of external short circuit, the tap changing device shall be capable of carrying the same current as the windings. However at discretion of Engineer in charge the contractor has to supply either Dry Type Transformer in a compact secondary substation (CSS) or Oil type transformer with suitable switchgears and protection.

2.6.1 Accessories

The Dry type transformers must be provided with at least the following:

- Rating and terminal marking plate
- Marshaling box
- Lifting hooks and jacking pads, towing holes
- Earthing terminals
- Neutral CT
- Off-circuit tap changer
- Temperature monitoring system /temperature scanner
- Winding temperature indication (WTI) relay

Temperature monitoring system shall be supplied with temperature sensors fitted in each limb. Temperature monitoring system shall initiate alarm and trip for winding over temperature. Alarm and trip temperatures shall be site settable. The monitoring system shall also have an indicating device.

The Dry type transformer shall be provided suitable mechanical ventilation aswell as per the site condition if required.

2.7 EARTHING

2.7.1 Earthing System

The LT & HT equipment and parts shall be earthed as required as per provisions of IS.

2.7.2 Earthing System for Array Yard

- a. The earthing for array and LT power system shall be made with GI pipe including accessories, and providing masonry enclosure with cast iron cover plate having locking arrangement, watering pipe using charcoal or coke and salt as required as per provisions of IS: 3043. Necessary provision shall be made for bolted isolating joints of each earthing pit for periodic checking of earth resistance.
- b. Each Array structure of the Solar PV Yard shall be grounded properly. The array structures are to be connected to earth pits as per IS standards.
- c. The earthing for the power plant equipment shall be made as per provisions of IS. Necessary provision shall be made for bolted isolating joints of each earthing pit for periodic checking of earth resistance.
- d. The complete earthing system shall be mechanically & electrically connected to provide independent return to earth. All equipments shall have two distinct earth connections.

2.8 PROTECTION CLASS OF CABINET / PANELS, ENCLOSURES etc.

The degree of protection for following equipment shall be,

TABLE 2 CLASS OF INGRESS PROTECTION

	Indoor Inverter panel	IP 42
	LT switch board	IP 52
	HT switch gear	IP 4X
	All outdoor Junction Box	IP 65
	String combiner	IP 65
	Dry type main transformer(if applicable)	IP 34

The Switchboard shall be designed and manufactured in accordance with the relevant International and Indian standards suitable for the site conditions, and the specific code number and validity should be mentioned. Separate control and power panels shall be provided with separate power circuit for isolated operation of control circuit. The design of panels, cabinet enclosures and packaging density of components mounted therein shall be such that the temperature rises does not exceed 10 deg C above the ambient under the worst conditions.

2.9 LIGHTNING PROTECTION

- a. The Solar PV Power plant should be provided with Lightning and over voltage protection. The “Lightning Protection System” must be completed prior to start-up of commissioning activities of the project. The main aim of overvoltage

protection is to reduce the over voltage to a tolerable level before it reaches the PV or other sub-system components. The source of over voltage can be lightning or other atmospheric disturbance.

- b. The Lightning Conductors shall be made as per Indian Standards in order to protect the entire Array Yard from Lightning stroke. BS – 4752 – Circuit breakers of rated voltage upto and including 1000 volts and 1200 volts dc.

2.10 TECHNICAL SPECIFICATIONS FOR COMPACT SECONDARY SUBSTATION (CSS):

2.10.1 CODE & STANDARDS:

All equipment and material shall be designed manufactured and tested in accordance with the latest applicable IEC standards. The 11KV Package Substation design must be as per IEC 61330/62271-202.

The Package Sub-station offered shall in general comply with the latest issues including amendments of the following standards.

Title	Standards
High Voltage Low Voltage Pre-Fabricated Substation	IEC:61330/ 62271-202
High Voltage Switches	IEC 60265
Metal Enclosed High Voltage Switchgear	IEC 60298/IEC62271-200
High Voltage Switchgear	IEC 60694
Low Voltage Switchgear and Control gear	IEC 60439
Power Transformers	IEC 60076

2.10.2 Service Conditions:

The Package substation shall be suitable for continuous operation under the basic service conditions indicated below:

Ambient Temperature: 50 Deg C
 Relative Humidity upto 95%
 Altitude of Installation upto 1000m

The Enclosure of High Voltage switchgear-control gear, Low Voltage switchgear-control gear and transformer of the package substation shall be designed to be used under **normal outdoor service conditions** as mentioned. The enclosure should take minimum space for the installation including the space required for approaching various doors & equipment inside.

2.10.3 SPECIFIC REQUIREMENT

The main components of a prefabricated- package substation are Transformer, High-voltage switchgear-control gear, Low-voltage switchgear-control gear and corresponding interconnections (cable, flexible, bus bars) & auxiliary equipment. The components shall be enclosed, by either common enclosure or by an assembly of enclosure. All the components shall comply with their relevant IEC standards.

2.10.4 OUTDOOR ENCLOSURE

a. Outdoor enclosure:

The outdoor enclosure shall be made up of Galvanized Iron sheet instead of CRCA tropicalized to local weather conditions. Painting with Powder coating 7 tank process.

The enclosure shall be of partially modular design of GI sheets fastened by riveting. Enclosure construction is with Steel Rivets instead of Nut-Bolt/welding.

The thickness of enclosure shall be 1.5 mm for non-load bearing members & 2mm for load bearing members. The enclosure shall be painted with Powder Coating/polyurethane paint.

The metal base shall ensure rigidity for easy transport & installation. Baseframe made up of 4mm HRCA Material with HOT DIP GALVANIZATION Process to enhance the life of the product and avoid rusting.

Substation will be used in outdoor application hence to prevent enclosure from rusting/corrosion, welding should be avoided.

The protection degree of the Enclosure shall be **IP54 for LT & HT switchgear compartment & IP23 for Transformer compartment**. Proper / adequate ventilation aperture shall be provided for natural ventilation by way of Louvers etc.

Considering the outdoor application of the substation the doors shall be provided with proper interlocking arrangement for safety of operator and to avoid corrosion door should have stainless steel hinges. Door should be provided with stoppers.

Interconnection between HT switchgear and transformer shall be using 1Cx3x95 sq.mm al. unarmored XLPE cable and between transformer and LT switchgear shall be using busbar.

b. Internal Fault : Failure within the package substation due either to a defect, an exceptional service condition or mal-operation may initiate an internal arc. Such an event may lead to the risk of injury, if persons are present. It is desirable that the highest practicable degree of protection to persons shall be provided. The Design shall be tested as per IEC61330/62271-202. **Type test report of arcing due to internal fault should submitted with offer. The Compact substation shall be tested for internal arc test –AB for 21KA for 1 sec (A-operator ,B-pedestrian) (Test done with RMU inside CSS Enclosure)**

c. Covers & Doors : Covers & doors are part of the enclosure. When they are closed, they shall provide the degree of protection specified for the enclosure. Ventilation openings shall be so arranged or shielded that same degree of protection as specified for enclosure is obtained. Additional wire mesh may be used with proper Danger board for safety of the operator. All covers, doors or roof shall be provided with locking facility or it shall not be possible to open or remove them before doors used for normal operation have been opened. The doors shall open outward at an angle of at least 90⁰ & be equipped with a device able to maintain them in an open position. **The doors shall be lockable type with cylindrical shooting bolt and the locking arrangement shall be covered by magnetic flap pad Lock arrangement instead of Al-Drop(Normal Kundi tala). Roof is 6 Degree Inclined to avoid Water coggng during rainy season. The roof of the transformer compartment shall be detachable type to access the transformer for maintenance purpose.**

d. Earthing : All metallic components shall be earthed to a common earthing point. It shall be terminated by an adequate terminal intended for connection to the earth system of the installation, by way of flexible jumpers/strips & Lug arrangement. The continuity of the earth system shall be ensured taking into account the thermal & mechanical stresses caused by the current it may have to carry. The components to be connected to the earth system shall include :

- a) The enclosure of Package substation,
- b) The enclosure of High voltage switchgear & control gear from the terminal provided for the purpose,
- c) The metal screen & the high voltage cable earth conductor,
- d) The transformer tank or metal frame of transformer,
- e) The frame &/or enclosure of low voltage switchgear,

There shall be an arrangement for internal lighting activated by associated switch for HV , Transformer & LV compartments separately.

e. **Labels:** Labels for warning, manufacturer's operating instructions etc. shall be durable & clearly legible.

f. **Cleaning & Painting :**

The paints shall be carefully selected to withstand tropical heat and rain. The paint shall not scale off or crinkle or be removed by abrasion due to normal handling. **The enclosure shall be painted with Powder Coating.**

g. **Current Transformers**

All current transformers should be complying with IEC 60185.

Current transformers should be of dry type, with ratings and ratios as required.

Cable current transformers used in circuit breaker modules should be maximum 100mm wide. Current transformers used in metering cubicles should be having dimensions according to DIN 42600, Narrow type. Current transformer shall be placed in the cable covers so that it can be easily replaced at site without removing the bushings.

h. **Auxiliaries.**

The switchgear should be prepared for options like motor operation, auxiliary contacts and short-circuit indicators. Necessary terminal blocks and wiring etc. should be placed behind the front cover of each module.

i. **Fault Passage Indicators.**

These shall facilitate quick detection of faulty section of line. The fault indication may be on the basis of monitoring fault current flow through the device. The unit should be self-contained requiring no auxiliary power supply. The FPI shall be integral part of RMU to avoid thefts. The FPI shall have clear display, automatic reset facility and shall be SCADA compatible.

2.10.5 TESTING AND CERTIFICATION.

A) TYPE TESTS.

Units should be type tested in accordance with IEC standards 60056, 60129, 60265, 60298,60420,60529 and 60694. The following type tests should perform on the HT Switchgear and report should submit with offer.

- Short time and peak withstand current test
- Temperature rise tests
- Dielectric tests
- Test of apparatus i.e. circuit breaker and earthing switch
- Arc fault test

- Measurement of resistance of main circuit.
 - Mechanical endurance test.
 - Duty cycle test.
 - Internal arc test for HT chamber.
- Type test reports for above type shall be submitted with the offer.

B) ROUTINE TESTS.

Routine tests should be carried out in accordance with IEC 60298 standards. These tests should be ensure the reliability of the unit.

Below listed test should be performed as routine tests before the delivery of units;

- Withstand voltage at power frequency
- Measurement of the resistance of the main circuit
- Withstand voltage on the auxiliary circuits
- Operation of functional locks, interlocks, signaling devices and auxiliary devices
- Suitability and correct operation of protections, control instruments and electrical connections of the circuit breaker operating mechanism
- Verification of wiring
- Visual inspection
- Time travel characteristics measurement facility for Breaker should be available with the manufacturer to asses the quality of RMU.

C) DISTRIBUTION TRANSFORMER:

i) Cast Resin Dry Type Transformer

This specification covers the requirements of design, manufacture, testing and supply of cast resin dry type transformers complete with all the accessories and fittings for efficient and trouble-free operation.

ii) CODES & STANDARDS

The equipment covered by this specification shall, unless Other wise stated to be designed, constructed and tested in accordance with latest revisions of relevant Indian standards / IEC publications.

IS 1271	-	Classification of Insulating Materials.
IS 2026	-	Power transformers (part I - V)
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.

D) GENERAL DESIGN FEATURES:

1. All transformers shall be of the latest design, dry type Cast Resin only.
2. 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.
3. Each transformer shall be suitable for operation at full rated power on all tapings without exceeding the applicable temperature rise.
4. 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.
5. 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.
6. 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.
7. All electrical connections and contacts shall be of ample cross sections for carrying the rated current without excessive heating.

The transformer shall be capable of continuous operation at full load rating under the following conditions.

- a) Voltage variation = $\pm 10\%$
- b) Frequency variation = $\pm 5\%$
- c) Combined voltage and frequency variation (Absolute sum) = 10%

E) CONSTRUCTION

The transformer shall be dry type, AN cooled suitable for Compact substation application.

The core-clamping frame shall be provided with lifting eyes having ample strength to lift the complete core and winding assembly.

- i. Off circuit tapings shall be provided on the HV windings. Tap changing is done by means of off-circuit links accessible through openings provided.
- ii. The lifting lugs and rollers shall be provided. A winding temp. Scanner shall be provided and is actuated by means of resistance temperature detectors embedded in LV windings of all three phases. It should have alarm and trip contacts at a specified temperature.
- iii. The transformer shall be of IP00 protection class and will be installed in the transformer compartment of compact substation having IP23 protection class.

F) WINDINGS

- I. The winding insulation shall be of Class "F/H" and temperature rise limit i.e. 90 deg. C/ 115 Deg C over ambient of 50 Deg C. Windings shall be of electrolytic copper conductors (circular in shape) of high conductivity and 99.9% purity.

- II. Windings shall be designed to withstand the specified thermal and dynamic short circuit stresses.
 - a. The windings shall be duly sectionalized. Accessible joints brazed or welded and finished smooth shall connect similar sections. No corona discharge shall result on the winding upon testing the transformer for induced voltage test as specified in IS.
 - b. The end turns of the high voltage windings shall have reinforced insulation to take care of the voltage surges likely to occur during switching or any other abnormal condition.

The high voltage and low voltage winding are shall be made of copper Conductors. HV winding will be always be resin casted under vacuum while LV winding can either be casted or pre-impregnated with resin.

G) CORE

The double wound Core shall be constructed from non-ageing cold rolled Grain oriented steel sheets. The built core shall be painted with high temperature resistant paint to prevent corrosion at the edges of core plates and to withstand high temperatures. By using different core material optimization of core losses shall be achieved. The yokes shall be firmly clamped between yoke channels or plates. The top & bottom yoke frames shall be secured to each other by means of tie-rods, which help in securing the winding in place.

The design of the magnetic circuit shall be such as to avoid static discharges, development of short circuit paths within itself or to the earthed clamping structure and the production of flux component at right angles to the planes of laminations which may cause local heating.

H) 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.

Terminal Arrangement

HV side and LV side of transformer will have the top busbar arrangement for connection of HT side by means of cable and LT side by means of busbar.

I) 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 coat of high quality red oxide or yellow quoted primer, followed by filler coats.

J) ROUTINE TEST

All Routine Tests in accordance with IEC 60076 / IS 2026 shall be carried out on each transformer.

K) CSS EARTHING:

Earthing arrangement shall be provided for earthing each cable, PVC cable gland, neutral busbar, chassis and frame work of the cubicle with separate earthing terminals at two ends. The main earthing terminals shall be suitably marked. The earthing terminals shall be of adequate size, protected against corrosion, and readily accessible. These shall be identified by means of sign marked in a legible manner on or adjacent to terminals.

Neutral bus bar strip shall be connected to Earthing terminal with help of GI strip of suitable capacity & nut-bolt arrangement.

L) TYPE TESTS FOR THE PACKAGE SUBSTATION:

The Package Substations offered must be type-tested as per IEC 61330/62271-202. The copy of type test summary should be submitted along with the tender. CSS manufactured at in JV consortium/ System Houses/ System Integrator shall not be accepted. Only Original Equipment Manufacturers are accepted.

Routine Tests: The routine tests shall be made on each complete prefabricated substation.

- a) Voltage tests on auxiliary circuit.
- b) Functional test.
- c) Verification of complete wiring.

Test Witness: Routine test shall be performed in presence of Owner's representative if so desired by the Owner. The Contractor shall give at least fifteen (15) days advance notice of the date when the tests are to be carried out.

M) TEST CERTIFICATES:

Certified reports of all the tests carried out at the works shall be furnished in three (3) copies for approval of the Owner.

N) PACKAGED SUBSTATION ENCLOSURE:

- Tests to verify the degree of protection.
- Arcing due to internal fault
- Test to prove enclosure class - Temperature rise of the transformer inside the enclosure.
- Short circuit test to prove the capability of the earthing circuits to be subjected to the rated peak and the rated short-time withstand currents.
- Tests to verify the withstand of the enclosure of the prefabricated substation against mechanical stress.

CHAPTER 03

TECHNICAL SPECIFICATION – CIVIL

3. PLANNING, SURVEYING AND DESIGNING:

3.1 TOPOGRAPHICAL SURVEY AND SETTING OUT THE WORK:

Following will be the scope of the contractor:

- Carrying out topographical survey and preparation of plans (maps) and report of the entire area/areas indicated for locating the power plant and its other systems using survey instruments by clearance of shrubs, bushes etc by Competent Engineers
- Positions in plan all natural and artificial features of the area like water ways, trees, structure, fences, pucca and kutcha roads including culverts and crossings, foot tracks, other permanent objects like telephone posts and transmission towers etc., are to be established and subsequently be shown on survey maps by means of conventional symbols (preferably symbols of Survey of India maps). All earth deposits, depressions, hills and valleys within the area/areas are to be surveyed and plotted on maps by contours. Necessary levelling work of the entire area/ areas are to be surveyed and plotted on maps by establishing horizontal location so that location and sketching of contours for the area/ areas can be done at specified intervals and in specified scales on maps.
- Carrying out bench mark (GTS / any other reference bench mark approved by the EIC) to site/sites under survey by parallel levelling, establishing and constructing bench mark, grid and reference pillars in the field
- Carrying out Spot level survey of the entire area/areas at 3m intervals and development of contours. Levels shall also be taken on all traverse stations and on salient points located at random over the area (ground points). Contours are to be interpolated at suitable intervals after the above points are plotted. The contours shall not be just interpolated but properly surveyed on the ground so that features falling between the two successive levels are also picked up. At places of sharp curvature or abrupt change in direction and elevation, points selected shall be close to each other.
- Soft copy of drawings should be prepared in standard computer software like AutoCAD (*.dwg) format, on standard A0 size. Complete set of all drawings in Soft form should be submitted in soft copy.
- The contractor shall submit three copies of survey maps and Contour Map of the site for review and approval of the EIC. After approval, 6(six) prints of all the final maps along with a set of the originals on polyester base film shall be submitted. Copies of the drawings shall be submitted in proper flappers and original polyester base drawings should be handed over in proper card board covers indicating index of drawings.
- The field work shall be done with total station equipment in the following steps.
- Establishing horizontal and vertical controls and locating reference grids and bench mark in the area
- Surveying for establishing spot levels and plotting contours
- Surveying for locating natural and man-made details.

3.2 PLANNING:

- The Contractor should carry out Shadow Analysis considering height of all the building/ structures at the site and accordingly design strings & arrays layout considering optimal usage of space, material and labour. The Contractor should submit the array layout drawings along with Shadow Analysis Report to IITH for approval.
- Based on the above work, topography of the area a general layout drawing with clear demarcation showing boundary pillars, location of Array Yard, Inverter room, Main Control Room, sewage & drainage system and approach roads and general drainage etc. has to be prepared. Drawings and design reports along with all relevant documents to be submitted to IITH for approval.
- The formation level of the proposed power plant has to be fixed with reference to High Flood Level of the proposed site, the ground level shall be fixed taking into consideration the highest flood level and EIC to vet the same.

3.3 DESIGNING:

3.3.1 FOUNDATION WORKS FOR SOLAR MODULE STRUCTURE:

- Foundations shall be designed considering Dead and live loads as per IS: 875(Part 1& 2 respectively), wind load as per IS: 875 (Part 3) and Seismic forces for the site as per IS: 1893. The design of foundation of array structure shall be based on soil test report of the site and shall be approved by IITH. However, Design of RCC foundation shall be as per the requirements of IS: 1080.
- Foundation drawings & designs shall be submitted to IITH after vetting by any of the IITs (other than IIT Hyderabad)/NITs/ Government institutes approved by Engineer in charge (Minor Component). The works shall commence after approval of Engineer in charge (Minor Component).
- Foundations and Pedestals for Module Structure shall be of Reinforced cement concrete (RCC) and the dimensions of the same shall be as per the vetted and approved structural drawings. General requirements for design and construction shall be as per the requirements of IS:1904.
- All RCC works shall comply with IS: 456:2000 with minimum grade of Concrete M30 or as per the vetted and approved design whichever is more.
- The minimum thickness of 25mm grout shall be provided with high strength grout having a minimum characteristic compressive strength of 60 N/mm² at 28 days (Preferably Conbextra GP2) at the base plate level. The grout shall be chloride - free, cement based, free flowing, non-metallic grout. The mixing of the Grout shall conform to the recommendations of the manufacturer of the Grout. After the base has been prepared, its alignment and level has been checked and approved and before actually placing the grout, a low dam shall be set around the base at a distance that will permit pouring and manipulation of the grout. The height of such dam shall be at least 25mm above the bottom of the base.

3.3.2 MODULES MOUNTING STRUCTURES:

- The structure design shall be as per the requirement of IS: 800 (2007). Structure shall be designed considering Dead and live loads as per IS: 875(Part 1& 2 respectively), wind load as per IS: 875 (Part 3) and Seismic forces for the site as per IS: 1893. The design calculations, Design drawings with material specifications shall be submitted to IITH after vetting by any of the IITs (other than IIT Hyderabad)/NITs/Government institutes approved by Engineer in charge (Minor Component)for review & the approval.

- The base columns shall be made with reinforced cement concrete as per IS: 456:2000. The structure shall be designed for simple mechanical and electrical installation. It shall support Solar PV modules at a given orientation, absorb and transfer the mechanical loads to the ground properly. There shall be no requirement of welding or complex machinery at site. The contractor/manufacturer shall specify installation details of the Solar PV modules and the support structures with appropriate diagrams and drawings. The fabrication drawings along with detailed design shall be submitted in six sets to IITH for approval before starting the erection work. The work will be carried out as per designs approved by IITH.
- The frames and leg assemblies of the array structures shall be made of hot dip Galvanized steel per IS:4759. Minimum thickness of galvanization should be at least 120 microns.
- All fasteners shall be of Stainless steel - SS 304. Nut & bolts, supporting structures including module Mounting Structures shall have to be adequately protected against all climatic condition.
- The Sizes of the Galvanized Steel Sections shall be as per the Vetted and Approved Structural Drawings
- The fasteners shall be galvanized as per IS:5358 which shall in turn grouted in the RCC foundation.
- Modules shall be mounted on a non-corrosive support structures.

3.3.3 FOUNDATIONS FOR TRANSFORMERS AND OTHER VARIOUS STRUCTURES:

- Foundation for the Transformer shall be of Reinforced Cement Concrete with minimum grade of concrete of M30 or as per approved Structural Design which ever is more conforming to IS: 456 or as per the Structural Design whichever is more, and the layout and arrangement shall be as per IS:10028 or as per Manufacturers instruction. Transformer foundation shall be designed for the loads as per IS: 875 and IS: 1893 and approval of IITH should be obtained for the design and drawings before starting of the construction.

3.3.4 DESIGNING OF WATER CLEANING SYSTEM FOR SOLAR PANELS:

- The water cleaning system proposed by the contractor shall be a proven methodology adopted by Major Solar Projects in India and the system shall be showcased before approval of the design and implementation.
- The water cleaning system shall be designed by the Contractor by taking tap offs from the nearby locations shown by IITH. The system shall be so designed that the Pressure at the delivery location shall be sufficient to create a water jet for thoroughly cleaning of the Solar Panels. For Pumping water to the OH Tanks as well as to the proposed pipe network as desired and to supply to the Sprinkler system, required number of pumps with required capacity shall be designed and provided. The efficient design and implementation of the water cleaning system is the responsibility of the contractor for sufficing the cleaning of solar panels.

1. SITE CLEARANCE:

- Before the earth work is started, the area coming under cutting and filling shall be cleared of shrubs, rank vegetation, grass, brushwood, trees and saplings of girth up to 30cm measured at a height of one metre above ground level and rubbish removed up to a distance of 50 metres outside the periphery of the area under clearance. The roots of trees and saplings shall be removed to a depth of 60cm below ground level or 30 cm below formation level or 15 cm below sub grade level, whichever is lower, and the holes or hollows filled up with the earth, rammed and levelled.

- The Existing trees hindering the alignment of the solar panel network shall be carefully removed and transplanted at the locations shown by IIT Hyderabad.
- Existing structures and services such as old buildings, culverts, fencing, water supply pipe lines, sewers, power cables, communication cables, drainage pipes etc. within or adjacent to the area if required to be diverted/removed, shall be diverted/dismantled as per directions of the Engineer in charge (Minor Component)
- Disposal of Earth shall be disposed off at the specified location or as decided by the Engineer in-Charge. The contractor has to take written permission about place of disposal of earth before the earth is disposed off, from Engineer in charge (Minor Component).

2. Removal of Existing Paver Blocks and Grass Pavers

- The existing paver blocks and the Grass Pavers shall be carefully removed at the locations for the purpose of excavation for casting of Foundations. The removed paver blocks and Grass Pavers shall be properly stacked at the site location for relaying/refixing after completion of Foundation Works.

3. EARTH WORK: -

- The work shall be done in accordance with CPWD Specifications - 2019 - Vol.I & Vol. II and National Building Code 2016 with upto date correction slips.
- Wherever the Black-cotton soil encountered in foundation of proposed structures shall be removed the soil in total for the designated designed depths and excavate further more depth of minimum 800mm and said block cotton soil shall be removed and refilled bottom layer of 500mm depth with good moorum soil and then further 300mm depth layer with crushed stone dust (CSS) and as per the directions of Engineer in charge (Minor Component).
- The contractor shall make at his own cost all necessary arrangements for maintaining water level, in the area where works are under execution low enough so as not to cause any harm to the works or problems in carrying out with the execution. The water coming from any source, such as rains, accumulated rain water, floods, leakages from sewer and water mains, subsoil water table being high or due to any other cause whatsoever. The contractor shall make necessary provision of pumping, dredging, and bailing out water coming from all above sources and excavation and other works shall be kept free of water by providing suitable system approved by the Engineer in charge (Minor Component).
- Excavations in Hard rock shall be carried out with suitable methods except blasting and as per the directions of Engineer in charge (Minor Component).

4. FORMWORK:

- The formwork shall be strong and great care shall be exercised in its assembly. It shall be designed to take up increased pressure of concrete and pressure variations caused in the neighborhood of vibrating head, which may result in excessive local stress on the formwork. The joints of the formwork shall be made and maintained tight and close enough to prevent the squeezing out slurry or sucking in of air during vibration. The formwork to receive concrete shall be cleaned and made free from standing water, dust, etc.

5. STEEL REINFORCEMENT:

- The Steel Reinforcement work shall be carried out as per CPWD Specifications - 2019 - Vol.I & Vol. II

with upto date correction slips. And as per the directions of the Engineer in charge (Minor Component).

- The minimum grade of Reinforcement Steel shall be FE 500D.
- The reinforcement steel shall be tested as per the relevant IS Codes The sampling, transporting the samples to the Lab, arrangement for witnessing of lab tests by the representatives of Engineer in charge (Minor Component), testing charges shall be borne by the contractor and nothing extra shall be paid in this regard.

6. CONCRETE WORK: -

The work shall be done in accordance with CPWD Specifications - 2019 - Vol.I & Vol. II with upto date correction slips.

1.0 R.C.C./P.C.C WORK (DESIGN MIX CONCRETE):-

The work shall be done in accordance with CPWD Specifications - 2019 - Vol. I & Vol. II with upto date correction slips.

The minimum grade of PCC shall be M 15 or as per the directions of Engineer in charge (Minor Component).

2.0 R.C.C. (DESIGN MIX CONCRETE):-

The RCC work shall be done with Design Mix Concrete. Wherever letter M has been indicated, the same shall imply for the Design Mix Concrete. The Design Mix Concrete will be designated based on the principles given in IS: 456, 10262 & SP 23. The condition and specifications stated herein shall have precedence overall conditions and specifications stated in relevant IS codes/CPWD specifications. The concrete mix shall be designed for specified target mean compressive strength in order to ensure that the work test results do not fall below the acceptance criteria specified for the concrete mix. The Contractor shall design mixes for each class of concrete indicating that the concrete ingredients and proportions will result in concrete mix meeting requirements specified. The mix shall be designed with quantities of admixture / plasticizer proposed to achieve required workability & strength. The specifications mentioned here in below shall be followed for Design Mix Concrete.

- 2.1 The sources of coarse aggregate, fine aggregate & water to be used in concrete work shall be identified by the contractor & he will satisfy himself regarding their conforming to the relevant specification & their availability before getting the same approved by the Engineer in charge (Minor Component).
- 2.2 **Coarse Aggregate:** - As per CPWD Specifications - 2019 - Vol.I & Vol. II with upto date correction slips.
- 2.3 **Fine Aggregate:** -As per CPWD Specifications - 2019 - Vol.I & Vol. II with upto date correction slips.
- 2.4 **Water:** - It shall conform to requirements laid down in IS:456-2000 / CPWD Specifications -2019 - Vol.I & Vol. II with upto date correction slips.
- 2.5 **Cement:** - **OPC 53** shall be used for design mix concrete and shall conform to IS-12269
- 2.6 **Admixtures / Plasticizers:** - The admixture shall conform to IS: 9103, wherein required, the admixture of approved quality and approved make only shall be used to attain the required workability.
- 2.7 **Grade of Concrete:** - The various grades of concrete shall be as given below: -
For PCC: Minimum grade of concrete shall be M15.
For RCC Works: Minimum Grade Shall be M30 or as per the approved Structural designs whichever is more and as per the directions of Engineer in charge (Minor Component).

NOTE:-

- i) . In the designation of a Concrete mix letter M refers to the mix and the number of the specified characteristic compressive strength of 15 cm - Cube at 28 days expressed in N/mm²
- 2.8 The contractor shall engage one of the following approved laboratories/ test house at their own expenses for designing the concrete mix in accordance with relevant IS Codes and to conduct laboratory test to ensure the target strength and workability criteria for a given grade of concrete.
- 2.8.1 IITs (other than IIT Hyderabad)/NITs
- 2.8.2 Any other Institute NABL Accredited Laboratory as approved by EIC (Minor Component).
- 2.9 The various ingredients for mix design / laboratory tests shall be sent to the lab / test houses through the Engineer in charge (Minor Component) and the samples of such aggregates sent shall be preserved at site.
- 2.10 The contractor shall submit the report on design mix from any of above approved laboratories for approval of Engineer in charge (Minor Component) within 30 days from the date of issue of letter of acceptance of the tender. No concreting shall be done until the design mix is approved. In case of change of source or characteristic properties of the ingredients used in the concrete mix during the work, a revised laboratory mix design report conducted at laboratory established at site shall be submitted by the contractor as per the direction of the Engineer in charge (Minor Component).
- 2.11 All cost of mix designing and testing connected therewith including charges payable to the laboratory shall be borne by the Contractor including redesigning of the concrete mix wherever required and directed by Engineer in charge (Minor Component).
- 2.12 **Frequency of Sampling:** As per IS 456:200
- 2.13 **STANDARD OF ACCEPTANCE: -**
- The acceptance criteria of Concrete shall be as per IS 456.2000
- 2.14 **Production of Concrete**
- However, if due to any reason, contractor wishes to supplement the concrete from Ready Mix Concrete (RMC) supplier, Contractor is permitted to procure from the Ready Mix Concrete(RMC) supplier approved by the Engineer in charge (Minor Component).All technical requirements such as cement type and minimum cement quantity, w/c ratio, slump, admixture etc. shall be conveyed to RMC supplier by the contractor and contractor shall be wholly responsible for ensuring the quality of concrete as required at site, nothing extra shall be paid to the contractor.
- 2.15 **Testing of Concrete:** The Sampling and testing of concrete cubes shall be carried out as per IS 456:2000. The tests shall be carried out at the approved NABL Accredited Laboratory by Engineer in charge (Minor Component). The sampling, transporting the samples to the Lab, arrangement for witnessing of lab tests by the representatives of Engineer in charge (Minor Component), testing charges shall be borne by the contractor and nothing extra shall be paid in this regard.
- 2.16 **Transportation, Placing and Compaction of Concrete**
- a. Mixed concrete from the RMC / Batching plant shall be transported to the point of placement by transit mixers
- b. Except where otherwise agreed to by the Engineer in charge (Minor Component), concrete shall be deposited in horizontal layers to a compacted depth of not more than 450 mm. Unless agreed to by the Engineer- in-Charge, concrete shall not be dropped into place from a height exceeding 1.5m. In order to avoid such situations chutes, tremie pipe or closed bottom buckets shall be used. These shall be kept clean and used in such a way as to avoid segregation. Slope of the chute shall be so adjusted that concrete flows without the use of excessive quantity of

water. The delivery end of chute shall be as close as possible to the point of deposit. The chute shall be thoroughly flushed with water before and after each working period and the water used for this purpose shall be discharged outside the formwork. The concrete shall be compacted by using immersion type vibrators. When the concrete is being continuously deposited to a uniform depth along a member, vibrator shall not be operated within one meter of free end of the advancing concrete. Every effort shall be made to keep the surface of the previously placed layer of concrete alive so that the succeeding layer can be amalgamated with it by the vibration process. The vibrator head shall not be brought more than 200 mm near to the formwork as this may cause formation of water stagnations.

- c. No concrete shall be placed in any part of the structure until the approval of Engineer in charge (Minor Component) has been obtained. If concreting is not started within 24 hours of the approval being given, it shall have to be obtained again from the Engineer- in-Charge (Minor Component). Concreting shall be done continuously over the area between construction joints. Fresh concrete shall not be placed against concrete which has been in position for more than 30 minutes.

2.17 In case of rejection of concrete on account of unacceptable compressive strength, governed by para “Standard of Acceptance” as above, the work for which samples have failed shall be redone at the cost of contractor. However, the Engineer in charge (Minor Component) may order for additional tests (like cutting cores, ultrasonic pulse velocity test, load test on structure on part of structure, etc) to be carried out at the cost of contractor to ascertain if the portion of structure wherein concrete represented by the sample has been used, can be retained on the basis of results of individual or combination of these tests.

