

**INDEX**

*Name of Work: Roof Top Solar Generation Plant and Upgradation of NSSO Bhawan Jodhpur Office Building  
Jodhpur*

<i>S.No</i>	<i>Items</i>	<i>Page No</i>
<i>1</i>	<i>Index</i>	<i>1</i>
<i>2</i>	<i>Information and Instruction for Bidders for E-Tendering</i>	<i>2 - 3</i>
<i>3</i>	<i>CPWD 6 for e-Tendering</i>	<i>4-7</i>
<i>4</i>	<i>Form CPWD-8</i>	<i>8-16</i>
<i>5</i>	<i>Performa B Under taking Certificate from Concerned Contractor</i>	<i>17</i>
<i>6</i>	<i>Annexure II – Proforma for Earnest Money Deposit Declaration</i>	<i>18</i>
<i>8</i>	<i>Conditions for Engagement of Associated Contractor</i>	<i>19-21</i>
<i>9</i>	<i>Eligibility criteria for EI works and other specialized electrical works</i>	<i>22-26</i>
<i>9</i>	<i>Memorandum of Understanding</i>	<i>27 - 30</i>
<i>10</i>	<i>Willingness Certificate</i>	<i>31 - 34</i>
<i>11</i>	<i>Technical Specification for Internal E.I. Works</i>	<i>35-65</i>
<i>12</i>	<i>List of Approved Makes for material (Electrical)</i>	<i>67-69</i>
<i>13</i>	<i>Schedule of Quantity for Electrical work</i>	<i>70-81</i>

***Certified that this NIT contains 01 to 81 Pages***

***Executive Engineer (Elect.) Jodhpur  
CPWD Jodhpur***

**INFORMATION AND INSTRUCTIONS FOR CONTRACTORS FOR e-TENDERING (UP TO DG/MAN/303  
DT. 28-03-2014) FORMING PART OF NIT AND TO BE POSTED ON WEBSITE)  
(Applicable for inviting open tenders)**

The Executive Engineer (E) Jodhpur, CPWD, Jodhpur on behalf of President of India invites online Percentage Rate tenders from approved and eligible Registered contractors of CPWD in appropriate class in composite category for the following work(s) :

S.No.	NIT No.	Name of work & Location	Estimated cost put to tender	Earnest Money	Period of completion	Last date & time of submission of tender	Date and Time to submit Mandatory document	Time date of opening of tender
1	2	3	4	5	6	7	8	9
1.	06/EE(E)/Jodhpur/AE(E)-I/Jodhpur/2021-22	Roof Top Solar Generation Plant and Upgradation of NSSO Bhawan Jodhpur Office Building Jodhpur	Rs. 28,21,997/-	Earnest Money Deposit Declaration	2 Months	10.08.2021 (3.00 PM)	10.08.2021 (3.00 PM)	10.08.2021 (3.30 PM)

- The intending bidder must read the terms and conditions of CPWD-6 carefully. He should only submit his bid if he considers himself eligible and he is in possession of all the documents required
- Information and Instructions for bidders posted on website shall form part of bid document.
- The tender document consisting of plans, specifications, the Schedule of quantities of various types of items to be executed and the set of terms and conditions of the contract to be complied with and other necessary documents can be seen from website [www.tenderwizard.com/cpwd](http://www.tenderwizard.com/cpwd) or [www.eprocure.gov.in](http://www.eprocure.gov.in) free of cost.
- But the bid can only be submitted after depositing of original Proforma for Earnest Money Deposit Declaration**
- Those contractors not registered on the website mentioned above, are required to get registered before hand. If needed they can be imparted training on online tendering process as per details available on the website.
- The intending bidder must have valid class-III digital signature to submit the bid.
- On opening date, the contractor can login and see the bid opening process. After opening of bids he will receive the competitor bid sheets.
- Contractor can upload documents in the form of JPG format and PDF format.
- Contractor must ensure to quote rate of each item. The column meant for quoting rate in figures appears in pink colour and the moment rate is entered, it turn sky blue.  
*In addition to this, while selecting any of the cells a warning appears that if any cell is left blank the same shall be treated as "0".  
Therefore, if any cell is left blank and no rate is quoted by the bidder, rate of such item shall be treated as "0" (ZERO).*
- Goods and Service Tax (GST) purchase tax, turn over Tax, Excise Duty, Work Contract Tax or any other tax on materials as applicable shall be paid by the contractor himself, The Contractor shall quote his rates considering all such taxes.
- SC/ST contractors enlisted under class V category are exempted from processing fee payable to ITI Limited.  
**List of Documents to be scanned and uploaded within the period of bid submission:-**
  - Proforma for Earnest Money Deposit Declaration Page No. 18 (Annexure-II)

- ii) *Enlistment order of the contractor in CPWD Composite category valid on date of opening of tender extended validity*
- iii) *Valid Electrical contractor licence*

*or*

The tender from Composite of the agency shall be opened on uploading the valid electrical license from competent authority in the name of the Composite contractor or Undertaking regarding the same. The Composite contractor shall be allowed to participate in the tender with an Undertaking that they will either obtained Valid electrical license & submitted before date of Start of electrical work or associate contractors having valid electrical license of eligible class. (As per Performa 'B' enclosed at Page-17)

- iv) *Copy of Registration in EPFO & ESIC Department*
- v) *Certificate of Registration for GST for the state in which the work located and acknowledgement of upto date return filed for GST. (Not later than six months back from last date of receipt of tender)*

*Or*

*If the contractor is presently not working in the state in which the work is located then he has to submit and undertaking that :-*

- (i) *I am presently not working in the state where the work is to be executed and do not have GST registration of the concerned state.*
- (ii) *If the work is awarded to me, then I shall obtain GST registration within 7 day of award of work or before the 1st payment is made whichever is earlier*

- vi) *Copy of Pan Card*
- vii) *Address with phone No. and email Id of bidder*

***Executive Engineer ( Elect.)  
CPWD Jodhpur***

**CPWD-6 FOR e-TENERING (Amended as per DG/MAN/303 dt. 28-03-2014)**

1. Percentage Rate tenders are invited on behalf of President of India invites online Percentage Rate tenders from approved and eligible Registered contractors of CPWD in appropriate class in composite Category for the following work Roof Top Solar Generation Plant and Upgradation of NSSO Bhawan Jodhpur Office Building Jodhpur

The enlistment of the contractors should be valid on the last date of submission of tenders.

In case the last date of opening of tender is extended, the enlistment of contractor should be valid on the original date of opening of tenders.

- 1.1 The work is estimated to cost **Rs. 28,21,997/-** This estimate, however, is given merely as a rough guide.
2. Agreement shall be drawn with the successful tenderer on prescribed Form No. CPWD 8 which is available as a Govt. of India Publication. Tenderer shall quote his rates as per various terms and conditions of the said form which will form part of the agreement.
3. The time allowed for carrying out the work will be **02 Months** from the date of start as defined in Schedule 'F' or from the 1<sup>st</sup> date of handing over of the site, whichever is later, in accordance with the phasing, if any, as indicated in the tender documents.
4. The site for the work is available.
5. Tender documents consisting of plans, specifications, the schedule of quantities of the various types of items to be executed and the set of terms and conditions of contract to be complied with and other necessary documents except Standard General Conditions Of Contract Form can be seen from website [www.tenderwizard.com/cpwd](http://www.tenderwizard.com/cpwd) or [www.eprocure.gov.in](http://www.eprocure.gov.in) free of cost.
6. After submission of the bid the contractor can re-submit revised bid any number of times but before last time and date of submission of bid as notified.
7. While submitting the revised bid, contractor can revise the rate of one or more item(s) any number of times (he need not re-enter rate of all the items) but before last time and date of submission of bid as notified.
8. When bids are invited in three stage system and if it is desired to submit revised financial bid then it shall be mandatory to submit revised financial bid. If not submitted then the bid submitted earlier shall become invalid.
9. Earnes Money in the form of Proforma for Earnest Money Deposit Declaration  
The receipt shall also be uploaded to the e-tendering website by the intending bidder upto the specified bid submission date and time.
- ~~10. Earnest money in the form of Treasury Challan or Demand Draft or Pay order or Banker's Cheque or Deposit at Call Receipt or fix deposit receipt (drawn in favour of Executive Engineer (E), JdCED, CPWD, Jodhpur) shall be scanned and uploaded e-tendering website with in the period of bid submission. The Original EMD should be deposited either in the office of Executive Engineer inviting bids or division office of any Executive Engineer, CPWD within the period of bid submission. (The EMD documents shall only be issued from the place in which the office of receiving division office is situated). The EMD receiving Executive Engineer shall issue a receipt of deposition of earnest money deposit to the bidder in a prescribed format (enclosed) uploaded by tender inviting EE in the NIT.~~

The receipt shall also be uploaded to the e-tendering website by the intending bidder upto the specified bid submission date and time.

A part of earnest money is acceptable in the form of Bank Guarantee also. In such case, 50% of earnest money or Rs.20 lakh, whichever is less, will have to be deposited in shape prescribed above, and balance

~~in shape of Bank Guarantee of any scheduled bank which to be scanned and uploaded by the intending bidders.~~

Interested contractors who wish to participate in the tender has also to make following payment within the period of bid submission.

- (i) **e-Tender Processing Fee – Rs. 1612 /-** (0.05% of estimated cost put to tender + 15% G.S.T.) **shall be payable to M/s 'ITI Limited' through their e-gateway by credit / debit card, internet banking or RTGS / NEFT facility.**

Copy of Enlistment order and certificate of work experience and other documents as specified in the press notice shall be scanned and upload to the e-tendering website within the period of bid submission. ~~The Original EMD should be deposited either in the office of Executive Engineer inviting bids or division office of any Executive Engineer, CPWD within the period of bid submission. (The EMD documents shall only be issued from the place in which the office of receiving division office is situated). The EMD receiving Executive Engineer shall issue a receipt of deposition of earnest money deposit to the bidder in a prescribed format (enclosed) uploaded by tender inviting EE in the NIT.~~

Online bid documents submitted by intending bidders shall be opened only of those bidders, who has deposited e-Tender Processing Fee with M/s ITI Ltd. and earnest money deposited and other documents scanned and uploaded are found in order.  
**The bid submitted shall be opened at 15.30 P.M. on 10.08.2021**

10. The bid submitted shall become invalid and e-tender processing fee shall not be refunded if:
- The bidder is found ineligible.
  - ~~The bidder does not deposit original EMD with division office of any Executive Engineer, CPWD (The EMD Document shall only be issued from the place in which the office of receiving division office is situated).~~
  - The bidder does not upload all the documents (including GST registration) as stipulated in the bid documents ~~including the copy of receipt for deposition of Original EMD.~~
  - If any discrepancy is noticed between the documents as uploaded at the time of submission of bid and hard copies as submitted **physically by the lowest tenderer in the office of tender opening authority.**
11. The contractor whose bid is accepted will be required to furnish **performance guarantee of 3% (Three Percent)** of the bid amount within the period specified in Schedule F. This guarantee shall be in the form of cash (in case guarantee amount is less than Rs. 10000/-) or Deposit at Call receipt of any scheduled bank/Banker's cheque of any scheduled bank/Demand Draft of any scheduled bank/Pay order of any Scheduled Bank (in case guarantee amount is less than Rs. 1,00,000/-) or Government Securities or Fixed Deposit Receipts or Guarantee Bonds of any Scheduled Bank or the State Bank of India in accordance with the prescribed form. In case the contractor fails to deposit the said performance guarantee within the period as indicated in Schedule 'F', including the extended period if any, the Earnest Money deposited by the contractor shall be forfeited automatically without any notice to the contractor. **The contractor whose bid is accepted will also be required to furnish either copy of applicable licenses/ registrations of proof of applying for obtaining labour licenses, registration with EPFO, ESIC and BOCW welfare Board and Programme chart (Time and progress) within the period specified Schedule F.**
12. Intending Tenderers 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 charges 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 and 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.
13. *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.