3. Structural Steel Work:

- The Structural drawings vetted by the IITs/NITs/other Government Institutions shall be submitted to IITH for review and approval
- The shop drawings shall be prepared in line with the approved structural drawings
- The Galvanised structural Steel material shall be tested at the NABL certified third party lab approved by Engineer in charge (Minor Component) as per the relevant IS Codes. The sampling, transporting the samples to the Lab, arrangement for witnessing of lab tests by the representatives of Engineer in charge (Minor Component), testing charges shall be borne by the contractor and nothing extra shall be paid in this regard.
- The frames and leg assemblies of the array structures shall be made of hot dip Galvanized steel as per IS:4759.
- The Galvanised Steel material shall be procured from Approved Makes Only.
- Minimum thickness of galvanization should be of 120 microns.
- The Galvanised steel with minimum thickness of galvanization of 120 microns shall be directly procured from the Approved manufacturers only.
- The Grade of Steel shall be as per the vetted and approved structural Drawings
- The sizes of the Galvanized steel sections shall be as per the vetted and approved structural drawings
- Sampling and testing plan shall be followed for ascertaining the conformity of galvanized coating on structural steel and other allied products inline with IS 4759.

- All fasteners shall be of Stainless steel - SS 304. Nut & bolts, supporting structures including module Mounting Structures shall have to be adequately protected against all climatic condition.
- The sizes of the Galvanized steel MS hot dip galvanized anchored in Anchoring bolts and fasteners shall be galvanized as per IS:5358 which are in turn grouted in the RCC foundation.
- Before casting of pedestals the base plates and the bolts shall be checked for the alignment using total station before casting of concrete.
- The alignment of the base plate and bolts is the responsibility of the contractor and in case of misalignment, the pedestals shall be recasted by the contractor.

4. Welding (where ever required) : Welding shall generally be done by electric arc process as per IS 816 and IS 823. The electric arc method is usually adopted and is economical. Where electricity for public is not available generators shall be arranged by the contractor at his own cost unless otherwise specified. Gas welding shall only be resorted to using oxyacetylene flame with specific approval of the Engineer in charge (Minor Component). Gas welding shall not be permitted for structural steel work Gas welding required heating of the members to be welded along with the welding rod and is likely to create temperature stresses in the welded members. Precautions shall therefore be taken to avoid distortion of the members due to these temperature stresses.

The work shall be done as shown in the shop drawings which should clearly indicate various details of the joint to be welded, type of welds, shop and site welds as well as the types of electrodes to be used. Symbol for welding on plans and shops drawings shall be according to IS 813.

As far as possible every efforts shall be made to limit the welding that must be done after the structure is erected so as to avoid the improper welding that is likely to be done due to heights and difficult positions on scaffolding etc. apart from the aspect of economy. The maximum dia of electrodes for welding work shall be as per IS 814. Joint surfaces which are to be welded together shall be free from loose mill scale, rust, paint, grease or other foreign matter, which adversely affect the quality of weld and workmanship.

5. PRECAUTIONS : All operation connected with welding and cutting equipment shall conform to the safety requirements given in IS 818 for safety requirements and Health provision in Electric and gas welding and cutting operations.

- (a) The work shall be positioned for downward welding wherever possible.
- (b) Arc length voltage and amperage shall be suited to the thickness of material, type of groove and other circumstances of the work. The welding current and electrode sizes for different types of joints shall be as per IS 9595.
- (c) The sequence of welding shall be such as will avoid undue distortion and minimize residual shrinkage stresses. Recommendation of IS 9595 shall be followed.

6. PROCESS OF WELDING

The electrode manipulation during welding shall be such as to ensure that:

- (1) The parent metal is in a fused stage when the filler metal makes contact with it.
- (2) The weld metal does not overflow upon any unfused parent metal forming overlapping.
- (3) The parent metal is not under-cut along the weld toes.

- (4) The flowing metal floats, the slag, the oxides, and the gas bubbles to the surface behind the advancing pool. In case any of these requirements is unattainable by manipulation, the current shall be adjusted or the electrode size changed.

Each time the arc is started the electrode shall be moved in such a way that the fusion of base metal at the starting point is assured. At the completion of a run the movement of electrode shall be slowed down to fill the arc crater.

After every interruption of the arc except at completion of a run, the arc shall be restarted ahead of the previous deposit and then move back to fill the crater or such alternative technique shall be used as will ensure complete filling of the crater, or complete fusion between the new and old deposit and the base metal at the point of junction, and result in continuity of weld. Before welding operation is completed, all traces of slag shall be removed from the deposit, by chipping if necessary, and the deposit and the adjoining base metal shall be wire brushed and cleaned at all points. The requirements shall apply not only to successive layers, but also to successive beads, and to the overlapping area wherever a junction is made on starting a new electrode.

- (5) The welds shall be free from cracks, discontinuity in welding and other defects such as (i) under-size (ii) over-size, (iii) under-cutting and (iv) over-cutting in the case of fillet welds and defects (ii), (iii) & (iv) in the case of butt welds. All defective welds which shall be considered harmful to the structural strength shall be cut out and rewelded.

In case of welded butt joints in steel of thickness upto 50mm the weld joint shall be subjected to radiographic examination as described in IS 1182.

All welds shall be cleaned of slag and other deposits after completion. Till the work is inspected and approved painting shall not be done. The surface to be painted shall be cleaned of spatter, rust, loose scale, oil and dirt.,

- (6) Inspection and testing of welds shall be as per IS 822.

Assembly : Before welding is commenced, the members to be welded shall first be brought together and firmly clamped or tack welded to be held in position. This temporary connection has to be strong enough to hold the parts accurately in place without any disturbance. Tack welds located in places where final welds will be made later shall conform to the final weld in quality and shall be cleaned off slag before final weld is made.

Erection : The specification shall be as described in 10.3.3 of CPWD Specifications except that while erecting a welded structure adequate means shall be employed for temporary fastening the members together and bracing the frame work until the joints are welded. Such means shall consist of applying erection bolts, tack welding or other positive devices imparting sufficient strength and stiffness to resist all temporary loads and lateral forces including wind. Owing to the small number of bolts ordinarily employed for joints which are to be welded, the temporary support of heavy girders carrying columns shall be specially attended. Different members which shall be fillet welded, shall be brought into as close contact as possible. The gap due to faulty workmanship or incorrect fit if any shall not exceed 1.5 mm if gap exceeds 1.5 mm or more occurs locally the size of fillet weld shall be increased at such position by an amount equal to the width of the gap.

7. Epoxy Paint on Galvanized Structural Steel Members:

The Galvanized Structural Steel members shall be spray coated with Epoxy Primer and two coats of Epoxy Paint of approved shade.

8. Structural Stability Certificate:

The structural Stability certificate shall be provided after completion of the work by the Structural Designer from IITs (other than IIT Hyderabad)/NITs/Government Institutes approved by the Engineer in charge (Minor Component)

9. Waterline Network for cleaning of Solar Panels:

- The water cleaning system shall be designed by the Contractor by taking tap offs from the near by locations shown by IITH. The system shall be so designed that the Pressure at the delivery location shall be sufficient to create a water

jet for thoroughly cleaning of the Solar Panels. If the sufficient pressure is not achieved, booster pumps & tanks shall be provided for sufficing the cleaning of solar panels.

- The existing road crossings shall be used for crossing the waterlines across the roads. In case of unavoidable circumstances, with the approval of Engineer in charge (Minor Component), the road may be cut and new road crossings shall be laid with NP3 Hume Pipes only. The road which was cut shall be relayed with Bituminous Concrete/ Cement Concrete with proper level upto the satisfaction of Engineer in charge (Minor Component) . No extra cost shall be paid to the contractor in this regard.
- Trenches shall be made by the contractor for taking the waterline from the tap off location shown by IITH and the pipes shall be joined
- HDPE (PE 100, PN 10) pipe lines as per IS 4984 of suitable diameter shall be provided along with the control valves complete as per directions of Engineer in charge (Minor Component). Jointing of HDPE Line shall be carried out and pressure testing shall be done for leakages in the Joints. After satisfactory pressure testing, the excavated trenches shall be backfilled, compacted and levelled.
- **Sprinkler:** - CPVC/PVC/HDPE pipe lines of suitable diameter with control valves, sprinkler system complete for cleaning of solar panels as per the approved design.
- The water cleaning system shall be implemented by the Contractor inline with the approved design. The Pressure at the delivery location shall be sufficient to create a water jet for thoroughly cleaning of the Solar Panels. For Pumping water to the OH Tanks as well as to the proposed pipe network as desired and to supply to the Sprinkler system, required number of pumps with required capacity shall be provided as per the approved design. The efficient design and implementation of the water cleaning system is the responsibility of the contractor for sufficing the cleaning of solar panels. The efficiency of the water cleaning system implemented by the Contractor shall be demonstrated on site for through cleaning of solar panels.

10. Concealing of Water Lines at the Structural Steel Columns:

- Gutter shall be fabricated from plain G.S. Sheets of 0.5 mm thick. and shall be of the shape and section as required to conceal the exposed waterlines. The longitudinal edges shall be turned back to the extent of 12 mm and beaten to form a rounded edge. Gutter shall be supported on and fixed Galvanised Structural Steel members. The colour shade shall be as per the approval of the Engineer in charge (Minor Component)

11. Relaying of Removed Paver Blocks and Grass Paver Blocks:

After Completion of RCC Foundation and Structural Steel Works following procedure shall be followed for relaying of Paver Blocks and Grass paver Blocks including grass.

- **SUB GRADE**
 - a. Construction of subgrade using approved available soil within the IITH Compound, spread the earth layer by layer, mix with water to achieve MDD at Optimum Moisture Content and compacting with plate Compactor to required percentage of MDD (IS:2720-Part 8) as per MORTH Clause 305 including all leads and lifts complete.
- **SUB-BASE CONSTRUCTION**
 - a. Providing and construction of granular sub base (GSB) of Grading -II of Table 400-1 including mixing in a

mechanical mixing plant at OMC, carriage of mixed Material to work site, spreading in uniform layers as per drawing with motor grader on prepared cum subgrade and compacting with vibratory roller to achieve required percentage of MDD (as per IS:2720:Part 8), complete as per Clause 401 of MORTH Specifications and as per approved drawing and as per direction of Engineer in charge (Minor Component)

- **Relaying of Removed CC Pavers**

- a. The paver blocks removed earlier shall be relayed over the 50mm thick compacted bed of coarse sand, filling the joints with fine sand etc. all complete as per the direction of Engineer in charge (Minor Component) in case of grass pavers the same has to be laid on sweet soil with proper compaction and grass to be relayed.
- b. In case of misplacement of removed paver blocks by the contractor, then new paver blocks shall be procured matching the Grade, colour, thickness and pattern of the existing paver blocks and shall be laid in required colour and pattern over and including 50mm thick compacted bed of coarse sand, filling the joints with line sand etc. all complete as per the direction of Engineer in charge (Minor Component).
- c. Note: The Contractor shall ensure the levels while relaying of removed paver blocks and the slope shall be properly matched to avoid any stagnation of water. The surface after relaying shall match with the surrounding paver blocks with neat finish upto the satisfaction of Engineer in charge (Minor Component)

12. Submission of MTCs:

- The manufacturer's Test Certificates of all the Materials like Cement, Fly Ash, Admixture, Reinforcement steel, Galvanized Structural Steel, Grout Material, HDPE, CPVC, PVC Pipes, paints etc shall be submitted to the Engineer in charge (Minor Component) at the time of receipt of the material.
- Concrete Batch Sheets for the Ready Mix Concrete shall be submitted to the Engineer in charge (Minor Component)

13. Testing Charges:

- The sampling, transporting the samples to the Lab, arrangement for witnessing of lab tests by the representatives of Engineer in charge (Minor Component), testing charges shall be borne by the contractor and nothing extra shall be paid in this regard.

CHAPTER 04

TECHNICAL SPECIFICATION – INSTRUMENTATION

4.1. SPECIFICATION FOR CONTROL INSTRUMENTS

4.1.1. Scope

This specification covers the design requirements necessary to design, engineer, select hardware, and configure software for Control systems.

4.1.2. Standards and Specifications

a. Codes and Standards

TABLE 3 CODE & STANDARD FOR INSTRUMENTATION SYSTEM

IEC 60079	Installation and Maintenance of Electrical Apparatus for Use in Potentially Explosive Atmospheres.
IEC60529	Degrees of Protection of Enclosures.
IEC 617	Graphic Symbols for Electronic Diagrams.
ISA S5.1	Instrumentation, Symbols and Identification.
ISA S5.2	Binary Logic Diagrams for Process Operations.
ISA S5.3	Graphic Symbols for Distributed Control / Shared Display Instrumentation, Logic and Computer Symbols.
ISA 71.01	Environmental Conditions for Process Management and Control System, Temperature and Humidity.
ISA 71.04	Environmental Equipment Conditions for Process Management and Control System, Air-borne Contaminants.
ISO 9001	Quality Systems.
ANSI/ISATR99.00.01-2004	Security Technologies for Manufacturing and Control Systems
ANSI/ISATR99.00.02- 2004	Integrating Electronic Security into the Manufacturing and Control Systems Environment
EEMUA 191	Alarm System, a guide to design, management & procurement.
IEC 61000-4	Electromagnetic Compatibility (EMC) Part 4: Testing and measurement Techniques
IEC 61131-3	Programming Languages

4.2 SCADA

4.2.1 General Requirements

4.2.1.1 The Contractor shall provide complete SCADA system with all accessories, auxiliaries and associated equipment and cables for the safe, efficient and reliable operation and monitoring of entire solar plant and its auxiliary systems.

4.2.1.2 The Contractor shall provide all the components including, but not limited to, Hardware, Software, Panels, Power Supply, HMI, Laser Printer, Gateway, Networking equipment and associated Cables, firewall etc. needed for the completeness.

4.2.1.3 SCADA System shall have the provision to perform the following features and/or functions:

- (i) Web enabled Operator Dashboards: Showing key information on Generation, Performance and Current Status of various equipment in Single Line Diagram (SLD) format with capability to monitor PV array Zone level (i.e. SCB level) parameters.
- (ii) Real time Data Logging with Integrated Analytics & Reporting: Logging of all parameters - AC, DC, Weather, System Run Hours, Equipment Status and Alarms as well as derived/ calculated/ integrated values. The SCADA User interface shall be customizable and enable Report Generation and Graphical Analysis.
- (iii) Fault and System Diagnostics with time stamped event logging.
- (iv) Generate, store and retrieve user configurable Sequence of Event (SOE) Reports.
- (v) Interface with different field equipment in the plant and work seamlessly with field equipment supplied by different companies.

4.2.1.4 The Control system shall be designed to operate in non-air-conditioned area. However, the Contractor shall provide a Package/ Split AC of suitable capacity decided by heat load requirement in SCADA room at Main Control Room.

4.2.1.5 The SCADA System shall comply with CEA (Cyber Security in Power Systems) Guidelines, 2021, amended from time to time, and the technical standards for communication system in Power Sector laid down by the relevant Authority.

4.2.1.6 All the Solar Plaza zones shall be connected on a SCADA system for remote monitoring as well and the Centralized monitoring station of SCADA System shall be installed and commissioned in the MRS Substation of IITH Campus.

4.2.1.7 The SCADA System shall be supplied with approved make only and the I/O summary, technical datasheets, product catalogue each and every component of complete SCADA system shall be got approved from the Engineer In Charge of major component.

4.2.2 Architecture

4.2.2.1 The SCADA System shall be built over Industrial IoT architecture with integrated Analytics, secure web access, enterprise software and Database.

4.2.2.2 Data acquisition shall be distributed across MCR and LCRs while plant level data aggregation shall be done in plant servers.

4.2.2.3 Analog and Digital IO modules shall have integrated processor for distributed IO processing and control.

4.2.2.4 Data communication system shall be built over fibre optic cables/ wireless network with high bandwidth TCP/IP communication (Fast Ethernet or 802.11 a/b/g/n) across all Inverter and Control Rooms with Internet/Intranet access at Main Control Room. Firewall shall be provided for network security.

4.2.2.5 Plant SCADA Server shall have Industrial Grade server hardware running SCADA & Monitoring Software with data storage (complete plant data) space for 2 years.

Note: One redundant server shall be provided along with separate SMPS power supply.

- 4.2.2.6 Plant data for monitoring and control operations should be accessible without dependence on external network.
- 4.2.2.7 Operator Workstation/PC shall be of Industrial Grade for browser-based access to plant data from Plantmshall be installed/stored on local and remote servers only with user access control for protecting the software and data assets from accidental deletion or corruption.
- 4.2.2.8 Internet/Intranet at Plant: Public or private network access shall be provided at the plant through any broadband/VSAT connectivity of 2Mbps or higher bandwidth. In case no broadband/VSAT connectivity can be provided at the plant, a 3G/4G data card from any Internet Service Provider (ISP) may be provided.
- 4.2.2.9 GPS based Time Synchronization System: The SCADA system shall have a Master/Slave Clock system along with antenna, receiver, cabinet and internal interconnection cables. All SCADA controllers, servers, OWS and communicating equipment shall be synchronized to the GPS clock.

4.2.3 Industrial IoT Controllers & Data Acquisition

The Plant SCADA and Monitoring System may use one or more IIoT Controllers at each Inverter Control Room and MCR for the purpose of data acquisition and data forwarding to the SCADA Servers. The IIoT Controllers shall meet the following minimum requirements:

- 4.2.3.1 The IIoT Controllers shall be distributed in nature and work independently of other IIoT Controllers or any central controller in the system.
- 4.2.3.2 Shall be capable of supporting wide range of field protocols to communicate with different field equipment (Modbus over RS485/Ethernet, etc.)
- 4.2.3.3 Shall have local storage for a minimum of 2 weeks (in case of network failure).
- 4.2.3.4 Provide web-based interface to configure the controller for various equipment in the field.
- 4.2.3.5 IO Functionality: Shall support status monitoring of VCBs & Trip relays on RMU/HT & Transformer panels through distributed DI/AI modules.
- 4.2.3.6 Controls: Shall be capable of Controlling breakers (ON/OFF). Both ON/OFF and Parameter control of inverters shall be supported.
- 4.2.3.7 Data Communication with Servers: Shall send the data collected, from all the equipment at Inverter Control Room and/or Main Control Room, to the Monitoring & Control Server.
- 4.2.3.8 Controllers shall be capable of sending data over Internet connections, USB data cards.

4.2.4 System Spare Capacity

Over and above the equipment and accessories required to meet the fully implemented system as per specification requirements, Control System shall have spare capacity and necessary hardware/ equipment/ accessories to meet following requirement for future expansion at site:

- (i) 10 % spare channels in input/output modules fully wired up to cabinets TB.
- (ii) Wired-in "usable" space for 10% modules in each of the system cabinets for mounting electronic modules wired up to corresponding spare terminals in system cabinets.
- (iii) Empty slots between individual modules/group of modules, kept for ease in maintenance or for heat dissipation requirement as per standard practice of Contractor shall not be considered as wired-in "usable" space for I/O modules.

- (iv) Terminal assemblies (if any in the offered system), corresponding to the I/O modules shall be provided for above mentioned 10 % blank space.
- (v) Each processor / controller shall have 20% spare functional capacity to implement additional function blocks, over and above implemented logic/ loops. Further, each processor / controller shall have spare capacity to handle minimum 20% additional inputs/ outputs of each type including above specified spare requirements, over and above implemented capacity. Each of the corresponding communication controllers shall also have same spare capacity as that of processor/controller.
- (vi) The Data communication system shall have the capacity to handle the additions mentioned above.
- (vii) Ten (10) percent spare relays of each type and rating mounted and wired in cabinets TB. All contacts of relays shall be terminated in terminal blocks of cabinets.
- (viii) The spare capacity as specified above shall be uniformly distributed throughout all cubicles. The system design shall ensure that above mentioned additions shall not require any additional controller/processor/ peripheral drivers in the system delivered at site. Further, these additions shall not deteriorate the system response time / duty cycle, etc. from those stipulated under this specification.

4.2.5 Functionalities

- 4.2.5.1 In case of central inverter configuration, SCADA system shall enable PV array Zone monitoring i.e. the total current from each String Combiner Box shall be monitored on the DC side of the inverter.
- 4.2.5.2 The SCADA system shall monitor instantaneous and cumulative electrical parameters from all DC& AC Equipment including inverters, MFM, Transformer and Switchgear (LT & HT Panels) at regular intervals not greater than one minute.
- 4.2.5.3 The SCADA system shall monitor instantaneous and cumulative environment parameters from weather sensors or data loggers at same interval as electrical parameters and provide PR, CUF on the fly.
- 4.2.5.4 The SCADA system shall provide Alarms and Alerts on equipment faults and failure in less than 5 seconds. Alarms on status change of hardwired DI shall also be provided.
- 4.2.5.5 The SCADA system shall provide configurable alerts on any parameter crossing settable thresholds. The list of such parameters shall be finalised in consultation with the IITH.
- 4.2.5.6 The SCADA system shall have user-friendly browser-based User Interface for secure access from anywhere, for minimum ten concurrent connections from the Operator PC or other securely connected laptop/mobile, for plant monitoring, O&M, daily reporting, and analysis. A dashboard providing summary details of total plant generation, day's export, irradiance, Inverter Control Room level generation and performance indicators like PR and CUF.
- 4.2.5.7 Reporting: The SCADA system shall provide downloadable reports in Excel/PDF, configurable for equipment parameters across the plant.
- 4.2.5.8 Power Plant Control: SCADA system shall provide required interface to the local SCADA operator to set various power control modes (active/reactive power/frequency/PF) through the inverters over industry standard communication protocols like Modbus over TCP/IP.
- 4.2.5.9 All programming functionalities shall be password protected to avoid unauthorized modification.

4.2.5.10 The Contractor shall provide software locks and passwords to Employer for all operating & application software. Also, the Contractor shall provide sufficient documentation and program listing so that it is possible for the Employer to carry out modification at a later date.

4.2.6 Communication Cable Laying

4.2.6.1 All RS485, IO and CAT6 cables shall be laid in separate conduits with a minimum separation of 1.5ft from AC/DC power cables all along.

4.2.6.2 Power cables shall be laid deep in the trenches first. Data cables shall be laid in separate conduits after partially filling the trenches to ensure minimum 1.5 ft separation between power and communication cables all along the trench.

4.2.6.3 IO Cables between switch gear panels and SCADA panel shall be laid on separate cable trays, with a minimum of 1.5ft separation from trays carrying AC Power cables.

4.2.6.4 RS485 & CAT6 cables between switch gear panels or Inverters and SCADA panel shall be laid on separate cable trays, with a minimum of 1.5ft separation from trays carrying AC Power cables.

4.2.7 Control Cabinets / Panels / Desks at Main Control Room

4.2.7.1 The cabinets shall be IP 22 protection class. The Contractor shall ensure that the temperature rise is well within the safe limits for system components even under the worst condition and specification requirements for remote I/O cabinets.

4.2.7.2 The cabinets shall be totally enclosed, free standing type and shall be constructed with minimum 2 mm thick steel plate frame and 1.6 mm thick CRCA steel sheet or as per supplier's standard practice for similar applications.

4.2.8 Software Licences

The Contractor shall provide software license for all software being used in Contractor's System. The software licenses shall be provided for the project and shall not be hardware/ machine-specific.

4.2.9 Hardware at Main Control Room

The Hardware as specified shall be based on latest state of the art Workstations and Servers and technology suitable for industrial application & power plant environment.

4.3 SPECIFICATION FOR FIELD INSTRUMENTS

4.3.1 Scope

- a. This specification covers the basic requirements for the selection criteria for Field Instrumentation including final control elements.
- b. The contractor shall supply the field instrument and spare instrument as per Annexure B and Annexure C.

4.3.2 Environmental Conditions

All instruments and Instrument items shall be tropicallized and suitable for outdoor installation in climatic conditions. All electronic instrument shall be intrinsically safe for gas group IIC. In summary, all Instruments, Instrument accessories and enclosures shall be suitable for location outdoors for the following worst case conditions:

- Max. Design Temperature: 60 °C
- Min. Design Temperature: 9 °C
- Design relative humidity for Instrument and Instrument items: 85 % to 100%.

4.3.3 Basis of Instrument Selection

a. Measurement of solar irradiation (brightness) by Pyrometer

The selection criteria shall be the following:

- MOC of the instrument shall be suitable for the environmental conditions of IITH which may have traces of H₂S gases in atmosphere.
- Instrument shall be provided with local indication in engineering unit apart from 4-20 mA transmission to control system.
- Wavelength covered 0.7 to 8 microns.
- Instrument shall be IP 65.
- Inaccuracy 2% of Full scale max.
- Range at least 30% lower than LRL and 50% higher than URL.
- Span & zero adjustment- Required
- Self-Diagnostic feature –Required.
- Cable entry to the instrument through double compression gland.

b. Measurement of wind speed and ambient temperature

The selection criteria shall be the following:

- a. MOC of the instrument shall be suitable for the environmental conditions of IITH which may have traces of H₂S gases in atmosphere.
- b. Instrument shall be provided with local indication in engineering unit apart from 4-20 mA transmission to control system.
- c. Instrument shall be IP 65.
- d. Inaccuracy 2% of Full scale max.
- e. Appropriate compensation method shall be incorporated in the system for errors arising due to lead resistance for measurement.
- f. Range atleast 30% lower than LRL and 50% higher than URL.
- g. Span & zero adjustment- Required
- h. Self-Diagnostic feature –Required.
- i. Cable entry to the instrument through double compression gland.

4.3.4 Inspection and Testing

- a. The manufacturer shall conduct all tests required to ensure that the field instruments furnished shall conform to the requirements of this specification and in compliance with the requirement of the applicable codes. IITH has the right to witness the tests which shall be as finalized by the IITH during detail engineering.
- b. Test certificates shall be provided for all the items included under this Section of the specification for the IITH's approval.

4.3.4 Instrumentation Earthing requirements

To ensure good protection to both personnel and instrumentation, three earthing systems shall be provided.

The earthing systems shall be defined as follows:

PE : Protective Earth

IPE : Instrument Protective Earth

I.E. : Instrument Earth System

a. Protective Earth

The PE shall be used to protect power systems, and instrumentation equipment and personnel against electrical shock.

b. Instrument Protective Earth (IPE)

The IPE shall be a protective earth used only for instrumentation equipment. All instrument enclosures, equipment and instrument cables shall be connected to the IPE. The termination of incoming instrument cables shall be connected via the IPE bus bar to a crossing terminal located on the side of the junction box. The outgoing multipair cables shall not be connected to the IPE bus bar inside the junction box. It shall be earthed in Central control room.

Every marshalling, termination cabinet located in local or main technical room shall be fitted with an IPE bus bar. The incoming and outgoing cables shall be connected to this bus bar.

c. Instrument Earth System (IE)

The IE shall be the reference point for all digital and analog signals.

All individual screens and overall screens shall be connected to this point. Data highway cable shall also be connected to this point.

For instruments the screen shall be insulated from local earth. For junction boxes all screens of analog and digital signals incoming cables shall be connected to specific non-disconnecting terminal type. They shall be isolated from junction boxes' IPE bus bar. All screen terminals shall be looped together. The overall screen of the outgoing multipair cable shall also be connected to the last screen terminal.

Termination cabinets / Marshalling / DCS stations located in local or main technical room shall be fitted with IE bus bar mounted on insulation blocks. All overall screens of analog and digital signal multipair cables shall be connected on this IE bus bar.

4.3.4 Instrumentation Equipment Protection requirements

a. Environmental protection

All instruments / equipment and installation material shall be suitable for the overall climatic conditions, the position within the installation and the local environment, with particular attention to site ambient conditions. All field instruments shall be provided with necessary weathering and anticorrosion protection.

b. Ingress protection

All field instruments shall have ingress protection to IP 65 or better.

All instruments installed inside pressurized equipment / control rooms shall have ingress protection to IP 32 as a minimum.

c. RFI Interference and Electromagnetic Compatibility

All equipment shall remain unaffected by radio transmissions (Levels of permissible RFI shall be as per IEC 801). Band-pass and / or band stop filters shall be fitted, as necessary. The design of electronic instruments should be in compliance with the electromagnetic compatibility (EMC) requirements as per IEC 801.

4.3.5 Instrument Cabling

Field mounted electrical instruments should be wired and connected to the identified junction boxes. Instrument wiring between the Control building and field junction boxes should be by means of multicore / multipair cable. Multicore cable shall be individually shield as well as overall shielded.

After final installation of the plant, 20% spare shall remain in each of the multicore / multipair cables for future use. The number of types of cable should be restricted to a minimum. Field analog and digital signal shall be 1P/2P 0.75 Sq. mm, 6P/12P 0.75 Sq. mm stranded annealed copper conductor.

Field devices communicating to DCS through appropriate digital communication bus.
All cables shall be overall armoured for mechanical strength. Outer sheath of all cable shall be FRLS.

4.3.6 Instrument Junction Box

Junction boxes shall be IP65, corrosion resistant and provided with drain fittings. Terminals shall be sized for the specified number of wires plus 20% spares and suitable for environmental conditions and electrical classification. For individual shielded multipair cables, a separate terminal shall be provided for each shield drain wire.

The junction boxes will be installed at a maximum height of 1.4 meter (measured at top portion of Junction Box) relative to the floor elevation.

CHAPTER 05

COMPREHENSIVE OPERATION AND MAINTENANCE

5.1 General

- a. The Contractor shall operate the Solar PV Power Plant for a period of 5 years from the date of commissioning. Zero date of operation and maintenance shall begin after successful completion of trial run of the Solar PV Power Plant in all respect.
- b. The operation and maintenance of existing 0.95 MW solar PV plant shall be carried out by contractor.
- c. Operation and Maintenance of the Solar Photovoltaic Power Plant including supply of spares, consumables, wear and tear, Maintenance/ overhauling, replacement of damaged modules, invertors, PCU's, switch gear etc., cleaning of modules, operation and monitoring(round the clock) & maintaining of O and M records of total system etc.
- d. The contractor has to depute following minimum manpower for the operation and maintenance of the solar PV plant:
 - I. One Plant Engineer (Qualification: Graduate in Electrical/Mechanical Engg. With 05 years of relevant Experience or Diploma in Electrical / Mechanical engineering with 8 years of relevant Experience).
 - II. Two technicians (Qualification: ITI in Electrician grade with 03 years of relevant Experience).
 - III. Required number of Unskilled Labor for cleaning and other maintenance purpose as approved by EiC.

Note: The contractor shall take prior approval of the credentials of above manpower from EiC of project before deploying them at site. The above specified manpower is minimum and indicative only, any additional manpower if required for the successful Operation and Maintenance of Solar PV plant in order to achieve the desired parameters shall be deployed by the contractor on his own without any additional cost to IITH.

- e. The engineer of the contractor shall report daily to authorize representative of IITH and brief the daily O & M activity of SPV plant. The engineer/supervisor of contractor shall follow the instruction of EIC.
- f. The Contractor will furnish necessary details regarding technical competence, qualification and number of different grades of personnel to be posted at site along with proposed maintenance (preventive) schedule for a period of 5 years from the date of commissioning.
- g. The maintenance staff of the Contractor shall be available in the Power Plant for every day irrespective of whether the plant is in operation or not unless otherwise instructed by the IITH.
- h. The Contractor's representatives/employees shall conform to all general regulations in force at site and to any special conditions affecting by local administration issued by IITH. All employees of the Contractor working at site shall be deemed to be aware of dangers and risks incidental to the conditions of the IITH's land and works from time to time and the IITH shall not be responsible for any injury arising there from. IITH reserves the right to ask the Contractor to remove/transfer any staff of the Contractor from site without assigning any reason whatsoever. Instructions issued in writing to the Contractor in this matter shall be binding and the Contractor shall replace the transferred/removed person with a suitable person immediately.

- i. All persons deployed by the Contractor for regular maintenance & operation must remain in proper uniform while on duty. The Contractor shall supply uniforms, raincoats, toolset, gloves, gumboots and other items required for carrying out the services.
- j. The Contractor shall maintain attendance register for all their staff deployed for carrying out jobs on regular basis and shall be produced for verification on demand by authorized personal of IITH.
- k. The contractor shall ensure that all safety measure are taken at the site to avoid the accidents to his employees or his co-contractor's employees.
- l. The contractor shall comply with the provision of all relevant Acts of Central or State Governments including payment of Wages Act 1936, Minimum Wages Act 1948, IITH's Liability Act 1938, Workmen's Compensation Act 1923, Industrial Dispute Act 1947, Maturity Benefit Act 1961, Employees State Insurance Act 1948, Contract Labor (Regulations & Abolishment) Act 1970 or any modification thereof or any other law relating whereto and rules made there under from time to time.
- m. In order to ensure longevity, safety of the core equipment and optimum performance of the system the contractor should use only genuine spares of high quality standards with approval of IITH.

5.2 SCOPE OF OPERATION & MAINTENANCE OF THE POWER PLANT

- a. The Contactor shall provide all day-to-day operation and maintenance for the Power Plant as set forth herein. Operator shall perform the work and supply all required spare parts in a prudent and efficient manner and in accordance with Manufacturers and systems designers' specifications, the Annual Operating Plan for the Plant and all operation and maintenance manuals. All Indian applicable laws including environmental protection, pollution, sanitary, employment and safety laws, ("Government Rules"). Contactor shall use all responsible and practical efforts –
 - (i) To maximize plant capacity utilization,
 - (ii) To reduce plant downtime,
 - (iii) To optimize the useful life of the equipment of the power plant.
- b. The Contractor shall provide his maintenance staff at the power Plant for day-to-day operation and maintenance. The maintenance personnel shall be qualified, certified by competent authorities and well trained so that they can handle any type of operational hazards quickly and timely. The responsibility of providing suitable Personal Protection Equipments rests solely with the Contractor.
- c. The nature of maintenance is comprehensive type i.e. all spare, parts, equipment, etc. needs to be replace during maintenance shall be done by contactor without additional cost.
- d. The Contractor shall arrange to provide proper and elaborate O&M training of Solar Power Plant and associated power evacuation arrangement to the IITH's staff for successful takeover of the plant in due course of time.
- e. The maintenance personnel shall be in a position to check and test all the equipment regularly, so that, preventive maintenance, could be taken well in advance to save any equipment from damage. Abnormal behavior of any equipment shall be brought to the notice of IITH not later than 2 hours for taking appropriate action.