14. *Canvassing whether directly or indirectly, in connection with tenders is strictly prohibited and the tenders submitted by the contractors who resort to canvassing will be liable to rejection.*
15. *The competent authority on behalf of the President of India reserves to himself the right of accepting the whole or any part of the tender and the tenderer shall be bound to perform the same at the rate quoted.*
16. *The contractor shall not be permitted to tender for works in the CPWD Circle (**Division in case of contractors of Horticulture/ Nursery category**) responsible for award and execution of contracts in which his near relative is posted as Divisional Accountant or as an officer in any capacity between the grades of Superintending Engineer and Junior Engineer (both inclusive). He shall also intimate the names of persons who are working with him in any capacity or are subsequently employed by him and who are near relatives to any gazetted officer in the Central Public Works Department or in the Ministry of Urban Development. Any breach of this condition by the contractor would render him liable to be removed from the approved list of contractors of this department.*
17. *No Engineer of gazetted 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 **30 days** from the date of opening of tenders. If any tenderer withdraws his tender before the said period or issue of letter of acceptance, whichever is earlier, 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 shall form a part of the contract document. 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: -  
The Notice Inviting Tender, all the documents including additional conditions, specifications and drawings, if any, forming the part of the tender as uploaded at the time of invitation of tender and acceptance thereof together with any correspondence leading thereto.  
Standard CPWD Form 8 of year 2014 with up-to-date correction slips.*
20. *In case of any discrepancy is noticed between the documents as uploaded at the time of submission of the bid online and hard copies as submitted physically in the office of **Executive Engineer** by 1<sup>st</sup> lowest, without prejudice to any other right of remedy, be at liberty to forfeit 50% of the said earnest money as aforesaid. Further the tenders shall not be allowed to participate in the retendering process of the work.*

**Executive Engineer ( Elect.)**  
**CPWD Jodhpur**

GOVERNMENT OF INDIA  
CENTRAL PUBLIC WORKS DEPARTMENT

STATE	<b>Rajasthan</b>	CIRCLE	<b>SE Jodhpur, CPWD Jodhpur</b>
BRANCH	<b>E &amp; M</b>	DIVISION	<b>EE(E) Jodhpur, CPWD Jodhpur</b>
ZONE	<b>NZ-III</b>	SUB-DIVISION	<b>AE(E)-I Jodhpur CPWD Jodhpur</b>

**Percentage Rate Tender & Contract for Works**

- (i) Tender for the work of :- (Roof Top Solar Generation Plant and Upgradation of NSSO Bhawan Jodhpur Office Building Jodhpur)
- (i) To be submitted on line by 15.00 hours on 10.08.2021 (date) to **Executive Engineer (E) Jodhpur, CPWD Jodhpur**
- (ii) To be opened in presence of tenderers who may be present at 15.30 hours on 10.08.2021 (date) in the office of **Executive Engineer (E) Jodhpur, CPWD Jodhpur**

Issued to :- \_\_\_\_\_  
(Contractor)

Signature of officer issuing the documents : \_\_\_\_\_

- (i) Designation : **Executive Engineer (E) Jodhpur, CPWD Jodhpur**

Date of Issue :- \_\_\_\_\_

**TENDER**

I/We have read and examined the notice inviting tender, schedule, A, B, C, D, E & F. Specifications applicable, Drawings & Designs, General Rules and Directions, Conditions of Contract, clauses of contract, Special conditions, Schedule of Rate & other documents and Rules referred to in the conditions of contract and all other contents in the tender document for the work.

I/We hereby tender for the execution of the work specified for the President of India within the time specified in Schedule 'F', viz., schedule of quantities and in accordance in all respects with the specifications, designs, drawings and instructions in writing referred to in Rule-1 of General Rules and Directions and in clause 11 of the Conditions of contract and with such materials as are provided for, by, and in respects in accordance with, such conditions so far as applicable.

We agree to keep the tender open for **Thirty (30) days from the due date of its opening** and not to make any modifications in its terms & conditions.

*A Sum of **Rs. \_\_\_\_\_** /- is hereby forwarded in Cash / Receipt Treasury Challan / Deposit at call Receipt of a Scheduled Bank / fixed Deposit receipt of scheduled Bank/ Demand draft of a scheduled Bank, / Bank guarantee issued by a scheduled bank as earnest money. If I/We fail to furnish the prescribed performance guarantee within prescribed period, I/We agree that the said President of India or his successors in office shall without prejudice to any other right or remedy, be at liberty to forfeit the said earnest money absolutely. Further, If I/ We fail to commence work as specified, I/We agree that President of India or his successors in office shall without prejudice to any other right or remedy available in law, be at liberty to forfeit the said earnest money and the performance guarantee absolutely, otherwise the said earnest money shall be retained by him towards security deposit to execute all the works referred to in the tender documents upon the terms and conditions contained or referred to therein and to carry out such deviations as may be ordered, upto maximum of the percentage mentioned in Schedule 'F' and those in excess of that limit at the rates to be determined in accordance with the provision contained in Clause 12.2 and 12.3 of the tender form.*

*Further, I/We agree that in case of forfeiture of Earnest Money or both Earnest Money and performance guarantee as aforesaid, I / We shall be debarred for participation in the re-tendering process of the work.*

***I/We undertake and confirm that eligible similar work(s) has/have not been got executed through another contractor on back to back basis. Further that, if such a violation comes to the notice of Department, then I/we shall be debarred for tendering in CPWD in future forever. Also, if such a violation comes to the notice of Department before date of start of work, the Engineer-in-Charge shall be free to forfeit the entire amount of Earnest Money Deposit/Performance Guarantee.***

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

Date \_\_\_\_\_

Signature of Contractor

Postal Address

Witness :

Address :

Occupation :

**ACCEPTANCE**

The above tender (as modified by you as provided in the letters mentioned hereunder) is accepted by me for and on behalf of the President of India for a sum of Rs. \_\_\_\_\_ (Rupee \_\_\_\_\_)

The letters referred to below shall form part of this contract Agreement.

- (i)
- (ii)
- (iii)

For & on behalf of President of India

Signature .....

Designation .....

Dated .....

**PROFORMA OF SCHEDULES**

**Name of Work:-** Roof Top Solar Generation Plant and Upgradation of NSSO Bhawan Jodhpur Office Building Jodhpur

(Operative schedules shall be supplied separately to each intending tenderer)

**SCHEDULE 'A'**

Schedule of Quantities As per separate sheets attached for Work.

**SCHEDULE 'D'**

Extra schedule for specific requirements/document for the work, if any: As attached in tender form

**SCHEDULE 'E'**

**Reference to General Conditions of contract – GCC 2020 for Construction works of CPWD as amended/modified upto previous day to last date of submission of tender.**

Name of Work:- Roof Top Solar Generation Plant and Upgradation of NSSO Bhawan Jodhpur Office Building Jodhpur

<b>Name of Work:</b> Roof Top Solar Generation Plant and Upgradation of NSSO Bhawan Jodhpur Office Building Jodhpur		
<b>Estimated Cost for Composite work</b>		
	Electrical Work	<b>Rs. 28,21,997/-</b>
	Total	<b>Rs. 28,21,997/-</b>
<b>Earnest money</b>	<i>Earnest Money Deposit Declaration</i>	
<b>Performance Guarantee</b>	<i>3% of tendered amount (in favour of Executive Engineer, Jodhpur Central Division, CPWD Jodhpur)</i>	
<b>Security Deposit</b>	2.5% of tendered amount.	

**GENERAL RULES & DIRECTIONS :**

Officer inviting tender:

**Executive Engineer(E),  
CPWD,Jodhpur.**

Maximum percentage for quantity of items of work to be executed beyond which rates are to be determined in accordance with Clauses 12.2 & 12.3

**See below**

## SCHEDULE 'F'

### Definitions:

2(v)	<b>Engineer-in-Charge</b> Electrical items of work	<b>Executive Engineer (E), CPWD, Jodhpur</b>
	Civil items of work	<b>Executive Engineer(E) , Jodhpur CPWD Jodhpur</b>
2(viii)	Accepting Authority	<b>Executive Engineer(E) , Jodhpur CPWD Jodhpur</b>
2(x)	Percentage on cost of materials and labour to cover all overheads and profits	15%
2(xi)	<b>Standard Schedule of Rates:</b> Electrical items of Work:	<b>DSR 2018/2019 &amp; MR</b>
2(xii)	Department:	Central Public Works Department
9(ii)	Standard CPWD contract Form:	GCC 2020, CPWD form 7 as modified & corrected up to previous day to the last date of submission of online tender papers.
<b>Clause 1</b>	i) Time allowed for submission of Performance Guarantee from the date of submission of letter of acceptance	07
	ii) Maximum allowable extension with late fee @ 0.1% per day of Performance Guarantee amount beyond the period as provided in (i) above	03
<b>Clause 2</b>	Authority for fixing Compensation under Clause 2	<b>Superintending Engineer, CPWD, Jodhpur</b>
<b>Clause 2 A</b>	Whether Clause 2A shall be applicable	<b>No</b>
<b>Clause 5</b>	i) Number of days from the date of issue of letter of acceptance for reckoning date of start	<b>10 Days</b>
	ii) Time allowed for execution of work	<b>02 Months</b>

### Authority to decide:-

<b>Extension of time</b>	<b>Engineer-in-Charge of major component of work or successor thereof</b> (The ultimate authority to decide final extension of time case is <b>Executive Engineer (E), CPWD, Jodhpur</b> )
<b>Rescheduling of mile stone</b>	<b>Superintending Engineer, CPWD, Jodhpur</b> or his successor thereof
<b>Shifting of date of start in case of delay in handing over of site</b>	<b>Superintending Engineer, CPWD, Jodhpur</b> or his successor thereof

**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 **As per CPWD Works Manual 2019 amended upto date**

**Clause 7A** Whether Clause 7A shall be applicable **Yes**  
*No Running Bill shall be paid for the work till the applicable labour licences, registration with EPFO, ESIC and BOCW, Welfare Board, whatever applicable are submitted by the contractor to the Engineer in Charge*

**Clause 10A**  
*List of testing equipment to be provided by the contractor at site lab.*  
 1 Earth Tester 2. Multimeter 3. LT Magger 4. Tong tester

**Clause 10B(ii)**  
*Whether Clause 10 B (ii) shall be applicable* **No**

**Clause 10C**  
*Component of labour expressed as percent of value of work* **N.A**

**Clause 10CA**

Materials Covered under this clause :	Nearest Materials (other than cement, reinforcement bars and structural steel) for which All India Wholesale Price Index to be followed.	Base Price of all the materials covered under clause 10 CA*
1 .....	1 .....	1 .....
2 .....	2 .....	2 .....
3 .....	3 .....	3 .....
4 .....	4 .....	4 .....

N.A.

**\* Base Price of all the materials covered under clause 10 CA is to be mentioned at the time of approval of NIT.**

**CLAUSE 10 CC**  
*Clause 10 CC to be applicable in contracts with stipulated period of completion exceeding the period shown in next column* **Not Applicable**  
*Schedule of component of other Materials, Labour, POL etc. for price escalation.* **Not Applicable**  
**Clause 10 CC Not applicable**  
*Component of Electric (except materials covered under clause 10CA) /Electrical construction Materials expressed as percent of total value of work. - Xm* **Not Applicable**  
*Component of Labour – expressed as percent of total value of work. Y* **Not Applicable**  
*Component of P.O.L. – expressed as percent of total value of work. Z* **Not Applicable**

**Clause 11**  
 Specification to be followed for execution of work **CPWD General Specifications for Electrical Part-I Internal (2013), Part-II External (1995) as per Terms & Conditions.**

**CLAUSE 12***Type of Work**Maint Work***12.2 & 12.3** Deviation Limit beyond which clause

12.2 &amp; 12.3 shall apply for all items other than foundation items as mentioned in clause 12.5 : No Limit

**12.5** (i) Deviation limit beyond which clauses

12.2 &amp; 12.3 shall apply for foundation work : 100%

(ii) Deviation Limit for item in earth work

: 100%

Sub head of DSR or related items

**Clause 16**

Competent Authority for decided reduced rates.

**Superintending Engineer Jodhpur  
CPWD, Jodhpur****Clause 18**

List of mandatory machinery, tools & plants to be deployed by the contractor at site.	1.DE spanner set 3. Crimping tool 5. Drill machine	2. Line tester 4. Screw driver
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**Clause 25** Standing Committee for dispute redressal :

<b>A</b>	<b>Standing Committee for Dispute Redressal for works under EE-Jodhpur, EE-Jaisalmer, EE(E)-Jodhpur, Under Superintending Engineer (Jodhpur)</b>		
(i)	<b>C E (Jaipur)</b>	-	<b>Chairman</b>
(ii)	<b>SE (Works cum TLQA), O/o ADG(RL) , Lucknow</b>	-	<b>Member Secretary</b>
(iii)	<b>SE(C), Agra</b>	-	<b>Member</b>

**Clause 32 & 36 (i)**

“Requirement of Technical Representative (s) and Recovery Rate”

<b>S. No.</b>	<b>Minimum Qualification of Technical Representative</b>	<b>Discipline</b>	<b>Designation (Principal/ Technical/ Technical Representative)</b>	<b>Minimum Experience</b>	<b>No.</b>	<b>Rate at which recovery shall be made from the contractor in the event of not fulfilling provision of Clause 36(i) per month</b>	
1.	Diploma/ Graduate Engineer	(E/M)	Technical Repetitive Quantity/Billing Engineer	Graduate with 2 years experience Diploma holder with 5 year experience	1	Rs. 15,000/-	Rs. Fifteen Thousand Only

**Clause 42**

- (i) (a) Schedule/statement for determining theoretical quantity of cement & bitumen on the basis of Delhi. Schedule of Rates \_\_\_\_\_ printed by CPWD. **N.A.**
- (ii) Variations permissible on theoretical quantities.
- (a) Cement for works with estimated cost put to tender not more than Rs. 5 Lakh for works with estimated cost put to tender more than 5 Lakhs. **N.A.**
- (b) Bitumen for all works.
- I Steel Reinforcement and structural steel sections for each diameter, section and category. **N.A.**
- (d) All other materials. **Nil**

**RECOVERY RATES FOR QUANTITIES BEYOND PERMISSIBLE VARIATION**

S.No.	Description of Item	Rate in Figures and words at which recovery shall be made from the contractor	
		Excess beyond permissible variation	Less use beyond the permissible variation
1.	Cement		
2.	Steel reinforcement		
3.	Structural Sections		
4.	Bitumen issued free		
5.	Bitumen issued at stipulated fixed price		

----N.A.---

*Executive Engineer ( Elect.)*  
*CPWD Jodhpur*

ANNEXURE  
Clause- 10 -A & 18

*List of mandatory machinery, tools and plants & testing Equipment to be deployed by the contractor at site*