- f. The contactor shall perform the following obligations prior to take over the O&M activity:
- I. Prepare Mobilization plan in consultation with the IITH
 - II. Provide the services and personnel set forth in the Mobilization Plan.
 - III. Prepare in consultation with the PIC, the initial Annual Operating plan.
 - IV. Develop and implement plans and procedures including those for firefighting, maintenance planning, procuring the inventory control of stores and spares plan to meet emergencies, plant safety and security and such other facilities and systems as may be necessary to commence of contactor's ongoing responsibilities.
 - V. Provided in plant training to IITH personnel who will gain experience for the operation and maintenance of the plant.
 - VI. All repairing & replacement works are to be completed by the Contractor within 24 hours from the time of occurrence of fault or defect. If it is not possible to set right the equipment within this time, the Contractor shall notify the IITH indicating nature of fault & cause of damage etc. within 12 hours from the time of occurrence of the fault.
 - VII. During operation and maintenance if there is any loss or damage to any component of the power plant due to miss-management/ miss-handling or due to any other reasons what soever, the Contractor shall be responsible for immediate replacement / rectification of the same. The damaged component may be repaired, if it is understood after examination that after repairing performance of the components shall not be degraded, otherwise the defective components shall have to be replaced by new one without any extra cost to the IITH.
 - VIII. The scope of maintenance work shall include the following:
 - Regular operation and maintenance of the Solar PV Power Plant including existing 0.95 MW Solar power system, for a period of 5 years after commissioning and submission of daily performance data of the power plant. The Contractor shall keep a Record Book in this respect clearly indicating date of checking & comments for action etc.
 - The scope of operation includes injecting power to the 11kV at the nearest substations. Proper records of operation of Power Plant System are to be kept as per direction of IITH.
 - Cleaning of the Power Plant including array yard on regular basis.
 - Normal and preventive maintenance of the Power Plant such as cleaning of module surface, tightening of all electrical connections, Line accessories, Transformers and associated switch gear on the HT side.
 - Keeping & recording daily log sheet as per approved format for the Power Plant to be supplied after commissioning of the Power Plant.
 - Contractor's employees shall use no part of the power plant building for residential or any other purpose except for running the plant.
 - The Contractor shall submit monthly Performance report of Solar PV Power Plant indicating cumulative energy generation data as per approved format within seven days of the following month.
 - The Contractor shall preserve all recorded data in either manual or through computer format and shall submit to IITH quarterly, also as and when necessary and on regular basis.

5.3 HANDING OVER THE PLANT AFTER EXPIRY OF O&M TERM

- a. After the expiry of 5year term, contractor shall hand over the plant to the IITH in excellent working condition with full generation capacity. The contactor shall demonstrate performance test of all the major & critical equipment to ensure Generation (as per, YEAR WISE GUARANTEED GENERATION FOR 25 YEARS
- b. Table 10 YEAR WISE GUARANTEED GENERATION DURING LIFE CYCLE OF THE PLANT) from the Solar Photovoltaic Power Plant. While handing over the plant contactor shall hand over all technical documents, literature, instruction manuals, lists of spares part & tools and tackles. Contactor will also hand over all the relevant record/documents.
- c. On completion of O&M term the Contactor will apply to the Engineer in-charge for the issue of Handling Over Certificate and the same will be issued within 2 months of Handing Over in all respects, after verifying from the documents & tests and satisfying himself that the Operation and Maintenance has been competed in accordance with details set out in the control documents & Prudent Utility Practices.

CHAPTER 06

GENERAL TECHNICAL REQUIREMENTS

6.1 INTRODUCTION

This part covers technical requirements which will form an integral part of the Contract. The following provisions shall supplement all the detailed technical requirements brought out in the Technical Specifications and the Technical Data Sheets.

6.2 COMPLETENESS OF FACILITIES

- a. Each of the plant shall be engineered and designed in accordance with the specification requirement and as per relevant standards.
- b. All equipment furnished by the Contractor shall be complete in every respect, with all mountings, fittings, fixtures and standard accessories normally provided with such equipment and/or those needed for erection, completion and safe operation & maintenance of the equipment and for the safety of the operating personnel, as required by applicable codes, though they may not have been specifically detailed in the respective specifications, unless included in the list of exclusions.

6.3 CODES & STANDARDS

- a. In addition to the codes and standards specifically mentioned in the relevant technical specifications for the equipment/ plant/ system, all equipment parts, systems and works covered under this specification shall comply with all currently applicable statutory regulations and safety codes of the Republic of India as well as of the locality where the project will be installed, including the following:
 - (a.) Bureau of Indian Standards (BIS)
 - (b.) Central electricity act
 - (c.) Indian Factories Act and State Factories Act
 - (d.) Regulations of the Central Pollution Control Board, India
 - (e.) Regulations of the Ministry of Environment & Forest (MoEF), Government of India
 - (f.) Pollution Control Regulations of Department of Environment, Government of India
 - (g.) TG REDCO / TG Electricity regulations
 - (h.) TG State Pollution Control Board.
 - (i.) Rules for Electrical installation by Tariff Advisory Committee (TAC).
 - (j.) Any other statutory codes / standards / regulations, as may be applicable.
- b. Unless covered otherwise by Indian codes & standards and in case nothing to the contrary is specifically mentioned elsewhere in the specifications, the latest editions (as applicable as on date of bid opening), of the codes and standards given below shall also apply:
 - (a.) American National Standards Institute (ANSI) / IEEE
 - (b.) American Society of Testing and Materials (ASTM)
 - (c.) American Society of Mechanical Engineers (ASME)
 - (d.) International Organisation for Standardization (ISO)
 - (e.) National Electrical Manufacturers Association (NEMA)
 - (f.) National Fire Protection Association (NFPA)
 - (g.) International Electro-Technical Commission (IEC)

- c. Other International/ National standards such as DIN, VDI, BS, GOST etc. shall also be accepted for only material codes and manufacturing standards, subject to the Purcher's approval, for which the Bidder shall furnish, along with the offer, adequate information to justify that these standards are equivalent or superior to the standards mentioned above. In all such cases the Bidder shall furnish specifically the variations and deviations from the standards mentioned elsewhere in the specification together with the complete word to word translation of the standard that is normally not published in English.
- d. In the event of any conflict between the codes and standards referred to in the above clauses and the requirement of this specification, the requirement of Technical Specification shall govern.
- e. In case of any change in codes, standards & regulations between the date of bid opening and the date when vendors proceed with fabrication, the IITH shall have the option to incorporate the changed requirements or to retain the original standard. It shall be the responsibility of the Contractor to bring to the notice of the IITH such changes and advise IITH of the resulting effect.

6.4 EQUIPMENT FUNCTIONAL GUARANTEE

- a. The functional guarantees of the equipment under the scope of the Contractors given elsewhere in the technical specification. These guarantees shall supplement the general functional guarantee provisions covered under General Conditions of Contract.

6.5 DESIGN OF FACILITIES/ MAINTENANCE & AVAILABILITY CONSIDERATIONS

6.5.1 Design of Facilities

- I. All the design procedures, systems and components proposed shall have already been adequately developed and shall have demonstrated good reliability under similar conditions elsewhere.
- II. The Contractor shall be responsible for the selection and design of appropriate equipment to provide the best co-ordinated performance of the entire system. The basic requirements are detailed out in various clauses of the Technical Specifications. The design of various components, assemblies and subassemblies shall be done so that it facilitates easy field assembly and dismantling. All the rotating components shall be so selected that the natural frequency of the complete unit is not critical or close to the operating range of the unit.

6.5.2 Maintenance and Availability Considerations

- I. Equipment/facilities offered shall be designed for high availability, low maintenance and ease of maintenance. The Bidder shall specifically state the design features incorporated to achieve high degree of reliability/ availability and ease of maintenance. The Bidder shall also furnish details of availability records in the reference plants stated in his experience list.
- II. Bidder shall state in his offer the various maintenance intervals, spare parts and man-hour requirement during such operation. The intervals for each type of maintenance namely the minor and major overhauls shall be specified in terms of fired hours, clearly defining the spare parts and manhour requirement for each stage.
- III. Lifting devices i.e. hoists and chain pulley jacks, etc. shall be provided by the contractor for handling of any equipment or any of its part having weight in excess of 500 kgs during erection and maintenance activities.
- IV. Lifting devices like cranes/lifting tackles, slings, etc. to be connected to hook of the hoist / crane shall be provided by the contractor for lifting the equipment and accessories covered under the specification.

6.6 DOCUMENTS TO BE FURNISHED

- a. Each of the plant and equipment shall be fully integrated, engineered and designed to perform in accordance with the technical specification. All engineering and technical services required ensuring a completely engineered plant shall be provided in respect of mechanical, electrical, control & instrumentation, civil & structural works as per the scope.
- b. The Contractor shall furnish engineering data/drgs. for entire equipment covered under this specification in accordance with the schedule of information as specified in Technical Specification and Data sheets.. Apart for this, following documents also to be submitted:

6.7 INSTRUCTION MANUALS

The Contractor shall submit to the IITH, draft Instruction Manuals for all the equipment covered under the Contract by the end of one year from the date of his acceptance of the Letter of Award. The Instruction manuals shall contain full details required for erection, commissioning, operation and maintenance of each equipment. The manual shall be specifically compiled for this project. After finalization and approval of the IITH the Instruction Manuals shall be submitted. The Contract shall not be considered to be completed for purposes of taking over until the final Instructions manuals have been supplied to the IITH. The Instruction Manuals shall comprise of the following.

6.7.1 ERECTION & COMMISSIONING MANUALS/CHECKLISTS

The erection & Commissioning Manuals/Checklists shall be submitted at least two (2) months prior to the commencement of erection activities of particular equipment/system. The erection manual should contain the following as a minimum.

- a) Erection strategy.
- b) Sequence of erection.
- c) Erection instructions.
- d) Critical checks and permissible deviation/tolerances.
- e) List of tools, tackles, heavy equipment like cranes, dozers, etc.
- f) Bill of Materials
- g) Procedure for erection.
- h) General safety procedures to followed during erection/installation.
- i) Procedure for initial checking after erection.
- j) Procedure for testing and acceptance norms.
- k) Procedure / Check list for pre-commissioning activities.
- l) Procedure / Check list for commissioning of the system.
- m) Safety precautions to be followed during erection and commissioning

6.7.2 OPERATION & MAINTENANCE MANUALS

- I. The operating and maintenance instructions together with drawings (other than shop drawings) of the equipment, as completed, shall be in sufficient detail to enable the IITH to operate, maintain, dismantle, reassemble and adjust all parts of the equipment. They shall give a step by step procedure for all operations likely to be carried out during the life of the plant / equipment including, operation, maintenance, dismantling and repair including periodical activities such as chemical cleaning of the generator. Each manual shall also include a complete set of drawings together with performance/rating curves of the equipment and test certificates wherever applicable. The contract shall not be considered to be completed for purposes for taking over until these manuals have been supplied to the IITH.

- II. If after the commissioning and initial operation of the plant, the manuals require any modification / additions / changes, the same shall be incorporated and the updated final instruction manuals shall be submitted to the IITH for records.
- III. A separate section of the manual shall be for each size/ type of equipment and shall contain a detailed description of construction and operation, together with all relevant pamphlets and drawings.
- IV. The manuals shall include the following :
 - a. List of spare parts along with their drawing and catalogues and procedure for ordering spares.
 - b. Where applicable, fault location charts shall be included to facilitate finding the cause of maloperation or break down.
 - c. Detailed specifications for all the consumable

6.7.3 PROJECT COMPLETION REPORT

The Contractor shall submit a Project Completion Report at the time of handing over the plant. After final acceptance of individual equipment /system by the IITH, the Contractor will update all original drawings and documents for the equipment/ system to "as built" conditions and submit.

6.7.4 ENGINEERING INFORMATION SUBMISSION SCHEDULE

Prior to the award of Contract, a Detailed Engineering Information Submission Schedule shall be tied up with the IITH. For this, the bidder shall furnish a detailed list of engineering information along with the proposed submission schedule. This list would be a comprehensive one including all engineering data / drawings / information for all bought out items and manufactured items. The information shall be categorized into the following parts.

- a. Information that shall be submitted for the approval of the IITH before proceeding further, and
- b. Information that would be submitted for IITH's information only. The Engineering Information Schedule shall be updated month-wise. The schedule should allow adequate time for proper review and incorporation of changes/modifications, if any, to meet the contract without affecting the equipment delivery schedule and overall project schedule. The early submission of drawings and data is as important as the manufacture and delivery of equipment and hardware and this shall be duly considered while determining the overall performance and progress.

6.7.5 ENGINEERING PROGRESS AND EXCEPTION REPORT

Report giving the status of each engineering information including

- a. A list of drawings/engineering information which remains unapproved for more than four (4) weeks after the date of first submission
- b. Drawings which were not submitted as per agreed schedule. The draft format for this report shall be furnished to the IITH within four (4) weeks of the award of the contract, which shall then be discussed and finalised with the IITH.

6.8 TECHNICAL CO-ORDINATION MEETING

The Contractor shall organize and attend at least one monthly progress meetings with the IITH representatives during the period of Contract at mutually agreed venues for review of progress & resolving technical clarifications, if any. The Contractor shall attend such meetings at his own cost and fully co-operate with such persons and agencies involved during the discussions.

The Contractor shall ensure availability of the concerned experts/consultants/ personnel who are empowered to take necessary decisions during these meetings. The Contractor shall be equipped with necessary tools and facilities so that, if required, the drawings/documents can be resubmitted after incorporating necessary changes and approved during the meeting itself.

•The Contractor shall furnish monthly progress report to the IITH detailing out the progress achieved on all erection activities as compared to the schedules. The report shall also indicate the reasons for the variance between the scheduled and actual progress and the action proposed for corrective measures, wherever necessary.

6.9 Material of Construction

All materials used for the construction of the equipment shall be new and shall be in accordance with the requirements of this specification. Materials utilised for various components shall be those which have established themselves for use in such applications.

6.9.1 RATING PLATES, NAME PLATES & LABELS

- a. Each main and auxiliary item of plant including instruments shall have permanently attached to it in a conspicuous position, a rating plate of non-corrosive material upon which shall be engraved manufacturer's name, equipment, type or serial number together with details of the ratings, service conditions under which the item of plant in question has been designed to operate, and such diagram plates as may be required by the IITH.
- b. Such nameplates or labels shall be of white non-hygroscopic material with engraved black lettering or alternately, in the case of indoor circuit breakers, starters, etc. of transparent plastic material with suitably coloured lettering engraved on the back. The name plates shall be suitably fixed on both front and rear sides.
- c. Hanger/ support numbers shall be marked on all pipe supports, anchors, hangers, snubbers and restraint assemblies. Each constant and variable spring support shall also have stamped upon it the designed hot and cold load which it is intended to support. Suitable scale shall also be provided to indicate load on support/hanger.
- d. Nameplates shall be as per best practices of the industry
- e. All segregated phases of conductors or bus ducts, indoor or outdoor, shall be provided with coloured phase plates to clearly identify the phase of the system

6.10 TOOLS AND TACKLES

The Contractor shall supply with the equipment one complete set of all special tools and tackles and other instruments required for the erection, assembly, disassembly and proper maintenance of the plant and equipment and systems (including software). These special tools will also include special material handling equipment, jigs and fixtures for maintenance and calibration / readjustment, checking and measurement aids etc. A list of such tools and tackles shall be submitted by the Bidder along with the offer.

The price of each tool / tackle shall be deemed to have been included in the total bid price. These tools and tackles shall be separately packed and sent to site. The Contractor shall also ensure that these tools and tackles are not used by him during erection, commissioning and initial operation. For this period the Contractor should bring his own tools and tackles. All the tools and tackles shall be of reputed make acceptable to the IITH.

6.11 WELDING

If the manufacturer has special requirements relating to the welding procedures for welds at the terminals of the equipment to be performed by others the requirements shall be submitted to the IITH in advance of commencement of erection work.

6.12 GENERAL REQUIREMENTS -QUALITY ASSURANCE

- a. All materials, components and equipment covered under this specification shall be procured, manufactured, erected, commissioned and tested at all the stages, as per a comprehensive Quality Assurance Program. An indicative program of inspection/tests to be carried out by the contractor for some of the major items is given in the respective technical specification. This is, however, not intended to form a comprehensive program as it is the contractor's responsibility to draw up and implement such program duly approved by the IITH. The detailed Quality Plans for manufacturing and field activities shall be drawn up by the Bidder and will be submitted to IITH for approval.
- b. Manufacturing Quality Plan will detail out for all the components and equipment, various tests/inspection, to be carried out as per the requirements of this specification and standards mentioned therein and quality practices and procedures followed by Contractor's/Sub-contractor's/sub-supplier's Quality Control Organisation, the relevant reference documents and standards, acceptance norms, inspection documents raised etc., during all stages of materials procurement, manufacture, assembly and final testing/performance testing. The Quality Plan shall be submitted on electronic media in addition to hard copy, for review and approval.
- c. Field Quality Plans will detail out for all the equipment, the quality practices and procedures etc. to be followed by the Contractor's "Site Quality Control Organization", during various stages of site activities starting from receipt of materials/equipment at site.
- d. The Bidder shall also furnish copies of the reference documents/plant standards/acceptance norms/tests and inspection procedure etc., as referred in Quality Plans along with Quality Plans. These Quality Plans and reference documents/standards etc. will be subject to IITH's approval without which manufacturer shall not proceed. These approved documents shall form a part of the contract. In these approved Quality Plans, IITH shall identify customer hold points (CHP), i.e. test/checks which shall be carried out in presence of the IITH's EIC or his authorized representative and beyond which the work will not proceed without consent of IITH in writing. All deviations to this specification, approved quality plans and applicable standards must be documented and referred to IITH along with technical justification for approval and dispositioning.
- e. No material shall be dispatched from the manufacturer's works before the same is accepted, subsequent to pre-dispatch final inspection including verification of records of all previous tests/inspections by IITH. All material used for equipment manufacture including casting and forging etc. shall be of tested quality as per relevant codes/standards. Details of results of the tests conducted to determine the mechanical properties; chemical analysis and details of heat treatment procedure recommended and actually followed shall be recorded on certificates and time temperature chart. Tests shall be carried out as per applicable material standards and/or agreed details.
- f. All welding and brazing shall be carried out as per procedure drawn and qualified in accordance with requirements of ASME Section IX/BS-4870 or other International equivalent standard acceptable to the IITH.
- g. All welding/brazing procedures shall be submitted to the IITH or its authorized representative for approval prior to carrying out the welding/brazing.
- h. All brazers, welders and welding operators employed on any part of the contract either in Contractor's/sub-contractor's works or at site or elsewhere shall be qualified as per ASME Section-IX or BS-4871 or other equivalent International Standards acceptable to the IITH.

- i. Welding procedure qualification & Welder qualification test results shall be furnished to the IITH for approval. However, where required by the IITH, tests shall be conducted in presence of IITH / authorised representative.
- j. Unless otherwise proven and specifically agreed with the IITH, welding of dissimilar materials and high alloy materials shall be carried out at shop only.
- k. No welding shall be carried out on cast iron components for repair.
- l. The Contractor shall list out all major items/ equipment/ components to be manufactured in house as well as procured from sub-contractors (BOI). All the sub-contractor proposed by the Contractor for procurement of major bought out items including castings, forging, semi-finished and finished components/equipment etc., list of which shall be drawn up by the Contractor and finalised with the IITH, shall be subject to IITH's approval
- m. For components/equipment procured by the contractors for the purpose of the contract, after obtaining the written approval of the IITH, the contractor's purchase specifications and inquiries shall call for quality plans to be submitted by the suppliers. The quality plans called for from the sub-contractor shall set out, during the various stages of manufacture and installation, the quality practices and procedures followed by the vendor's quality control organization, the relevant reference documents/standards used, acceptance level, inspection of documentation raised, etc. Such quality plans of the successful vendors shall be finalized with the IITH and such approved Quality Plans shall form a part of the purchase order/contract between the Contractor and sub-contractor. Within three weeks of the release of the purchase orders /contracts for such bought out items /components, a copy of the same without price details but together with the detailed purchase specifications, quality plans and delivery conditions shall be furnished to the IITH on the monthly basis by the Contractor along with a report of the Purchase Order placed so far for the contract.
- n. IITH reserves the right to carry out quality audit and quality surveillance of the systems and procedures of the Contractor's or their sub-contractor's quality management and control activities. The contractor shall provide all necessary assistance to enable the IITH carry out such audit and surveillance.
- o. The contractor shall carry out an inspection and testing programme during manufacture in his work and that of his sub-contractor's and at site to ensure the mechanical accuracy of components, compliance with drawings, conformance to functional and performance requirements, identity and acceptability of all materials parts and equipment. Contractor shall carry out all tests/inspection required to establish that the items/equipment conform to requirements of the specification and the relevant codes/standards specified in the specification, in addition to carrying out tests as per the approved quality plan.
- p. Quality audit/surveillance/approval of the results of the tests and inspection will not, however, prejudice the right of the IITH to reject the equipment if it does not comply with the specification when erected or does not give complete satisfaction in service and the above shall in no way limit the liabilities and responsibilities of the Contractor in ensuring complete conformance of the materials/equipment supplied to relevant specification, standard, data sheets, drawings, etc.
- q. For all spares and replacement items, the quality requirements as agreed for the main equipment supply shall be applicable.
- r. Repair/rectification procedures to be adopted to make the job acceptable shall be subject to the approval of the IITH/ authorized representative.

6.12.1 SAMPLING AND TESTING OF CONSTRUCTION MATERIALS

The method of sampling for testing of construction materials and work / job samples shall be as per the relevant IS / standards / codes and in line with the requirements of the technical specifications / quality plans. All samples shall be jointly drawn, signed and sealed wherever required, by the contractor and the engineer or his authorized representative.

The contractor shall carry out testing in accordance with the relevant IS / standards / codes and in line with the requirements of the technical specifications / quality plans. Where no specific testing procedure is mentioned, the tests shall be carried out as per the best prevalent engineering practices and to the directions of the Engineer-In-Charge. All testing shall be done in the presence of the Engineer-In-Charge or his authorized representative in a NABL accredited / Govt. Laboratory acceptable to IITH. This includes all IITs, NCB, CSMRS, reputed government / autonomous laboratories / organizations, NITs and other reputed testing laboratories. The test samples for such test shall be jointly selected and sealed by the Engineer-In-Charge and thereafter these shall be sent to the concerned laboratory through the covering letter signed by IITH Engineer. The test report along with the recommendations shall be obtained from the laboratories without delay and submitted to IITH.

6.12.2 PURCHASE AND SERVICE

Structural steel supply shall be procured from main steel producers like SAIL, TISCO, IISCO, RINL, JSW Steel, Lloyds Steel, Jindal Steel & Power. In case of non-availability of some of the sections with main steel producers the contractor may propose to procure the sections from the re-rollers of the main steel producers, the name of such re-rollers will have to be cleared by corporate quality assurance of IITH for which details such as BIS approval, main steel producer's approval, past experience for production of sections of specified material, details of machines plants testing facilities etc., Confirmation that the process control and manufacturing of steel sections by re-rollers shall be same as that of main steel producers, that billets for re-rolling will be sourced from main steel producers only shall be furnished with regards to re-roller.

Even after clearance of re-rollers, induction of billets with identified and correlated Mill test certificates (TC's) in the process of re-rolling, sampling of steel, quality checks thereof and stamping of final product for further identification and correlation with TC's prior to dispatch shall be the responsibility of the contractor and these shall be performed in presence of the authorized representative of the main Contractor.

Reinforcement steel supply if in the scope of the contractor shall be procured from main steel producers like SAIL, TISCO, IISCO, RINL, JSW Steel, Lloyds Steel, Jindal Steel & Power (for 8-40mm reinforcement steel) and mill test certificates (TC) is to be obtained and submitted to IITH for co-relation. In case any size /diameter specified is not available with main steel producers and are proposed to be supplied from the conversion agent of the main steel producer the name of such conversion agent / re-roller shall have to be approved by IITH for which details such as BIS approval, Main steel producer's approval, Past experience for production of sections of specified material, details of machines, plants testing facilities etc., and confirmation that the process control and manufacturing of steel sections by re-rollers is the same as that of main steel producers, that billets for re-rolling are sourced from main steel producers only shall be furnished with regards to re-roller.

6.12.3 DOCUMENTATION PACKAGE

The Contractor shall be required to submit the QA Documentation in two hard copies and a soft copy, as identified in respective quality plan with tick mark. Each QA Documentation shall have a project specific Cover Sheet bearing name & identification number of equipment and including an index of its contents with page control on each document.

The QA Documentation file shall be progressively completed by the Supplier's sub- supplier to allow regular reviews by all parties during the manufacturing.

6.12 ENGINEER IN CHARGE (IITH) SUPERVISION

To eliminate delays and avoid disputes and litigation, it is agreed between the parties to the Contract that all matters and questions shall be referred to the EIC and without prejudice to the provisions of 'Arbitration' clause in Section GCC , the Contractor shall proceed to comply with the EIC's decision.

The work shall be performed under the supervision of the EIC or his authorised representative. The scope of the duties of the EIC pursuant to the Contract, will include but not be limited to the following:

- (a.) Interpretation of all the terms and conditions of these documents and specifications:
- (b.) Review and interpretation of all the Contractor's drawing, engineering data, etc:
- (c.) Witness or his authorised representative to witness tests and trials either at the manufacturer's works or at site, or at any place where work is performed under the contract :
- (d.) Inspect, accept or reject any equipment, material and work under The contract :
- (e.) Issue certificate of acceptance and/or progressive payment and final payment certificates
- (f.) Review and suggest modifications and improvement in completion schedules from time to time, and
- (g.) Supervise Quality Assurance Programme implementation at all stages of the works.

6.13 INSPECTION, TESTING AND INSPECTION CERTIFICATES

- a. The word 'Inspector' shall mean the EIC from IITH and/or his authorised representative and/or an outside inspection agency acting on behalf of the IITH to inspect and examine the materials and workmanship of the works during its manufacture or erection.
- b. The EIC or his duly authorised representative and/or an outside inspection agency acting on behalf of the IITH shall have access at all reasonable times to inspect and examine the materials and workmanship of the works during its manufacture or erection and if part of the works is being manufactured or assembled on other premises or works, the Contractor shall obtain permission for the EIC and for his duly authorised representative to inspect as if the works were manufactured or assembled on the Contractor's own premises or works.
- c. The Contractor shall give the EIC /Inspector fifteen (15) days written notice of any material being ready for testing. Such tests shall be to the Contractor's account except for the expenses of the Inspector's. The EIC/Inspector, unless the witnessing of the tests is virtually waived and confirmed in writing, will attend such tests within fifteen (15) days of the date on which the equipment is noticed as being ready for test/inspection failing which the contractor may proceed with test which shall be deemed to have been made in the inspector's presence and he shall forthwith forward to the inspector duly certified copies of test reports in two (2) copies.
- d. The EIC or Inspector shall within fifteen (15) days from the date of inspection as defined herein give notice in writing to the Contractor, or any objection to any drawings and all or any equipment and workmanship which is in his opinion not in accordance with the contract. The Contractor shall give due consideration to such objections and shall either make modifications that may be necessary to meet the said objections or shall inform in writing to the EIC/Inspector giving reasons therein, that no modifications are necessary to comply with the contract.
- e. When the factory tests have been completed at the Contractor's or sub-contractor's works, the EIC /Inspector shall issue a certificate to this effect fifteen (15) days after completion of tests but if the tests are not witnessed by the EIC /Inspectors, the certificate shall be issued within fifteen (15) days of the receipt of the Contractor's test certificate by the EIC /Inspector. EIC /Inspector to issue such a certificate shall not prevent the Contractor from proceeding with the works. The completion of these tests or the issue of the certificates shall not bind the IITH to accept the equipment should it, on further tests after erection be found not to comply with the contract.

- f. In all cases where the contract provides for tests whether at the premises or works of the Contractor or any sub-contractor, the Contractor, except where otherwise specified shall provide free of charge such items as labour, material, electricity, fuel, water, stores, apparatus and instruments as may be reasonably demanded by the EIC /Inspector or his authorised representatives to carry out effectively such tests on the equipment in accordance with the Contractor and shall give facilities to the EIC/Inspector or to his authorized representative to accomplish testing.
- g. The inspection by EIC / Inspector and issue of Inspection Certificate thereon shall in no way limit the liabilities and responsibilities of the Contractor in respect of the agreed Quality Assurance Programme forming a part of the contract.
- h. To facilitate advance planning of inspection in addition to giving inspection notice as specified at clause no 9.05.03- of this chapter, the Contractor shall furnish quarterly inspection programme indicating schedule dates of inspection at Customer Hold Point and final inspection stages. Updated quarterly inspection plans will be made for each three consecutive months and shall be furnished before beginning of each calendar month.
- i. All inspection, measuring and test equipment used by contractor shall be calibrated periodically depending on its use and criticality of the test/measurement to be done. The Contractor shall maintain all the relevant records of periodic calibration and instrument identification, and shall produce the same for inspection by IITH. Wherever asked specifically, the contractor shall re-calibrate the measuring/test equipment in the presence of EIC / Inspector.

6.14 PRE-COMMISSIONING AND COMMISSIONING FACILITIES

The Contractor up on completion of installation of equipment and systems, shall conduct pre-commissioning and commissioning activities, to make the equipment/systems ready for safe, reliable and efficient operation on sustained basis. During commissioning the Contractor shall carry out system checking and reliability trials on various parts of the facilities. All pre-commissioning/commissioning activities considered essential for such readiness of the equipment/systems including those mutually agreed and included in the Contractor's quality assurance programme as well as those indicated in clauses elsewhere in the technical specifications shall be performed by the contractor.

The pre-commissioning and commissioning activities of the equipment/systems furnished and installed by the contractor shall be the responsibility of the Contractor. The Contractor shall provide, in addition, temporary instrumentation and other measuring devices, test instruments, calibrating devices etc. and labour required for successful performance of these operations. If it is anticipated that the above test may prolong for a long time, the Contractor's workmen required for the above test shall always be present at site during such operations. All erection & commissioning checks shall be as per manufacturer's manual on mutually agreed terms.

- (a) As soon as the facilities or part thereof has been completed operationally and structurally and before start-up, each item of the equipment and systems forming part of facilities shall be thoroughly cleaned and then inspected jointly by the IITH and the Contractor for correctness of and completeness of facility or part thereof and acceptability for initial pre-commissioning tests, commissioning and start-up at Site. The list of pre-commissioning tests to be performed shall be as mutually agreed and included in the Contractor's quality assurance programme as well as those included elsewhere in the Technical Specifications.
- (b) The Contractor's pre-commissioning/ commissioning/start-up engineers, specially identified as far as possible, shall be responsible for carrying out all the pre-commissioning tests at Site. On completion of inspection, checking and after the pre-commissioning tests are satisfactorily over, the commissioning of the complete facilities shall be commenced during which period the complete facilities, equipment shall be operated integral with sub-systems and supporting equipment as a complete plant.
- (c) The time consumed in the inspection and checking of the units shall be considered as a part of the erection and installation period.

- (d) The check outs during the pre-commissioning period should be programmed to follow the construction completion schedule. Each equipment/system, as it is completed in construction and turned over for commissioning(start-up), should be checked out and cleaned. The checking and inspection of individual systems should then follow a prescribed commissioning documentation [SCL (Standard Check List) / TS (Testing Schedule) / CS (Commissioning Schedule)] to be furnished by the manufacturer/supplier.
- (e) The Contractor shall conduct vibration testing to determine the 'base line' of performance of all plant rotating equipment. These tests shall be conducted when the equipment is running at the base load, peak load as well as lowest sustained operating condition as far as practicable.

6.15 PACKAGING AND TRANSPORTATION

All the equipment shall be suitably protected, coated, covered or boxed and crated to prevent damage or deterioration during transit, handling and storage at Site till the time of erection. While packing all the materials, the limitation from the point of view of the sizes of railway wagons available in India should be taken account of. The Contractor shall be responsible for any loss or damage during transportation, handling and storage due to improper packing. The IITH's Inspector shall have right to insist for completion of works in shops before dispatch of materials for transportation.

6.16 STATUTORY REQUIREMENT :

Documentation, Technical Support & Coordination for getting clearance from statutory authorities like CEA, PCB, MOEF, TGERC, TGS LDC, TGTRANSCO, TGDISCOM, CERC, MNRE, REC registry etc. as required from CEA, TGTRANSCO etc.

All statutory clearances for commissioning and operation of system are in the scope of Supplier. However formal application along with necessary statutory fees shall be done by IITH but subsequent follow up and coordination and getting clearances is responsibility of Supplier.

CHAPTER 07

DRAWINGS & DOCUMENTS

7.1 DRAWINGS / DOCUMENTS TO BE SUBMITTED

The Contractor shall submit 3 copies of draft/ preliminary drawing / report enumerated below and in Various other sections of the specifications for approval of IITH during detailed engineering. Finally, the Contractor shall submit six number of hard copies of each drawing “As approved” along with soft copy in a pen drive.

TABLE 7 LIST OF DRAWINGS / DOCUMENTS

Sr. No.	Drawing / document description
1.	Topographical Survey Map and Contour Map showing the results of pre-construction survey of the project site showing all the details of existing features such as trees, drains, roads, culverts, fencing, electrical street light poles, buildings/structures, etc.
2.	General Layout drawing (Master Plan) of Solar PV power plant
3.	Module (Array yard) Layout and detail drawing.
4.	General arrangement and details drawing of Mounting structures.
5.	Foundation layout and structural detail for mounting structures
6.	Layout and details of Transformer foundation.
7.	Drawing for cable routing.
8.	Drawing for String Combiner Box
9.	Array yard lightning protection
10.	Drawings for protection system
11.	Drawing for auxiliary power supply distribution
12.	Drawing for string monitoring system
13.	Schematic diagram, Wiring diagram, Internal layouts etc. for switch gear, distribution board, panels, PCU / Inverters etc..
14.	Design Basis Report for 3.5 MWp DC solar power plant
15.	Analysis and Design calculation for Mounting structures and foundations for solar Panels.
16.	Miscellaneous design calculations which is necessary for the proper operation and maintenance of solar power plant.
17.	Instruction manuals
18.	Erection & commissioning manuals/checklists
19.	Operation & maintenance manuals
20.	Any other drawing / document required by IITH for clear understanding

- a. The drawings shall show sufficient overall dimensions, clearances and space requirements of all apparatus to be furnished.
- b. The IITH shall convey his approval or otherwise of the same, and in the event of disapproving the drawing, the Contractor shall re-submit the revised drawings with proper “revision number” for approval after making necessary modification / correction.
- c. No extension of time shall be allowed on account of the time consumed in submission and examination of defective drawings and resubmission of the corrected drawings.