- |   |               |
|---|---------------|
| 1. <i>Steel/Aluminium Ladder 1.5 m to 8 m.</i>                          | <i>2 Nos.</i> |
| 2. <i>Chase cutting machines.</i>                                       | <i>2 Nos.</i> |
| 3. <i>Electrical wire drawing equipment.</i>                            | <i>2 Set.</i> |
| 4. <i>Torque wrench for nut/bolt/screws.</i>                            | <i>2 Nos.</i> |
| 5. <i>Conduit die set.</i>  | <i>2 Set.</i> |
| 6. <i>Pipe vice.</i>  | <i>1 No.</i>  |
| 7. <i>Bench vice.</i>   | <i>1 No.</i>  |
| 8. <i>L.T.Megger 500/1000/110000 volts.</i>                             | <i>1 No.</i>  |
| 9. <i>Tong Tester.</i>  | <i>2 No.</i>  |
| 10. <i>Multimeter.</i>  | <i>2 No.</i>  |
| 11. <i>Hydraulically operated &amp; hand operated crimping machine.</i> | <i>2 No.</i>  |
| 12. <i>Earth tester.</i>  | <i>2 No.</i>  |
| 13. <i>Portable Ordinary drilling machine.</i>                          | <i>2 Nos.</i> |
| 14. <i>Portable Hammer drilling machine.</i>                            | <i>2 Nos.</i> |
| 15. <i>Overhead conduit puller.</i>                                     | <i>1 No.</i>  |

Executive Engineer (E) Jodhpur  
CPWD Jodhpur

**Performa 'B'**

**UNDEDRTAKING CERTIFICATE FROM CONCERNED CONTRACTOR HAVING VALID ELECTRICAL  
LICENSE OF ELEGIBLE CLASS**

***Name of Work:- Roof Top Solar Generation Plant and Upgradation of NSSO Bhawan Jodhpur Office Building  
Jodhpur***

*I hereby give my undertaking that have obtain the Electrical licence before the work or to associate for the work concerned contractor having valid electrical license of eligible class for the above mentioned work.*

*I will execute the work as per specifications and conditions of the agreement and per direction of the Engineer-in-charge.*

*Also I will employ full time technically qualified supervisor as required for the work. I will attend inspection of officers of the department as and when required.*

*Date.*

*Signature of Main Contractor*

**ANNEXURE-II**

**Proforma for Earnest Money Deposit Declaration**

Whereas, I/we----- (name of agency)

have submitted bids for ----- (name of work) -----

-----

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

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

or

(1) If, after the award of work, I/we fail to sign the contract, or to submit performance guarantee before the deadline defined in the tender documents,

(2) I/we shall be suspended for one year and shall not be eligible to bid for CPWD tenders from date of issue of suspension order.

Signature of the contractor(s)

## **CONDITIONS FOR ENGAGEMENT OF ASSOCIATED ELECTRICAL AGENCIES**

*The lowest tenderer have to submit electrical contractor license within two months of award of work if he himself eligible for carrying internal EI work and if not he has to submit the following documents for association of electrical contractors for internal EI work and specialized E&M Works.*

- 1. The contractor, if required should submit the willingness from an eligible electrical contractors/specialized agency to get associated with the applicant for execution of the electrical component of works as per the conditions set out in the MOU to be signed between the contractor and the associated eligible electrical contractor/ specialized agency.*
- 2. In support of the eligibility conditions of the proposed associated electrical contractor, copy of their registration documents if applicable, Electrical Contractor's License, Goods and Service Tax (GST) documents duly attested by the applicants (Contractor) shall be submitted to the EE(C) who will submit these documents to the Executive Engineer (E), Jodhpur, CPWD, Jodhpur in charge for deciding the eligibility within three days of receipt of the same.*
- 3. The contractor will submit MOU signed with eligible electrical contractor/specialized agency meeting the eligibility criteria same as specified for specialized works. The MOU in the enclosed form shall be signed by both the parties i.e. contractor as 1<sup>st</sup> party and associated electrical contractor as 2<sup>nd</sup> party. The contractor shall be responsible for all the works executed by associated contractor.*
- 4. In the event of the concerned E&M agency not performing satisfactorily or failure of associate to complete the E&M work, the contractor on the written direction of the department, shall remove the Associate deployed on the work and shall submit name of new associate who fulfill the conditions mentioned in NIT to execute the leftover work without any loss of time or variation in cost to the department in this regard. Contractor shall meet all the guarantee for the equipments already supplied for which payment has been released by the Deptt. in part. If any equipment supplied for the work, during the currency of the earlier Associate and paid partly by the Deptt. , 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 contractor shall be liable for replacement of the equipment(s) at no cost to Department. No change of Associate Electrical Contractor /Specialized Agency will be allowed without prior approval of the Engineer in charge*
- 5. The contractor/ specialized agency shall be responsible and liable for proper and complete execution of the Electrical work and ensure coordination and completion of both civil and electrical work.*
- 6. The associate contractor/specialized agency along with contractor shall attend the inspection of the work by the Engineer-in-Charge of E&M works as and when required.*
- 7. The associate or contractor/specialized agency shall sign a tripartite Agreement/Contract along with the main tenderer and the departmental officer, for technical compliance of specification, guarantee etc.*
- 8. The associate or contractor/ specialized agency shall attend the inspection of the work by the Engineer-in-Charge of E&M works as and when required.*

Executive Engineer (E) Jodhpur  
CPWD Jodhpur



**Name of Work : Roof Top Solar Generation Plant and Upgradation of NSSO Bhawan Jodhpur Office Building Jodhpur**

**Eligibility criteria for EI works and other specialized electrical works**

The contractor must associate specialized agencies meeting eligibility criteria as detailed below for specialized nature of items/work as listed below:-

Sl.No.	Specialized Work(s)/item of work(s)	Eligibility criteria for specialized agency to be associated by contractor for the
1	CCTV System	
2	UPS System	
3	RoofTop Solar Power Plant	
		The eligibility criteria for these specialized work will be in accordance to CPWD Works Manual 2019 as amended provisions of SOP 4/7, vide OM No. DG/SE/CM SOP/02 dated 30-10-2019 and also detailed below:

**NAME OF WORK:** *Roof Top Solar Generation Plant and Upgradation of NSSO Bhawan Jodhpur Office Building Jodhpur*

**Eligibility condition for Associate agency for execution of Providing E.I., Fans Work and allied works. Package-1**

*The associate agency shall be registered/enlisted in CPWD in composite category in appropriate class and should have a valid electrical license. The Registration/enlistment shall be valid on the date of MOU entered between main agency and associate agency.*

*The main contractor/agency has to submit detail of such agency to be associated to the Engineer-in-charge (of E.I., Fans Works and allied works) with in fifteen days from date of start of work. The associate agency shall be approved by Engineer-in-charge (of E.I., Fans Works and allied works). In case the main contractor intends to change associated agency/agencies during the operation of the contract, he shall obtain prior approval of Engineer-in-charge (of E.I., Fans Works and allied works). The associated agency shall also have to satisfy the laid down eligibility criteria mentioned above. In case Engineer-in-charge is not satisfied with the performance of any agency, he can direct the main contractor to change the agency executing such items of work and this shall be binding on the contractor.*

*However, the composite category contractor shall also be carrying out this work himself without associating any agency provided: -*

a) *He fulfils the prescribed eligibility criteria respectively for these work(s).*

*OR*

b) *He directly procures the equipment of approved make from manufacturer and get it installed from authorized agency/ service provider of the manufacturer or specialized agency as per criteria mentioned in the NIT.*

**Eligibility condition for Associate agency for execution of Providing UPS System (Package-2)**

The main contractor/agency has to submit detail of such agency to be associated to the Engineer-in-charge (SITC of UPS System) with in fifteen days from date of start of work. The associate agency shall be approved by Engineer-in-charge (SITC of UPS System). In case the main contractor intends to change associated agency/agencies during the operation of the contract, he shall obtain prior approval of Engineer-in-charge (SITC of UPS System). The associated specialized agency shall also have to satisfy the laid down eligibility criteria mentioned below. In case Engineer-in-charge is not satisfied with the performance of any agency, he can direct the main contractor to change the agency executing such items of work and this shall be binding on the contractor.

The associate specialized agency should have successfully completed works, as mentioned under during last 7 years ending previous day of last date of submission of tender.

(i) Three similar works each costing not less than 40% of estimated cost of relevant subhead put to tender i.e. each work of value Rs. 2,48,714/-

**OR**

(ii) Two similar works each costing not less than 60% of estimated cost of relevant subhead / to tender i.e each work of value Rs. 3,70,0876/-

**OR**

(iii) One similar work costing not less than 80% of estimated cost of relevant subhead put to tender i.e. each work of value Rs. 4,97,427/-

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

**Similar work shall mean works of "SITC of UPS System".**

However, the composite category contractor shall also be carrying out this work himself without associating any agency provided: -

a) He fulfils the prescribed eligibility criteria respectively for these work(s).

**OR**

b) He directly procures the equipment of approved make from manufacturer and get it installed from authorized agency/ service provider of the manufacturer or specialized agency as per criteria mentioned in the NIT.

**Eligibility condition for Associate agency for execution of Providing and Installing CCTV Surveillance System (Package-3).**

The main contractor/agency has to submit detail of such agency to be associated to the Engineer-in-charge (SITC of CCTV Surveillance System) with in fifteen days from date of start of work. The associate agency shall be approved by Engineer-in-charge (SITC of CCTV Surveillance System). In case the main contractor intends to change associated agency/agencies during the operation of the contract, he shall obtain prior approval of Engineer-in-charge (SITC of CCTV Surveillance System). The associated specialized agency shall also have to satisfy the laid down eligibility criteria mentioned below. In case Engineer-in-charge is not satisfied with the performance of any agency, he can direct the main contractor to change the agency executing such items of work and this shall be binding on the contractor.

The associate specialized agency should have successfully completed works, as mentioned under during last 7 years ending previous day of last date of submission of tender.

(i) Three similar works each costing not less than 40% of estimated cost of relevant subhead put to tender i.e. each work of value Rs. 2,27,217/-.

**OR**

(ii) Two similar works each costing not less than 60% of estimated cost of relevant subhead put to tender i.e. each work of value Rs. 3,40,826/-.

**OR**

(iii) One similar work costing not less than 80% of estimated cost of relevant subhead put to tender i.e. each work of value Rs. 4,54,435/-.

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

**Similar work shall mean works of "SITC of CCTV Surveillance System".**

However, the composite category contractor shall also be carrying out this work himself without associating any agency provided: -

a) He fulfils the prescribed eligibility criteria respectively for these work(s).

**OR**

b) He directly procures the equipment of approved make from manufacturer and get it installed from authorized agency/ service provider of the manufacturer or specialized agency as per criteria mentioned in the NIT.

**Eligibility condition for Associate agency for execution of Providing Solar photo voltaic power generation system (Package-4).**

The main contractor/agency has to submit detail of such agency to be associated to the Engineer-in-charge (SITC of Solar photo voltaic power generation system) with in fifteen days from date of start of work. The associate agency shall be approved by Engineer-in-charge (SITC of Solar photo voltaic power generation system). In case the main contractor intends to change associated agency/agencies during the operation of the contract, he shall obtain prior approval of Engineer-in-charge (SITC of Solar photo voltaic power generation system). The associated specialized agency shall also have to satisfy the laid down eligibility criteria mentioned below. In case Engineer-in-charge is not satisfied with the performance of any agency, he can direct the main contractor to change the agency executing such items of work and this shall be binding on the contractor.

The associate specialized agency should have successfully completed works, as mentioned under during last 7 years ending previous day of last date of submission of tender.

(i) Three similar works each costing not less than 40% of estimated cost of relevant subhead put to tender i.e. each work of value Rs. 2,68,664/-.

**OR**

(ii) Two similar works each costing not less than 60% of estimated cost of relevant subhead put to tender i.e. each work of value Rs. 4,02,996/-.

**OR**

(iii) One similar work costing not less than 80% of estimated cost of relevant subhead put to tender i.e. each work of value Rs. 5,37,328/-.

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

**Similar work shall mean works of "SITC of Solar photo voltaic power generation system".**

However, the composite category contractor shall also be carrying out this work himself without associating any agency provided: -

a) He fulfils the prescribed eligibility criteria respectively for these work(s).

**OR**

b) He directly procures the equipment of approved make from manufacturer and get it installed from authorized agency/ service provider of the manufacturer or specialized agency as per criteria mentioned in the NIT.

*Note: Specialized agency for "SITC of Solar Photo voltaic power generation system" shall also execute the item of Annual Comprehensive Maintenance Contract of SPV Power Generation sets as per Subhead XXIII of BOQ, as per agreement provisions and standard conditions for maintenance of system. No change in Specialized agency shall be acceptable for AMC part and specialized agency shall specifically agree to take up AMC also in MoU.*

**MEMORANDUM OF UNDERSTANDING [M.O.U] BETWEEN**  
**(Package-1) (Pdg. E.I., Fans and Allied Works)**

1] M/S [Name of the firm with full address]

*Enlistment Status*

*Valid Upto:*

*[Henceforth called the main contractor]*

*And*

2] M/S [Name of the firm with full address]

*Enlistment Status*

*Valid Upto:*

*[Henceforth, called Associated Contractor]*

**NAME OF WORK:**            *Roof Top Solar Generation Plant and Upgradation of NSSO Bhawan Jodhpur Office Building Jodhpur*

*[Electrical Component only] as per schedule, specifications, terms and conditions of the tender.*

*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 department (CPWD) 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 of this MOU allows. Both the parties shall be paid consequent to the execution as per agreement to the extent this MOU permits.*

*We have agreed as under :*

- 1- The associated contractor shall be liable for disciplinary action if he failed to discharge the action(s) and other legal action as per agreement besides forfeiture of the security deposit.*
- 2- All the material, machinery and equipment's, tools and tackles required for execution of the electrical works as per agreement shall be the responsibility of the associated contractor.*
- 3- The site staff required for the electrical work shall be arranged by the associated contractor as per terms and conditions of the agreement.*

**SIGNATURE OF MAIN CONTRACTOR**

*DATE  
PLACE*

**SIGNATURE OF ASSOCIATED CONTRACTOR**

*DATE  
PLACE*

**COUNTER SIGN EXECUTIVE ENGINEER (E)**

**MEMORANDUM OF UNDERSTANDING [M.O.U] BETWEEN**  
**Package-2 (Pdg. UPS System )**

1] M/S [Name of the firm with full address]

*Enlistment Status*

*Valid Upto:*

*[Henceforth called the main contractor]*

*And*

2] M/S [Name of the firm with full address]

*Enlistment Status*

*Valid Upto:*

*[Henceforth, called Associated Contractor]*

**NAME OF WORK:**            *Roof Top Solar Generation Plant and Upgradation of NSSO Bhawan Jodhpur Office Building Jodhpur*

*[Electrical Component only] as per schedule, specifications, terms and conditions of the tender.*

*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 department (CPWD) 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 of this MOU allows. Both the parties shall be paid consequent to the execution as per agreement to the extent this MOU permits.*

*We have agreed as under:*

- 1- *The associated contractor shall be liable for disciplinary action if he failed to discharge the action(s) and other legal action as per agreement besides forfeiture of the security deposit.*
- 2- *All the material, machinery and equipment, tools and tackles required for execution of the electrical works as per agreement shall be the responsibility of the associated contractor.*
- 3- *The site staff required for the electrical work shall be arranged by the associated contractor as per terms and conditions of the agreement.*

**SIGNATURE OF MAIN CONTRACTOR**

**DATE**  
**PLACE**

**SIGNATURE OF ASSOCIATED CONTRACTOR**

**DATE**  
**PLACE**

**COUNTER SIGN EXECUTIVE ENGINEER (E)**

**MEMORANDUM OF UNDERSTANDING [M.O.U] BETWEEN**  
**Package-3 (Pdg. CCTV Surveillance System )**

1] M/S [Name of the firm with full address]

*Enlistment Status*

*Valid Upto:*

*[Henceforth called the main contractor]*

*And*

2] M/S [Name of the firm with full address]

*Enlistment Status*

*Valid Upto:*

*[Henceforth, called Associated Contractor]*

**NAME OF WORK:**            *Roof Top Solar Generation Plant and Upgradation of NSSO Bhawan Jodhpur Office Building Jodhpur*

*[Electrical Component only] as per schedule, specifications, terms and conditions of the tender.*

*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 department (CPWD) 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 of this MOU allows. Both the parties shall be paid consequent to the execution as per agreement to the extent this MOU permits.*

*We have agreed as under:*

- 1- The associated contractor shall be liable for disciplinary action if he failed to discharge the action(s) and other legal action as per agreement besides forfeiture of the security deposit.*
- 2- All the material, machinery and equipment, tools and tackles required for execution of the electrical works as per agreement shall be the responsibility of the associated contractor.*
- 3- The site staff required for the electrical work shall be arranged by the associated contractor as per terms and conditions of the agreement.*

**SIGNATURE OF MAIN CONTRACTOR**

**DATE**  
**PLACE**

**SIGNATURE OF ASSOCIATED CONTRACTOR**

**DATE**  
**PLACE**

**COUNTER SIGN EXECUTIVE ENGINEER (E)**

**MEMORANDUM OF UNDERSTANDING [M.O.U] BETWEEN**

**Package-4 (Pdg. Solar photo voltaic power generation system)**

1] M/S [Name of the firm with full address]

*Enlistment Status*

*Valid Upto:*

*[Henceforth called the main contractor]*

*And*

2] M/S [Name of the firm with full address]

*Enlistment Status*

*Valid Upto:*

*[Henceforth, called Associated Contractor]*

**NAME OF WORK:**            *Roof Top Solar Generation Plant and Upgradation of NSSO Bhawan Jodhpur Office Building Jodhpur*

*[Electrical Component only] as per schedule, specifications, terms and conditions of the tender.*

*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 department (CPWD) 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 of this MOU allows. Both the parties shall be paid consequent to the execution as per agreement to the extent this MOU permits.*

*We have agreed as under:*

- 1- *The associated contractor shall be liable for disciplinary action if he failed to discharge the action(s) and other legal action as per agreement besides forfeiture of the security deposit.*
- 2- *All the material, machinery and equipment, tools and tackles required for execution of the electrical works as per agreement shall be the responsibility of the associated contractor.*
- 3- *The site staff required for the electrical work shall be arranged by the associated contractor as per terms and conditions of the agreement.*
- 4- *The Annual Comprehensive Maintenance Contract as per SH XIII of BOQ shall be part of this MoU as per agreement conditions.*

**SIGNATURE OF MAIN CONTRACTOR**

*DATE  
PLACE*

**SIGNATURE OF ASSOCIATED CONTRACTOR**

*DATE  
PLACE*

**COUNTER SIGN EXECUTIVE ENGINEER (E)**

**WILLINGNESS CERTIFICATE**  
**Package-1 (Pdg. E.I., Fans)**

**NAME OF WORK:**            *Roof Top Solar Generation Plant and Upgradation of NSSO Bhawan Jodhpur Office Building Jodhpur*

*I hereby give my willingness to work as associated contractor for 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.

Date:

**Signature of Contractor**

**WILLINGNESS CERTIFICATE**

***Package-2 (Pdg. UPS SYSTEM)***

**NAME OF WORK:**        *Roof Top Solar Generation Plant and Upgradation of NSSO Bhawan Jodhpur  
Office Building Jodhpur*

*I hereby give my willingness to work as associated contractor for 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.

Date:

**Signature of Contractor**

**WILLINGNESS CERTIFICATE**

***Package-3 (Pdg. & CCTV Surveillance System SYSTEM)***

**NAME OF WORK:**            *Roof Top Solar Generation Plant and Upgradation of NSSO Bhawan Jodhpur Office Building Jodhpur*

*I hereby give my willingness to work as associated contractor for 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.

Date:

**Signature of Contractor**

**WILLINGNESS CERTIFICATE**

***Package-4 (Pdg. Solar photo voltaic power generation system)***

**NAME OF WORK:**            *Roof Top Solar Generation Plant and Upgradation of NSSO Bhawan Jodhpur  
Office Building Jodhpur*

***I hereby give my willingness to work as associated contractor for 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.

Date:

**Signature of Contractor**

## GENERAL TERMS AND CONDITIONS FOR ELECTRICAL WORKS

1.0 All the works shall be carried out as per CPWD General specification for Electrical Works amended up to last date of submission of bid and should also comply with relevant provisions of the Indian Electricity Rules and Acts as applicable, amended up to last date of bid submission.

2.0 The contractor is advised to visit the site of work to have an idea of the execution of the work; failure to do so shall not absolve their responsibility to do the work as specified in agreement.

### 3.0 Rates:

3.1. The work shall be treated as on works contract basis and the rates tendered shall be for complete items of work (except the materials, if any, stipulated for supply by the department) inclusive of all taxes, duties, and levies etc. and all charges for items contingent to the work, such as packing, forwarding, insurance, freight and delivery at site for the materials to be supplied by the contractor, watch and ward of all materials (including those supplied by the department, if any) for the work at site etc

3.2. Prices quoted shall be firm.

### 4.0 Taxes and Duties:

4.1. Being an indivisible works contract, GST etc. are not payable separately.

4.2. The GST shall be deducted from the bills of the contractor as applicable in the State in which the work is carried out, at the time of payments.

5.0 **Completeness of Tender:** All sundry fittings, assemblies, accessories, hardware items, foundation bolts, termination lugs for electrical connections as required, and all other sundry items which are useful and necessary for proper assembly and efficient working of the various components of the work shall be deemed to have been included in the tender, whether such items are specifically mentioned in the tender documents or not.

6.0 **Works to be done by the contractor:** Unless and otherwise mentioned in the tender documents, the following works shall be done by the contractor, and therefore their cost shall be deemed to be included in their tendered cost:-

- (i) Foundations for equipments and components where required, including foundations bolts.
- (ii) Cutting and making good all damages caused during installation and restoring the same to their original finish.
- (iii) Sealing of all floor openings provided by him for pipes and cables, from fire safety point of view, after laying of the same.
- (iv) Painting at site of all exposed metal surfaces of the installation other than pre-painted items like fittings, fans, switchgear/distribution gear items, cubical switchboard etc. Damages to finished surfaces of these items while handling and erection, shall however be rectified to the satisfaction of the Engineer-in-Charge.
- (v) Testing and commissioning of completed installation.
- (vi) Storage space for all equipments, components and materials for the work

7.0 **Storage and Custody of Materials:** The contractor has to make his own arrangement for the storage of the material at site & necessary watch and ward of the electrical installation during the execution of work till the same is handed over to the department. No extra payment will be made on this account. The storage space shall however be arranged by the department at site, if available. The main contractor shall arrange for proper storage of the electrical fans and fittings at site and that double lock system shall be arranged for the fans and fittings after receipt at site until the time they are taken for installation. The contractor shall however be responsible for proper storage and safe custody of the same till their installation and handing over to the department.

8.0 **Electric Power Supply and Water Supply:** Power and water supply will be arranged by the main contractor at the site for installation purpose. However, for final testing purpose after complete installation of the electrical items, electricity supply will be made available free of cost to the contractor. Contractor will take due care to ensure safety of electrical installation during execution of work.

9.0 **Tools for handling and Erecting:** All tools and tackles required for handling of equipments and materials at site of work as well as for their assembly and erection and also necessary test instruments shall be the responsibility of the contractor.

**10.0 Payment Terms:** Payment shall be made as per the relevant clauses of form PWD 7/8 forming part of the tender documents.

**11.0 Co-ordination with other agencies:** The contractor shall co-ordinate with all other agencies involved in the building work so that the building work is not hampered due to delay in his work. Recessed conduit and other works, which directly affect the progress of building work, should be given priority.

**12.1. Care of buildings:** Care shall be taken by the contractor to avoid damage to the building during execution of his part of the work. He shall be responsible for repairing all damages and restoring the same to their original finish at his cost. He shall also remove, at his costs, all unwanted and waste materials arising out of his work, from the site.

### **13.0 Structural Alterations to Buildings:**

(i) No structural member in the building shall be damaged/altered, without prior approval from the competent authority through the Engineer-in-charge.

(ii) Structural provisions like openings, cut outs, if any, provided by the department for the work, shall be used. Where these required modifications, or fresh provisions are required to be made, such contingent works shall be carried out by the contractor at his cost.

(iii) All such openings in floors provided by the department shall be closed by the contractor after installing the cables/conduits/rising mains etc. as the case may be, by any suitable means as approved by the Engineer-in-charge without any extra payment.

(iv) All chases required in connection with the electrical works shall be provided and filled by the contractor at his own cost to the original architectural finish of the buildings.

**14.0 Addition to an installation:** Any addition, temporary or permanent, to the existing electrical installation shall not be made without a properly worked out scheme/design by a qualified Electrical Engineer to ensure that such addition does not lead to overloading, safety violation of the existing system.

### **15.0 Work in occupied buildings:**

(i) When work is executed in occupied buildings, there would be minimum of inconvenience to the occupants. The work shall be programmed in consultation with the Engineer-in-charge and the occupying department. If so required, the work may have to be done even before and after the office hours.

(ii) The contractor shall be responsible to abide by the regulations or restrictions set in regard to entry into, and movement within the premises.

(iii) The contractor shall not tamper with any of the existing installations including their switching operations or connections there to without specific approval from the Engineer-in-charge.

### **16.0 Drawings:**

(i) The work shall be carried out in accordance with the drawings issued by Engineer-in-charge and the tender documents and also in accordance with modification thereto from time to time as approved by the Engineer-in-charge.

(ii) All wiring diagrams shall be deemed to be 'Drawings' within the meaning of the term as used in Clause 11 of the conditions of contract (PWD 7 or PWD 8). They shall indicate the main switch board, the distribution boards (with circuit numbers controlled by them), the runs of various mains and sub mains and the position of all points with their controls.

(iii) All circuits shall be indicated and numbered in the wiring diagram and the points shall be given the same number as the circuit to which they are electrically connected.

(iv) After award of the work, the firm will be required to submit the drawings for the proposed work including layout plan, conduit routes etc. Work will be carried out as per the approved drawings.

### **17.0 Conformity to IE act, IE Rules, and standards:**

17.1. All electrical works shall be carried out in accordance with the provisions of Indian Electricity Act, 1910 and Indian Electricity Rules, 1956 amended up to 21.08.2018. List of rules of particular importance to electrical installations under these General Specifications is given in Appendix C for reference.

### **18.0 General requirements of components:**

18.1. **Quality of material:** All materials and equipments supplied by the contractor shall be new. They shall be of such design, size and materials as to satisfactorily function under the rated conditions of operation and to withstand the environmental conditions at site.

### **19.0 Inspection of materials and equipments:**

19.1. Materials and equipments to be used in the work shall be inspected by the departmental officers. Engineer-in-charge shall decide when and which material needs to be inspected. Such inspection will be of following categories:

- (i) Inspection of materials / equipments to be witnessed at the Manufacturer's premises in accordance with relevant BIS /Agreement Inspection Procedure.
- (ii) To receive materials at site with Manufacturer's Test Certificate(s)
- (iii) To inspect materials at the authorized dealer's go downs to ensure delivery of genuine materials at site.
- (iv) To receive materials after physical inspection at site.