CHAPTER 08

QUALITY ASSURANCE, INSPECTION & TESTING

8.1 The detailed item-wise quality assurance and inspection plan for supply and field jobs shall be submitted by successful bidder after award of contract for the approval of IITH. However indicative and minimum requirement for the measure items has covered under this chapter.

The data sheet submitted by the bidder for measure items shall only for information and understanding of the tender. However, finalisation of all items shall be carried out after award of work to successful bidder on the basis of detailed specification, quality plans etc. On that basis BOM shall be finalised. The contactor has to supply all the material as per approved BOM.

Following major equipment / BOIs will be inspected and routine tested (as per relevant IEC / IS) in line with corresponding MQPs (Manufacturing Quality Plan), MQP will be mutually discussed and agreed with the successful bidder. The cost of test will be deemed to be included in the cost of the equipment.

- A. Crystalline Solar Module
- B. Power Conditioning Unit / inverter
- C. LT and HT cables
- D. Transformer
- E. LT and HT Switchgear
- F. Surge/ lightening arrestor
- G. Strong monitoring system and string combiner box
- H. SCADA panel FAT testing
- I. SPV structure for SPV module
- J. Lightning system and other miscellaneous

The word “Inspector” shall mean the EIC and/or his authorized representative and/or an outside inspection agency acting on behalf of the IITH.

CHAPTER 09

DATA SHEET

9.1 NASA/OTHER SOURCE METEONORM DATA SHEET

Daily Global average Solar radiation on horizontal surface ton be taken for IITH Kandi campus from NASA or other reliable data sources.

9.2 DATASHEET TO BE FILLED BY THE BIDDER

The bidder has to fill following data sheets and to be submitted along with bid submission. In case if bidder is offering alternate make for the same item, then separate data sheet is to be filled for each make. It may be noted Data sheet submitted by the bidder for measure items shall only for information and understanding of the tender. However finalisation of all items shall be carried out after award of work to successful bidder on the basis of detailed specification, quality plan etc. On that basis BOM shall be finalised.

1. PLANT GENERAL DESIGN DATA SHEET

TABLE 8 GENERAL DESIGN DATA SHEET

1.	Capacity proposed SPV plant (KW _{peak} DC)	
2.	Name and version of software is used for design	
3.	Tilt angle	
4.	Power loss diagram to be attached	
5.	Performance ratio	
6.	Type of SPV module	
7.	Make of SPV module & Country of Origin	
8.	Details of of SPV module	
9.	Plant divided into total no of zones	
10.	1 No of Modules	
	2 No of Modules per string	
	3 No of strings	
	4 No. of Sub array	
11.	PCU	
	1 Make & Country of Origin	
	2 Capacity of each PCU	
	3 No. of PCUs for one zone	
12.	Electrical single line diagram of SPV plant to be enclosed	
13.	SCADA for diagnosing & monitoring	
14.	Schematics and layout drawings to be enclosed	
	1 SPV Array	

	2 Power Evacuation system	
15.	Total area required(Sq. M)	
16.	Annual energy generation (MWhr)	

2. MONTHLY GENERATION OUTPUT AT 11 KV ENERGY METER FOR FIRST YEAR

TABLE 9 MONTHLY GUARANTEED GENERATION OUT PUT

S. No	Month	Daily Global Average Radiation on horizontal surface (kWh/(m ² xDay))	Average Ambient Temperature	Guaranteed Generation in Million Unit(MU)*
1.	January			
2.	February			
3.	March			
4.	April			
5.	May			
6.	June			
7.	July			
8.	August			
9.	September			
10.	October			
11.	November			
12.	December			
Total				

3. YEAR WISE GUARANTEED GENERATION FOR 25 YEARS

TABLE 10 YEAR WISE GUARANTEED GENERATION DURING LIFE CYCLE OF THE PLANT

Month	GH I (kWh/(m ² x Day))	Avg amb Temp (°C) Sunsh ine hrs (for information)	Guaranteed Generation in Million Unit (MU) in successive years after final acceptance of the system																								
			Years*																								
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Jan																											
Feb																											
Mar																											
Apr																											
May																											
June																											
July																											
Aug																											
Sept																											
Oct																											
Nov																											
Dec																											

* Zero year shall begin after successful completion of trial run of the Solar PV Power Plant in all respect.

4. PV MODULE DATASHEET

Bidder should furnish the following data sheet in consultation with the panel manufacture should provide the authentication certificate from the Manufacturer.

TABLE 11 PV MODULE DATA SHEET

S. No	PARAMETERS	VALUES	REMARK
1.	Manufacturer/Vendor		
2.	Established		
3.	Address		
4.	Model		
5.	Confirming to IEC and other standards		
6.	Rated power at (STC) in Watts		
7.	Type (type of technology)		
8.	Last year MW sell of the modules of above model		
9.	Annual Manufacturing capacity of the above model in MW.		
10.	Annual Booked capacity of the above model in MW.		
11.	Total Capacity supplied to the Bidder		
Physical parameters of module			
12.	Length in mtr.		
13.	Width in mtr.		
14.	Depth in mtr.		
15.	Module Area in m2		
16.	Rough module area m2		
17.	Sensitive area (Cells) m2		
18.	Cell size		
19.	Total number of Cells in module		
20.	Cells in series		
21.	Cells in parallel		
22.	Cells in series per bypass diode		
23.	Number of bypass diodes		
24.	Weight in Kg.		
25.	Module frame material		

26.	Weather module frame is anodized ?		
27.	Type of Glass used in module		
28.	Any Additional feature please attach details		
Electrical Parameters			
29.	Rated Power Tolerance (%)		
30.	Rated Power per Square Foot or mtr (watts) Of module		
31.	Module Efficiency (%)		
32.	Series Fuse Rating (amps)		
33.	Connector Type		
34.	Maximum Power Point Voltage (Vmpp)		
35.	Maximum Power Point Current (Impp)		
36.	Open-Circuit Voltage (Voc)		
37.	Short Circuit Current (Isc)		
38.	Maximum Power Temperature Coefficient (% per degree C)		
39.	Open-Circuit Voltage Temperature Coefficient (mV per degree C)		
40.	Short-Circuit Current Temperature Coefficient (mA per degree C)		
41.	Fill factor		
Commercial			
42.	Materials Warranty (years)		
43.	Standard degradation per year		
44.	Power Warranty (years)		
45.	Test laboratory name where offered module has tested and enclose the report		
46.	Are panel insured ? (Please furnish details)		
47.	(Attach following curves) a. V-I curve for incident irradi. For 200W/m ² ,400 W/m ² , 600W/m ² , 800W/m ² , 1000W/m ² at STC. b. V-I curve for incident irradi. For 200W/m ² ,400 W/m ² , 600W/m ² , 800W/m ² , 1000W/m ² at 6 ° C c. V-I curve for incident irradi. For 200W/m ² ,400 W/m ² , 600W/m ² , 800W/m ² , 1000W/m ² at 45° C d. V-I curve for incident irradi. For 200W/m ² ,400 W/m ² , 600W/m ² , 800W/m ² ,		

	1000W/m ² at 37 ° C. e. Temperature Vs Power at incident irradiation. For 200W/m ² , 400 W/m ² , 600W/m ² , 800W/m ² , 1000W/m ² . f. Efficiency Vs Temperature at incident irradiation. For 200W/m ² , 400 W/m ² , 600W/m ² , 800W/m ² , 1000W/m ² .
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5. MOUNTING STRUCTURE

TABLE 12 MOUNTING STRUCTURE DATA SHEET

1	Type	
2	Overall dimensions Design	
3	Coating Dip (galvanized)	
4	Wind rating(Max. design Wind speed)	
5	Tilt angles	
6	Foundation type	
7	Number of Module per structure	
8	Fixing type	

6. TECHNICAL DATA OF PCU

TABLE 13 PCU DATA SHEET

Sr. No.	PARAMETERS	VALUES	REMARK
1.	Manufacture		
2.	Established		
3.	Address.		
4.	Model		
5.	Type (Central/ String)		
6.	Last year MW sell of the model of above model	MW	
7.	Annual Manufacturing capacity of the above model in MW.	MW	
8.	Annual Booked capacity of the above model in MW.	MW	
9.	Total Capacity supplied to the Bidder	MW	
INPUT CHARACTERISTICS (PV array side)			
10.	Operating mode		
11.	Minimum MPP voltage	V	
12.	Maximum MPP Voltage	V	
13.	Absolute Max. PV Voltage , Vmax array	V	
14.	Nominal PV Power Pnom DC	KW	
15.	Min Voltage for PNom	V	
16.	Maximum PV current Imax DC	A	
17.	Power Threshold	W	

18.	DC voltage range MPPT	UPC	
19.	Max permissible DC voltage	UPC max	
20.	Max permissible DC current	IpC max	
21.	Behavior at Pnom (limitation/ unlimited)		
22.	Temperature de-rating curve of the inverter		
Output Data			
23.	Grid Voltage	V	
24.	Grid frequency	HZ	
25.	Maximum Efficiency	%	
26.	European average efficiency	%	
27.	Number of Phases		
28.	Nominal Ac power	KW	
29.	Maximum AC power	KW	
30.	Maximum AC current	A	
31.	Standby loss	%	
32.	Sleep Mode Loss	%	
33.	Operating voltage grid -20% TO 15%	UAC	
34.	Utility type		
35.	Operating frequency grid	fAC	
36.	Voltage ripple PV voltage	UPP	
37.	Phase shift	Cos cp	
38.	Efficiency at 75% and 100% load	%	
Others			
39.	Standards		
40.	Array isolation Monitoring		
41.	Internal DC switch		
42.	Internal AC switch		
43.	Output voltage disconnect adjustment		
44.	Protection (IP24, IP54, NEMA 3R or Any)		
45.	Control (LCD or Any)		
46.	Technology (TL, IGBT or any)		
47.	Digital inputs & outputs		
48.	Monitoring by ethernet, SNMP, MODEM GSM		
49.	Remote & local supervision		
Commercial			
50.	Warranty (years)		
51.	Are PCUs insured ? (please furnish details)		
<p>Attach following curves:</p> <p>a. Efficiency profile Vs input power input</p> <p>b. AC power output Vs DC Power input</p> <p>c. Efficiency Vs Pout</p> <p>Any Additional feature? (attach details)</p>			

7. STRING MONITORING SYSTEM :

Bidder should furnish the following data sheet in consultation with the String Monitor System manufacture should provide the authentication certificate from the Manufacturer.

TABLE 14 STRING MONITORING SYSTEM DATA SHEET

Sr. No.	PARAMETERS	VALUES
1.	Manufacturer	
2.	Established	
3.	Address.	
4.	Model	
5.	Type (Central/ String)	
6.	Last year MW sell of the model of above model	
7.	Annual Manufacturing capacity of the above model in MW. Annual Booked capacity of the above model in MW.	
8.	Total Capacity supplied to the Bidder in MW	
9.	Input voltage range	
10.	Max fuse size	
11.	Max. PV short-circuit current per string Max. number of strings	
12.	Fused inputs per measuring channel	
13.	PV array configuration	
14.	Number of measuring channels	
15.	DC short-circuit current	
16.	Max. operating output current	
17.	Max. number of cables per output port	
18.	Dimensions: W x H x D in mm	
19.	Weight in kg.	
20.	Protection rating	
21.	Housing material	
22.	Permissible ambient temperatures	
23.	Rel. humidity	
24.	Condensation possible	
25.	Connection	
26.	Commercial	
27.	Warranty (years)	
28.	Are insured ?	

	(please furnish details)	
	Attach following curves: Schematic of the system Any Additional feature? (attach details)	

8. DRY TYPE / Oil immersed TRANSFORMER

TABLE 15 DRY TYPE TRANSFORMER DATA SHEET

Sr. No.	DESCRIPTION	Particulars
1	Service	
2	Make	
3	Rating	
4	Rated frequency	
5	No. of Phase and windings - HV Side - LV Side - Neutral	
6	Rated Voltage a) HV winding kV b) LV winding kV	
7	Vector group	
8	IP class	
9	Type of cooling	
10	Tapping a) Range b) No. of steps c) In steps of	
11	Tap changer type	
12	Class of insulation	
13	Temperature rise restricted to class of insulation	
14	% Impedance	
15	Temperature rise above Ambient of 50 Deg. C b) Winding Deg. C	
16	Terminal Details a) HV Side b) LV Side	
17	Insulation level a) Impulse withstand voltage i) HV kV peak b) Power frequency withstand voltage for one minute (dry) i) HV neutral kV rms ii) LV neutral	
18	Minimum specific creepage Distance (mm/kV)	
19	Winding conductor material	

	a) HV b) LV	
20	Losses (at 75° Deg. C and principal Tapping) a) No load loss at rated Voltage and Frequency kW b) Load loss at rated Current (ONAN) kW c) Total loss at maximum Rated power kW	
21	Efficiency at 75° C and 0.9 PF a) at full load (ONAN) % b) at 75% load(ONAN) % c) at 50% load (ONAN) %	
22	Hot spot temp. in winding limited to C	
23	Overall dimensions (L x B x H) (mm)	
24	Shipping dimensions a) Height m b) Breadth m c) Length m	
25	Over all weight kg	
26	Painting	
27	Maximum flux density	
28	Quantity of oil (liters)	
29	Details of Instruments and protection provided with the transformer (Make & Type)	
30	150% voltage withstand capacity in time/cycle	

9. CIRCUIT BREAKER

TABLE 16 VCB DATA SHEET

Sl. No.	PARTICULARS	SPECIFICATION
1	Service	
2	Make & Type	
3	Rating	
4	Circuit breaking capacity (kA)	
5	Short Circuit withstand capacity	
6	Operating time: - Opening time - Closing time	
7	Weight of circuit breaker	
8	Insulation level	
9	Impulse withstand voltage	
10	Rated supply voltage for Control Voltage	
11	Minimum creepage	
12	Overall dimensions	
13	Noise Level At 50 m distance At 150 m distance	

10. POWER AND CONTROL CABLE (LT)

TABLE 17 POWER & CONTROL CABLE DATA SHEET

Sr. No.	Particular	Specification
1.	Conductor	
2.	power cable above 6 sq. mm size	
3.	control cable and power cable (size≤6 sq. mm)	
4.	Voltage rating	
5.	Type of insulation	
6.	Type of Inner sheath	
7.	Type of Armour	
8.	Type of Outer sheath	

11. POWER CABLE (HT)

TABLE 18 HT CABLE DATA SHEET

Sr. No.	Particular	Specification
1.	Conductor	
2.	Voltage rating	
3.	Type of insulation	
4.	Type of Inner sheath	
5.	Type of Armour	
6.	Type of Outer sheath	

12. PYRANOMETER

TABLE 19 PYRANOMETER DATA SHEET

1	Spectral Response	
2	Sensitivity	
3	Time Response	
4	Temperature Range	
5	Temperature Dependence	
6	Accuracy	
7	Signal Output	

CHAPTER 10

LIST OF APPROVED MAKES FOR VITAL ITEMS

Following is the approved list of acceptable makes.

The contactor should supply only the following make items as specified.

10.1 LIST OF ACCEPTABLE MAKES - ELECTRICAL

SR. NO	MATERIAL / ITEMS	APPROVED MAKE
1	TRANSFORMERS	CGL/ALSTOM /EMCO / VOLTAMP/ RAYCHEM/ SIEMENS /ABB – HITACHI/ ESENNAR/ SCHNEIDER- ELECTRIC/ TOSHIBA
2	COMPACT SECONDARY SUBSTATION (CSS)	SCHNEIDER ELECTRIC/SIEMENS/ABB/L&T
3	HT/LT SWITCHGEAR	SCHNEIDER ELECTRIC/SIEMENS/ ABB/ L&T/ALSTOM
4	POWER AND CONTROL CABLES (both AC and DC)	UCL/CCI /FINOLEX /POLYCAB /NICCO/ HAVELLS/KEC
5	CIRCUIT BREAKER (HT / LT)	BHEL/SIEMENS/ABB/SCHNEIDER/GE
6	PROTECTION RELAY FOR SWITCHGEAR (Numeric type only)	ABB/ALSTOM/ SCHNEIDER/ L&T/SIEMENS
7	METER	AEP/IMP/MECO/AE/L&T/SECURE
8	SCADA & AUTOMATION	SCHNEIDER ELECTRIC/SIEMENS/ ABB/ HONEYWELL.
9	CABLE LUGS	COMET/ COSMOS/ DOWELL'S (BILLER INDIA) / JAINSON
10	CABLE GLANDS (DOUBLE COMPRESSION)	COMET /COSMOS/ DOWELL'S /JAINSON
11	HT AND LT PANEL BOARDS	CPRI APPROVED SYSTEM INTEGRATORS
12	PUSH BUTTONS	ABB, L&T, SCHNEIDER, RISHABH
13	MULTIFUNCTION METERS	CONZERV/ RISHAB/ ELMEASURE/SECURE
14	PROTECTION CT	ECS/ERICON/VIDYUT

15	METERING CT	ECS/ERICON/PRAGATI
16	METERING PT	ECS/ERICON/PRAGATI
17	INDICATING LAMPS	L&T, SIEMENS, SCHNEIDER, ABB, RASS CONTROL/TEKNIC

Note: Any other item if not specified above shall be taken prior approval from Engineer-in- Charge before any procurement by the contractor. The contractor shall invariably take prior approval of the samples and Technical data sheets of each and every item from the Engineer In Charge before any procurement on site.

10.2 LIST OF ACCEPTABLE MAKES - SOLAR PV PRODUCTS:

SR. NO	MATERIAL / ITEMS	APPROVED MAKES
1	PCU(Inverters)	SMA /ABB/VACON/SIEMENS /HITACHI /SCHNEIDER/AEG EMERSON/WAREE Or other reputed brands having necessary test certificates from NABL/MNRE/UL (with approval of IITH)
2	PV JUNCTION BOX	SMA/Siemens/ Fibox/Volex India /Citel/ Lumberge connect/Kitani electric /Voka/BDS Or other reputed brands having necessary test certificates from NABL/MNRE/UL (with approval of IITH)
3	PV MODULE (CRYSTALLINE) Indian Manufacturer only	TATA SOLAR/MOSER BAER/BHEL /Renew system/Waree/ PANASONIC/ Or other NABL accredited firm as approved by IITH. Or other reputed brands having necessary test certificates from NABL/MNRE/UL (with approval of IITH)

Note: Any other item if not specified above shall be taken prior approval from Engineer-in- Charge before any procurement by the contractor. The contractor shall invariably take prior approval of the samples and Technical data sheets of each and every item from the Engineer In Charge before any procurement on site.

10.3 LIST OF ACCEPTABLE MAKES - CIVIL WORKS:

This section gives list of approved makes for few items. The contractor shall obtain approval of makes of all materials at time of submission of detailed design. The contractor shall submit the samples of all the materials before procurement.

Sr.No.	Material / Item	Approved Make
1	Anchor Fastner, Rebar, Chemcial/ Mechanical fastner, Core - cutting, Dry stone cladding clamp, Expandable fasteners	Hilti, Fischer
2	Aluminium Sections	Hindalco, Jindal, Bhoruka, Indalco, Global
3	Cement OPC/ PPC	Ultratech, ACC, Lafarge, Bharathi, Zuari.
4	Cement – White	Birla, JK
5	Chemical Admixtures & Additives	BASF, Pidilite, Sika, Fosroc, Ecmas, Sunanda Chemicals, Mapei, Hycrete, Bal-Endura, MC Bauchemie, MYK Schomburg,
6	Crystalline Integral Waterproofing	Kryton, Penetron, Pidilite, BASF, Fosroc,
7	Concrete Cover Blocks	Astra, Ramtec or approved equivalent. For exposed concrete only pointed type shall be
8	Non shrink cementious precision (anchoring) grout	Fosroc, Sika, Ardex Endura, BASF
9	PAINT - Cement Based	ICI Dulux, Berger Paints, Asian, Nerolac,
10	Paint - Acrylic, Synthetic Enamel, Acrylic emulsion- interior and exterior	Asian Paints, Akzo Nobel (Dulux), Berger, Nerolac, Jotun, Nippon
11	Paint - Texture Paints (Interior, Exterior)	Asian, Jotun, ICI Dulux, Berger, Nippon
12	Paint - Anti microbial paint	Asian, Berger, Jotun
13	Paint - Fire Retardant paint	Jotun, Akzo Nobel, Viper-Nullifire, Asian
14	Paint - High Albedo paint/ Solar reflective paint	BASF, Jotun, Sika, Fosroc, Pidilite, Ecmas
15	Paint - Oil Bound Distemper & Dry Distemper	Asian Paints, AkzoNobel (ICI Dulux), Berger
16	Paint - PU paint, epoxy paint and primer	Asian, Nippon, ICI, Berger, Jotun, Nippon
17	Polish for wooden work	MRF, Asian
18	Polysulphide Sealant	Fosroc, Dow corning, Sika, MC-bauchemie
19	Polyurethane Concrete Flooring, Epoxy flooring, Self Levelling compound	BASF, Fosroc, Ardex Endura, MYK Schomburg, Sika,
20	Polyster Powder coating/ PVDF Coating	Jotun, Akzo nobel (Interpon), Valspar, Asian
21	PAINT - Cement Based	ICI Dulux, Berger Paints, Asian, Nerolac
22	Paint - Texture Paints (Interior, Exterior)	Asian, Jotun, ICI Dulux, Berger, Nippon
23	Paint - Oil Bound Distemper & Dry Distemper	Asian Paints, AkzoNobel (ICI Dulux), Berger,
24	Polycarbonate Sheets & Panel system	Tuflite, Gallina India, Dan Pal (Dpi)

Sr.No.	Material / Item	Approved Make
25	Polysulphide Sealant	Fosroc, Dow corning, Sika, MC-bauchemie
26	Polyurethane Concrete Flooring, Epoxy flooring, Self Levelling compound	BASF, Fosroc, Ardex Endura, MYK Schomburg, Sika,
27	Reinforcement Steel	SAIL, TATA (TISCO), RINL, JINDAL
28	Stainless Steel	SAIL, Jindal, Salem steel
29	Stainless Steel Bolts, Washers and Nuts, Pressure plates, screws	Kundan, Puja, Atu, GKW, knettlefoldl
30	Structural Silicon sealant, Weather Silicone	Dow Corning, Momentive (GE)
31	Structure Steel & Hallow Section Producers only	SAIL, TATA (TISCO), RINL, Jindal steel & Power (JSPL) or approved equivalent for non-
	Water Supply Pipes & Fittings	
32	CPVC Water Supply Pipes	Astral / Supreme / Ashirvad
33	G.I. Pipes	Tata / Zenith / Jindal
34	HDPE Pipes	Jain Irrigation / Supreme / Oriplast / Nagarjuna
35	D.I. Pipes	Neco / Welspun
36	Pipe Insulation	Armaflex / Thermaflex
37	CPVC Ball Valve	Ashirvad / Astral / Supreme
38	Pressure Reducing Valves	Zoloto / Sant / Varie
39	Gun Metal Ball Valve	Zoloto / Sant / Leader
40	Gun Metal Wheel Operated Sluice Valve	Zoloto / Sant/ Leader
41	Gun Metal Gate Valve	Zoloto / Sant/ Leader
42	Gun Metal Butterfly Valve	Zoloto / Sant / Leader
43	Gun Metal Non-Return Valve	Zoloto / Sant/ Leader
44	Electrically Operated Actuator Valves	Zoloto / Sant / Equivalent
45	Cast Iron Y Strainer	Zoloto / Sant/ Leader
46	Electronic Water Meter	Krohne / Dwyer
47	Air Release Valve	Zoloto / Sant/ Leader
48	Pressure Gauge	Zoloto / Sant / Equivalent
49	Water Level Sensor / Indicator	Honeywell / Wika / Seimens
50	Pipe Clamps and Support	Intellotech / Fischer / Hitech / Hilti

SECTION-04

PAYMENT TERMS AND PAYMENT SCHEDULE

4.0 THE DETAILED PAYMENT TERMS AND PAYMENT SCHEDULE ARE GIVEN UNDER:

4.1 PAYMENT TERMS

- (i) All the payments against the Schedules specified under Table 21 shall be made through Running Account Bills in specified format.
- (ii) From all Running Account Bill payments of Part-A and Part-B cited below, 2.5% of gross amount of payment shall be withheld as security deposit for the satisfactory performance of the plant. The security deposit so withheld shall be released at the end of five years from date of completion of Part-A as per the completion certificate issued by Engineer-in-Charge subject to adjustments of all amounts towards unattended claims, if any.
- (iii) The contractor is allowed to submit the bank guarantee (BG) in lieu of liquid retention of money from the RA Bills.
- (iv) During the Part- C period of operation and maintenance of Solar Plant, monthly Running Account bills shall be raised by the contractor by 7th of every month in prescribed proforma (CPWA 27A). IITH shall endeavour to make payment of monthly Running Bills within ten working days from the date of receipt of bills with all required documents in the office of Engineer- in-Charge, IITH.
- (v) The tendered amount for Part-A, Part-B and Part-C shall be inclusive of applicable Works Contract Tax under GST.
- (vi) Other Taxes: Income tax/surcharge/cess or any other tax as applicable on the amounts paid by IIT Hyderabad shall be recovered at source at applicable rates as notified by Government of India and a certificate to this extent shall be issued to the contractor.

Table 21: Schedule of Payments

Component	Stage of work	Payment
<p align="center">Part-A Electrical- Mechanical Works (Original Agreement)</p>	<p>Stage 1: Planning and Designing – Submission and approval of all design calculations, drawings, Design Basis Reports (DBRs), Feasibility Reports, PV Syst Software Analysis Report, Shadow analysis, Electrical SLDs, Services Routing plans, SCADA Architecture, I/O summary, and allied drawings good for construction. 1.1 Approval of all Electrical and Mechanical designs drawings - 3.5% [This schedule can be operated in a maximum of two segments].</p>	<p>On submission of Tax invoice by the contractor towards the running bill subject to a maximum of 3.5% of contract amount of Part A</p>
	<p>Stage 2: Delivery of all electro-mechanical equipment including SPV Modules, Inverters, DC Cables, HT & LT Cables, HT/LT Switchgear, Transformers, CSS, Earthing & Lightning protection system, Instrumentation, sensors, PLC, SCADA, Hardware/Software and allied components and upon submission of Delivery Chalan copies) [This schedule can be operated in a maximum of Four segments].</p>	<p>On submission of tax invoice by the contractor towards the running bill subject to a maximum of 50% of contract amount of Part A</p>
	<p>Stage 3: Installation of all Electrical - mechanical equipment's, components, Solar PV Modules, Inverters and allied works including laying of all AC/DC Cables up to the satisfaction of Engineer in Charge. [This schedule can be operated in a maximum of Four segments].</p>	<p>On submission of tax invoice by the contractor towards the running bill subject to a maximum of 16.5% of contract amount of Part A</p>
	<p>Stage 4: Installation of all instrumentation, Automation, SCADA components and allied works for final testing and commissioning of plant. [This schedule can be operated in a maximum of Four segments].</p>	<p>On submission of tax invoice by the contractor towards the running bill subject to a maximum of 10% of contract amount of Part A</p>
	<p>Stage 5: Completion of Testing, Commissioning of all electrical, mechanical works and components and automation works including all PLC, HMI, SCADA, hardware, software, sensors, instruments etc., up to the satisfactory of EiC. [This schedule can be operated in a maximum of Four segments].</p>	<p>On submission of tax invoice by the contractor towards the running bill subject to a maximum of 10% of contract amount of Part A</p>

	Stage 6 (Provisional Final): Completion of performance testing, trial run and commissioning of plant including all allied works related to mechanical/ electrical/ instrumentation works and declaration of completion of Part-A by IITH.	On submission of tax invoice by the contractor towards the running bill subject to a maximum of 10% of contract amount of Part A
Part-B: Civil Works (Original Agreement)	Stage-1: Civil Structures Planning, Surveying, Alignment, Structural Designing, Structural Stability Certification, Architectural & Shop Drawings etc.,	On submission of tax invoice by the contractor towards the running bill subject to a maximum of 2% of contract amount of Part B
	Stage-2: Removal of existing CC Paver Blocks/Demolishing of Concrete or Bitumen Pavements, Earth Work Excavation in all types of soils and Construction of RCC foundations & Pedestals, finishings etc., for enabling Structural Steel Frame Work as mentioned at Civil Tech Specs.	On submission of tax invoice by the contractor towards the running bill subject to a maximum of 12% of contract amount of Part B
	Stage-3: Galvanized Structural Steel Members Procurement, Fabrication, Erection work in riveted, bolted or welded in Built-up sections and its joinery as per the approved design including finishing of members as mentioned at Civil Technical Specs.	On submission of tax invoice by the contractor towards the running bill subject to a maximum of 73% of contract amount of Part B
	Stage-4: Providing cleaning system of Solar Panels by laying of external HDPE main water pipe lines of required size and tap-offs with the CPVC pipes with minimum of 20mm size including plumbing fixtures & fittings, valves, booster pumps, Pumps of required capacities, OH PVC tanks of required capacities wherever required etc., as required for either Sprinkler system or regular plumbing system as mentioned at Civil Tech Specs.	On submission of tax invoice by the contractor towards the running bill subject to a maximum of 10% of contract amount of Part B
	Stage-5: Refilling of soil back into the foundation trenches including compaction, Refixing of Removed CC paver blocks in its position or providing and laying of Cement Concrete (or) Bitumen Pavement patch finishings etc., as the case may be to make it good and get back to as good as original condition of pavements and Plazas as mentioned at Civil Technical Specs and Terms & conditions.	On submission of tax invoice by the contractor towards the running bill subject to a maximum of 3% of contract amount of Part B
Part-C (Supplementary)	Stage 1: The relevant tendered rate shall be paid for Operation and Maintenance of 3.5 MW Solar Plant for 5 Years as monthly RA bills for O&M of plant.	Monthly contract amount rate for relevant period of Part C

Agreement)	Stage 2 (Original Agreement and Supplementary Agreement): On completion of DLP and O&M period of Five years after commissioning of the plant Solar Plant, Final Bill shall be settled under this schedule.	All dues to be settled on submission of Final bill by Contractor.
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SECTION-05
RESPONSE REQUIREMENTS

5.0 Potential bidders may furnish their bids by submitting the following documents in English language as per the indicated formats.

- a) Covering Letter as per the format provided in **Appendix I**.
- b) Supporting documents as per formats provided in **Appendix II** against each of the above-mentioned qualifying criteria as proof of having the capabilities to support the requirements of IIT Hyderabad.
- c) Litigation Impact Statement as per format in **Appendix III**.

5.1 APPENDIXES

APPENDIX - I
Cover Letter from the Bidder
(On Company letter head)

Date :

To
The Executive Engineer-Electrical,
Construction and Maintenance Division,
IIT Hyderabad, Kandi, Sangareddy,
Telangana-502284.

Reference: Notice Inviting Tender for Setting up of 3.5MW (AC) in-house Captive Solar PV Plant at IIT Hyderabad campus which includes Planning, Design, Supply, Installation, Testing & Commissioning with 05years Post commissioning Operation & Maintenance of Plant.

Dear Sir,

This is to notify you that our company intends to submit a response to this NIT for **Setting up of 3.5MW (AC) in-house Captive Solar PV Plant at IIT Hyderabad campus which includes Planning, Design, Supply, Installation, Testing & Commissioning with 05 years Post commissioning Operation & Maintenance of Plant.**

Primary and Secondary contacts for our company are:

Primary Contact Secondary Contact

Name:

Designation:

Address:

Mobile No.

e-mail ID

We confirm that the information contained in this response or any part thereof, including its exhibits, and other documents and instruments delivered or to be delivered to IITH is true, accurate, verifiable and complete. This response includes all information necessary to ensure that the statements therein do not in whole or in part mislead the IITH in its short listing process.

We fully understand and agree to comply that on verification, if any of the information provided here is found to be misleading the short listing process or offering or accepting unduly favors from our company in the short listing process, we are liable to be dismissed from the selection process or termination of the contract during the project, if selected to do so, for undertaking the installation of said Project at IITH.

It is hereby confirmed that I/We are entitled to act on behalf of our corporation/company/firm/organization and empowered to sign this document as well as such other documents, which may be required in this connection.

Dated this Day of 2024

(Signature) (In the capacity of)

Duly authorized to sign the NIT Response for and on behalf of:

Sincerely,

[SYSTEM INTEGRATOR'S NAME]

Name

Title

Signature

Date

(Name and Address of Company) Seal/Stamp of System Integrator

CERTIFICATE AS TO AUTHORISED SIGNATORIES

I, certify that I am of the, and that who signed the above response is authorized to bind the corporation by authority of its governing body.

Date:

(Seal Here)

APPENDIX – II

RESPONSE FORMATS & SUPPORTING DOCUMENTS

The respondent must use the following formats to provide the information against each of the qualifying criteria specified in Section 5.

Form 1

Criterion I: Details of the Organization	
Name	
Nature of the legal status in India	
Nature of business in India	
Date of Incorporation	
Date of Commencement of Business	
Address of the Headquarters	
Address of the Registered Office in India	
Supporting Documents Certificate of Incorporation from Registrar of Companies (ROC), PAN, Service tax Certificate.]	