19.2. Adequate care to ensure that only tested and genuine materials of proper quality are used in work shall be ensured by firm. The firm shall ensure that:

- (i) Material will be ordered & delivered at site only with the prior approval of the department to ensure timely delivery.
- (ii) As and when the order is placed for the fittings/ fixtures, cables, switchgears, poles, rising main, other main items etc, its copy shall be endorsed to the CPWD Engineer-in-charge.
- (iii) The firm will be required to procure material like exhaust fans, MCB's & DB's, switches & sockets, wires & cables, conduits and switchgears etc directly from the manufacturer/ authorized dealers to ensure genuineness & quality and as per the approved makes only. Proof in this regard shall be submitted by the contractor if required by the department.
- (iv) Inspection at factory or at godown of the manufacturer, as required, shall be arranged by the firm for a mutually agreed date. Certificate for genuineness of the fittings shall have to provided duly signed by the manufacturer's officer not below the rank of Regional Manager.
- (v) Delivery of material shall be taken up only with the consent of department, after clearance of the material.
- (vi) Department shall reserve the right to waive inspection in lieu of suitable test certificate, at its discretion.

19.3. Similarly, for fabricated equipments, the contractor will first submit dimensional detailed drawings for approval before fabrication is taken up in the factory. Suitable stage inspection at factory also will be made to ensure proper use of materials, workmanship and quality control.

#### **20.0 Ratings of components:**

20.1. All components in a wiring installation shall be of appropriate ratings of voltage, current and frequency, as required at the respective sections of the electrical installations in which they are used.

20.2. All conductors, switches and accessories shall be of such size as to be capable of carrying the maximum current, which will normally flow through them, without their respective ratings being exceeded.

#### **21.0 Conformity to standards:**

21.1. All components shall conform to relevant Indian Standard Specifications wherever existing. Materials with ISI certification mark shall be preferred.

21.2. Relevant Indian Standards including amendments or revisions thereof up to 21.08.2018 of tender acceptance shall be applicable in the respective contracts for respective items, firm to ensure its compliance.

#### **22.0 Interchangeability:**

Similar parts of all switches, lamp holders, distribution fuse boards, Switch gears, ceiling roses, brackets, pendants, fans and all other fittings of the same type shall be interchangeable in each installation.

#### **23.0 Workmanship:**

23.1. Good workmanship is an essential requirement to be complied with. The entire work of manufacture/fabrication, assembly and installation shall conform to sound engineering practice.

23.2. Proper supervision/skilled workmen: The contractor shall be a licensed electrical contractor of appropriate class suitable for execution of the electrical work. He shall engage suitably skilled/licensed workmen of various categories for execution of work supervised by supervisors / Engineer of appropriate qualification and experience to ensure proper execution of work. They will carry out instruction of Engineer-in-charge and other senior officers of the Department during the progress of work.

23.3. Use of quality materials: Only quality materials of reputed make as specified in the tender will be used in work.

23.4. Fabrication in reputed workshop: Switch boards and LT panels shall be fabricated in a factory/workshop having modern facilities like quality fabrication, seven tank processes, powder/epoxy paint plant, proper testing facilities, manned by qualified technical personnel. These shall be as per make / item approved.

24.0 **Testing:** All testes prescribed in this General Specification, to be done before, during and after installation, shall be carried out, and the test results shall be submitted to the Engineer-in-charge in prescribed Performa, forming part of the Completion Certificate.

25.0 **Commissioning on completion:** After the work is completed, it shall be ensured that the installation is tested and commissioned.

**26.0 Completion plan and completion certificate:**

26.1. For all works completion certificate after completion of work as given in Appendix –E of CPWD Specification shall be submitted to the Engineer-in-charge.

26.2. Completion plan for the following, along with three set of prints of the same shall also be submitted.

- (i) General layout of the building.
- (ii) Locations of main switchboard and distribution boards, indicating the circuit numbers controlled by them.
- (iii) Position of all points and their controls.
- (iv) Types of fittings, viz. fluorescent, pendants, brackets, bulk head, fans, exhaust fans etc.
- (v) Name of work, job number, tender reference, actual date of completion, names of Division/ Sub-division and name of the firm who executed the work with their signature.

27.0 **Guarantee** The installation will be handed over to the department after necessary testing and commissioning. The installation will be guaranteed against any defective design/workmanship. Similarly, the materials supplied by the contractor will be guaranteed against any manufacturing defect, inferior quality. The guarantee period will be for a period of 12 months from the date of handing over to the department. Installation/ equipments or components thereof shall be rectified/ repaired to the satisfaction of the Engineer-in-charge. The firm will be required to submit guarantee of material from the manufacturer to the department.

28.0 The order of preference in case of any discrepancy as indicated in condition no. 1 under “Conditions of contract” given in the Standard CPWD Contract form may be read as the following:

- (a) Nomenclature of item as per Schedule of Quantities.
- (b) Additional specifications, particular specifications and special conditions for Electrical Works.
- (c) General conditions.
- (d) Contract Clauses of General conditions of contract for CPWD 2014 and amendment therein upto last date of bid submission, CPWD specifications for electrical works as applicable.
- (e) Architectural/structural drawings and specifications mentioned in drawings.
- (f) Indian standard specifications of BIS.
- (g) Sound engineering practice as per directions of the Engineer-in-charge.
- (h) Manufacturer’s specifications. A reference made to any Indian Standard Specifications in these documents, shall imply reference to the latest version of that standard, including such revisions/amendments as issued by the Bureau of Indian Standards upto 21.08.2018 The contractor shall keep at his own cost all such publications of relevant Indian Standards applicable to the work at site.

29.0 The department shall deduct GST as per Tax Act and Income Tax and other taxes on the value of work done from each bill of the contractor as per prevailing Government instructions/orders. Labour cess as per building and other construction worker’s welfare cess act 1996 shall also be deducted from all the bills payable to the firm. In lieu, the department shall issue a certificate of deduction of tax at source to the contractor in relevant forms.

30.0 The main contractor shall not indulge in procurement of electrical items and getting the work done on labour contract with the electrical contractor. The whole electrical component shall be executed by the eligible electrical contractor on a turnkey basis i.e. procurement of material & engaging labour. The associate electrical contractor shall submit the completion certificate of electrical work executed by him along with necessary test reports, completion plan etc. If Composite contractor himself meets eligibility conditions for execution of electrical work then he may not associate any other eligible electrical contractor.

31.0 The contractor shall take all safety precautions to avoid accidents by exhibiting caution boards, red flags, red lights and by providing necessary barriers and all other measures required from time to time. The contractor shall be responsible for all damages and accidents due to negligence on his part.

32.0 The contractor shall give due notices to Municipality, Police and/or other authorities that may be required under the law/rules under force and obtain all requisite permissions/licenses for temporary obstructions/enclosures and pay all charges which may be leviable on account of his execution of the work under the agreement. Nothing extra shall be payable on this account.

33.0 The contractor shall leave such recesses, holes, openings, etc., as may be required for the electric, air-conditioning and other related works. (For this purpose, any required inserts, sleeves, brackets, conduits, base plates, insert plates, clamps etc. shall be arranged by the contractor and fix the same at the time of casting of concrete, stone work & brick work, if required, and nothing extra shall be payable on this account.

34.0 The contractor shall give a trial run of the equipments and machinery for establishing its capability to achieve the specifications within laid down tolerances to the satisfaction of the Engineer-in-charge before commencement of work.

35.0 The work will be carried out in close coordination with the building work and other agencies. Conduits will be laid in the slab within the specified time and it will have to be ensured that the casting of slabs is not delayed for want of laying of conduits. The conduits will also be laid in walls before the Plaster work is undertaken so as to avoid breaking cutting of plaster while making chase for laying of conduits subsequently. The contractor will have to employ adequate labour for carrying out the work. No claim regarding the idle labour for any reason will be entertained by the Department.

36.0 No tools and plants including special T&P etc. shall be supplied by the department and the contractor will have to make his own arrangements at his expenses.

37.0 All tools, plant and machinery provided by the contractor shall, when brought at the site, be deemed to be exclusively intended for the construction and completion of this work and the contractor shall not remove the same or any part thereof (save for the purpose of moving it from one part of the site to another) without the consent of the Engineer-in-charge.

38.0 All materials shall be got checked & approved by the Engineer-in-charge on receipt of the same at site before use and rejected material is to be removed from the site immediately.

39.0 No foreign exchange shall be made available by the department for the purchase of equipments, plants, machinery, materials of any kind or any other items required to be carried out in execution of work.

40.0 The contractor shall carry out his work, so as not to interfere with or hinder the progress or completion of the work being performed by other contractor (s) or by the Engineer-in-charge and shall as far as possible arrange his work and shall place and dispose off the materials being used or removed, so as not to interfere with the operations of other contractors, or he shall arrange his work with that of the others in an acceptable and coordinated manner and shall perform it in proper sequence to the entire satisfaction of Engineer-in-charge.

41.0 All items which are not covered while carrying out electrical work shall be removed and shall be cleared by the contractors as soon as the work is completed.

42.0 The contractor shall give the Engineer-in-charge in every month, a progress report of the work done during the previous month. The progress of work will be reviewed periodically by the Engineer-in-charge with the contractor and shortfalls, if any, sorted out. The contractor shall thereupon take such action as may be necessary to bring back his work to schedule without any additional cost to the department.

43.0 It shall be responsibility of the main contractor to sort out any dispute involved with the associated contractor without any time and cost overrun to the department. The main contractor shall be solely responsible for settling the dispute/litigation arising out of his agreement with the associate contractor. The contractor shall ensure that the work shall not suffer on this account.

44.0 The contractor shall quote his rates considering the specifications, terms & conditions and particular specifications and special conditions etc. and nothing extra shall be payable whatsoever unless otherwise specified.

45.0 The main contractor shall be responsible for coordinating the activities of all works and essential progress of works as per milestone and laid down programme.

46.0 The contractor shall be responsible for the watch and ward of the site/property/material provided by him and materials issued by the department against pilferage and breakage during the period of execution and thereafter till

the work is completed and physically handed over to the department.

47.0 Samples of all materials, fittings and other materials/articles required for execution of the work shall be got approved from the Engineer-in-charge. Materials/articles manufactured by the firms of repute as indicated in tender documents and approved by the Engineer-in-charge shall only be used.

48.0 The contractor shall ensure quality construction in a planned and time bound manner. Any sub-standard material or work beyond set out tolerance limits shall be summarily rejected by the Engineer-in-charge.

49.0 The contractor shall be required to make a sample Room for each type at the earliest opportunity using all approved materials for approval of Engineer in charge before mass scale finishing works are taken up.

50.0 Even ISI marked materials shall be subjected to quality test at the discretion of the Engineer-in-charge besides testing of other materials as per the specifications described for the item/material. Whenever ISI marked materials are brought to the site of work; the contractor shall, if required by the Engineer-in-charge, furnish manufacturers test certificates to establish that the materials procured by the contractor for incorporation in the work satisfy the provisions of IS codes relevant to the material and/or the work done.

51.0 The contractor shall have to engage well experienced skilled labour and deploy modern T&P and other equipments to execute the work.

52.0 The firm shall use only electrically operated chase cutting machine for cutting the chases in the wall for recessed conduit wiring.

53.0 The contractor will have to make his own arrangement for storage of materials. No storage space shall be provided by department.

54.0 The contractor will have to make his own arrangement for water and power supply for execution of works.

55.0 The contractor will have to ensure that the skilled labour i.e. wireman etc., Engaged in the execution of the work must possess valid electrical license, otherwise he will not be permitted to execute the work.

56.0 The associate contractors executing the electrical works must possess the valid electrical contractor license otherwise they will not be permitted to execute the electrical works.

57.0 The contractor shall be responsible for removal of all defects in the work during the guarantee/warranty period. The department shall carry out routine maintenance only. However, if any failure is noticed during this period which is attributable to poor quality of material and bad workmanship, the contractor will be required to rectify the same at his own cost, failure of which the department will be at liberty to get the defects rectified at the risk & cost of the contractor. The contractor will also be required to carryout his own inspection/testing during the guarantee/warranty period and attend to any defect taking place during this period.

58.0 Priority to arrange the material shall be decided by the department. However, material required for the work shall be brought at site only at the appropriate time keeping in view the progress of building works as well as Electrical & Mechanical works. Decision of Engineer-in-charge in this regard shall be final.

59.0 The contractor has to intimate his authorized representative, who will be receiving instructions in his absence. The contractor /his authorized representative is bound to sign the site order book as and when required by the Engineer-in-charge and to comply with the instructions therein.

60.0 Suitable back plates providing for fixing the wall brackets and ceiling flush fittings shall be supplied by the contractor free of cost.

61.0 It shall be responsibility of contractor to provide polythene/PVC plastic cover for all SDBs/meter boards/feeder pillars/panels etc. so as to protect them from wear & tear/damage during execution stage. Contractor shall provide the covers for the materials if any being supplied departmentally also. Nothing extra shall be paid on this account.

62.0 Contractor is fully responsible for any kind of damage to the LT/HT cable during execution of work. No joints shall be allowed if the cable is damaged. Contractor has to replace the full length at his own cost.

63.0 The MCB/MCCB and switch accessories should be of same make as that of MCB DBs and Modular Switch

boxes respectively. The make of cable end boxes will also be same that of MCBDBs.

64.0 Colour coding shall have to be adopted in the wiring system as per specification.

65.0 Tinned copper Earthing lugs/Thimbles/ferrules shall be provided for termination of earth wire to all Metallic outlet boxes/fittings/fixtures/fan regulator/MCB DB/switch board/Meter board etc., properly crimped/brazed/soldered for which nothing extra shall be paid.

66.0 Suitable crimping tools shall be used for crimping the lugs/thimbles/ferrules. Nothing extra shall be paid on this account. The lugs/thimbles/ferrules pressed by conventional/ordinary pliers shall not be accepted.

67.0 A suitable brass/tinned copper neutral link shall be fixed at suitable place in the Metallic outlet boxes of all sizes to terminate neutral wire properly. Nothing extra shall be paid on this account.

68.0 An earth termination with earth stud of brass/tinned copper i/c 2 No. metallic washers or suitable earth bar of Brass/tinned copper with tinned copper thimbles/ferrules/lugs should be suitably fixed at suitable place in the Metallic outlet box for termination of protective earth conductor. Nothing extra shall be paid on this account.

69.0 In the outlet boxes, phase from one switch to other switch shall be looped with suitable size of solid copper conductor. Nothing extra shall be paid on this account. Stranded conductor shall not be accepted.

70.0 Only required number of knockouts should be removed from Metallic outlet boxes for entry of conduits. If more than required number of knockouts are removed, the Metallic outlet box shall not be accepted.

71.0 Separate G.I. boxes shall be used for staircase light switches and bell push. Nothing extra shall be paid on this account.

72.0 Metal sheath of Co-axial T.V. cable shall be terminated using 'U' shape thimble/lugs/ferrules. Nothing extra shall be paid on this account.

73.0 To facilitate drawing of wires 16/18 SWG GI fish wire be provided along with laying of recessed conduit. Nothing extra shall be paid on this account.

74.0 Cable connection to switch gear is deemed to be included in the item of end termination. No extra payment shall be made for that.

**Note : The quantity of material in the BOQ is indicative. Contractor has to assess the actual requirement of material at site before placing the order, keeping in view the drawing and site requirement from the shortest route. No claim for payment for unused excess material shall be entertained.**

Executive Engineer (E) Jodhpur  
CPWD Jodhpur

### ADDITIONAL CONDITIONS FOR E.I & FAN WORKS

- 1- The work shall be carried out strictly in accordance with CPWD General Specifications for Internal Electrical Works 2013 & External Work-1994 and in accordance with Indian Electricity Rules, 1956, Indian Electricity Act, 2003 as amended up to date and as per instructions of the Engineer-in-Charge including as below and nothing will be paid extra.
- (a) All material shall be got approved from Engineer-in-Charge in sample register before use and approved samples shall be kept in safe custody at site and shall be made available to inspecting officer/ team of QC. One sample flat/Bay shall be made for approval of final location of switch boards/ fittings etc. and then only work shall be executed in other flats/bays.  
All damages done to the building during/ for execution of Electrical work shall be the responsibility of the contractor and the same will be made good immediately at his own cost to the satisfaction of the Engineer-in-Charge. Any expenditure incurred by the department in this condition shall be recovered from the contractor and decision of the Engineer-in-Charge about recovery shall be final.
- (b) All hardware items such as screws, thimbles, G.I. wires etc. which are essentially required for completing an item as per specifications will be deemed to be included in the item even when the same have not been specifically mentioned. All hardware materials such as nuts/ bolts/ screws/ washers etc. to be used in the work shall be SS/ zinc/cadmium plated iron.
- (c) CONDUIT LAYOUT shall be prepared by contractor and got approved before execution of work. In case contractor does not do so before start of work, recovery @ 2(two)% of tendered amount of I.E.I. works shall be made from the bill. Minimum number of Junctions to be kept, & if required junctions to be kept underneath the fitting locations in corridor/rooms so that junctions are not visible after fittings are fixed/ in position. Drop of conduit shall be well planned w.r.t. location of fitting/ D.B. and criss crossing to be avoided. All chases in walls shall be cut using electrical chisels/cutters. For this purpose, electricity shall be arranged by contractor. In case contractor fails to do chase cutting by electrical chisels/ cutters and resorts to manual methods, a recovery of Rs.50/- per point shall be made from contractor's bill. A photographic record of such cutting shall be maintained by the contractor and included in Monthly Progress Report.
- (d) Any conduit which is not to be wired by the contractor shall be provided with GI fish wire for wiring by some other agency subsequently. Nothing extra shall be paid for the same. Termination of multi-stranded conductors shall be done using crimping type thimbles at both the ends. Rate for the same is included in the respective item.
- (e) All metal boxes to be applied primer and painted, then only should be installed else recovery @Rs.20/- per point should be made from contractor's bill. Boxes shall have socket arrangement for tightening screws, instead of simple holes in M.S.sheet. Boxes shall be again painted at the time of wiring.
- (f) For Submain Wiring, Colour Code for different phases and Neutral (R.Y.B. black) to be maintained. While circuit wiring, wiring for fan point, wiring for light point shall be done with different colours for easy identification. Wiring for neutral shall be done with black colour and all connections to fans & fittings wherever visible shall be made with white PVC insulated copper wire or wherever cover sleeve may be provided. At Switch board, Switch shall be fixed in a logical manner w.r.t. fittings layout.
- (g) Unless specifically approved by Executive Engineer (E), loose wire box, above DB shall not be provided however DB's shall have loose wire box of same make.  
All connections to MCB's shall be made using thimble/lugs.  
All DB's i/c incoming & outgoing MCB's shall be suitably numbered with PAINT for location/circuits.  
DB shall be fixed in recess suitably (30 mm. approx. projected from unplastered wall) to ease opening of door. Top of DB to match with door frame height as per site conditions.
- (h) Phenolic laminated sheet shall be of white colour, and shall be filed/ rounded at edges and of minimum 3mm thick.
- (i) All fittings and fans should be properly earthed through the protective conductor.  
Provision of earth bars in main boards, earth terminal block in DB's & earth studs in all metal boxes shall be made, connection to this stud shall be crimped. A clamp type termination should be made in the termination of earth strips (where provided) to pipe electrodes to provide surface type contact.
- (j) The earthing shall be carried out in the presence of the Engineer-in-charge or his authorized representative.
- (k) The size at switch box for providing Modular Plate Type Switch/sockets shall be properly settled to take care of all necessary switches/screws/fan regulators. Blanking plate if required shall also be provided at no extra cost.
- (l) For point wiring in steel conduit all modular type switches/sockets/telephone outlets/T.V.outlets shall be of only one make.
- (m) Whenever supply items like fans & fittings etc. are also included in the Schedule of work, such items shall be executed only after completion of at least 75% of the wiring items.
- (n) The contractor shall make his own arrangement at his own cost for electrical/ general tools and plants required for the work.

- (o) All LED light fittings should have minimum 2-year warranty, warranty certificate to be Submitted by agency on OEM letter head regarding this.
- 2- The work shall be carried out according to approved drawings/details which shall be subsequently issued to the successful tenderer for execution of work and as per instructions of the Engineer-in-Charge who will have the right to change the layout as per requirement at site and the contractor shall not have any claim due to change in layout.  
The work shall be carried out in engineering like manner. The bad workmanship will not be accepted and defects shall be rectified at contractor's cost to the satisfaction of the Engineer-in-Charge. The programme of electrical works are to be coordinated in accordance with the building work and no claim for idle labour will stipulated in the tender, electrical work shall have to be completed alongwith completion of civil work. All the debris of the electrical works should be removed and the site should be cleared by the contractor immediately after the accruing of debris. Similarly, any rejected material should be immediately cleared off from the site by the contractor.  
Watch and ward of the material/equipment shall be the responsibility of the contractor till handing over of installation to the department.  
The contractor or his representative is bound to sign the site order book as and when required by the Engineer-in-Charge and to comply with the remarks therein.
- 3- The entire installation shall be at the risk and responsibility of the contractor until these are tested and handed over to the department. However, if there is any delay in construction from the department side, the installation may be taken over in parts, but the decision on the same shall rest with Engineer-in-Charge which shall be a binding on the contractor.  
Some of the items of work, if already executed: on that case, the successful tenderer shall have to use these items for completing the work. For wiring, the existing conduit wherever required shall be used by the contractor. The recovery will be made for these items as accepted rate of similar items.
- 4- The secured advance as applicable shall be allowed.
- 5- **Test Certificate:** Test certificate for the work carried out shall also be submitted failing which recovery @1% tendered amount & maximum of Rs.1500/- shall be made from final bill.
- 6- **Panels:** Drawing of all types of Elect. panel board shall be submitted for approval within 30 days from award of work and fabrication to be taken up only after approval of such drawing. Before painting proper surface, treatment shall be done and then powder coated. These shall be offered for inspection during fabrication.
- 7- Quantities indicated in Schedule of work are only tentative, contractor shall consult AE-in-Charge before procurement. Payment shall be made only for the quantities actually executed and measured.
- 8- **Time Period:** Contractor has to plan his activities, so that electrical work is to be carried out in close co-ordination with CIVIL work and in no case CIVIL work be delayed because of delay in electrical work and the work has to be completed accordingly.
- 9- The makes for items shall be as per list attached.
- 10- **Storage:** Responsibility for storage space for execution of work shall be of main contractor.
- 11- **Power & Water Supply:-** Responsibility for supply of power & water for execution of work shall be of contractor.
- 12- Material to be used in the work shall be strictly as per list of make attached. The material in required quantity to be used in the work shall be got approved along with necessary technical data sheet from the Engineer-in-charge before its use at site. The Engineer-in-charge shall reserve the right to instruct the contractor to remove the material which, in his opinion, is not as per specifications.
- 13- Contractor shall preserve the copies of invoices, test certificates, gate passes etc. to prove the genuineness of material/ purchases. The responsibility of procurement, genuine material of specialized works shall rest with the contractor.
- 14- Contractor is advised to visit site before quoting rates for determining site conditions. No claim or argument shall be entertained in this regard at later stage.
- 15- Required repairing and finishing work is to be done by agency after installation of split air conditioners.

Executive Engineer (E) Jodhpur  
CPWD Jodhpur

## TECHNICAL SPECIFICATIONS & CONDITIONS FOR (UPS)

### **Part I : GENERAL**

#### **SUMMARY**

The UPS system offered shall be designed to provide power solutions for Equipments of PA System, servers, workstations, CCTV, Fire alarm system. This specification describes the architecture and the different components required for providing a Suitable solution for the critical requirements. 1X15KVA UPS with 30 Mins backup.

#### **SPECIFICATION FOR UPS SYSTEM**

##### **a) GENERAL FEATURES**

- a. The UPS shall be Double conversion type and shall provide a regulated and uninterrupted three-phase AC power, within specified tolerances, to critical station loads during normal and emergency operations. It shall incorporate hot swappable battery features for 15 KVA UPS System.
- b. It shall be possible to coordinate the protective device like MCBs/MCCBs etc down the line so that in case of any short circuit at down side, relevant MCB shall trip and not the UP  
Each UPS should have its own distinct Battery Bank rated for giving back-up of 30 minutes.
- c. All UPS shall be synchronized to make output waveform similar for all UPS if required in future.

##### **DESCRIPTION**

The power solution shall consist of the following features:

- a) Three phase input and output.
- b) High efficiency UPS  $\geq 96\%$  from 30% load to 100% load for 1 x 15 KVA UPS System.
- c) Parallel Redundant configuration
- d) Fully rated Static Switch (STS).
- e) Maintenance Bypass
- f) Battery units in a separate

##### **1.3.1 SUBMITTALS**

- (A) The following documents shall be submitted within 15 days from issue of letter of commencement of work.
  - 1) Product catalogue sheets or equipment brochures.
  - 2) System single-line operation diagram.
  - 3) Tentative Bar Chart clearly indicating the various activities
  - 4) Battery selection calculation.
- (B) The following documents shall be submitted on completion of the work:
  - 1) Installation manual, which includes instructions for storage, handling and start-up of all systems.
  - 2) User manual, which includes operating instructions.

- 3) As built equipment drawings.

## **ENVIRONMENTAL REQUIREMENTS**

- (A) Operating ambient temperature: 0°C to 40°C.  
(B) Relative humidity: 0 to 95%, non-condensing.

## **10 KVA UPS SYSTEMS**

### **(A) GENERAL**

- 1) UPS system shall consist of rating 15 KVA in a redundant configuration as per the schedule , Bypass Static Switch, Battery unit for standard run time and interface LCD display. The UPS shall be of the Double Conversion On-Line topology with power factor corrected inputs.
- 2) The battery system should consist of modular battery cabinets and shall be sized for a back up of 30 (THIRTY) minutes for each UPS.

### **(B) SYSTEM RATINGS AND OPERATIONAL CHARACTERISTICS**

System continuous rating: The system shall be rated for 15 KVA on full load of 18 KW output @ 0.9 p.f.

#### **(C) SYSTEM INPUT**

- 1) Input voltage rating: 3ph 415 V
- 2) Wide Voltage Window 320-600 V. The system could able to operate at 600 V for at least 1 minute
- 3) Input frequency: 50 Hz +/- 10%
- 4) Input power factor: The PFC rectifier shall be power factor corrected so as to maintain an input power factor of 0.99 @ loads > 40% to unity to ensure generator compatibility and avoid reflected harmonics from disturbing loads sharing the utility power. The rectifier output shall be filtered with a ripple current not exceeding 1% rms over the allowable continuous input voltage range.
- 6) Power walk-in / Soft-Start: shall be linear from 0 to 100% of the load over a 30 second period.  
Foiled  
selectable from 5 to 30 sec. adjustable with 5 sec. increment.