FORM-02 :

Criterion II: Financial Information			
	FY 2023-24	FY 2022-23	FY 2021-22
Revenue (in INR Crores)			
Profit Before Tax (in INR Crores)			
Revenue from IT Services (in INR Crores)			

Form 3

Criterion III: Solar Installation Project Information (one form for each project reference duly certified by authorized signatory)
Client Information
Name of client
Name of the person who can be referred to from Clients' side, with name, designation, postal address, contact phone, fax number, e-mail id,
Nature of business / operations of client
Revenue/Budget (in case of Government dept.) of the client
Size of operations of customer impacted by the solution in terms of turnover, number of locations, number of employees etc.
Project Details
Brief description of the Project
Functional areas of business covered in the project
Implementation Geographical Location/ Number of Locations / business units at which the project is implemented
Duration of engagement (with Start date and end-date/expected end-date)
Scope of the Project (design, build, operation and maintenance of solar PV installation projects)
<u>Supporting Documents</u> Relevant documents indicating the successful completion of the project

Form 4

Criterion IV: Solar Engineers and Electrical Engineers & Information	
Number of Solar Engineers in the Company	
Number of Electrical Engineers in the Company	
Supporting Documents Certification by the company auditors supporting the number of Solar Engineers and Electrical Engineers in the organization	

Form 5**Criterion V: Support office in Telangana Information****Date of Commencement of Business:****Address of the Headquarters:****Address of the Registered Office in Telangana****Supporting Documents**

Rent Agreement / Labours License / Bank Statements / Undertaking by the competent authority of the company to open the office within 1 month of Work commencement

APPENDIX- III
LITIGATION IMPACT STATEMENT
On Company letterhead

[Date]

To
The Executive Engineer-Electrical,
Construction and Maintenance Division,
IIT Hyderabad, Kandi, Sangareddy,
Telangana-502284.

Reference: Notice Inviting Tender for Setting up of 3.5MW (AC) in-house Captive Solar PV Plant at IIT Hyderabad campus which includes Planning, Design, Supply, Installation, Testing & Commissioning with 05years Post commissioning Operation & Maintenance of Plant.

Dear Sir,

We have read and understood the contents of the Notice Inviting Tender and pursuant to this hereby confirm that we satisfy the eligibility criteria laid out therein. We hereby confirm that save as may be set out in the schedule attached to this statement, there is no litigation (including court, arbitration and other proceedings), inquiry or order from any regulatory authority, current or pending against us, which if adversely determined might have material adverse impact on our ability to carry on our business or pay our debts as they fall due or on our ability to enter into any of the transactions contained in or contemplated in respect of the *Setting up of 3.5MW (AC) in-house Captive Solar PV Plant at IIT Hyderabad campus which includes Planning, Design, Supply, Installation, Testing & Commissioning with 05years Post commissioning Operation & Maintenance of Plant.*

(Signature) (In the capacity of)
Duly authorized to sign the NIT Response for and on behalf of:

Sincerely,
[BIDDER NAME]

Name

Title

Signature

Date

(Name and Address of Company) Seal/Stamp of System Integrator

TABLE-22**BROAD CHECKLIST OF DOCUMENTS TO BE SUBMITTED ALONG WITH TENDER:**

Sl. No.	Doc Ref	Description of the Document	Enclosed Yes/No	Remarks
1	Registration of Firm (ROF)	Copy of valid Registration of Firm (ROF)		
2	PAN details	Copy of PAN card		
3	GST registration details	Copy of GST Registration certificate & GSTIN should accompany the Technical Bid		
4	Details of similar works executed (Detailed Completion certificates & statements to be enclosed)	Three similar works completed each of rated capacity not less than 40% of the 3500kVA capacity Solar PV Power Plant.		
		Two similar works completed each of rated capacity not less than 60% of the 3500kVA capacity Solar PV Plant		
		One similar works completed each of rated capacity not less than 80% of the 3500kVA capacity Solar PV Plant		
5	As per Para No. 1.4 of NIT	Cost of EMD (Rs. 26,00,000/- only)		
6	As per Sl. No.2 of NIT	Copy of Certificate from CA for Average Annual Financial Turnover as specified in the NIT document.		
7	As per Sl. No. 3 of NIT	The bidder should not have incurred any loss (profit after tax should be positive) in more than two years during available last five consecutive balance sheets (balance sheet in case of private/public limited company means its standalone financial statement and consolidated financial statement both), duly audited and certified by the Chartered Accountant.		
8	As per Sl. No. 4 of NIT	Banker's Certificate or Net worth Certificate (as per the prescribed format given in NIT): The bidder shall submit the Banker's certificate or Net-worth certificate as per the below: Banker's Certificate of the amount equal to Rs. 6,40,00,000/-only issued by any scheduled bank, Or Net worth certificate of minimum amount Rs.1,60,00,000/-only, issued by certified Chartered Accountant with UDIN .		
9	As per Sl. No. 5 of NIT	The bidder should have bidding capacity equal to or more than Rs.16,00,00,000/- only.		

10	As per Sl. No. 6 of NIT	The tenderer shall have to furnish an affidavit as per Form 'J' of the NIT		
11	As per Sl. No. 7 of NIT	The bidder shall have Employees Provident Fund (EPF) enlistment and proof of the same shall be attached along with the Technical Bid clearly showing the Provident Fund Code number		
12	As per Sl. No. 8 of NIT	The bidder shall have the Employee State Insurance Corporation (ESIC) enlistment and proof of the same shall be attached with the Technical bid.		
13	As per Sl. No. 9 of NIT	The bidder shall carry a mandatory site visit of IITH campus for the true assessment of this work before bidding and the same shall be acknowledged from the EE-Electrical, IITH as per the format given in Annex-IV		
14	As per Sl. No. 10 of NIT	The bidder shall submit the Indemnity bond as per format provided in Annexure-II.		
15	As per basic eligibility criteria Section B of Project Technical details	a) Detailed Project report including Technical feasibility of Solar Generation at identified various locations/Target locations specified.		
		b) Sources from where the hardware is manufactured along with the hardware specification and plant design, installation and commissioning timelines.		
		c) Technical specifications, including proposed makes of each and every component proposed to be installed in the Project along with their warranty terms.		
		d) Detailed Electrical Plan i.e., Single Line Diagram etc. mentioning the technical details of each Electrical component proposed for the intended Project.		

Note: The above check-list is broad and indicative only. Apart from the above, the bidder shall ensure to submit all the documents along with his technical bid, which are specified in this Notice inviting Tender document and also which are otherwise appropriately required in support of its bid.

5.4 EVALUATION CRITERIA:

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

- (i) The basic eligibility criteria as prescribed in Section 1.0 of this NIT in respect of experience of similar works completed, bidding capacity and financial turnover etc., shall first be scrutinized and the bidders basic eligibility for this work be determined.
- (ii) The bidders qualifying the basic eligibility criteria as set out in Section 1.0 of this NIT shall be evaluated for following criteria by scoring method on the basis of details furnished by them.
- (iii) The scoring for evaluation shall be done as per Table 1. The IITH reserves the right to restrict the list of such qualified bidders to any number deemed suitable by it.
- (iv) IIT Hyderabad may independently verify the credentials submitted by the bidder and may obtain the client feedback directly. In case of adverse feedback of the clients, those bids will be disqualified. The bidders shall give complete contact information of clients of eligible projects while submitting their credentials. Bids with incomplete submissions in this context shall be rejected.

5.5 EVALUATION BREAK-UP

The bidders qualifying the initial criteria for eligibility as set out in above paras, will be evaluated by the scoring method detailed below on the basis of details furnished by them:

(a) Financial strength (Form A, B & C)	Maximum 15 marks
1. Annual Turnover	10 marks
2. Bankers Certificate	5 marks
(b) Experience in eligible similar nature of work during last Seven years (Form “D”)	Maximum 20 marks
<i>A site visit to the project(s) specified in NIT bid may be undertaken by the IITH nominee/committee to assess the quality of the work.</i>	
(c) Fulfilment of basic eligibility criteria related to Project as mentioned in Section-D i.e., submission of Detailed Project report including Technical feasibility of Solar Generation in the identified plazas, areas etc., indicating annual energy generation at target locations, annual degradation of PV modules, estimated annual savings to IIT Hyderabad, Technical Presentation etc.	
	Maximum 25 marks
1. Detail Technical Feasibility report etc.	15 marks
2. Technical Presentation	10 marks
(d) Performance on work (Form “F”)- Time over run	Maximum 20 Marks
(e) Performance on work (Form “F”)- Quality	Maximum 20 Marks
	Total 100 Marks

Notes:

1. *Criteria for evaluation of performance of the contractor is given in Form “K”.*
2. *To become eligible for qualification in technical bid evaluation, the bidder must secure at least fifty percent marks in each attribute (Section a, b, c, d & e) and sixty percent marks in aggregate.*
3. *The department, however, reserves the right to restrict the list of bidders in NIT bid evaluation to any number, as deemed suitable by it.*
4. *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.*

5.6 DISQUALIFICATION

Even though any bidder may satisfy the above requirements, he would be liable to disqualification if he has:

- made misleading or false representation or deliberately suppressed the information in the forms, statements and enclosures required in the eligibility criteria document.
- record of poor performance such as abandoning work, not properly completing the contract, or financial failures / weaknesses etc.,

5.7 FINANCIAL INFORMATION

Bidder should furnish the following financial information: Annual financial statement for the last five years in (Form A) & Bankers Certificate (Form B)/ Net worth certificate in (Form C).

5.8 EXPERIENCE IN SIMILAR WORKS

Bidder shall furnish the following attested credentials in the eligibility document:

- List of all works of similar works successfully completed during the last seven years in (Form D).
- List of the projects under execution or awarded in (Form E).
- Particulars of completed works and performance of the bidder duly authenticated/certified by an Officer not below the rank of Executive Engineer or equivalent should be furnished separately for each work completed or in progress in (Form F).
- In case of projects pertaining to private sector, the bidder shall submit certificates issued by the Project Manager of the Client organization.
- Information in (Form D) should be complete and no work should be left out.

5.9 ORGANIZATION INFORMATION

Bidder shall furnish the following self-attested documents:

- Structure and organization in Form- G.
- Details of Technical and administrative personnel to be employed for the work in Form-H.

5.10 CONSTRUCTION PLANT AND MACHINERY

Bidder shall furnish the following attested documents in the eligibility document:

- List of P& M owned

CRITERIA FOR EVALUATION OF THE PERFORMANCE OF BIDDERS FOR TECHNICAL ELIGIBILITY

Sl. No	Attributes	Marks	Evaluation	
(a)	Financial Strength (Maximum 15 Marks)		(i) 60% marks for minimum eligibility Criteria	
	(i) Average annual Turnover	10 Marks	(ii) 100% marks for twice the minimum eligibility criteria or more.	
	(ii) Bankers Certificate	05 Marks	(iii) In between (i) & (ii)- on pro-rata Basis	
(b)	Experience in similar class of work (Maximum 20 Marks)	20 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	
(c)	Submission of Detailed Project report including Technical feasibility of Solar Generation in the identified plazas, areas etc, Technical Presentation. (i) Technical feasibility report (ii) Technical Presentation	25 marks	# Marks will be given based on the quality of documentation provided by the bidder and as per the assessment of Bid evaluation committee.	
		15marks		
		10marks		
(d)	Performance on works [Time Over Run (TOR)]: Maximum 20 marks			
	Parameter	Calculation for points	Score	Maximum Marks
	If TOR =		1.00 2.00 3.00 >3.50	20
	(i) Without levy of compensation		20 15 10 10	
	(ii) With levy of compensation		20 5 0 -5	
	(iii) Levy of compensation not decided		20 10 0 0	
	TOR = AT/ST, where AT =Actual Time; ST= Stipulated Time. Time in the Agreement plus (+) 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.			
(e)	Performance of works (Quality): Maximum 20 Marks			
	(i) Outstanding	20		
	(ii) Very Good	15		
	(iii) Good	10		
	(iv) Poor	0		

Note:

Performance of work (Quality) certified as “satisfactory” will be treated as good.

1. *Criteria for evaluation of performance of the contractor is given in Form “K”.*
2. *To become eligible for qualification in technical bid evaluation, the bidder must secure at least fifty percent marks in each attribute (Sections a, b, c, d & e) and sixty percent marks in aggregate.*
3. *The department, however, reserves the right to restrict the list of bidders in NIT bid evaluation to any number, as deemed suitable by it.*
4. *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.*

SECTION-06

ANNEXURES

ANNEXURE-I

On non-judicial stamp paper of minimum Rs. 100

Guarantee offered by Bank to IITH in connection with the execution of contracts) Form of Bank Guarantee for Earnest Money Deposit /Performance Guarantee/Security Deposit/Mobilization Advance/ Refund of milestone with held amount

1. Whereas the Executive Engineer (name of division), IITH on behalf of the President of India (hereinafter called "The Government") has invited bids under (NIT number)..... dated for (name of work)..... The Government has further agreed to accept irrevocable Bank Guarantee for Rs. (Rupees only) valid up to (date)*...as Earnest Money Deposit from (Name and address of contractor) (hereinafter called "the contractor") for compliance of his obligations in accordance with the terms and conditions of the said NIT.

OR**

Whereas the Executive Engineer (name of division)..... , IITH on behalf of the President of India (hereinafter called "The Government") has entered into an agreement bearing number..... with(name and address of the contractor)..... (hereinafter called "the Contractor") for execution of work (name of work) The Government has further agreed to accept an irrevocable Bank Guarantee for Rs. (Rupees only) valid upto (date)..... as Performance Guarantee/Security Deposit/Mobilization Advance/Refund of mile stone withheld amount 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)..... (herein after referred to as "the Bank"), hereby undertake to pay to the Government an amount not exceeding Rs. (Rupees.....only) on demand by the Government 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 Government 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 Government any money so demanded notwithstanding any dispute or disputes raised by the contractor in any suit or proceeding pending On non-judicial stamp paper of minimum Rs. 100 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 Government 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 or to extend time of performance by the said Contractor from time to time or to postpone for any time or from time to time any of the powers exercisable by the Government against the said contractor and to forbear or enforce any of the terms and conditions relating to the said agreement and we shall not be relieved from our liability by reason of any such variation or extension being granted to the said Contractor or for any forbearance, act of omission on the part of the Government or any indulgence by the Government to the said Contractor or by any such matter or thing whatsoever which under the law 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 Government 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 Government 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 Government in writing.
9. This Bank Guarantee shall be valid up to unless extended on demand by the Government. 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 extended date of expiry of this guarantee, all our liabilities under this guarantee shall stand discharged.

Date

Witnesses:

1. Signature.....

Authorized signatory

Name and address

Name

Designation Staff code no.

2. Signature

Bank seal

Name and address

* Date to be worked out on the basis of validity period of 90 days where only financial bids are invited and 180 days for two/three bid system from the date of submission of tender.

**In paragraph 1, strike out the portion not applicable. Bank Guarantee will be made either for earnest money or for performance guarantee/security deposit/mobilization advance/Refund of mile stone withheld amount, as the case may be.

ANNEXURE-II

INDEMNITY BOND (VIOLATION OF LAWS, NORMS, ACCIDENTS, DAMAGES ETC)
(On Non-Judicial Stamp Paper of Rs.100/-only)

Name of Project: Setting up of 3.5MW (AC) in-house Captive Solar PV Plant at IIT Hyderabad campus Including Planning, Design, Supply, Installation, Testing & Commissioning with 05years Post commissioning Operation & Maintenance of Plant

KNOW all men by these presents that I/We _____ (Name of Contractor with address) do hereby execute Indemnity Bond in favour of Indian Institute of Technology (IIT) Hyderabad having their office at Kandi, Sangareddy-502284, Telangana, India and for the project IIT Hyderabad under consideration.

On this day of2024

THIS DEED WITNESSETH AS FOLLOWS:

I/We, (Name of Contractor) hereby do indemnify and save harmless IITH having their office at Kandi-502284, Sangareddy, Telangana, India from the following: -

1. Any third party claims, civil or criminal complaints/liabilities/material/life loss during site mishaps and other accidents such as snake bites etc or disputes and/or damages occurring or arising out of any mishaps at the site due to faulty work, negligence, faulty construction and/or for violating any law, rules and regulations in force, for the time being while executing/executed civil works by me/us.
2. Any damages, loss or expenses due to or resulting from any negligence or breach of duty on the part of me/us or any sub-Contractor/s if any, servants or agents.
3. Any claims by an employee of mine/ours or of sub-Contractors if any, under the workman compensation act and employers' Liability act, 1939 or any other law rules and regulations in force for the time being and any acts replacing and/or amending the same or any of the same as may be in force at the time and under any law in respect of injuries to persons or property arising out of and in the course of execution of the Contract work and/or arising out of and in the course of employment of any workman/employee.
4. Any act or omission of mine/ours or sub-Contractor/s if any, our/their servants or agent which may involve any loss, damage, liability, civil or criminal action.

IN WITNESS WHEREOF THE HAS SET HIS/THEIR HANDS ON THIS DAY OF SIGNED AND DELIVERED BY THE AFORESAID IN THE PRESENCE OF WITNESSES:

- 1.
- 2.

ANNEXURE-III
ACCEPTANCE OF TENDER TERMS & CONDITIONS
(To be given on Company Letter Head)

Date:

To
The Executive Engineer-Electrical,
Indian Institute of Technology Hyderabad,
Kandi – 502 284,
Telangana, India.

Sub: Acceptance of Terms & Conditions of Tender.

Tender Reference No: _____

Name of work: -

Dear Sir,

1. I / We have downloaded / obtained the NIT/ tender document(s) for the above mentioned 'NIT' from the web site(s) namely _____ as per your advertisement, given in the above-mentioned website(s).
2. I / We hereby certify that I / we have read the entire terms and conditions of the tender documents (including all documents like annexure(s), schedule(s), etc.), which form part of the contract agreement and I / we shall abide hereby by the terms / conditions / clauses contained therein.
3. The corrigendum(s) issued from time to time by your IITH too have also been taken into consideration, while submitting this acceptance letter.
4. I / We hereby unconditionally accept the tender conditions of above-mentioned tender document(s) / corrigendum(s) in its totality / entirety.
5. I / We certify that all information furnished by the our Firm is true & correct and in the event that the information is found to be incorrect/untrue or found violated, then IIT Hyderabad shall without giving any notice or reason therefore or summarily reject the bid or terminate the contract, without prejudice to any other rights or remedy including the forfeiture of the full said earnest money deposit absolutely.

Yours Faithfully,

(Signature of the Bidder, with Official Seal)

ANNEXURE-IV

MANDATORY SITE VISIT FORMAT

NIT No.: IITH/CMD/ELE/NIT/2024-25/07

This is to certify that I/We (Name of Representative, Designation)
(Name of contractor/firm with address) have visited the site onand are thoroughly aware of the work, technology/machinery installed at IITH campus in relation to the above-mentioned work. We understand the execution site, guidelines, working hours etc. and shall adhere to the contract stipulations, terms, conditions and clauses. We, understand that, if any equipment/machinery, other parameters had been missed out by us during site visit, it shall be deemed to be included in our scope of work as per NIT terms and conditions.

Date of visit:

Signature of Firm's Representative who had visited the site.

Name of Representative & Designation

Verified that Firm had visited the site on

Signature of Engineer-In-Charge

Note: - Site visit is allowed only on working days (Monday to Friday: 9 am to 5 pm except on Holidays).

ANNEXURE-V

ANNUAL ENERGY CONSUMPTION DETAILS OF IITH CAMPUS

Sr No.	Month & Year	CMD (KVA)	kVAh	kWh
		Recorded		
1	Jan-23	3168	1597860	1508480
2	Feb-23	3294	1839200	1735350
3	Mar-23	3504	1597870	1589110
4	Apr-23	4220	973481	966949
4A	Apr-23	4808	2461629	2429321
5	May-23	5006	2409570	2369540
6	Jun-23	5284	2484000	2444500
7	Jul-23	4300	1952740	1926380
8	Aug-23	4308	2037928	1981368
9	Sep-23	4484	2202836	2173328
10	Oct-23	4092	2493676	2491184
11	Nov-23	4352	2108784	2042152
12	Dec-23	4128	1988816	1964300
13	Jan-24	4084	2251908	2274664
14	Feb-24	4488	2372940	2389660
15	Mar-24	6024	3021588	2969188
16	Apr-24	7564	3557252	3464944
17	May-24	7596	3679568	3584452

SECTION-07

FORMS

FORM-A

FINANCIAL INFORMATION

Name of Bidder:

- I. 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).

Fig in Lakhs Rs.

Sl. No.	Particulars	Financial Years				
		2019-20	2020-21	2021-22	2022-23	2023-24
i)	Turnover of construction Works					
ii)	Profit /Loss					

- II. Financial arrangements for carrying out the proposed work.

- III. Net worth Certificate from Bankers of the bidder in the prescribed Form B.

Signature of Chartered Accountant with Seal

Signature of Bidder(s)

FORM – B

FORM OF BANKERS' CERTIFICATE" FROM A SCHEDULED BANK

To
The Executive Engineer -Electrical
Construction and Maintenance Division,
IIT Hyderabad.

This is to certify that to the best of our knowledge and information that Ms./Shri.....
..... 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 Rs.....(Rupees.....).

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

(Signature with seal of Branch Manager)

For the Bank NOTE: (1) In case of partnership firm, certificate should include names of all partners as recorded with the Bank.

2. The bankers certificate should be on letter head of the bank

FORM FOR CERTIFICATE OF NET WORTH FROM CHARTERED ACCOUNTANT

It is to certify that as per the audited balance sheet and profit & loss account during the **financial year 2023-24/ financial year 2022-23(strikeout whichever is not applicable)**, the Net Worth of M/s _____(Name & Registered Address of contractor/ Individual/firm/company), as on _____(the relevant date) is Rs. _____after considering all liabilities. It is further certified that the Networth of the company has not eroded by more than 30% in the last three years ending on **31st March 2024/ 31st March 2023 (strikeout whichever is not applicable)**.

Signature of Chartered Accountant

Name of Chartered Accountant

Membership No. of ICAI

Date and Seal

NOTE: The Turnover Certificate and Networth certificate shall be submitted by the Intending bidder for the same set of consecutive 03 financial years only as per below mentioned options:

OPTION A: Turnover Certificate for the three consecutive financial years ending 31st March 2024 i.e., FY:2021-22, FY:2022-23, FY:2023-24 with Networth Certificate for the financial year, FY:2023-24 ending 31st March 2024.

OR

OPTION B: Turnover Certificate for the three consecutive financial years ending 31st March 2023 i.e., FY:2020-21, FY:2021-22, FY:2022-23 with Networth Certificate for the financial year, FY:2022-23 ending 31st March 2023.

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

1	2	3	4	5	6	7	8	9	10
Sl. No.	Name of work/ project and Location	IITH or sponsoring Organization	Cost of work (in Crores)	Date of commencement as per contract	Stipulated date of completion	Actual date of completion	Litigation /arbitration pending / in progress with details*	Name and address (Postal & email)/ contact no of officer	Whether the work was done on back to back basis. Yes/No

***Indicate gross Amount Claimed and Amount Awarded by the Arbitrator.**

SIGNATURE (S) OF BIDDER (S) (WITH STAMP)

FORM "E"

LIST OF THE PROJECTS UNDER EXECUTION OR AWARDED

Sl. No.	Name of work/ project and Location	IITH or sponsoring Organization	Cost of work (in Crores)	Date of commencement as per contract	Stipulated date of completion	Present Progress (Financial & Physical)	Litigation/ arbitration pending / in progress with details*	Name and address (Postal & email)/ contact no of officer	Whether the work being done on back to back basis. Yes/No

***Indicate gross Amount Claimed and Amount Awarded by the Arbitrator.**

SIGNATURE (S) OF BIDDER (S) (WITH STAMP)

FORM 'F'

PERFORMANCE REPORT OF WORKS REFERRED IN FORM –B& C:

(Bidder may suggested to submit the Performance Report with the details covering in this Form-F)

1.	Name of work / Project & Location	
2.	Agreement No.	
3.	Estimated Cost	
4.	Tendered Cost	
5.	Actual Value of work done.	
6.	Date of Start	
7.	Date of completion	Yes/ No.
	i) Stipulated Date of Completion (as mentioned in work order)	
8.	ii) Actual Date of Completion	
	i) Whether case of levy of compensation for delay has been decided or not	
9.	ii) If decided, amount of compensation levied for delayed completion, if any.	
	1) Quality of Work	Outstanding / Very Good/ Good/ Poor
	2) Financial Soundness	Outstanding / Very Good /Good/Poor
	3) Technical Proficiency	Outstanding / Very Good/ Good/Poor
	4) Resourcefulness	Outstanding / Very Good/ Good/Poor
	5) General Behaviour	Outstanding / Very Good/ Good/Poor
Dated:		Executive Engineer or Equivalent with office stamp

FORM "G"

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 proprietary firm
 - (c) A firm in partnership
 - (d) A limited company or Corporation
4. Particulars of registration with various Government Bodies (attach attested photocopy):

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. Was the bidder ever required to suspend construction for a period of more than six months continuously after he commenced the construction? If so, give the name of the project and reasons of suspension of work:
8. Has the bidder, or any constituent partner in case of partnership firm, ever abandoned the awarded work before its completion? If so, give name of the project and reasons for abandonment:
9. Has the bidder, or any constituent partner in case of partnership firm, ever been debarred/black listed for tendering in any organization at any time? If so, give details:
10. Has the bidder, or any constituent partner in case of partnership firm, ever been convicted by the court of law? If so, give details:
11. In which field of Civil Engineering construction the bidder has specialization and interest?:
12. Any other information considered necessary but not included above.:

Signature of Bidder(s)

**DETAILS OF TECHNICAL & ADMINISTRATIVE PERSONNEL TO BE
EMPLOYED FOR THE WORK**

S.No.	Designation	Total Number	Number available for this work	Name	Qualifications	Professional and experience details of work carried out	How these would be involved in this work	Remarks

Signature of Bidder(s)

**DETAILS OF CONSTRUCTION PLANT AND EQUIPMENT LIKELY TO BE USED
IN CARRYING OUT THE WORK**

Sl. No.	Name of equipment	No.	Capacity or Type	Age	Condition				Current location	Remarks
						Presently owned	Leased	To be Purchased		

Signature of Bidder(s)

AFFIDAVIT

I/we undertake and confirm that our firm/partnership firm has not been blacklisted by any state/Central Departments/PSUs/Autonomous bodies during the last 7 years of its operations. Further that, if such information comes to the notice of the department then I/we shall be debarred for bidding in IIT Hyderabad in future forever. Also, if such information comes to the notice of IIT Hyderabad on any day before date of start of work, the Engineer-in-charge shall be free to cancel the agreement and to forfeit the entire amount of Earnest Money Deposit/Performance Guarantee (Scanned copy of this notarized affidavit to be uploaded at the time of submission of bid)

NOTE: Affidavit to be furnished on a 'Non-Judicial' stamp paper worth Rs.100/-

Signature of Bidder(s) or an authorized Officer of the firm with stamp

Signature of Notary with seal

FORM-L

**WLLINGNESS CERTIFICATE FROM CONCERNED COMPETENT
ASSOCIATE CONTRACTOR**

(Separate for each sub head of E&M work)

Name of Work:

I hereby give my willingness to work as E&M Contractor for Sub Head of the above mentioned work. I will execute the work as per specifications and conditions for the agreement and as per direction of the Engineer-in-charge. Also I will employ full time technically qualified supervisor for the works.

I will attend inspection of officers of the department as and when required.

Signature of Main Contractor

Address Telephone: FAX:

Email:

Signature of Associate Electrical
Contractor

and Registration Detail Address:

Telephone:

FAX:

Email:

FORM –M

PROPOSAL FOR ELIGIBLE ASSOCIATING AGENCIES FOR MINOR COMPONENTS OF WORK

I/we hereby propose the following agencies as per mentioned against each for executing corresponding minor components of work. Their consent letters are also attached.

Sl. No.	Name of Associated Contractor	Category and class of registration	Enlistment copy/completion Certificates attached	Monetary Limit of work	Validity of registration
			Consent letter attached (Yes/No)		

Internal Electrical Installations, UPS street lighting, compound and footpath lighting etc.

MV panels, DG sets and External Service Connection cabling, earthing

Note: Self-attested photocopies of enlistment order, valid electrical contractor license, work experience certificates of each agency for each component of E&M work shall be submitted.

Signature of Main contractor

FORM –N

Name of Project:

CONSENT LETTER FROM ELIGIBLE ASSOCIATE AGENCY OF MINOR COMPONENT OF WORK

I / We hereby give my consent to associate with M/s _____, for executing the minor component of work of _____ (Mention category).

1. I / We will execute the work as per specifications and conditions of the agreement and as per directions of _____ the Engineer –in-Charge for the corresponding minor work till the completion of the work.
2. I / We will be responsible for necessary action to handover the installations and for rectification of defects and repair during the maintenance / warranty period.
3. Also I / We will employ full time technically qualified Engineer / supervisor for the minor component of the work as required for the work. I / We will attend inspection of officers of the department as and when required.

Date:

Signature with date of Major Component Contractor
Address

Signature with date of Associate/ Minor Component Contractor
Address

Witness with address
(From major component contractor side)

Witness with address
(From minor component contractor side)

FORM- "O"

AFFIDAVIT OF MEMORANDUM OF UNDERSTANDING (MOU)

(to be submitted for each and every E&M component on Non-Judicial stamp paper of Rs.100/- only)

1. M/s. (Name of the firm with full address) Enlistment Status
Valid Up to:
(Henceforth called the main Contractor)
2. M/s. (Name of the firm with full address) Enlistment Status
Valid Up to:
(Henceforth called Associate Contractor or Electrical contractor) For the execution of E& M Work)

Name of Project:

We state that M.O.U between us will be treated as an agreement and has legality as per Indian Contract Act (amended up to date) and the IITH can enforce all the terms and conditions of the agreement for execution of the above work. Both of us shall be responsible for the execution of work as per the agreement to the extent this MOU allows. Both the parties shall be paid consequent to the execution as per agreement to the extent this MOU permits. In case of any dispute, either of us will go for mediation/arbitration by the Superintending Engineer (SE) or above, IITH In charge. His decision shall be final and binding on both of us.

We have agreed as under:

1. The Associated Contractor will execute all E & M works in the wholesome manner as per terms and conditions of the agreement. The associate contractor shall be paid as per standard procedure followed by the department and the agreement between parties. Any type of internal transaction between the associate contractor and the main contractor shall be as per their convenience and mutual understanding without involving the department.
2. The Main contractor will execute E & M works by associated electrical contractor as per contract.
3. All the machinery and equipment, tools and tackles required for execution of the E & M works, as per agreement, shall be the responsibility of the Associated Contractor.
4. The site staff required for the E & M work shall be arranged by the Associated Contractor as per terms and conditions of the agreement.
5. Site order book maintained for the said work shall be signed by the main contractor as well as by the Engineer of the Associated Contractor and by Associated Contractor himself.
6. All the correspondence regarding execution of the E & M work shall be done by the department with the Associated Contractor with a copy to the main contractor. In case of non-compliance of the provisions of agreement, the main contractor, as well as the associated contractor shall be responsible. The action under relevant clause of contract will be taken.
7. The main contractor will make payment to associate contractor as and when bill paid by department,

failure to which department shall make payment to associate contractor as per contract condition.

Name of the Sub Head to be indicated:

SIGNATURE OF MAIN CONTRACTOR with Address, telephone No., FAX, email

DATE:
PLACE:

SIGNATURE OF ASSOCIATED CONTRACTOR with Address, telephone No., FAX, email

Date:
Place:

1. Witness with address

2. Witness with address

(From major component contractor side) (From minor component contractor side)

Countersigned Executive Engineer(E)

List of Minimum number of Testing Equipment's for Electrical & Mechanical works

- 1) Megger(LT/HT)- 2 nos.
- 2) Earth Resistance Tester 2 nos.
- 3) Wire Gauge 2 nos.
- 4) Multi meter 2 nos.
- 5) Vernier Calipers 2 nos.
- 6) Tong Tester 2 nos.
- 7) 3-Phase Power Analyzer

SECTION-08

PROFORMA OF SCHEDULES: A TO F

SCHEDULE “A”	: Volume 2 (Price Bid)
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	: For Original works component: General Conditions of Contract CPWD for EPC Works; GCC 2024 for EPC Projects and Standard Operating Procedures for CPWD Works Manual 2024 as amended/ modified up to the last date of submission of Bid. For Operation and Maintenance O&M Component: CPWD GCC for Maintenance works 2023 and CPWD Maintenance Manual 2023 as amended/ modified up to the last date of submission of Bid

Name of Work	: Setting up of 3.5MW (AC) in-house Captive Solar PV Plant at IIT Hyderabad campus which includes Planning, Design, Supply, Installation, Testing & Commissioning with 05years Post commissioning Operation & Maintenance of Plant
Estimated Cost of Work	: Rs. 16,00,00,000/- only. <i>[Part A (Electrical and Mechanical works): Rs. 10,77,40,044/-</i> <i>Part B (Civil Works): Rs. 3,79,96,000/-</i> <i>Part C (Operation & Maintenance): Rs. 1,42,63,956/-]</i>
Earnest Money Deposit	: Rs. 26,00,000/-
Performance Guarantee	: 5% of accepted tender value for Part-A & B (Original works component), Prior to the commencement of work and 5% of the accepted tender value for Part-C (O&M Component), Prior to the commencement of supplementary agreement .
Security Deposit	: 2.50% of bid amount + 50% of the PG amount shall be retained as Security Deposit for the Defect Liability Period (DLP).

SCHEDULE “F” (GENERAL RULES & DIRECTIONS)

- | | |
|--|--|
| a) Officer inviting Tender | : Executive Engineer (Electrical),
Construction and Maintenance Division (CMD),
IIT Hyderabad. |
| b) Applicable mode of EPC Contract | : <i>EPC Mode – I</i> |
| c) Mode of Technology to be adopted | : <i>As per NIT Specifications</i> |
| d) Maximum % of quantity of items of works to be executed of | : <i>(i) Electrical -Mechanical and associated works.....75%</i>
<i>(ii) Civil and associated works.....25%</i> |

Definitions:

- | | |
|--|--|
| (i) <i>Engineer-in-charge of Project</i> | : Executive Engineer (Electrical), IITH or successor thereof. |
| (ii) <i>Engineer-In-charge for Major Component (Electrical-Mechanical works)</i> | : Executive Engineer (Electrical), IITH or successor thereof. |
| (iii) <i>Engineer -in-Charge for Minor Component (Civil Structures, External & Internal Water Supply)</i> | : Executive Engineer (Civil), IITH or Successor thereof. |

- (iv) **Accepting Authority** : Director, IIT Hyderabad or successor thereof.
- (v) Percentage on cost of materials and Labour to cover all overheads and profits : 15% (Fifteen Percentage)
- (vi) Standard Schedule of Rates : CPWD Plinth Area Rates 2023 with modifications and correction slips up to date of submission of bids + Cost Index applicable.
- Department : Construction and Maintenance Division, IIT Hyderabad
- Standard Contract Form : CPWD Form 8 & GCC 2024 for Works on EPC mode enclosed with this tender document.

Clause 1:

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, as applicable for this project. : 15 days

Maximum allowable extension with late fee (non-refundable) @ 0.1% per day of Performance Guarantee amount beyond the period provided in (i) above : 7 days with late fee @ 0.1% per day of PG amount

Clause 2:

Authority for fixing compensation under clause 2 : Superintending Engineer, Construction and Maintenance Division, IIT Hyderabad or successor thereof.

Clause 5:

Number of days from the date of issue of letter of acceptance for reckoning date of start : 15 days from Letter of Acceptance or handing over of site, whichever is later.

5.1.1 (a) Schedule of Handing over of site: : 15 days from Letter of Acceptance (LoA)

5.1.1.(b) Schedule of issue of Designs: : Not Applicable

Clause 5.7:

Recording of hindrances : Applicable

Table of Milestones for Project Completion
Time Period Allowed:12 Months

Sl. No.	Milestone Programme	Time Allowed (from date of start)	Amount to be withheld in case of non-achievement of milestone
1	Planning and Designing – Submission and approval of all design calculations, drawings, Design basis Reports (DBRs), Feasibility Reports, PV Syst Software Analysis Report, Shadow analysis, Electrical SLDs, Services Routing plans, SCADA Architecture, I/O summary allied drawings good for construction.	02 Months	1 % of total contract amount of Part-A
2	Civil Structure and Foundation drawings, Architectural layouts and allied drawings good for construction.	02 months	1% of total contract amount of Part- B
3	Delivery of all Civil Structure and foundation material	3.5 Months	3% of total contract amount of Part- B
4	Delivery of all instrumentation, sensors, HMIs, DC control cables, PLC, HMI, SCADA, hardware, software, sensors, instruments and allied components	04 Months	1 % of total contract amount of Part-A
5	Delivery of all electro-mechanical equipment including SPV Modules, Inverters, HT & LT Cables, HT/LT Switchgear, Transformers, CSS, Earthing system and allied components	05 Months	1 % of total contract amount of Part-A
6	Fabrication and Erection of all Civil structures including Foundation works etc.	5.5 Months	4.5 % of total contract amount of Part- B
7	Final finishing and Final completion of all Civil structure and foundation works including associated plumbing works.	06 Months	1.5 % of total contract amount of Part- B
8	Installation of all Electro-mechanical equipment's, Solar PV Modules. Inverter's, CSS, Breakers, switchgear and allied components	7.5 Months	4 % of total contract amount of Part- A
9	Installation of all instrumentation, sensors, HMIs, DC and AC cables, Earthing and allied works	09 months	1 % of total contract amount of Part-A
10	Testing and commissioning of Electro-Mechanical equipment's including all Solar PV Modules. Inverter's, CSS, Breakers, switchgear, HT< Cables and allied components	10 Months	0.5 % of total contract amount of Part-A

11	Testing and commissioning of all instrumentation, sensors, HMIs, DC and AC cables, Earthing and allied works including all PLC, HMI, SCADA, hardware, software, sensors, instruments, Automation and allied components	11 Months	0.5 % of total contract amount of Part-A
12	Performance Testing, Trial Run and Commissioning of Solar Plant	12 Months	1 % of total contract amount(Part-A)

NOTE:

1. Withheld amount shall be released if and when subsequent milestone is achieved within respective time specified. However, in case milestones are not achieved by the Contractor for the work, the amount shown against milestone shall be withheld without prior notice.
2. Intending bidder may submit phasing of activities/milestones based on their resources and methodology at the time of bidding corresponding to physical milestones/stages indicated in the above table. These shall be formed part of the agreement after approval of the accepting authority, otherwise it would be assumed that agency agrees with the above mentioned physical milestones.

Time allowed for execution of this work : 12 Months

Authority to decide:		
(i) Extension of time	:	Superintending Engineer, IIT Hyderabad or successor thereof.
(ii) Rescheduling of milestones	:	Superintending Engineer, IIT Hyderabad or successor thereof.
(iii) Shifting of date of start in Case of delay in handing over of site	:	Superintending Engineer, IIT Hyderabad or successor thereof.
Clause 6:	:	Applicable
Clause 7:		
Gross work to be done together with net payment /adjustment of advances for material collected, if any, since the last such payment for being eligible to interim payment.	:	<p>(i)As per Schedule of Stage Payment of Solar PV Plant (Part-A), the minimum amount eligible for interim payment is Rs. 20 Lacs for first three RA bills and Rs.50 Lacs for subsequent RA bills. This value includes admissible amount of Secured Advance.</p> <p>(ii) As per Schedule of Stage Payment of Civil Structural Steel Works, Cleaning system etc (Part-B), the minimum amount eligible for interim payment is Rs. 10 Lacs for first three RA bills and Rs.30 Lacs for subsequent RA bills. This value includes admissible amount of Secured Advance.</p> <p>However, Engineer in charge at his discretion may release monthly payment even at a lesser</p>

			amount but the contractor cannot claim as a matter of right and no interest is permitted.
Clause 7A:	:		Yes, Applicable 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 Bidder to the Engineer-in Charge.
Clause 8A:			
Authority to decide compensation on account if contractor fails to submit completion plans	:		Superintending Engineer, IIT Hyderabad
This shall not apply for maintenance or upgradation contracts not involving any services For other works, the limit shall be as below:	:		
Clause 10A:			Applicable
List of testing equipment to be provided by the agency at site lab	:		As per applicable CPWD Specifications and NIT Particular Specifications or as Instructed by the Engineer In Charge (EiC)
Clause 10 B (i):	:		Applicable
Clause 10 B (ii):	:		Applicable as per GCC
Clause 10 B (iii):	:		Not Applicable
Clause 10 B (iv) & (v):	:		Applicable
Clause 10CC:	:		Applicable
Clause 10CC for Maintenance Period:	:		Not applicable
Clause 11:			
Specifications to be followed for execution of work	:		<p>Civil work:</p> <p>1) CPWD Specifications 2019 Volume- I & II with corrections slips up to last date of submission of bid.</p> <p>Electrical work:</p> <p>1. CPWD General Specification for Electrical Works Part I Internal – 2023. 2. CPWD General Specification for Electrical Works Part II External – 2023. 3. CPWD General Specification for Electrical Works Part IV Substation – 2013.</p>

Note:		
	<p>(i) All above specifications shall be applicable along with all correction slips up to the last date of submission/uploading of Bid.</p> <p>(ii) In case of discrepancy in mentioned items / description among any of the following two or more documents, the following order of preference shall be followed. If any item required for completing the work in any of the following documents but not in the order of preference below, shall be applicable and nothing extra shall be paid on this account. However, percentages mentioned in “Schedule of Building wise Sub-Heads” shall have precedence among all the following documents for payment purpose.</p> <ol style="list-style-type: none"> a) Description under Scope of work & Nomenclature of BOQ. b) Architectural Drawings and Schedule of finishes. c) Schedule of Quantities. d) Technical Specifications, Particular Specification and Special Condition, if any e) CPWD Specifications, Electrical & Mechanical and Civil with up to date corrections as on last date of submission of Bid. f) GCC for EPC Projects enclosed with the Bid g) Indian Standard Specifications of B.I.S. h) National Building Code 2016 i) Manufacturers specifications. j) Sound Engineering practices. k) Decision of Engineer-in-charge. <p>Note: A reference made to any Indian Standard Specifications in these documents, shall imply to the latest version of that standard, including such revisions/ amendments as issued by the Bureau of India Standards up to last date of submission of tenders. The Contractor shall keep at his own cost all such publications of relevant Indian Standard applicable to the work at site, with correction slips up to last date of submission of bids.</p>	
Clause 12:	:	Applicable only for the original construction work. Type of work: Project and original work
Clause 12.1:	:	Applicable
Deviation/variation limit:	:	5%
Clause 12.2: Payment of deviations/variations beyond 0.25% of the accepted tendered amount.	:	In case there is any change in scope as defined in the contract, the contractor shall carry out the changes as per direction of Engineer-in Charge and nothing extra shall be payable to the contractor on account of same if the additional cost of such work is up to 0.25% (zero-point two five percent) of the accepted tendered amount and worked out as per sub-clause 12.3 of GCC 2022. Variations/ deviations up to 0.25% (zero-point two five percent) of the accepted tendered amount shall be deducted from overall variations/ deviations for making payment.
Clause 12.3 & Clause 12.4:	:	Applicable

Clause 16:		
Action in case Work not done as per Specifications	:	Superintending Engineer (Civil), IIT Hyderabad.
Clause 17:	:	Defects liability period shall be Five (05) years after declaring the sectional completion of the respective Solar Zones (Plazas) by the Executive Engineer (Electrical) IIT Hyderabad. However, the final completion certificate of the project shall be issued by Superintending Engineer, IIT Hyderabad.
Clause -19,19A,19B,19C,19D,19E,19F, 19G,19H,19I,19J,19K,19L	:	Applicable
Authority to decide penalty for each default under 19C, 19D, 19G & 19K	:	Executive Engineer (Electrical)
Clause 25: Settlement of disputes by Conciliation and Arbitration:		
Conciliator	:	Dean (Planning)
Authority to appoint arbitrator	:	Director, IIT Hyderabad
Seat of Arbitration	:	Hyderabad
Venue of Arbitration	:	IIT Hyderabad
Type of Arbitration Tribunal	:	Sole Arbitrator
<i>Note: Provisions of Arbitration and Conciliation Act 1996 with latest amendments in force shall be applicable.</i>		
Clause 31:	:	Not Applicable

Clause 32:

A. The Requirement of Technical / Architectural Personnel required to be deployed for planning stage (Till all the Architectural & structural drawings are prepared & got approved) and their recovery rates at which recovery shall be made from the Contractor in the event of not fulfilling the provision of clause 32(i) are as below:

Sl. No.	Qualification	Discipline	Number	Minimum Experience (Years)	Designation	Rate of recovery
1	Graduate Architect	Architect	1	10	Lead Architect	Rs. 65,000/- per month
2	Graduate Engineer - Electrical	Electrical Engineer	1	10	E&M Lead Planner	Rs. 60,000/- per Month per person
5	Post Graduate in Structures	Structural Engineer	1	10	Lead Structural Engineer	Rs.75,000/- Per month

B. The Requirement of Technical Representative(s) at Site execution and Recovery Rates at which recovery shall be made from the Contractor in the event of not fulfilling the provision of clause 32(i) are as below:

Sl. No.	Qualification	Number	Minimum Experience (Years)	Designation	Rate at which recovery shall be made from the Contractor in the event of not fulfilling provision of clause 32(i)
1	Graduate Engineer-Electrical	1	10	Project Manager with degree in Electrical Engineering	Rs. 1,00,000/- per month
4	Graduate Engineer or Diploma Engineer-Electrical	4	5 or 10 Respectively	Project/Site Engineer	Rs. 40,000/- per month per person
	Graduate Engineer or Diploma Engineer - Civil	2	5 or 10 Respectively	Project/Site Engineer	Rs. 40,000/- per month per person
5	Graduate Engineer/ Diploma	1	5/10 Respectively	Quality Engineer	Rs. 40,000/- per month per person
6	Diploma	1	8	Surveyor	Rs. 30,000/- per

	Engineer				month per person
7	Graduate Engineer/ Diploma	1	5/10 Respectivel y	Project Planning/billing Engineer	Rs. 40,000/- per month per person
8	Safety Engineer/ Graduate	1	5	Ensuring Safety measure for construction activity	Rs. 40,000/- per month per person

Note:

1. The requirement shown above is the peak requirement. Deployment of personnel as per actual need shall be made by the Contractor as directed by Engineer- in- Charge.
2. The specialized technical staff for execution for components such as Electrical, Mechanical and Civil structures etc. shall be deployed as per the requirement of work.
3. Assistant Engineers retired from Government services who 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.
4. The bidder shall submit a certificate of employment of the technical representative(s) (in the form of copy of Form – 16 or CPF deduction issued to the Engineers employed by him) along with every account bill / final bill and shall produce evidence of regular physical availability of such engineers on the above project whenever required by the 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 2023 with amendments up to the date of submission of bid.
	Variations permissible on theoretical quantities.	
	Cement	
	Cement for works with estimated cost put to tender more than Rs. 5 Lakh.	2% Plus/Minus
	Bitumen for all works.	2.5% Plus only and nil on minus side.
	Steel reinforcement and structural steel	2% Plus/minus side sections for each diameter, section and category.
	All other materials	Nil

RECOVERY RATES FOR QUANTITIES BEYOND PERMISSIBLE VARIATION

S. 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

SECTION- 09

SPECIAL CONDITIONS OF CONTRACT

9.0 GENERAL:

- 9.1 Special Conditions of Contract shall be read in conjunction with the General Conditions of Contract, Schedule of Quantities, specifications of work, approved drawings and any other documents forming part of this contract wherever the context so requires. The order of precedence of the above documents shall be interpreted as per General Conditions of Contract.
- 9.2 Notwithstanding the sub-division of the document into these separate sections and volumes, every part of each shall be deemed to be supplementary of every other part and shall be read with and into the contract so far as it may be practicable to do so.
- 9.3 The materials, design and workmanship shall satisfy the relevant Indian Standards (Latest), the job specifications contained herein and other national / international codes (Latest) referred to. Where the job specifications, stipulate requirements in addition to those contained in the standard codes and specifications, these additional requirements shall also be satisfied. In the absence of any Standards/Specifications/Codes of practices for detailed specifications covering any part of the work covered in this tender, Contractor shall ensure that the work is executed as per the best and sound engineering practices and/or as per the instructions/ directions of Engineer- in-Charge. The decision of EIC as regards the specification to be adopted and their interpretation and the mode of execution of work shall be final and binding on the Contractor and no claim whatsoever shall be entertained on this account.
- 9.4 The Contractor shall execute the whole and every part of the Works in the most professional and workman-like manner and both as regards materials and in other respects in strict accordance with specifications and latest Indian and international codes.
- 9.5 Excavated good earth declared surplus or otherwise shall be disposed of at designated locations as per the directions of the Engineer – in - charge, which shall be different from the disposal site for black cotton soil.
- 9.6 Wherever the Black-cotton soil encountered in foundations of proposed structures and Road works shall be removed the soil in total for the designated designed depths and excavate further more depth of minimum 800mm and said black cotton soil shall be removed and refilled bottom layer of 500mm depth with good moorum soil and then further 300mm depth layer with crushed stone sand (CSS).
- 9.7 For soil required for re-filling, if sufficient space is not available for stacking at site of excavation, the Contractor shall make his own arrangements for transporting and stacking the earth elsewhere and then bring it back for re-filling. Nothing extra shall be paid on this account for to and fro carriage.
- 9.8 Disposal of surplus excavated earth including mud, liquid mud, dismantled RCC, dismantled brick work etc. shall be made only in the dumping yard approved by local authority. It will be the responsibility of the contractor to get the permission for dumping yard from local authority as required. If any royalty /fees is payable to local authority, such royalty / fees shall also be borne by the contractor. Disposal shall be carried out strictly as per the regulations of local authority. However, the above materials shall not be removed out of IITH's premises without prior written authorization of EIC.
- 9.9 The Contractor shall put in place a Vehicle Wash area to ensure that the vehicles exiting the construction work site are free from sediment to avoid dirtying the public roads.

- 9.10 The Contractor shall carefully protect and preserve all bench marks, site details, pegs and other things used in the setting out of the building for Construction. All preliminary works such as establishment of a set of bench marks, permanent DGPS, Total Station/theodolite stations, for the commencement and during the progress of the work and till physical completion of the work shall be carried out by the Contractor at his own cost. It shall be Contractor's responsibility to shift the existing benchmark to his work site to set out the necessary control points and alignment of the various works. The Contractor shall also provide DGPS instrument with other required precision Survey Instruments as per site requirement and/or as directed by EIC. The work of setting out shall be deemed to be a part of general works preparatory to the execution of the work and no separate payment shall be made for the same.
- 9.11 The work will be carried out in accordance with the architectural drawings and structural drawings as approved by the Engineer-in- Charge. The structural and architectural drawings shall have to be properly correlated before executing the work. Working drawings will be submitted by the contractor timely for progressive work and enable EIC to approve the drawings.
- 9.12 Shop drawings giving complete information for the fabrication of the component parts including the location, type, size, length and details of connections shall be prepared well in advance by the contractor before the actual fabrication and got approved from the respective consultants, who are appointed and subsequent approvals of Engineer-in-Charge. Delay in submission of the drawings by the contractor causing consequent delay in approval by the respective consultant shall not absolve the contractor of his responsibilities.
- 9.13 As the Contract is in EPC Mode-1, the Contractor have to supply designs and shop drawings and which got to be approved by respective consultants or Indian Institute of Technology or any other Institute of repute for the particular items as specified and approved subsequently by Engineer-in-charge, and all costs towards the same, including charges for approvals by third party shall be deemed to have been included in the quoted rates.
- 9.14 Architectural drawings shall take precedence over other services drawings in respect of overall dimensions unless and otherwise directed by EIC.
- 9.15 All temporary works, ancillary works, enabling works, including dewatering of surface and subsoil water, preparation and maintenance of temporary drains at the work site, preparation and maintenance of approaches to working areas, wherever required, for execution of the work, shall be the responsibility of the Contractor and all costs towards the same shall be deemed to have been included in the quoted prices.
- 9.16 The scope of Civil works also includes Site development like levelling, grading, civil foundations for the structures, plumbing arrangements for cleaning of solar panels from the nearby tap-off locations and drainage arrangements.
- 9.17 The Contractor shall, at his own expense and without extra charges, make provision for all pumping, dewatering, dredging or bailing out water, if necessary, irrespective of the source of water. The water so pumped out shall be discharged as per local byelaws and as approved by the Engineer-in-charge. The Contractor shall also take all necessary precautions in diverting channels and in discharging the drained water as not to cause damage to the works, crops or any other property within/outside the plot. Excavated area for the basement/ foundation trenches shall be kept free from water while all the works below Ground level are in progress. Nothing extra shall be paid on this account in terms of time and cost.
- 9.18 The Contractor shall at his own expense and without extra charges, take all precautions such as shoring for all depths or any other arrangement as approved by Engineer-in-Charge for ensuring that there shall be no sliding / collapsing of the excavated earth. The measurement for excavation shall be regulated as per the provisions of the MOHTH specification and Nothing extra shall be

payable on account of shoring / other arrangements.

- 9.19 Earth work in excavation and filling for, building works shall be governed under provisions of CPWD Specifications and Delhi Analysis of Rates (DAR).
- 9.20 Further contractor shall take all necessary precautions to protect and safe guard the foundation of the adjacent building / Structure / Overhead/Underground utilities. Nothing extra shall be payable on this account.
- 9.21 For the building items covered by CPWD Specifications shall be executed accordingly. Where it is felt that the CPWD Specifications concerned does not reflect the full scope of work under any item, those items shall be executed as per the Indian Standards or any other relevant Specifications.
- 9.22 Should work be suspended by reason of rain, strike, lockouts or any other cause, Contractor shall take all precautionary measures for the protection of works and at his own cost and shall make good any damage arising from any of these causes to satisfaction of EIC.
- 9.23 Work shall normally be done in a single shift/day. However, if the work is required to be executed in more than one shift in a day for meeting the time lines, the Contractor with prior approval of the Engineer - in -charge, shall have to make necessary arrangements for the same and all costs towards the same shall be deemed to have been included in the quoted rates.
- 9.24 Defect liability period shall start from the date of taking over of sectional completion of building after its completion in all respects as mentioned in Schedule-F@clause-5 and as per the scope of the contract by the Engineer – in - charge.
- 9.25 After completion of Project as mentioned in Schedule-F of the contract, the Solar Plant shall be taken over by the Institute and put to use. To ensure safety of the occupants and prevent from dust & debris, the contractor has to hard barricade the on-going solar plazas being constructed by them nearby, as per the directions of Engineer in Charge.

9.26 LABOUR CAMP:

IITH shall not permit the contractor to set up labour camp within its boundary. Contractor shall make his own arrangements to set up labour camps. The facilities like dwelling units, water supply, lighting arrangement, drainage and sanitation as stipulated in Clause- 19H of the contract shall be arranged by the Contractor and all costs towards the same shall be deemed to have been included in the quoted rates.

- 9.27 The Contractor shall put in place an arrangement for controlled entry and exit of labourers / workers / technicians with Gate Passes or Identification Badges with Colour photographs individually authorized by the Contractor or through Bio-metric system at entry & exit gates as required and all costs towards the same shall be deemed to have been included in the quoted prices.

9.28 MAINTENANCE OF REGISTER OF TESTS: -

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. Contractor shall be responsible for safe custody of all the test registers.

9.29 METHOD STATEMENT:

The contractor shall submit a 'Methods statement' for the approval of the EIC soon after the award of work to him. The 'Methods statement' is a statement by which the construction

procedures for important activities of construction are stated, checked, and approved. The 'Methods statement', should have a description of the item with elaborate procedures in steps to implement the same, the specifications of the materials involved, their testing and acceptance criteria, equipment to be used, precautions to be taken, mode of measurement, etc.

9.30 AMENDMENT OF TENDER DOCUMENT

Before the deadline for submission of tenders, the Tender Document may be modified by Indian Institute of Technology Hyderabad by issue of addendum/ corrigendum. Issue of addendum/ corrigendum will however be stopped 03 days prior to the deadline for submission of tenders as finally stipulated.

Addendum/ corrigendum, if any, will be hosted on e-procurement portal of Ministry of Education, Govt. of India (<https://eprocure.gov.in/eprocure/app;>) and IITH Website (<https://www.iith.ac.in/tenders>) only and shall become a part of the tender document. All Tenderers are advised to see the website for addendum/ corrigendum to the tender document which may be uploaded up to 03 days prior to the deadline for submission of Tender as finally stipulated.

To give prospective tenderer reasonable time in which to take the addendum/ corrigendum into account in preparing their tenders, extension of the deadline for submission of tenders may be given as considered necessary by IITH.

9.4 WORK PROGRAMME:

9.4.1 The Contractor shall, within 15 days after the date of award of the work, submit his detailed work programme preferably in Microsoft Project (Level-3), detailed Project quality plan for works executable at site and also at manufacturer's place, safety plan, for the approval of the Engineer in - charge, which shall clearly set out his proposed schedule for the whole of the Works, the time for completing the major sections of the Works and his schedule for mobilizing the materials and equipment necessary for implementing the Works in a timely cohesive and efficient manner. The Contractor shall submit the above Resource Mobilization Plan on the basis of site /region prevalent labour constants/ productivity factors and separately a Project Material Procurement Plan clearly mentioning the procurement strategy for long lead items.

9.4.2 PROJECT REVIEW MEETINGS:

The contractor, immediately on award of work shall submit details of his key personnel to be engaged for the work at site. In addition, he shall furnish the Engineer-in-Charge detailed organogram involved with the work.

The Contractor shall present the programme and status at various review meetings as required.

i) **Weekly Review Meetings:** Shall be attended by Local Team headed by Project -in-Charge.

ii) Agenda:

- a) Weekly programme v/ s actual achieved in the past week and programme for next week.
- b) Remedial Actions and hold up analysis.
- c) Client query approval.

iii) Monthly Review meetings: Shall be attended by Project -in- Charge and the Management Representative who can take independent decisions.

iv) Agenda

- a) Progress Status/ Statistics.
- b) Completion Outlook.
- c) Major hold ups / slippages.
- d) Assistance required.
- e) Critical issues.
- f) Client query/ approval.
- g) Anticipated cash flow requirement for next two months

9.5.0 WATER AND POWER

9.5.1 **Water:** Contractor shall make his own arrangement for water, required and suitable for construction.

9.5.2 **Power:** Contractor shall make his own arrangements for power required for construction of the Project. Alternately, he may apply for and arrange power at the project site. All associated activities for obtaining necessary approvals and sanctions for construction power shall be coordinated by the contractor, the cost of which shall be deemed to be included in the quoted rates under various items of work (i.e. Schedule of Items)". However, the EIC shall provide all necessary documents / drawings for submission to the TGSPDCL/ TGTRANSCO. All installations / fixtures & fittings / cabling for construction power shall be in the scope of the contractor without any additional cost to the Institute. The delay on part of the Contractor in timely getting the statutory clearances and establishing required installation for adequate power supply shall not be accounted for extension of time and also shall not absolve him of Contractual responsibilities.

9.5.3 If the IITH provides water and electricity, the cost for such facility will be recovered from the bills of the contractor at the prevailing rates of local Government bodies as per actuals.

9.6 MEASUREMENTS, BILLING & TERMS OF PAYMENT:

9.6.1 All works shall be measured as per the Solar Zonewise schedules and Sub-Head wise payment % Breakup provided on actual works done as per the terms and conditions of the tender document.

9.6.2 Contractor shall submit computerized bills as per Clause 6A of GCC.

9.6.3 Terms of Payment: Following shall be the terms of payments for the subject works: -

The above progressive payments are subject to deduction towards income tax and other recoveries as applicable as per the terms of the contract.

Note: The contractor shall prepare and submit a consolidated Bill for the Project. However, separate abstract shall be submitted for each subhead.

9.7 CONTRACT DRAWINGS

The contractor shall keep mandatorily one copy each of approved drawings, conditions of contract, specifications, instructions and schedule of quantities at the site of works available for reference by any authorized representative of IITH/ Engineer- in-charge, at all times during the progress of the works. The drawings shall be displayed and arranged as directed by the Engineer-in- Charge.

9.8 WORK TO BE CARRIED OUT BY SPECIALISED AGENCIES (if any):

9.8.1 The contractor shall submit the following details of the specialized agency (if any) before execution of work as per the Terms and conditions of the Contract for approval of EIC:

List of similar works carried out by the agency during the last five years along with the name of work, name and address of clients, year of execution, value of work done and brief specification of the work. The credentials for such completed works shall be obtained from the Project Manager / Executive Engineer concerned along with contact address.

9.8.2 Notwithstanding the approval of the Engineer-in-Charge for the specialized agencies, the services of the specialized agencies shall be removed wherever the Engineer-in-Charge is not satisfied with the performance of the specialized agency. Thereupon, the Contractor shall immediately arrange for an alternate specialized agency conforming to prescribed eligibility criteria. Nothing extra shall be payable on this account. Further, no extension of time shall be permissible on this account.

9.9 MOCK-UP

9.9.1 The concept of Mock Ups is to assess the performance parameters / quality standards specified for specified item/unit in the project. The main objective of the section is to address issues prior to construction to minimize disruption to the critical path of construction program and is as follows;

- Determine whether the contractor possesses required skill level necessary to construct the activity, assemblies or systems such that the as-built construction will satisfy specified requirement.
- To understand the sequence of operation and discuss alternative sequencing options if any.
- To assess the standard of workmanship and aesthetics to be replicated throughout the project.
- To recognize and resolve potential areas of conflict prior to the commencement of construction.

9.9.2 The Contractor shall prepare the full scale mock-up at site for the Typical Solar Plaza or a Single vehicle Parking as per the directions of and upto the satisfaction of Engineer-in-Charge.

9.9.3 Contractor shall build mock-ups for each form of construction and finish required, including concrete / MS Structure/Solar Panels etc. using materials indicated for the completed work as per given specifications.

9.9.4 Mock up shall be constructed by the same personnel who will be constructing actual construction of the said activity or system on the project along with acting site supervisors, key personnel during actual construction.

9.9.5 Contractor shall furnish the Mock up schedule taking care to ensure that sufficient time period is available between erection / installation of the mock up and actual execution of that item of work to enable EIC to incorporate changes and take corrective actions if any.

9.6.7 The Contractor shall establish the acceptable quality of workmanship as desired by the EIC for each of the items of the Works and their elements by preparing specimens and mock ups as directed by the EIC.

9.6.8 Nothing extra shall be payable for preparing the specimens and the mock ups. No claims of any kind whatsoever including the claim of extension of time will be entertained due to the incorporation of the requirement.

9.6.9 In case of non-approval of the mock-ups by EIC on account of quality issues or other reasons attributable to the Contractor, the mock ups shall be rebuilt up by the Contractor at no extra cost and time to EIC.

9.10 MATERIALS AND SAMPLES:

The Contractor shall arrange a sample room for displaying approved samples which shall be maintained till the completion of the work. No payment will be made to the contractor for the samples procured.

The sample approval shall be given in writing by EIC within 15 days after submission of the sample with supporting catalogues and other documents as required by EIC.

The delay in submittal of the samples by the Contractor and further cascading delay in subsequent approvals and procurement shall not attract any extra cost and time to the Contract.

9.11. RECOMMENDED MAKE OF MATERIALS:

9.11.1 A list of recommended makes of materials is placed in Chapter-10.

9.11.2 The order of preference amongst the various products/materials shall be as follows:

The products/materials shall be as per the Brand specified in the Chapter-10

If the Brand is not specified, then the products/material shall be ISI marked and the same shall be got approved by the Engineer- in-Charge before execution.

If ISI marked product/material is not available, the same shall be as approved by the Engineer-in-Charge before execution.

9.12. MEDIA RELEASES

The Contractor shall not issue any information, publication, document or article for publication concerning the project to the media without the express approval of Indian Institute of Technology Hyderabad.

9.13 COMPLETION CERTIFICATES/NOC FROM LOCAL STATUTORY BODIES

Contractor has to arrange at his own cost work completion certificates or NOCs if required to be obtained, from the local statutory bodies of central and state govt. such as electrical, safety, Fire authority, CEA, TGSPDCL, TGTRANSCO etc. Any fees required for obtaining such NOCs shall be paid by IITH on production of relevant depository challans/ receipts from such Govt. authorities.

The application on behalf of IITH for submission to relevant authorities along with copies of required certificates complete in all respects shall be prepared and submitted by the Contractor well ahead of time so that the actual construction / commissioning of the work is not delayed for want of the approval / inspection by concerned authorities.

The inspection of the works by the authorities shall be arranged by the Contractor and necessary co-ordination and liaison work in this respect shall be the responsibility of the Contractor.

9.14 COMPLETION DRAWINGS & STANDARD MEASUREMENT BOOK (SMB)

9.14.1 During the execution of the Works a set of drawings shall be retained in the Contractor's Site Offices for the exclusive purpose of recording changes made to the Work as the construction

proceeds. On completion of the Work, the Contractor shall submit required details and “Mark-up” of changes if any in all drawings of the project to the EIC. The Contractor shall render all required assistance in getting the "AS BUILT" drawings prepared by the Engineer-in-Charge. These drawings shall include and show all the changes / deviations made from the working drawings during the course of construction and also the other details as called for by the Engineer-in-Charge.

- 9.14.2 Along with the completion drawings the Contractor shall also prepare and submit to the Engineer-in-Charge the Standard Measurement Book (SMB) in the form of a bound book in two sets and a soft copy of the same in Excel. SMB shall incorporate the standard measurements of the all types of Painting works as per the completion / as built drawings in modules finalized in consultation with the Engineer-in-Charge. All the above to be done at no extra cost.

9.15 TOOLS, PLANTS AND MACHINERY

The Contractor shall provide and install at site, T &P as stipulated in Clause of the Contract. The deployment of T&P shall be planned as per work requirement to suit the nature, quantum and speed of the work for lifting/ hoisting construction materials/equipment etc. The T&P shall be maintained in good working condition throughout the progress of work. All adequate precaution regarding formal upkeep of valid Statutory/ Safety credentials of major construction equipment as directed by EIC, their installation, operation, maintenance, materials etc., shall be taken care of. The operating staff to be deployed shall be properly qualified and adequately trained and experienced. All safety precautions shall be taken during the project duration, against possible accident. The Contractor shall deploy his representative to effectively enforce the safety rules and regulations in this regard. Nothing extra shall be payable on this account for the above.

9.15.1 Construction equipment & Mechanization of construction activities:

The contractor shall deploy all necessary tools and plants as per the requirement of the work.

The Contractor shall without prejudice to his overall responsibility to execute and complete the work as per specifications and Time Schedule, progressively deploy adequate equipment, and tools & tackles and augment the same as decided by Engineer-in-Charge depending on the exigencies of the work so as to suit the construction schedule.

The Contractor shall mechanize the construction activities to the maximum extent by deploying all necessary construction equipment/ machinery in adequate numbers and capacities.

9.16 CEMENT & STEEL:

16.1 For Cement and Steel and other materials, as prescribed, the quantities brought at site shall be entered in the respective material at site accounts and shall be treated as issued for maintenance of daily consumption.

The procurement of Cement and Reinforcement Steel, and, their issue and consumption shall be governed as per conditions laid down hereunder.

9.16.1 CEMENT

The Contractor shall procure 53 grade (Conforming to IS:8112) Ordinary Portland Cement, as required in the work, from reputed manufactures of cement, having a production- capacity of one million tonnes per annum or more, such as ACC, Ultratech, etc., as approved by Engineer-in-Charge. Samples of cement arranged by the Contractor shall be taken by the Engineer-in-Charge, and got tested in accordance with provisions of the relevant BIS codes. In case test results indicate that the cement arranged by the Contractor does not conform to the relevant BIS codes, the same shall stand rejected and shall be removed from the site by the Contractor at his own cost forthwith. Procurement of cement of other type and grade shall be on prior approval

of the EIC for specific area of application. However, Portland Pozzolana Cement (PPC) may be allowed to use for non-structural cast-in-situ items of work.