### **(D) SYSTEM OUTPUT**

- 1) Output voltage rating: 3 ph 415 V .
- 2) Output voltage regulation for steady state and transient variations for unbalanced load +/-1%.
- 3) Max. voltage transient recovery time:
  - a. 20% load step change +3%
  - b. 50% load step change +3%
- 4) 100% load step change +5% Frequency tolerance: 50 Hz, ±1.0 percent (free running)
- 5) Output harmonic distortion:
  - a) <2% THD maximum and 1% of any single harmonic for a 100% linear load.
  - b) <3% THD maximum for a 100% non-linear load.
- 8) Overload capability:
  - a) 150% for 60 seconds in normal operation.
  - b) 125% for 600 seconds in normal operation.
- 9) Short circuit withstand: The UPS must withstand a bolted-fault short circuit on the output without damage to the UPS system.
- 10) System AC-to-AC efficiency ≥ 96% at 100% load for 10 KVA UPS System.
- 11) Acoustical noise: noise measured at 1 mtr. from the operator surface shall not be more than 65 dB.
- 12) Output Waveform- Sine wave.
- 13) Neutral conductor size 1.5 times phase conductor.
- 14) **Efficiency :**

**For 10 KVA UPS System:**

- a. Normal Double Conversion mode:  $\geq 96\%$  from 30% load to 100% load
- b. EConversion / VI mo  
de:  $\geq 98.5\%$  from 30% load to 100% load
- c. ECO mode:  $\geq 99\%$  from 30% load to 100% load.

**(E) MODES OF OPERATION**

The UPS shall be designed to operate as an on-line, double-conversion, reverse-transfer system in the following modes:

1. **Normal:** UPS inverters continuously powers the critical AC load. The rectifier/chargers derives power

from the mains AC power supply source converting this to DC power to supply the inverters, while simultaneously float/boost charging the battery system. Power supplied by the UPS inverters is, to within specified tolerances, at rated voltage and frequency.

2. **ECO mode:** The UPS system is configured to use static bypass operation as the preferred mode under predefined. Transfers to battery operation upon utility failure. Efficiency up to 99%.

3. **E Conversion:** E Conversion allows the system to supply the active part of the load through the bypass. The inverter is kept running in parallel with the bypass source and supplies the reactive part of the load. The input power factor of the UPS is, regardless of the load power factor, maintained close to unity as the reactive part of load is significantly reduced in the UPS input current. In case of an interruption to the utility/mains supply, the inverter immediately maintains the output voltage so that breaks or drops during this transfer are practically eliminated. UPS operates with static bypass in parallel with main inverter. Main inverter actively corrects power factor, and harmonics to provide sinusoidal main input current without interruptions.

4. **Battery:** Upon failure of the mains AC power supply source, the critical AC load is powered by the inverter, which gets, without interruption, power from the battery system. There shall be no interruption in power to the critical load upon failure or restoration of the mains AC power supply source. Upon restoration of the mains AC power supply source, power to the rectifier initially is restricted by a gradual power walk-in. Following the short power walk-in period, the rectifier powers the inverter and simultaneously recharges the battery through the battery converter. This shall be an automatic function and shall cause no interruption to the critical load.

5. **Off-Battery or Frequency Converter:** When the battery system is taken out of service for maintenance or the UPS is used as a frequency converter, it is disconnected from the battery converter and inverter by means of (an) external disconnect breaker(s). The UPS shall continue to function and meet all of the specified steady-state performance criteria, except for the power outage back-up time capability.

6. **Static bypass - 100 percent rated, continuous duty:** The static bypass transfer switch shall be solid state, rated for 100 percent continuous duty without mechanical contactor device in parallel for higher reliability and consistent response time and shall operate under the following conditions:

- **Uninterrupted transfer:** The static bypass transfer switch shall automatically cause the bypass source to assume the critical load without interruption after the logic senses one of the following conditions:

Inverter overload exceeds unit's rating.

Battery protection period expired and bypass current is available. Inoperable inverter.

- **Interrupted transfer:** If the bypass source is beyond the conditions stated below, the

UPS shall make an interrupted transfer (not less than 100 milliseconds in duration in ECO mode).

Bypass voltage greater than +10 percent, -10 percent from the UPS rated output voltage.

Bypass frequency tolerance is user selectable to  $\pm 0.1\text{Hz}$ ,  $\pm 3\text{Hz}$ , and  $\pm 10\text{Hz}$ .

- **Automatic uninterrupted forward transfer:** The static bypass transfer switch shall automatically forward transfer power, without interruption, after the UPS inverter is turned on after an instantaneous overload induced reverse transfer has occurred and the load current returns the UPS's nominal rating or less.
- **Manual transfer:** A manual static transfer shall be initiated from the UPS control panel by turning the UPS inverter off.

7. **Parallel:** For higher capacity or higher reliability, the UPS outputs (3ph/4w) can be directly paralleled together; parallel controllers in every UPS automatically share the load. The largest parallel capacity is up to five times the nominal load of each unit composing the system i.e. Maximum 5 units of same capacity could be connected in parallel.

## F) COMPONENTS

### 1) Rectifier

- a) Each UPS shall include an active power factor corrected, Insulated Gated Bipolar Transistor (IGBT) rectifier.
- b) **Input harmonic current suppression:** The PFC rectifier shall produce a sinusoidal input AC current on each phase with low harmonic content, limiting THD on the UPS input to below 3 percent @ 100% load.
- c) **Battery charger current limiting:** The UPS shall be equipped with a system designed to limit the battery recharge current.  
40% charger up to 80% load  
20% charger 80% - 100% load
- d) **Wide input voltage window:** 320-600 V. The system can operate at 600 V for 1 minute.
- e) DC bus voltage shall be as per manufacturer's standard.
- f) The DC bus voltage shall be compensated against temperature variations (Battery Temperature Compensation) to always maintain optimal battery float charging voltage for temperature excursions above or below 25°C.
- g) DC ripple voltage shall be less than  $\pm 1\%$  of nominal with no battery connected.
- h) Pulse Width Modulation (PWM) current control shall be used. Digital Signal Processors (DSP) shall be used for all monitoring and control tasks. Analog control is not acceptable.
- i) Typical batteries re-charge time as per IEEE 485.

### 2) BATTERIES

- a) Standard battery technology shall be Valve Regulated Lead Acid (VRLA) Standard Maintenance Free type modular batteries.
- b) Batteries shall be housed in a separate modular battery cabinet for each UPS system along with required accessories.
- c) Battery voltage shall be Battery Temperature Compensated.
- d. The battery system should consist of modular battery cabinets Charging power in % of output power:
  - 40% charge  $\leq$  80% load

- 20% charge  $\leq$  100% load

Battery test: Manual or automatic (selectable) Deep discharge protection

Cold start without additional equipment

3) **INVERTER**

- a) The inverter shall consist of fast switching IGBT.
- b) Inverter shall be PWM controlled using DSP logic. Analog control shall not be acceptable.
- c) The inverter shall be fully rated.
- d) Nominal output voltage shall be 415 V, 3-phase, 50Hz, 4-wire plus ground.
- e) Efficiency at full load: Not less than 96% from 30% load to 100% load
- f) Crest Factor: 1:3
- g) Remote Emergency Power off (EPO) shall be provided.
- h) **Transient Recovery:** The output voltage returns to within  $\pm 1\%$  of the steady state value within 50ms.

i) **Fault Clearing**

- a. The inverter shall electronically be turned off to protect against excessive overload conditions which exceed the parameters defined.
- b. UPS systems shall sense an overload condition and automatically transfer to the bypass input source which shall be used to provide the necessary fault clearing current required.

j) **Inverter DC Protection**

- a. The inverter shall be protected by the following features that shall be independently adjustable for maximum system flexibility.
  - 1. DC Over-voltage Trip.
  - 2. DC Under-voltage Shutdown.
  - 3. DC Under-voltage Disconnect annunciated by an internal visual alarm and relay contact closure.

k) **Output Protection**

- a. The inverter shall be electronically turned off to protect against overloads and abnormal load conditions which exceed the units rating.
- b. UPS systems shall sense an overload condition and automatically transfer to the bypass input source which shall be used to provide the necessary current required.

l) **Over-current Protection**

- a. The inverter shall be protected from excessive overloads, including reverse currents, by fast acting fuses to prevent damage to power semiconductors.  
All fuses shall be provided with a blown fuse indicator with alarm indication on the control panel.

4) **STATIC BYPASS - 100 PERCENT RATED, CONTINUOUS DUTY:**

The static bypass transfer switch shall be solid state, rated for 100 percent continuous duty without mechanical contactor device in parallel for higher reliability and consistent response time and shall operate under the following conditions:

1. **Uninterrupted transfer:** The static bypass transfer switch shall automatically cause the bypass source to assume the critical load without interruption after the logic senses one of the following conditions:
  - a. Inverter overload exceeds unit's rating.
  - b. Battery protection period expired and bypass current is available.
  - c. Inoperable inverter.
2. **Interrupted transfer:** If the bypass source is beyond the conditions stated below, the UPS shall make an interrupted transfer (not less than 100 milliseconds in duration in ECO mode).
  - a. Bypass voltage greater than +10 percent, -10 percent from the UPS rated output voltage.
  - b. Bypass frequency tolerance is user selectable to  $\pm 0.1\text{Hz}$ ,  $\pm 3\text{Hz}$ , and  $\pm 10\text{Hz}$ .
3. **Automatic uninterrupted forward transfer:** The static bypass transfer switch shall automatically forward transfer power, without interruption, after the UPS inverter is turned on after an instantaneous overload induced reverse transfer has occurred and the load current returns the UPS's nominal rating or less.
4. **Manual transfer:** A manual static transfer shall be initiated from the UPS control panel by turning the UPS inverter off.
5. **Overload Ratings:** Each static bypass transfer switch shall have the following overload characteristics:
  - a. 1,000% of UPS output rating for 100 milliseconds.
  - b. 150% of UPS output rating for one (1) minute.
  - c. 100% of UPS output rating indefinitely.
  - d. Each switch shall be suitable for all load conditions permitted by the upstream protective devices such that no damage is sustained during operation.
- 5) **MECHANICAL**

The UPS system, Static Switch and VRLA SMF batteries shall be housed in separate racks having the following specifications:

- a) Powder coated finish of approved colour.
- b) Dead front construction
- c) Caster fitted for mobility.
- d) Cable entry: Top & Bottom both option should be available
- e) Cooling: Forced by internal blower.
- f) UPS system shall be able to place back to wall.

## Man-Machine Interface (MMI)

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UPS Display and Control Panel: Each UPS module shall be equipped with a LCD display. This shall automatically provide all information relating to the current status of the UPS as well as being capable of displaying metered values. The display shall be menu-driven, permitting the user to easily navigate through operator screens.

a) Metered Values: An MCU or DSP shall control the display functions of the monitoring system. All three-phase parameters shall be displayed simultaneously. All voltage and current parameters shall be monitored using true RMS measurements for accurate ( $\pm 1\%$ ) representation of non-sinusoidal waveforms typical of computers and other sensitive loads. The following parameters shall be displayed:

### A. Measurements:

1. Input voltage (Ph-Ph and PH-N).
2. Input current per phase.
3. Bypass voltage.
4. Bypass input frequency.
5. UPS output voltage (Ph-Ph and Ph-N).
6. UPS output current per phase.
7. UPS output frequency.
8. UPS output percent load.
9. UPS output kVA.
10. UPS output power factor.
11. Battery voltage.
12. Crest factor.
13. Battery current.
14. Battery backup time and remaining service life.

### B. Status indications and events:

- 1) Load on battery.
- 2) Load on UPS.
- 3) Load on bypass.
- 4) Low battery warning.
- 5) General alarm.
- 6) Inoperable battery.

- 7) Remaining back-up time during operation on battery power.
  - 8) Bypass source outside tolerances.
  - 9) Additional indications shall provide maintenance assistance.
- C. Time-stamped historical events:** This function shall time stamp and store important status changes and anomalies.
- D. Power Flow Mimic:** Each UPS module shall be equipped with a mimic to indicate power flow to the
- critical load along with an indication of the availability of the rectifier/charger, battery, automatic bypass, inverter, load. The mimic shall provide a quick and easy indication of the load level (displayed on LCD), including for overload conditions (displayed on LCD). This power flow is also shown in the LCD menu.
- E. Alarms and Status Information:** Alarm and status conditions shall be reported at a single module UPS system or at a paralleled module UPS or both. The display and control panel shall report the alarms and status information. Each alarm shall be visually displayed in text form and an audible alarm will sound for each alarm displayed.

Inverter ON/OFF: Each UPS module shall be equipped with an inverter ON/OFF buttons which will transfer the load from all UPS modules to the bypass mains supply, if it is available. The inverter ON/OFF control shall be protected under menu confirm protect if the bypass mains is not available.