The Contractor shall mandatorily maintain records of the batch sheets in hard copies of all concrete supply on daily basis for monitoring the actual consumption of cement during complete tenure of the Project

Contractor may be allowed to use mineral admixtures as per the approved mix design and in line with relevant IS Codes keeping desired strengths of the concrete and timelines of the buildings/project intact.

9.16.2 STEEL

Reinforcement steel shall mean Fe-500D unless otherwise specified. The Contractor shall procure steel reinforcement TMT bars (of Fe 500 D grade having elongation ratio more than 14.5%) conforming to IS: 1786-2008 or latest / Structural steel conforming to IS:2062, from main producers of Steel like SAIL, TISCO etc., or as approved by the Engineer-in-Charge. The Contractor shall have to obtain and furnish test certificates to the Engineer-in-Charge in respect of all supplies of steel brought by him to the site of work. Samples shall also be taken and tested by the Engineer-in-Charge. In case the test results indicate that the steel arranged by the Contractor does not conform to the specification as above, the same shall stand rejected and shall be removed from the site of work forthwith.

The structural steel, reinforcement steel shall be stored by the Contractor at site of work strictly on hard elevated bed or wooden sleepers enclosed within demarcated area (fabrication yard, reinforcement yard) in such a way as to prevent distortion, corrosion and nothing extra shall be paid on this account. Bars of different sizes (diameters) and lengths shall be stored separately away from the scraps to facilitate easy counting and checking.

Coefficient of weight i.e. the weight per unit length of the steel procured by the Contractor shall be ascertained at site before using it and certified by the Engineer-in-Charge. For this coefficient indicated in CPWD Specifications or any other BIS standards shall be adopted. The standard sectional weights referred to in standard table of the CPWD specifications are to be considered for conversion of length of various sizes of steel Reinforcement bars into weight and as per clause 6.2 of IS 1786.

9.16.3 The actual issue and consumption of steel and cement for the items of the works at site shall be regulated and proper accounts maintained as provided in clause 10 of the contract. The Procurement and consumption of Steel and Cement for the production of Precast Elements at Factory shall be monitored by maintaining proper registers/invoices/DCs/MTCs in line with extent possible as per the clause 10 by the QA & QC team of the Contractor/Agency as deployed and which shall be monitored & verified by the Institute time to time. The theoretical consumption of steel and cement shall be worked out as per procedure prescribed in clause 38 of the contract and shall be governed by conditions laid therein.

9.16.4 Steel and Cement brought to site and remaining unused shall not be removed from site without the written permission of the Engineer-in-Charge

9.17 REPORTS TO BE SUBMITTED

The contractor shall prepare and submit monthly progress report (including progress photographs) for the month to the EIC in three copies within 7 days of the following/next month. Reporting shall continue until the contractor has completed all works including the outstanding work as on the completion date as stated in the taking over certificate for the works. Each report shall include but shall not be limited to the following:

- The status of supply and delivery of major materials and Plant to be incorporated in the Works, and the supply of major items of the Contractor's construction plant;
- Records of personnel and Contractor's equipment on site;
- Activities executed/ achievements during the month.
- copies of quality assurance documents, test results and certificates of materials;
- Safety statistics, including details of any hazardous incidents and activities relating to environmental aspects and public relations; and
- Comparisons of actual and planned progress, with details of any aspects which may jeopardize the completion in accordance with the Contract, and the measures being (or to be) adopted to overcome such aspects.
- Areas of concern/ problems/hold ups & its impact and action plans. And any other reports sought by the EIC.

9.18 QUARRY MATERIALS

The Contractor shall be wholly responsible to identify the suitable sources for quarry materials required for the Works, such as earth, sand, stone, gravel, murrum, etc., and to make his own arrangements (within the contract price) for collection and transportation of the materials irrespective of the leads and lifts required. The party managing the quarry identified by the Contractor should have proper license from the Government of Telangana. All materials supplied by the Contractor shall satisfy the requirements set forth in the Specifications contained in this Bid and shall be subject to the approval of the EIC. The Contractor shall take this into account while offering his rates and no claims whatsoever shall be entertained for extra costs on this account. All the seignorage (royalty) charges, levies etc., payable to Government shall be paid by the Contractor and are deemed to be included in the quoted rates.

19.19 INTERFERENCE WITH TRAFFIC AND ADJOINING PROPERTIES/BUILDINGS:

- 19.19.1 The Contractor shall prepare General Maintenance of Traffic Plan which will be subject to the approval of the EIC. In case any operation connected with the Works requires temporary diversion of the traffic, or obstruction or closure of any road, or any other 'right of way', the approval of the EIC and the respective competent authorities shall be obtained at least one week in advance.
- 19.19.2 The Contractor shall at all times during execution of the Works, ensure an uninterrupted flow of traffic/ students/ faculty/ Staff/occupants of completed buildings on the work locations.
- 19.19.3 The Contractor shall at all times during execution of the Works, provide convenient access to parts, steps, bridges or drives for all entrances to property abutting the work sites and maintain them clear, tidy and free from mud or objectionable matter.
- 19.19.4 If in order to avoid undue interference with the traffic and adjoining properties, the EIC instructs the Contractor to take special precautions or work within restricted Anne periods; the Contractor shall carry out the Works during such time and in such manner as directed by the EIC.
- 19.19.5 The Contractor shall not claim any extra cost or payment on account of all or any of the works specified in the above clauses 19.1 to 19.4.

19.20.0 CONTRACTOR TO CO-ORDINATE HIS WORK WITH OTHER ONTRACTORS:

Various other works may be progressing simultaneously in the project site. The Contractor shall co-ordinate with the other concerned Contractors and take into account the inter-relation with

other works while planning his daily construction activities, so as to eliminate any hindrance to any work(s) and/or to avoid any damages to the work(s) already carried out by other Contractors. The Contractor shall co-ordinate with the other concerned Contractors for all such works as per the Engineer's directions at no extra cost and he shall provide unhindered access to the T&P and machinery of the other contractors as per the directions of EIC.

19.21 SHIFTING OF UTILITY LINES:

During the course of execution of the works under this contract, the contractor is bound to undertake shifting of any Utility line(s) that are required to complete the Works satisfactorily. However, the Institute reserves the option to get such work carried out by other agency, but this shall not relieve the Contractor of any of his responsibilities and obligations under this Contract implying that this shall not be treated as compensation event for extension of time unless otherwise consented by EIC.

19.22 MOBILISATION OF MEN, MATERIALS AND EQUIPMENTS:

All expenses towards mobilization at site and demobilization including bringing the equipment, work force, materials, dismantling the equipment, clearing the site etc. shall be deemed to be included in prices quoted and no separate payments on account of such expenses shall be entertained. the EIC shall have exclusive rights to accept or reject any material or equipment and also the manpower engaged by the Contractor during complete tenure of the Project. This can also lead to demobilization of the supervisory manpower including key persons of the Contractor/Specialized agency in case of their non-satisfactory performance.

19. 23 LIGHTING & WATCH AND WARD:

19.23.1 The contractor shall at his own cost take all precautions to ensure safety of life and property by providing necessary barriers, area lighting, CCTV cameras with live feeding at the construction site and approaches, barrications, watchmen, necessary watch towers etc. during progress of work at all hours including night hours, if required, as directed by the Engineer-in-charge.

19.23.2 The Contractor shall be responsible for the watch and ward of the all construction premises and buildings, safety of all fittings and fixtures including sanitary and water supply fittings and fixtures provided by him against pilferage and breakage during the period of installation till handing over of all the works to IITH. Nothing extra shall be payable on this account.

19.24 DRAWINGS & DESIGN BASIS REPORTS(DBR):

Since the contract is on EPC mode, only concept drawings for the work are attached in the tender document. All other drawings shall be prepared by the contractor and got approved by the Engineer-in-Charge before execution. All drawings shall be made in Latest Version of AutoCAD and the Soft Copies on CDs and Six Hard Copies of Prints (A0 size) of all "Approved Drawings" and "As Built" Drawings shall be supplied by the Contractor to the Engineer – in – charge at Free of cost as per the Approved Program.

Also, Contractor has to submit the Soft/Hard copies of Design Basis Reports(DBR) of the all Structural, Electrical and Mechanical services etc., like as submitted by concerned consultants and which are approved by authorized certifiers.

9.25 APPLICABLE PERMITS:

9.25.1 The contractor(s) shall give to the Municipality, police and other authorities all necessary notices etc. that may be required by law and obtain all requisite licenses for temporary

obstructions, enclosures etc. and pay all fee, taxes and charges which may be levied on account of these operations in executing the contract. He shall make good any damage to the adjoining property whether public or private and shall supply and maintain lights either for illumination or for cautioning the public at night

9.25.2 The Contractor shall ensure that applicable permits mandated by the local bodies are obtained as required under the Applicable Laws. An indicative but not exhaustive list of some of the applicable permits are mentioned below for the guidance of the Contractor.

9.25.3 Consequences on account of failure to obtain the mandatory permits shall be the sole responsibility of the contractor and no claim what so ever shall be entertained by the EIC. Any liability incurred by EIC on account of such failure shall be recovered from the amounts/ payments due to the Contractor.

9.26 ADDITIONAL/EXTRA WORKS:

IITH reserves the right to execute any additional works/extra works, during the execution of work, either by themselves or by appointing any other agency, even though such works are incidental to and necessary for the completion of works awarded to the Contractor.

9.27 QUALITY ASSURANCE:

Detailed quality assurance programme to be followed for the execution of Contract under various divisions of works will be mutually discussed and agreed to. The Contractor shall establish document and maintain an effective quality assurance systems in line with CPWD Quality Assurance Manual for Building Works 2022 and Quality Assurance Policy & Check List for E& M services vide CPWD CSQ(E) Lr.No. 51(4)/CE(E) CSQ/2018/252, dtd 30.01.2018 and also as outlined in other recognized codes.

Quality Assurance System plans/procedures of the Contractor shall be furnished in the form of a QA manual. This document should cover details of the personnel responsible for the quality assurance, plans or procedures to be followed for quality control in respect of all the activities envisaged in the construction works. The quality assurance system should indicate organizational approach for quality control and quality assurance of the construction activities, at all stages of work at site.

IITH or their representative or any 3rd party for QA & QC approved by IITH shall reserve the right to inspect/witness, review any or all stages of work at site as deemed necessary for quality assurance and / or timely completion of the work.

The Contractor has to ensure the deployment of quality Assurance and Quality Control Engineer(s) depending upon the quantum of work. This QA/QC group shall be fully responsible to carry out the work as per standards and all codes' requirements. In case EIC feels that Contractor's QA/ QC Engineer(s) are insufficient, Contractor has to deploy other experienced Engineer(s) as per site requirement and to the full satisfaction of EIC.

9.28 INSURANCE:

Without limiting the Contractor's obligations and responsibilities stated elsewhere in the Contract, the Contractor shall at his own cost arrange, secure and maintain insurance in the joint names of IITH and the contractor with any of the subsidiary of the General Insurance Corporation of India in such a manner that IITH and the contractor are covered for all time during the period of contract i.e. the time period allowed for completion of work, extended period and the defect liability period. The insurance shall be effected in accordance with terms approved by IITH and the contractor shall submit the insurance policies to the Engineer-In-Charge within 15 (Fifteen) days of signing of the agreement along with the receipt of premium. The contractor shall timely pay and submit the receipts of payment of premiums for extensions of policies, if any. The insurance shall cover the following: -

9.29 CONTRACTOR'S ALL RISKS INSURANCE:

The contractor shall insure the work for a sum equivalent to the Contract value or such additional sums as specified and the interests of Indian Institute of Technology Hyderabad against ALL RISKS claims, proceedings, loss or damages, costs, charges and expenses from whatsoever cause arising out of OP in consequence of the execution and maintenance of the work for which the contractor is responsible under the contract.

9.30 WORKMAN COMPENSATION & EMPLOYERS LIABILITY INSURANCE:

This insurance shall be effected for all the contractor's employees engaged in the performance of the contract. IITH shall not be liable in respect of any damages or compensation payable at law in respect of or in consequence of any accident or injury to any workman or any other person in the employment of the contractor and the contractor shall indemnify and keep indemnified the Indian Institute of Technology Hyderabad against all such damages and compensation and against all claims, demands, proceedings, costs, charges and expenses, whatsoever in respect or in relation thereof.

9.30.1 Third Party Insurance The contractor shall be responsible for making good to the satisfaction of the Engineer-in-Charge any loss or any damage to all structures and properties belonging to IITH or being executed or procured or being procured by IITH or of the other agencies within the premises of all work of IITH if such loss or damage is due to fault and or the negligence or willful acts or omissions of the contractor, his employees, agents, representatives.

The contractor shall take sufficient care in moving his plants, equipment and materials from one place to another so that they do not cause any damage to any person or to the property of IITH or any third party including overhead and underground cables and in the event of any damage resulting to the property of the IITH or to a third party during the movement of the aforesaid plant, equipment or materials, the cost of such damages including eventual loss of production, operation or services in any plant or establishment as estimated by the IITH or ascertained or demanded by the third party, shall be borne by the contractor.

9.30.2 Before commencing the execution of the work, the contractor, shall insure and indemnify and keep IITH harmless of all claims, against the contractor's liability for any materials or physical damage, loss or injury which may occur to any property, including that of IITH or to any person including any employee of IITH, or arising out of the execution of the work or in the carrying out of the contract, otherwise than due to the matters referred to in the provision to (a)above. Such insurance shall be effected for an amount sufficient to cover such risks. The terms shall include a provision whereby, in the event of any claim being brought or made against IITH the insurer shall indemnify IITH against such claims and any costs, charges and expenses in respect thereof.

9.30.3 The contractor shall also at times indemnify IITH against all claims, damages or compensation under the provisions of Payment or Wages Act, 1936, Minimum Wages Act, 1948, Employer's Liability Act, 1938, the Workman's Compensation Act, 1947, Industrial Disputes Act, 1947 and Maternity Benefit Act, 1961, or any modification thereof or any other law relating thereof and rules made there under from time to time.

9.30.4 Contractor shall also at his own cost carry and maintain any and all other insurance(s) which he may be required to take out under any laws or regulation from time to time. He shall also carry and maintain any other insurance, which may be required by the Engineer-in-Charge.

9.30.5 The Contractor shall prove to the Engineer-in-charge from time to time he has taken out all the insurance policies referred to above and has paid the necessary premiums for keeping the policies alive till expiry of the Defects Liability Period.

9.30.6 The aforesaid insurance policies shall provide that they shall not be cancelled till the Engineer-in-charge has agreed for cancellation.

9.30.7 Remedy on the contractor's Failure to insure If the contractor shall fail to effect and keep in force the insurance referred to above or any other insurance which he /they may be required to effect under the terms of the contract then and in any such case Engineer-in-charge may without being bound to, effect and keep in force any such insurance and pay such premium or premiums, as may be necessary for that purpose and from time to time deduct the amount so paid by the Engineer-in-charge from any moneys due or which may become due to the contractor or recover the same as a debt due from the contractor.

9.31.0 INDEMNITIES:

The Contractor shall indemnify and hold harmless the IITH, the IITH's Personnel, and their respective agents, against and from all claims, damages, losses and expenses (including legal fees and expenses) in respect of:

- a) bodily injury, sickness, disease or death, of any person whatsoever arising out of or in the course of or by reason of the Contractor's design (if any), the execution and completion of the Works and the remedying any defects, unless attributable to any negligence, willful act or breach of the Contract by the IITH, the IITH's Personnel, or any of their respective agents, and damage to or loss of any property, real or personal (other than the Works), to the extent that such damage or loss arises out of or in the course of or by reason of the Contractor's design (if any), the execution and completion of the Works and the remedying of any defects, unless and to the extent that any such damage or loss is attributable to any negligence, willful act or breach of the Contract by the IITH, the IITH's Personnel, their respective agents, or anyone directly or indirectly employed by any of them.

9.32. FACTORY ACCEPTANCE TESTING (FAT):

The Contractor shall facilitate and organise Factory Acceptance Testing (FAT) inspections for IIT Hyderabad personnel who are nominated for the items which are mandatorily required FAT inspections by Engineer-in-charge.

9.33. PRO-RATA BASIS PAYMENTS:

The Solar Plaza zonewise wise /Sub-Head wise Percentage weightages of payment schedule of items mentioned at NIT are indicative and the payment may be released on Pro-rata basis against progressive quantum of work executed/procured materials as the case applicable to enable the cash flow to the Contractor as per the directions of Engineer-in-Charge.

9.34SPECIAL CONDITIONS OF CONTRACT FOR EXECUTION OF ALL SPECIALIZED ELECTRICAL & MECHANICAL (E & M) WORKS:

Association of Other Agencies for Execution of Specialized E&M Works by Main Contractor:

- 9.33.1 The bidder should either himself meet the eligibility conditions for the respective E&M components or otherwise he will have to associate with specialized agencies, fulfilling the eligibility requirements and hence consent letter from at least one eligible associate agency of the respective components of E&M work shall also be submitted as per attached Proforma as per Form "P".

In case the main contractor is himself eligible (as per eligibility criteria) for executing any specific minor component and intends doing the job himself, he may not be required to associate

with another agency for that minor component of work. In such cases the main contractor also has to submit the documents as per eligibility criteria mentioned for associated agency of individual E&M component.

However, the Composite category contractor shall also be eligible to carry out himself any or all of these works without associating any specialized agency provided:

He fulfil the prescribed eligibility criteria respectively for these work(s) If the main contractor does not fulfil the minimum eligibility criteria, the main contractor has to enter into MoU with agencies contractor(s) associated by him who is found eligible as per the eligibility criteria. Copy of such MoU shall be submitted to Engineer -in- charge of minor component .In case of change of associate contractor, the main contractor has to enter into agreement with the new contractor associated by him.

In case the main contractor intends to change any of the above agency/agencies during the operation of the contract, he shall obtain prior approval of Engineer-in-charge of relevant specialized component(s). The new agency/agencies shall also have to satisfy the laid down eligibility criteria. In case Engineer-in-charge is not satisfied with the performance of any agency, he can direct the contractor to change the agency executing such items of work and this shall be binding on the contractor.

The department (CMD, IITH) reserves the right to allow the main firm to submit additional Documents/additional names of the associates in case of the deficiencies in documents or in case of no associate getting qualified in respect of certain subheads. The same will have to be complied with the main contractor within the time allowed. The decision of the department shall be firm & binding on the intending bidders.

The main contractor should submit the willingness from eligible electrical/specialized contractors to get associated with him/her for execution of the specialized E & M component of works in wholesome manner and as per the conditions set out in the MOU to be entered into, between the one who is awarded the work and the associated eligible electrical contractor.

9.33.2 The main contractor has to submit the following documents for association of specialized agencies /associated contractor within one month of award of work:

- (i) In support of the eligibility conditions of the proposed associated Contractor, copy of their registration documents, Electrical License, GST Documents duly attested by the applicants (Main Contractor) shall be submitted to the Engineer-In- Charge for deciding the eligibility. Each such Associated Contractor will certify that they are not debarred from any Central Govt./State Govt., Central/State Govt. PSU/Autonomous bodies as on the day of application of tender. Proposal for associating agency for minor components of work shall be submitted in Form- “N” of this tender document from each associate independently for all electrical and mechanical components.
- (ii) The main contractor will submit the true copy of MOU signed with eligible associated agency. The MOU in the enclosed Form Q shall be signed by both the parties“ main contractor i.e., as 1st party and associated contractor as 2nd party. Independently for all electrical and mechanical components.

9.33.3 In the event of the concerned E&M agency not performing satisfactorily or failure of associate contractor to complete the E&M work, the main contractor on written directions of the Engineer in Charge of minor component, shall remove the associate contractor deployed on the work and shall submit name of new associate who fulfil the conditions mentioned in IITH to execute the left-over work without any loss of time or variation in cost to the department. Such associates shall also give an undertaking along with the main tenderer but both of them together will stand

guarantee for the equipment already supplied for which payment has been released by the department in part. If any equipment supplied for the work, during the currency of the earlier Associate contractor and paid partly by the Dept., becomes redundant /not in a position to be installed and commissioned and put to beneficial use due to change in agency for execution of E&M work, the main contractor shall be liable for replacement of the equipment(s) at no cost to Department. No change of Associated Contractor will be allowed without prior approval of the Engineer-in-charge of minor component of the work.

9.33.4 In respect of all works i.e., Solar PV Modules, Inverters, HT/LT Switchgears, Transformers, HT/LT Cables, Compact Secondary substation (CSS), SCADA, PLCA, Automation Components, Sensors, and allied components, the materials shall be procured only from the original equipment manufacturers/ authorized dealers of OEM. The contractor shall submit all documentary details in fulfilment of this conditions regarding procurement of materials including relevant test certificates.

9.33.5 Special Conditions for E&M Work are appended with this tender. It will be obligatory on the part of the contractor/tenderer to sign the tender documents for all the component parts.

9.33.6 The main contractor shall be responsible and liable for proper and complete execution of the E & M work and ensure coordination and completion of both civil and E & M work.

The associate contractor shall attend the inspection of the work by the Engineer-in-Charge of E&M works as and when required. The agencies executing the electrical work should have valid license for LT/HT as applicable and as described in eligibility criteria. Verifiable completion certificates of the work eligibility documents as the case may be, duly attested by the applicant shall be submitted. Valid Electrical Contractor' license, as the case may be, duly countersigned by the applicant as well as signed by the associate contractors shall also be submitted. Self-attested GST documents in respect of the associated agencies as well as signed by associate firms shall be submitted after the award of work.

The agencies executing the electrical work should have valid license for LT/HT as applicable and as described in eligibility criteria.

Class 1 category Electrical license issued by respective state department is required to execute any HT work. Class 2 category Electrical license issued by respective state department is required to execute any LT work. Main contractor/associate contractor shall submit the eligibility documents accordingly.

9.34 GENERAL CONDITIONS FOR ALL E&M WORKS:

- The agency must study various CPWD specifications; get themselves acquainted with site and site conditions, provision for firefighting system for various buildings in local byelaws and additional conditions carefully. The work shall be executed in close co-ordination with the progress of building work.
- All the equipment shall be delivered with
 - Manufacturer's test certificate,
 - Manufacturer's technical catalogues and Installation / Instruction (O&M) manuals.
- Scaffoldings & any other T & P required for execution, testing and commissioning of work shall be arranged by the contractor and is included in the cost of work tendered by the contractor.

- The design layout plans / drawings / other documents pertaining to E & M services shall have to be submitted by the consultant engaged by the contractor for approval from the Engineer in Charge of minor component within the time period as specified in the approved milestone chart.
- The main contractor shall submit the milestone/pert chart for completion of each activity as per the scope of work including details design and engineering, drawings, submissions and the same shall be got approved from the Engineer in Charge of minor component for further necessary execution.
- Inspection before Dispatch: All routine tests shall be conducted before dispatch of equipment's. No equipment shall be dispatched out from the manufactures premises before such tests are conducted and test result recorded. These test certificates shall be given along the supply of equipment. The Engineer- in-charge shall, if he so desires inspect and witness the pre-delivery tests. For this purpose, the agency shall give 15-day advance notice. Agency shall arrange for inspection of the department (FAT). The main contractor has to organize the FAT inspections with IITH personnel by intimating them in advance. However, the inspection shall be done at the discretion of the Engineer-In-charge without any additional cost implication by the contractor to IITH for FAT but ROUTINE TEST & TYPE TEST Certificates shall have to be submitted for equipment.
- Prior to dispatch, all equipment's 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, humid climate and accidents etc.

9.35 PROCEDURE FOR APPROVAL OF MATERIALS, SHOP FLOOR DRAWINGS AND COMMENCEMENT OF WORK

Within the time specified in the approved table of milestone, the contractor shall submit the following documents for approval.

- (i) List of makes & Model numbers of all items of equipment and accessories each sub Head of work.
- (ii) Catalogues of the equipment to be supplied.
- (iii) Shop floor drawings of each packages/ Sub work separately for approval.

It is the responsibility of the tenderer to get the makes, models and shop floor drawings approved by the Engineer-In-charge before placing of order.

- 9.36 Quality of material and workmanship: 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.

9.37 Inspection and testing at site:

- (i) The installation shall be subject to necessary inspection during every stage of erection, by the Engineer In-charge or his authorized representative. The Contractor shall provide all facilities and assistance for the purpose.

- (ii) The completed installation shall be inspected and tested by the Engineer-in charge in the manner as will be laid down by department.
- (iii) All instruments and facilities necessary for the tests at site shall be provided by the agency.
- iv) Some of the mandatory test to be complied by the contractor are as follows:
 - a) Insulation resistance test of cables
 - b) Insulation resistance test of ACBs/MCCB
 - c) Earth Resistance Testing
 - d) Functional Testing of LT Panel
 - e) Power supply quality testing

9.38 Completeness of work:

- (i) The installations shall be completed in all respects and put in to operation even where certain details have not been mentioned / left out in these specifications. Any discrepancy may be brought out in pre-bid meeting.
- (ii) All E&M services such as electrical installations, substation MV panels, cables, Transformers etc. shall be declared as completed after completion of trial run of 1 month or completion of whole work whichever is later. However, maintenance of these installations during the maintenance period of 60 months shall be carried out by the agency at his own cost.
- (iii) DLP / Warranty period of all works / machine / equipment shall commence from date of completion of complete work each Solar plaza zone wise.
- (iv) All electrical & mechanical fittings / fixture / appliances, to be provided for the work, where BEE certification is available should have 5-star rating (of BEE).

The CPWD specifications are available at CPWD website “cpwd.gov.in”. The department shall not be responsible for the lack of knowledge and also the consequences thereof to the Contractor. The information and data mentioned in the tender document have been furnished in good faith and for general information and guidance only. The Engineer-in-Charge in no case shall be held responsible for the accuracy thereof and / or interpretations or conclusions drawn there from by the Contractor and all consequences shall be borne by the Contractor and no claim, whatsoever, shall be entertained from the Contractor, if the data or information furnished in tender document is different from data / drawing after Preparation of architectural drawings, design and approved for construction. It is presumed that the Contractor has satisfied himself for all possible contingencies, situations, bottlenecks and acts of coordination, which may be required between different agencies.

9.39 QUALITY ASSURANCE: The Contractor shall make available, on request from the Department, for record, copies of challans, Purchase order copy, receipts and other certificates, if any, vouchers towards the quantity and quality of various materials procured and the same shall be kept in record. These shall also provide information on the name of the manufacturer, manufacturer’s product identification, manufacturer’s instructions, warning, date of manufacturing and test certificates from manufacturers for the product for each consignment delivered at site, shelf life, if any, for the department to ensure that the material have been procured from the approved source and of the approved quality, as directed by the Engineer-in-Charge. Day to day account of receipt of such material shall be maintained at site of work and shall be regulated by the department. Nothing extra shall be payable on this account. The contractor shall prepare a Quality Assurance Plan (QAP) in line with the CPWD Quality Assurance Policy and Checklist for E and M services and get it approved from the Executive

Engineer-Electrical, IITH for further implementation during execution of Project.

9.40 STORAGE OF MATERIALS: Storage and safe custody of all materials shall be the sole responsibility of the Contractor. Nothing extra shall be payable on this account.

9.41 QUALITY CONTROL AND TESTING OF MATERIALS:

- (i) All the material to be used on works shall bear ISI certification mark unless otherwise the make is specified in the item or special conditions appended this tender document. In case ISI mark material or the materials mentioned in the tender documents are not available, as per opinion of Engineer-in-charge, which shall be final and binding, the material to be used shall conform to CPWD specifications applicable in this tender or IS Code. In such cases Engineer-in-charge shall satisfy himself about the quality of such material and give his approval in writing. Only articles classified as first quality by the manufacturers shall be used unless otherwise specified. All material not having ISI mark shall be tested as per relevant ISI specification. The Engineer in charge may relax the condition regarding testing if the quantity of the materials required for the work is small. In all cases of use of ISI marked materials proper proof of procurement of materials from authentic manufacturers shall be provided by the contractor to the entire satisfaction of Engineer-in-charge. All materials equivalent to the one specified should be got approved by the Engineer-in-charge before using the said materials in the work.
- (ii) If the department desires to send any samples of materials for testing in an accredited laboratory, the Contractor at his own expense shall supply all materials, labour for preparing and testing samples as required by the Engineer-in-Charge. The testing shall be carried out in the presence of the representative of the Engineer- in- Charge. The transportation and testing charges shall also be borne by the contractor. The major samples which can be tested are wires, cables, PEX pipes, Chiller MS Pipes, PVC/MS Conduit Pipes.
 - (iii) Main contractor/ Associate Agency shall submit the required quantity of material as sample for testing from Govt./ Approved Private Laboratory.
 - (iv) Department shall send the samples to the testing laboratory & the test results shall directly come to department however, the cost of all testing shall be borne by the contractor.

9.42 No foreign exchange shall be made available by the department for importing (purchase) of equipment, plants, machinery, materials of any kind. No delay and no claim of any kind shall be entertained from the Contractor on account of variation in the foreign exchange rate and/or any Custom duties / charges or any other levies.

9.43 The tenderers shall take into account the element of wastage(s) those are likely to be there in all elements of the work and quote his price, taking that into account. The tenderers shall study all the items from the point of view of wastage(s), which are likely to take place.

9.44 Power supply required for construction, testing & commissioning shall have to be arranged by the Contractor at his own costs. Water required for testing of equipment is also in the scope of agency.

9.45 The description of E &M service & specification are given in general but they are not exhaustive i.e.; does not mention all the incidental works required to be carried out for complete execution of the item of work. The work shall be carried out, all in accordance with true intent and meaning of the specifications and the 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 are not mentioned in the contract document/specifications but will be necessary to complete the item in all respects. All these incidental works/ costs which are not mentioned, but are necessary to complete the work shall be deemed to have

been included in the overall amount quoted by the 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.

9.46 The scope of works also covers the preparation of layout plans, drawings for E & M schemes and approval of the same from the respective local bodies viz. Fire Officer/Lift Inspector/ CFO/ Electrical Inspector etc. before the commencement of work. During execution, if the local bodies etc. require a modification, the same shall be executed without any extra cost. Finally, after execution, 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 by the local bodies necessary for approvals / NOCs / clearances, the same shall be get executed and nothing extra shall be paid on this account. All statutory fees / charges required for obtaining clearances from Fire Officer/Lift Inspector/CEA / Local Bodies etc. shall be paid by the department.

9.47 The Make in India Policy of Govt. of India is invariably applicable to this NIT.

9.48 CONSULTANCY SERVICES FOR PROJECT:

9.48.1 SCOPE OF SERVICES:

- I. The contractor himself or the consultant appointed by the contractor shall provide consultancy services in the following areas:
 - i. All Electrical Engineering services
 - ii. All Mechanical Engineering services
 - iii. All Civil structure designing
 - iv. All Solar PV Module Planning & Designing
 - v. All works including electrical Installation, External Electrification, MV Panels, Transformers, Compact Secondary substation(CSS), routes for service connection, substation works, power distribution in each solar plaza,
 - vi. Electrical load details and Electrical Single line diagrams at substation level as well as solar plaza level including complete Internal/External Power distribution scheme.
 - vii. Any other services specified in this NIT document which are required but not specifically indicated.
 - viii. The contractor shall prepare and submit the Design Basis Report (DBR) including all design calculations, feasibility analysis, PV Syst reports, Shadow analysis etc. required for the comprehensive study and planning of the Project with the appropriate software.
- The consultant shall provide comprehensive consultancy services broadly described hereinafter. However, it should be clearly understand 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 Institute.

The consultant shall perform all the Architectural, design of Solar Plaza E&M services etc. by utilizing the most economical, effective and widely accepted engineering concepts/practices and shall at all times show a high degree of professionalism in his work.

The consultant shall be fully responsible for the design of all the Electrical & Mechanical engineering works.

9.49 ELIGIBILITY CONDITION FOR EXECUTION OF MINOR COMPONENT OF PROJECT

Minor component of Structural Steel, Civil and Plumbing Works have to be executed by the major component contractor and have to take up the minor component of Civil Works by them through one of the specialized agency/Civil Contractor, who have executed the similar works in last 07years, fulfilling the criteria as mentioned below. The proposed Specialized agency/Civil Contractor credentials shall be evaluated and approved by the Engineer in Charge (Minor Component) before commencement of the said minor component Structural Steel & Civil Works:

The said Structural Steel, Civil & Plumbing minor component agency have to fulfil the experience in one of the following criteria by considering the **Similar work as “Construction of Structural Steel Buildings OR Pre-engineered OR Pre-fabricated Steel Structures with trusses and frames including associated RCC foundations, Plumbing services (Other than steel structures shall not be eligible)”**.

Three similar works each of value not less than Rs. 1,51,98,400/- only.

OR

Two similar works each of value not less than Rs. 2,27,97,600/- only.

OR

One similar work of value not less than Rs. 3,03,96,800/- only.

9.50 Mode of Operandi of Engineers-in-Charge (EIC) of the work:

Executive Engineer (Electrical), Construction and Maintenance Division, IIT Hyderabad shall act as Engineer-in-Charge of the Major Component which includes all Electrical, Mechanical and allied works including SCADA, Automation, sensors etc.

Executive Engineer (Civil), Construction and Maintenance Division, IIT Hyderabad shall act as Engineer-in-Charge of Minor Component which includes all Civil, Structure and allied works including Plumbing related works.

Other than minor component, all other purposes shall be dealt by Engineer-in-charge of Major component. Running payment for the major component shall be made by Engineer-in-Charge of major component to the main contractor.

Running payment for the minor component shall be made by Engineer-in-Charge of minor component directly to the main contractor.

In case the main contractor intends to change any agency/agencies during the operation of the contract, he shall obtain prior approval of respective Engineer-in-Charge of the agreement. The new agency/agencies shall also have to satisfy the laid down eligibility criteria. In case Engineer-in-Charge of respective major/minor component is not satisfied with the performance of any agency, he can direct the contractor to change the agency executing such items of work and this shall be binding on the contractor.

Final bill of whole work shall be finalized and paid by the Engineer-in-Charge of major component

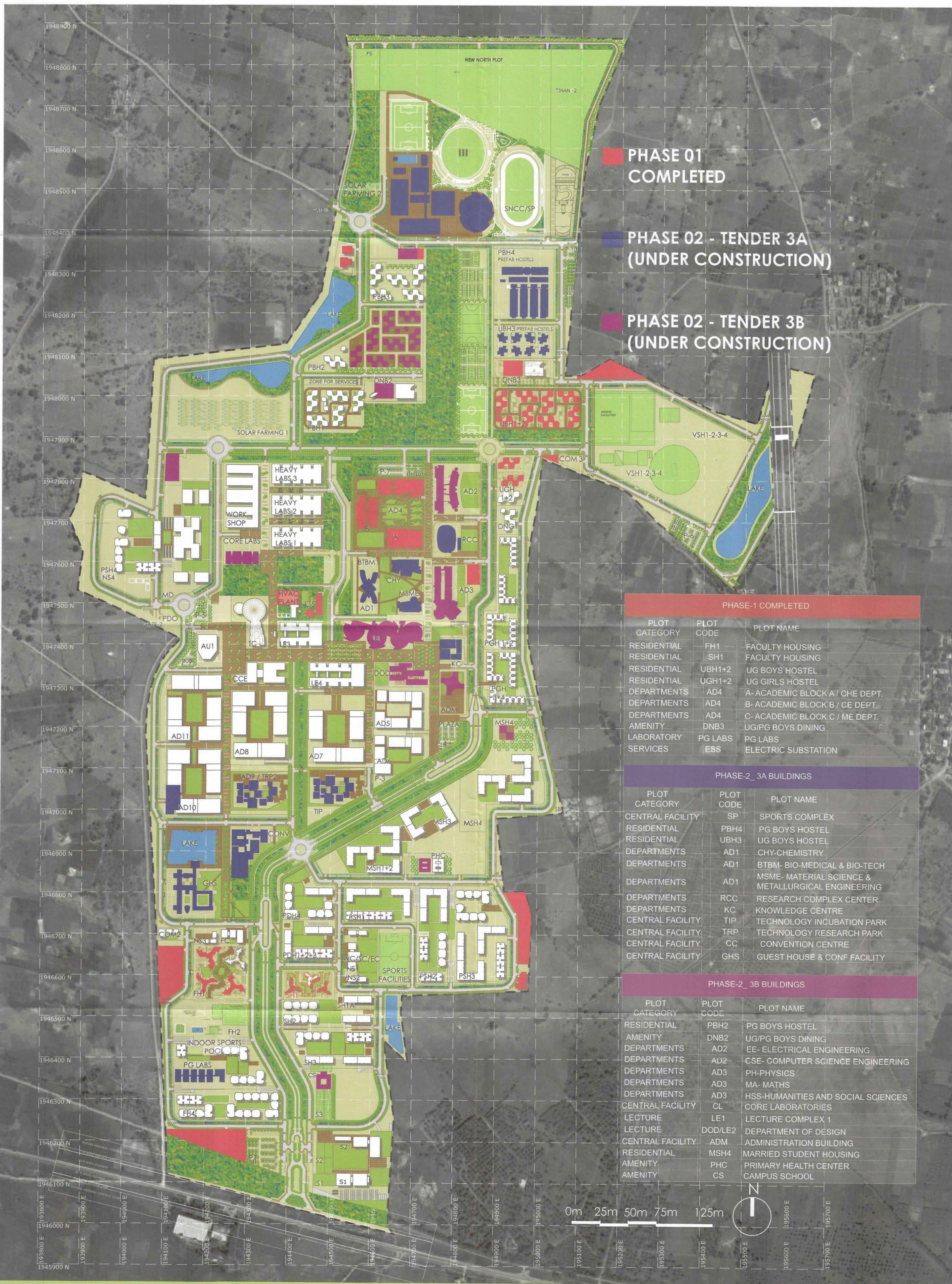
i.e., Executive Engineer (Electrical). Other Engineer-in-Charge of minor component i.e., Executive Engineer (Civil) will prepare and pass the final bill for their component of work and pass on the same to the Engineer-in-charge of major component, for including in the final bill for composite work. This model may also be adopted for running bills at the discretion of the Institute. Levy of Compensation under Clause 2, if any, and rescheduling of milestones as stipulated under clause 5, will be decided by Superintending Engineer on receipt of required information in this regard from Engineer-in-Charge of major component as well as concerned Engineer-in-Charge of minor component.

Milestones mentioned at Schedule-F are applicable for composite major and minor components of the work. The sequence of the major and minor component activities shall happen as the actual flow of the work. But as the milestones are clearly mentioned in Schedule F, which will be reviewed RA bills wise of combined Major & Minor Components of work, the amount to be withheld under Clause 5 of the contract will be decided by the Engineer-in-Charge of the respective component and to that extent on passing of every RA bill by E in C of minor component will intimate the value of RA bill to E in C of major component for taking necessary action in the event of not achieving the necessary milestones as assessed from milestone bar chart, specified percentage of the tendered value of work will be withheld for failure of each milestone. The composite work is treated as complete when all the components of the work are complete. The Completion Certificate of the composite work is recorded by Engineer-in-charge of major component after record of completion certificate by the Engineer-in-Charge of minor components.

Other than technical & contractual issues pertaining to minor component (i.e., Civil and Structure works) for all other purposes of contractual agreement like Arbitration case/Court case, if any, such shall be handled with main contractor by the Engineer-in-Charge of the major component with the support of Engineer-in-Charge of the minor component.

9.50.1 The contractor shall submit “Structural Stability Certificate” in prescribed format for the Structural Steel Frame work of Solar Panels Installations before start of the work. All the Structural Design Reports, drawings of the proposed base Structural Steel frame work including its joinery details for the installations of Solar Panels and the Structural Stability Certificate shall be signed and certified by the any Faculty from Civil/Structural Engineering Department of any Government Engineering College/University/NIT’s/IIT’s.



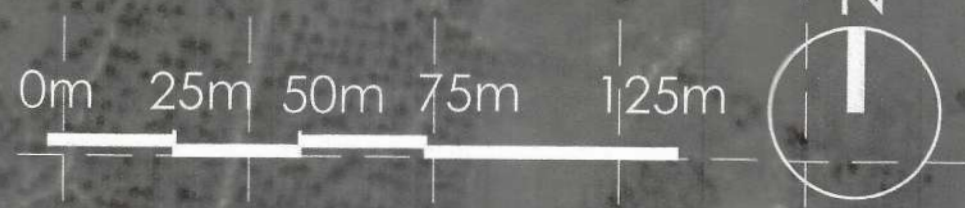


- PHASE 01 COMPLETED
- PHASE 02 - TENDER 3A (UNDER CONSTRUCTION)
- PHASE 02 - TENDER 3B (UNDER CONSTRUCTION)

PHASE-1 COMPLETED		
PLOT CATEGORY	PLOT CODE	PLOT NAME
RESIDENTIAL	FH1	FACULTY HOUSING
RESIDENTIAL	SH1	FACULTY HOUSING
RESIDENTIAL	UBH1+2	UG BOYS HOSTEL
RESIDENTIAL	UGH1+2	UG GIRLS HOSTEL
DEPARTMENTS	AD4	A- ACADEMIC BLOCK A / CHE DEPT.
DEPARTMENTS	AD4	B- ACADEMIC BLOCK B / CE DEPT.
DEPARTMENTS	AD4	C- ACADEMIC BLOCK C / ME DEPT.
AMENITY	DNB3	UG/PG BOYS DINING
LABORATORY	PG LABS	PG LABS
SERVICES	ESS	ELECTRIC SUBSTATION

PHASE-2_3A BUILDINGS		
PLOT CATEGORY	PLOT CODE	PLOT NAME
CENTRAL FACILITY	SP	SPORTS COMPLEX
RESIDENTIAL	PBH4	PG BOYS HOSTEL
RESIDENTIAL	UBH3	UG BOYS HOSTEL
DEPARTMENTS	AD1	CHY-CHEMISTRY
DEPARTMENTS	AD1	BTBM- BIO-MEDICAL & BIO-TECH
DEPARTMENTS	AD1	MSME- MATERIAL SCIENCE & METALLURGICAL ENGINEERING
DEPARTMENTS	RCC	RESEARCH COMPLEX CENTER
DEPARTMENTS	KC	KNOWLEDGE CENTRE
CENTRAL FACILITY	TIP	TECHNOLOGY INCUBATION PARK
CENTRAL FACILITY	TRP	TECHNOLOGY RESEARCH PARK
CENTRAL FACILITY	CC	CONVENTION CENTRE
CENTRAL FACILITY	GHS	GUEST HOUSE & CONF FACILITY

PHASE-2_3B BUILDINGS		
PLOT CATEGORY	PLOT CODE	PLOT NAME
RESIDENTIAL	PBH2	PG BOYS HOSTEL
AMENITY	DNB2	UG/PG BOYS DINING
DEPARTMENTS	AD2	EE- ELECTRICAL ENGINEERING
DEPARTMENTS	AD2	CSE- COMPUTER SCIENCE ENGINEERING
DEPARTMENTS	AD3	PH-PHYSICS
DEPARTMENTS	AD3	MA- MATHS
DEPARTMENTS	AD3	HSS-HUMANITIES AND SOCIAL SCIENCES
CENTRAL FACILITY	CL	CORE LABORATORIES
LECTURE	LE1	LECTURE COMPLEX 1
LECTURE	DOD/LE2	DEPARTMENT OF DESIGN
CENTRAL FACILITY	ADM	ADMINISTRATION BUILDING
RESIDENTIAL	MSH4	MARRIED STUDENT HOUSING
AMENITY	PHC	PRIMARY HEALTH CENTER
AMENITY	CS	CAMPUS SCHOOL



MASTER PLAN

शुभं वत्स / SUSHANT VATSA
 अभियंता (विद्युत्) / Executive Engineer (Electrical)
 भारतीय प्रौद्योगिकी संस्थान हैदराबाद
 Indian Institute of Technology (IIT) Hyderabad
 कोड- 502204, संगारदेवी, तेलंगना, भारत
 Kandl- 502 284, Sangareddy, Telangana, India

IIT HYDERABAD CAMPUS MASTER PLAN
 SCALE 1:4000

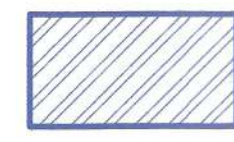
INDIAN INSTITUTE OF TECHNOLOGY HYDERABAD



PHASE 01 & 02 PARKING DOCUMENT |

सुशान्त वत्स / SUSHANT VATSA
निदेशक अभियंता (विद्युत) / Executive Engineer (Electrical)
भारतीय प्रौद्योगिकी संस्थान हैदराबाद
Indian Institute of Technology (IIT) Hyderabad
कॉन्डो- ५०२२८४, सांगारेड्डी, तेलंगाना, भारत
Kandi- 502 284, Sangareddy, Telangana, India

24.02.2021



EXISTING PARKING



NEW PROPOSED PARKING



सुशान्त वाट्स / SUSHANT VATSA
 कर्तव्यी अभियंता (विद्युत) / Executive Engineer (Electrical)
 भारतीय प्रौद्योगिकी संस्थान हैदराबाद
 Indian Institute of Technology (IIT) Hyderabad
 कोड- ५०२२८४, संगारैडो, तेलंगणा, भारत
 Kandi- 502 284, Sangareddy, Telangana, India

IIT HYDERABAD PARKING CALCULATION

PHASE 01

ACADEMIC ZONE

PARKING	NO. OF CARS	NO. OF 2-WHEELER	NO OF BICYCLE	AREA OF PARKING (SQM)
P7	109	140	144	4078
TOTAL	109	140	144	4078

NON-ACADEMIC ZONE

PARKING	NO. OF CARS	NO. OF 2-WHEELER	NO OF BICYCLE	AREA OF PARKING (SQM)
P1	119	228	116	8070
TOTAL	119	228	116	8070

PHASE 02

ACADEMIC ZONE

PARKING	NO. OF CARS	NO. OF 2-WHEELER	NO OF BICYCLE	AREA OF PARKING (SQM)
P3	46	58	40	2540
P9	42	29	80	2192
P5	39	80	72	2190
P4	80	69	56	6196
TOTAL	207	236	248	13118

NON-ACADEMIC ZONE

PARKING	NO. OF CARS	NO. OF 2-WHEELER	NO OF BICYCLE	AREA OF PARKING (SQM)
P10	25	189	220	3208
TOTAL	25	189	220	3208

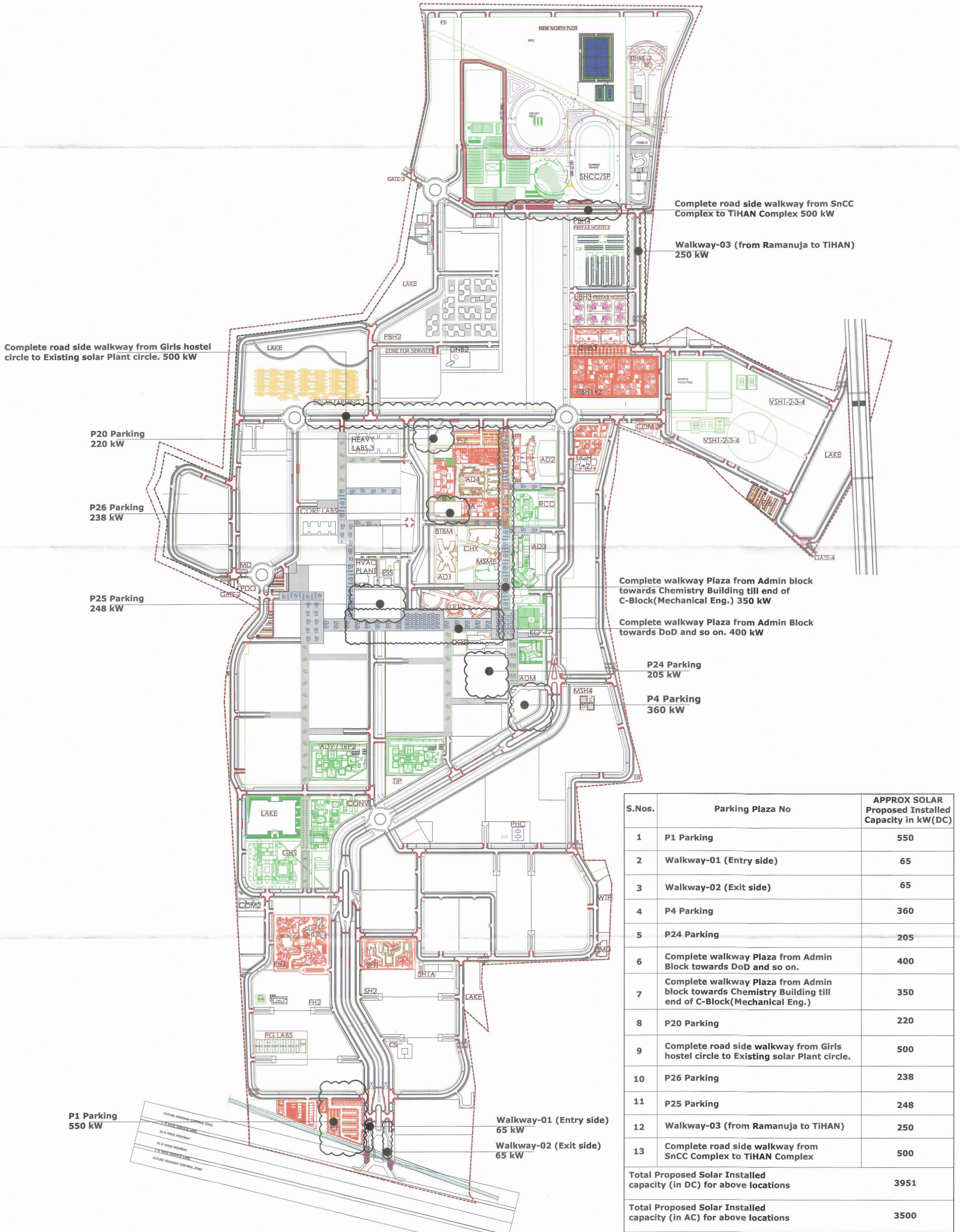
TOTAL PH1+PH2	460	793	728	28474
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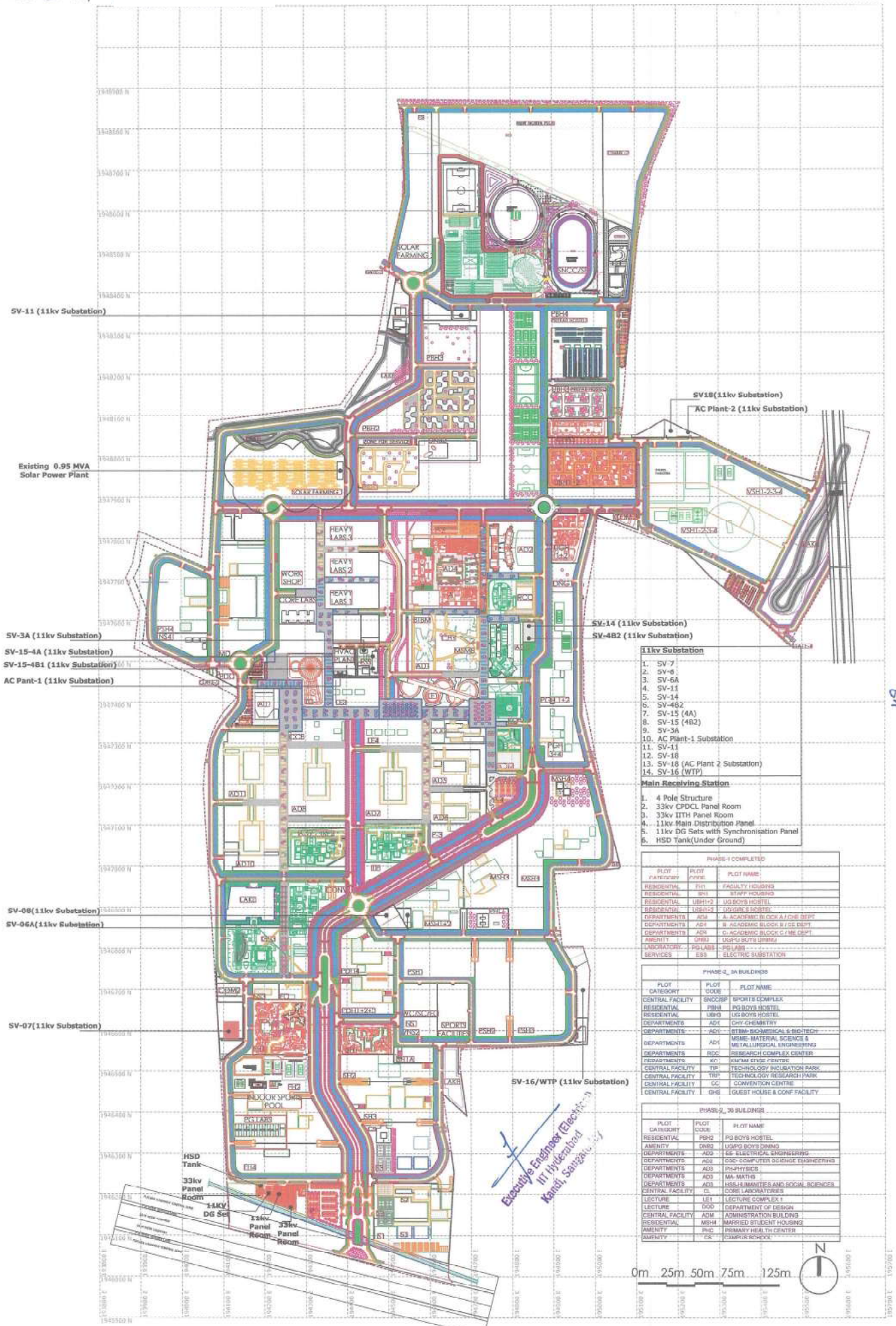
NEW PROPOSED PARKING (ACADEMIC)

PARKING	NO. OF CARS	NO. OF 2-WHEELER	NO OF BICYCLE	AREA OF PARKING (SQM)
P20	62	0		1978
P21	84	45	48	2550
P22	35	66	32	1774
P23	21	36	32	1140
P24	101	75	64	3096
P25	62	71	48	2940
P26	41	50	32	1584
P27	64	50	48	2160
TOTAL	470	393	304	17222

PARKING	TOTAL NO. OF CARS	TOTAL NO. OF 2-WHEELER	TOTAL NO. OF BICYCLE	TOTAL NO. OF PARKING
ACADEMIC ZONE	316	376	392	17196
NON-ACADEMIC ZONE	144	417	336	11278
NEW PROPOSED PARKING (ACADEMIC)	470	393	304	17222
TOTAL	930	1186	1032	45696

SOLAR PARKING PLAZA PLAN





SV-11 (11kv Substation)

Existing 0.95 MVA Solar Power Plant

SV-3A (11kv Substation)

SV-15-4A (11kv Substation)

SV-15-4B1 (11kv Substation)

AC Pant-1 (11kv Substation)

SV-08(11kv Substation)

SV-06A(11kv Substation)

SV-07(11kv Substation)

SV18(11kv Substation)

AC Plant-2 (11kv Substation)

SV-14 (11kv Substation)

SV-4B2 (11kv Substation)

11kv Substation

1. SV-7
2. SV-8
3. SV-6A
4. SV-11
5. SV-14
6. SV-4B2
7. SV-15 (4A)
8. SV-15 (4B2)
9. SV-3A
10. AC Plant-1 Substation
11. SV-11
12. SV-18
13. SV-18 (AC Plant 2 Substation)
14. SV-16 (WTP)

Main Receiving Station

1. 4 Pole Structure
2. 33kv CPDCL Panel Room
3. 33kv IITH Panel Room
4. 11kv Main Distribution Panel
5. 11kv DG Sats with Synchronisation Panel
6. HSD Tank(Under Ground)

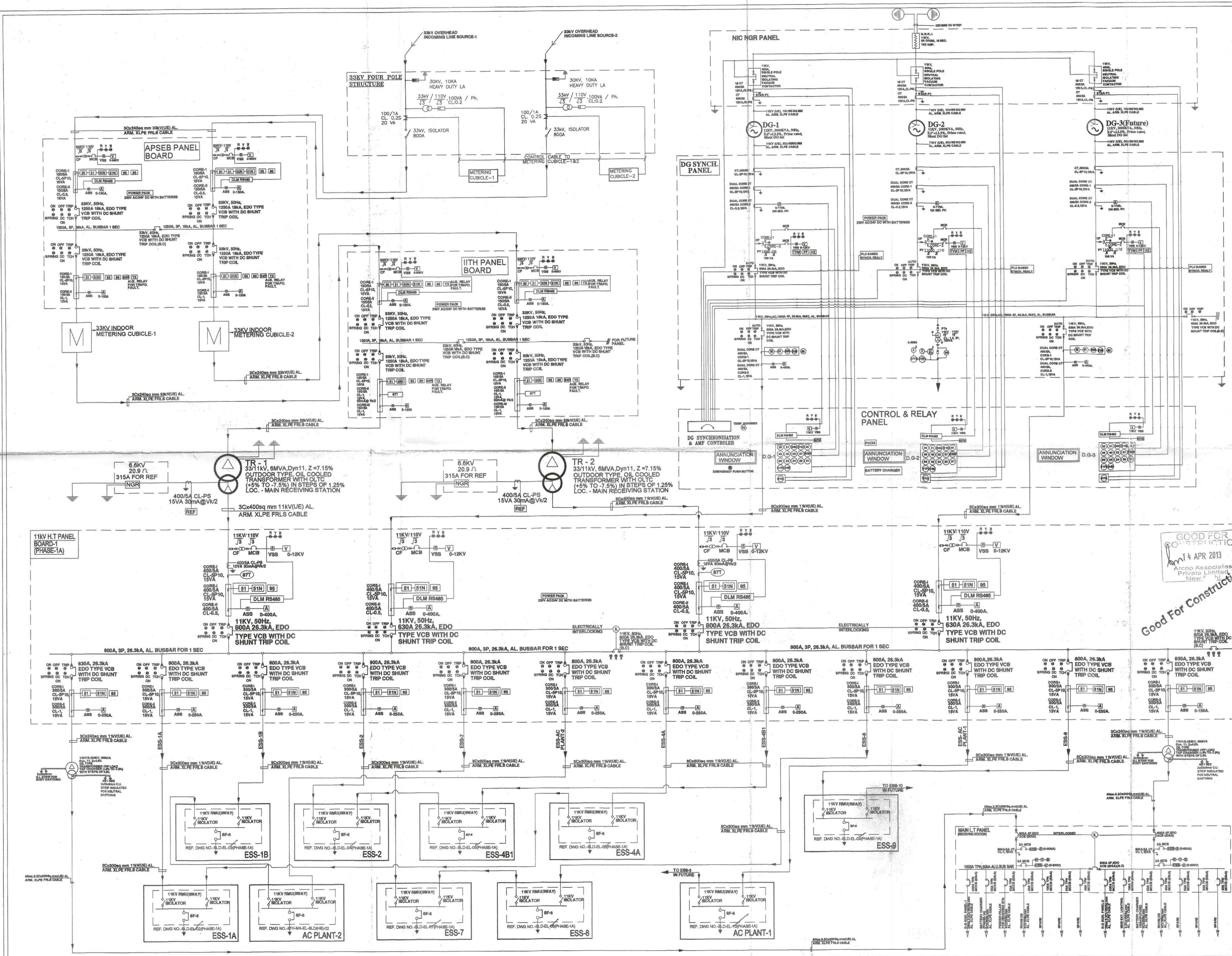
PHASE-1 COMPLETED		
PLOT CATEGORY	PLOT CODE	PLOT NAME
RESIDENTIAL	FH1	FACULTY HOUSING
RESIDENTIAL	SH1	STAFF HOUSING
RESIDENTIAL	UBH1/2	UG BOYS HOSTEL
RESIDENTIAL	UBH1/2	UG BOYS HOSTEL
DEPARTMENTS	AD4	A. ACADEMIC BLDG A / I/OE DEPT
DEPARTMENTS	AD5	B. ACADEMIC BLDG B / I/OE DEPT
DEPARTMENTS	AD6	C. ACADEMIC BLDG C / I/OE DEPT
AMENITY	DM2	UGPG BOYS UPRM
INDUSTRIAL	PL1/AB	PEL LAB
SERVICES	ESB	ELECTRIC SUBSTATION

PHASE-2, IN BUILDINGS		
PLOT CATEGORY	PLOT CODE	PLOT NAME
CENTRAL FACILITY	SNCCBP	SPORTS COMPLEX
RESIDENTIAL	PHH	PG BOYS HOSTEL
RESIDENTIAL	UBH3	UG BOYS HOSTEL
DEPARTMENTS	AD7	CEP CHEMISTRY
DEPARTMENTS	AD8	BTM-BIO-MEDICAL & BIOTECH
DEPARTMENTS	AD9	MSE- MATERIAL SCIENCE & METALLURGICAL ENGINEERING
DEPARTMENTS	RDC	RESEARCH COMPLEX CENTER
DEPARTMENTS	WC	WUMM CRUISE CENTRE
CENTRAL FACILITY	TIP	TECHNOLOGY INCUBATION PARK
CENTRAL FACILITY	TIP	TECHNOLOGY RESEARCH PARK
CENTRAL FACILITY	CC	CONVENTION CENTRE
CENTRAL FACILITY	GHS	GUEST HOUSE & CONF FACILITY

PHASE-2, IN BUILDINGS		
PLOT CATEGORY	PLOT CODE	PLOT NAME
RESIDENTIAL	PH2	PG BOYS HOSTEL
AMENITY	DM3	UGPG BOYS DINING
DEPARTMENTS	AD9	EE- ELECTRICAL ENGINEERING
DEPARTMENTS	AD9	CSC- COMPUTER SCIENCE ENGINEERING
DEPARTMENTS	AD9	PH-PHYSICS
DEPARTMENTS	AD9	MA- MATHS
DEPARTMENTS	AD9	USH-UMSITIES AND SOCIAL SCIENCES
CENTRAL FACILITY	C	CORE LABORATORIES
LECTURE	LE1	LECTURE COMPLEX 1
LECTURE	DD	DEPARTMENT OF DESIGN
CENTRAL FACILITY	ADM	ADMINISTRATION BUILDING
RESIDENTIAL	MSH	MARRIED STUDENT HOUSING
AMENITY	PH3	PRIMARY HEALTH CENTER
AMENITY	CS	CAMPUS SCHOOL

Electrical Engineer (Electrification)
 IIT Hyderabad
 Kanuri, Saravali





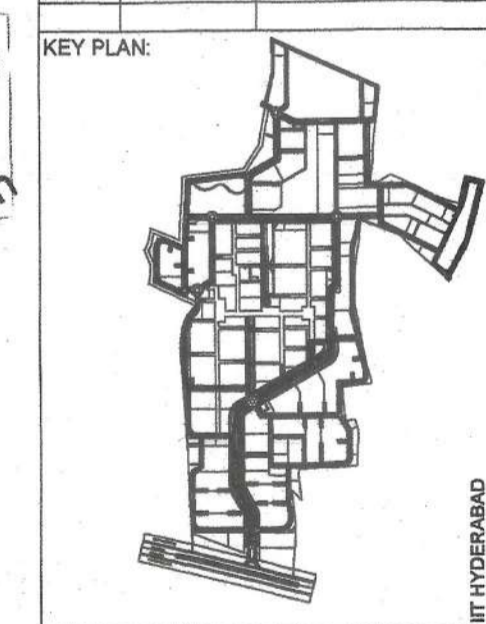
LEGEND

- DP MINATURE CIRCUIT BREAKER
- TRIP MATURE CIRCUIT BREAKER
- DRAWOUT CABLE CIRCUIT BREAKER
- CURRENT TRANSFORMER
- DRAWOUT POTENTIAL TRANSFORMER
- SPL. POWER TRANSFORMER
- INDICATION LAMP (OFF/ON/SPRING/TOCH)
- AMMETER
- VOLTMETER
- AMMETER SELECTOR SWITCH
- VOLTMETER SELECTOR SWITCH
- GROUNDING
- DIGITAL LOAD MANAGER WITH REMOTE PORT
- LONG TIME EARTH FAULT RELAY
- PHASE BALANCE RELAY
- FIELD RELAY
- DIRECTIONAL POWER RELAY
- 3 PH DO SET
- FREQUENCY RELAY FAULT LOCATOR
- GENERATOR DIFFERENTIAL RELAY
- STATOR RESTRICTED EARTH FAULT RELAY
- LOCK-OUT RELAY
- VACUUM CIRCUIT BREAKER
- UNDER VOLTAGE RELAY
- MOTOR THERMAL RELAY
- VOLTAGE BALANCE RELAY
- EARTH FAULT RELAY
- LONG TIME OVER CURRENT RELAY
- INSTANTANEOUS OVER CURRENT RELAY
- LOCK-OUT RELAY
- TRIP CIRCUIT SUPERVISION RELAY
- DIFF. RELAY FOR TRAFOS.
- AUX. RELAY FOR TRAFOS.
- RESTRICTED EARTH FAULT RELAY
- NORMAL OPEN
- UNDER POWER RELAY
- AD BREAKER FAILURE PROTECTION RELAY
- VOLTAGE RESTRICTED RELAY
- OVER VOLTAGE RELAY
- FREQUENCY RELAY
- FREQUENCY METER
- POWER FACTOR METER
- TR VECTOR METER
- MULTI FUNCTION METER
- POWER COMMAND CONTROL MODULE

NOTES

- Dimensions are not to be scaled.
- All Dimensions are in Millimeters unless stated otherwise.
- All Levels are in Meters.
- The architect shall provide all dimensions, unless specifications state otherwise and shall report any error, omission and/or anomaly to the architect before commencement of work.
- For construction purposes, the dimensions shall not be measured directly from the drawings. The dimensions shall not be used for construction until they are issued for construction.
- These drawings shall be the responsibility of the architect. The architect, Architect, Road Layout, HVAC, Electrical, E.L.V, P.W.E, G.A.B and other drawings shall be at all conditions of specifications.
- All shop drawings should be provided to the architect for approval.

DATE	REVISION	DESCRIPTION



CLIENTS
 Indian Institute of Technology (IIT) Hyderabad,
 Osmania University, Hyderabad,
 Andhra Pradesh, INDIA

ARCHITECTS & PLANNERS
 ARCON ASSOCIATES PVT. LTD.
 E-108, G.K. CLAYPANE PART 1
 NEW DELHI 110048
 PHONE: 011-26242000
 FAX: 011-26242008

MEP CONSULTANTS
 M.J. CONSULTANTS
 86, MADHUBAN SALING, 68, NEHRU PARK, 65,
 NEW DELHI-110 016
 +91-011-46275822, 5295495
 EMAIL: mj@mjconsultants.com

Architect's Signature **Client's Signature**

Job Title: IITH DETAIL UD & INFRA PHASE 1A
 Drawing Title: SCHEMATIC DIAGRAM FOR 33/11KV DISTRIBUTION SYSTEM (PHASE-1A)
 Document Release To: ELECTRICAL
GOOD FOR CONSTRUCTION

Job No.: 10-148
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 Checked by: S.S.Y.
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 AUTHORITY:

सुशान्त वसंत / SUSHANT VATSA
 इलेक्ट्रिकल इंजीनियर (रिगिस्टर्ड) / Executive Engineer (Electrical)
 भारतीय प्रौद्योगिकी संस्थान हैदराबाद
 Indian Institute of Technology (IIT) Hyderabad
 कडी- ५०२२८४, सान्गारेड, तेलंगणा, भारत
 Kandi- 502 284, Sangareddy, Telangana, India