## **F. UPS CONNECTIVITY AND MANAGEMENT**

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Unattended Graceful Operating system Shutdown and Remote monitoring:

- a) Server shutdown:
- b) The UPS, in conjunction with a network interface card, shall be able to gracefully shutdown one or more operating systems during an on battery situation (Ethernet TCP/IP networks).
- c) The UPS shall also be able to use an RS232 port to communicate over a DB9 serial cable and gracefully shutdown one or more operating systems during an on-battery situation. The UPS manufacturer shall have available software to support graceful shutdown and remote monitoring for the following systems: Linux, Novell, Solaris, Windows 7, Windows XP/2000/NT.
- d) Remote UPS monitoring: Remote UPS monitoring shall be possible in three ways:
  - i) Web monitoring: Remote UPS monitoring shall be possible via a web browser such as Internet explorer or Netscape Navigator.
  - ii) RS232 monitoring: Remote UPS monitoring shall be possible via either RS-232 or contact closure of the UPS.
  - iii) Simple Network Management Protocol (SNMP)

## **TECHNICAL SPECIFICATIONS & CONDITIONS FOR ROOF TOP SOLAR POWER PLAN**

Solar Photovoltaic Modules shall conform to UL/ CE/ IEC/ IS specifications necessary certification from the reputed laboratory shall be provided by bidder.

### **Electrical Features**

Solar Photovoltaic module array shall consist of high efficiency Solar Modules utilizing Crystalline Silicon Solar Photovoltaic cells. Solar Photovoltaic module shall be minimum 10KWp. crystalline high power cells are used in the Solar Photovoltaic module. Solar module shall be laminated using lamination technology using established polymer (EVA) and Tedlar/ Polyester laminate.

Each Solar module should consist of 72/60 Photovoltaic cells.

**Solar Photovoltaic module efficiency shall be greater than 15%** Module shall be made of high transmissivity glass front surface with anti reflection coating giving high encapsulation gain and hot butyl rubber edge sealant for module protection and mechanical support.

All materials used must have a proven history of reliable and stable operation in external outdoor applications. Solar modules are designed to operate and perform in relative humidity up to 100% with temperatures between -10 Deg C and +85 Deg C and with stand gust up to 200km/h from back side of the panel.

Sample modules and production processes employed in the manufacture of the offered module are in accordance with the requirements of IEC 61215/ IEC61730.

The module frame must be made of corrosion resistant materials, which is electrolytically compatible with the structural material used for mounting the module.

Module Junction box (weather resistant) shall be designed for long life out door operation in harsh environment.

Degradation of power generated should not exceeding 20% of the min. rated power over the 25 year period. Efficiency of solar PV system shall be guaranteed to 90% for above 12 years & 80% for above 25 years.

The solar modules shall have suitable encapsulation and sealing arrangements to protect the silicon cells from the environment. The arrangement and the material of encapsulation is compatible with the thermal expansion properties of the Silicon cells and the module framing arrangement/ material. The encapsulation arrangement ensures complete moisture proofing during life of the solar modules.

Each module must have low iron tempered glass front for strength and superior light transmission. It also must have back sheet for environment protection against moisture and high voltage electrical insulation. The fill factor of modules is not less than 0.70 or above 70%.

The peak power point voltage and the peak power plant current of any supplied module and / or any module string (Series connected module) shall be not more than 3% from the respective arithmetic mean for all modules and / or for all modules string as the case may be.

**Note:** I-V curve of each PV module with SI Nos. should be submitted along with Modules.3

### **Mechanical Features**

Solar Photovoltaic Module shall be made of toughened, low iron content, high transmissivity front glass. Anodized Aluminum Frame shall be provide around the module. The module shall be encapsulated with Ethyl Vinyl Acetate (EVA). Silicon edge sealant shall

be provided around laminate. The back surface shall be Tedlar/ Polyester trilaminate. ABS plastic terminal box shall be provided for the module output termination with gasket to prevent water moisture the module shall be Resistant to water, abrasion, hail impact, humidity & other environment factor for the worst situation at site. Bypass diode arrangement shall be provided.

### 1.2 Data Sheet For The Solar PV Module Shall Be Furnished By Vender

i	PV Module Manufacturer name & Country	
ii	PV Module type	
lii	No. of PV cells per Module	
Iv	Mounting arrangement for Solar module	-
V	Solar module frame material	-
vi	Module Overall dimensions (mm)	-
Vii	Cable gland at module Junction Box	-
Viii	Weather resistant HDPE junction Box (IP55)	-
Ix	Max. Temperature rise of solar cells under severe working conditions over Max. Ambient Temp.	-
X	Nominal voltage	
Xi	Operating voltage of solar module (nom)	-
Xii	Peak power voltage (Vmp) at standard test conditions	-
Xiii	Peak Power current (Imp) at standard test conditions	-
Xiv	Open circuit voltage (Voc) at standard test conditions	-
Xv	Short circuit current (Isc)	-
Xvi	Weight of each module	-
Xvii	Standards/ Approvals from International Agencies	-
Xviii	Cell Type	-
Xix	Cell Size (mm)	-
Xx	No. of cells (Matrix)	-
Xxi	Weight (Approx.) Kg	-
Xxii	Maximum Wind Resistance (m/s)	-
Xxiii	Maximum Hail Diameter @80Km/h (mm)	-

### 1.3 Module Mounting Structure

Structure shall support SPV modules at a given orientation, absorb and transfer the mechanical loads to the roof properly. There shall be no requirement of welding or complex machinery at site. The array structure shall be so designed that it will occupy minimum space without sacrificing the output from SPV panels & shall withstand heavy winds. The supplier/ manufacturer shall specify installation details of the PV modules and the support structures with appropriate diagrams and drawings.

Module mounting structure shall be made up of **aluminium**. Super structure shall be designed & fabricated according to site condition.

Support structure design and foundation or fixation mounting arrangements should withstand minimum horizontal wind speed of 200kms/ hr (Designed value shall be greater than 200kms/ hr). All fasteners shall be of Stainless steel - SS 303.

**1.4** The junction boxes shall be dust free, vermin and waterproof and made of FRP/ Thermo Plastic with IP67 protection. The terminals shall be connected to copper bus bar arrangement of proper sizes. The junction boxes shall have suitable cable entry points fitted with cable glands of appropriate sizes for both incoming and out going cables. Suitable markings shall be provided on the bus bar for easy identification and cable ferrules shall be fitted at the cable termination points for identification.

The junction boxes shall have suitable arrangement for the following:

## TECHNICAL SPECIFICATIONS AND CONDITIONS FOR CCTV SYSTEM

1.1 The work shall be carried out as per tender specifications and in accordance with the followings :

- a) CPWD General Specifications for Electrical works Part - I Internal - 2013 as amended up to date.
- b) CPWD General Specifications for Electrical works Part - II External - 1994 as amended up to date.

### 1.2 BUILDING CONSTRUCTION AND DRAWINGS

The Contractor shall prepare detailed working drawings in coordination with other Architectural and Services drawing and get these working drawings approved by the Engineer-in-charge. The approval of such drawings by the Engineer-in-charge shall be from the point of view of assisting the Contractor in Coordination of Services with other agencies and shall not absolve the contractor from his absolute and indivisible responsibility on performance and operation of his installation.

### 1.3 Payments terms:

On account payment for part work as assessed by the Engineer-in-Charge for the various items included in the contract shall be payable at part rates not exceeding the percentage indicated against the stages of work.

Sl. No.	Stage of work	Percentage of Rate
1	On initial inspection of materials and delivery at Site in good condition on pro-rata basis.	70%
2	On completion of pro-rata installation	20%
3	On completion of Testing and commissioning	10%

## *SPECIAL CONDITIONS OF WORK*

### **A.1 DEMONSTRATION :**

A.1.1 The Contractor shall completely check out, calibrate and test all connected hardware and software to ensure that the system performs in accordance with the approved specifications and sequences of operations submitted.

### **A.2 MANUALS**

The following manuals will be provided at the time of Handing over:

A.2.1 An Operator's Manual shall contain graphic explanations of keyboard use for all operator functions specified under Operator Training.

A.2.3 On completion of works "As Built drawings for completed installation" shall be prepared by the Contractor and five (5) copies of the same will be supplied to the Engineer-in-Charge. In addition, Five (5) sets of the followings shall be supplied to the Engineer-in-charge.

- 1) Operation Manuals,
- 2) Technical Literature for the various components of equipment,
- 3) Controls and Accessories installed,
- 4) Recommended Spares and Services Manuals

#### **A. TRAINING & HANDING -OVER**

A.3.1 All training by the Contractor shall utilize manuals and as-built documentation and the on-line help utility.

A.3.2 Operator training shall include:

- a. Sequence of Operation review
- b. Sign ON -Sign OFF
- c. Selection of all displays and reports
- d. Commanding of points, keyboard
- e. System initialization
- f. Trouble shooting of sensors (determining bad sensors)
- g. Password modification

A.3.3 Supervisor training shall include:

- a. Password assignment / modification
- b. Operator assignment/modification
- c. Operator authority assignment/modification
- d. Point disable/enable
- e. *Terminal and data segregation/modification*

#### **A.4 GUARANTEE**

A.4.1 The contractor shall guarantee the entire IP Based CCTV System as per specifications

both for components and for system as a whole. All equipment shall be guaranteed for **One year from the date of handing over to the client** against unsatisfactory performance or breakdown due to defective design, manufacture and/or installation. The installation shall be covered by the conditions that the whole installation or any part thereof found defective within one year from the date of completion shall be replaced or repaired by the contractor free of charge as decided by the Engineer-in-Charge.

A.4.2 The warranty shall cover the following: -

- a) Quality, strength and performance of materials used.

- b) Safe mechanical and electrical stress on all parts under all specified conditions of operation.
- c) Satisfactory operation during the guarantee period.

A.4.3 Labour to trouble shoot, repair, reprogram or replace system components shall be furnished by the contractor at no charge to the Engineer-in-charge during the guarantee period.

A.4.4 All corrective software modifications made during guarantee period shall be updated on all user documentation.

A.5 The models of various CCTV equipments from given makes will be finalized at the time of execution based on specification given in BOQ.

Executive Engineer (E)

### Technical Specifications for CCTV

<b>DOME CAMERA</b>			
S. No	Features	Specifications	Compliance
1	Form Factor	Dome	
2	Image Sensor	1/3" CMOS or better	
3	Day/Night Operation	Yes with IR Cut Filter	
4	Minimum Illumination	Color 0.04 lux ,B/W 0.002 lux	
5	Lens	3 - 6mm, P/DC/Auto Iris, Megapixel Lens with remote zoom and focus	
6	Electronic Shutter	1 ~ 1/10,000 s or better	
7	Image Resolution	2MP or better	
8	Compression	H.264 , MJPEG	
9	Frame Rate <i>and</i> Resolution	H.264 3M (2048 X 1536) @25/30 fps , 2 MP (1920 X 1080 ) @ 30 FPS	
10	Simultaneous Stream	Minimum 2 streams should be configurable at 1920 X 1080 @ 25/30 fps simultaneously	
11	White Balance	Auto / Manual / ATW / One Push	
12	GOV Length	It should be possible to vary the GOV length in the camera setting .	
13	Noise Reduction	Digital Noise Reduction 2D / 3D DNR	
14	Zoom	3x optical Zoom , 10x Digital Zoom	
15	Video Streams	Quad Stream supportable , All stream should be H.264	
16	Video quality view	Video compression type ( H.264/MJPEG) and bit rate of each stream should be viewable on home screen	
17	Image Setting	Saturation, Brightness, Contrast, Sharpness,Hue adjustable	
18	Two way audio	Line in / Line Out	
19	Audio Compression	G.711 / G.726 / AAC / LPCM	
20	Iris	P/DC/Auto iris	
21	Wide Dynamic Range	76 dB or better	
22	IR	Upto 40 mtr IR distance	
23	Alarm	1 x Input / 1 x output	
24	Edge Video Content Analytics	Camera should have in-built Edge Bases Analytics, Abandoned Object, Intrusion Detection,Tampering, Wrong Direction, Loitering Detection,Object Counting, Stopped Vehicle,	
25	Storage backup network failure <i>on</i>	Camera should support network failure detection , Camera should have the capability to start the recording automatically on SD card in case of connectivity between camera and NVR/Storage device goes down	

26	Edge Storage	Built in SD card slot with support upto 128 GB SD card	
27	Network Interface	RJ-45, 10/100Mbps Ethernet	
28	Edge Storage	Built in SD card slot with support upto 128 GB SD card or better	
28	Protocols	IPv4/v6, TCP/IP, UDP, RTP, RTSP, HTTP, HTTPS, ICMP, FTP, SMTP, DHCP, PPPoE, UPnP, IGMP, SNMP, QoS, ONVIF	
29	Text Overlay	Date & time, and a customer-specific text etc	
30	Security	HTTPS / IP Filter / IEEE 802.1X	
31	Firmware Upgrade	The firmware upgrade shall be done through web interface,	
32	Video Output	1 X BNC	
33	Enclosure	IP 66 weather proof ,	
34	Vandal Resistant	IK 10	
35	Power	POE / 12 V DC /24 V AC	
36	Operating Temperature	-30 °C to 60 °C	
37	Operating Humidity	Humidity 10%–90% No Condensation	
38	Certification	UL, CE, FCC, RoHS	
39	ONVIF	ONVIF Profile S & G	
40	User accounts	20	
41	Supported Browser	<i>Web</i> Internet Explorer (7.0+) / Firefox / Safari	
<b>BULLET CAMERA</b>			
<b>S. No</b>	<b>Features</b>	<b>Specifications</b>	<b>Compliance</b>
1	Form Factor	Bullet	

2	Image Sensor	1/2.9" CMOS or better	
3	Day/Night Operation	Yes with IR Cut Filter	
4	Minimum Illumination	Color 0.1 lux B/W 0.01 lux	
5		2.8 - 10mm, P/DC/Auto Iris, Megapixel Lens with remote zoom and focus	
6	Electronic Shutter	1 ~ 1/10,000 s or better	
7	Image Resolution	2MP or better	
8	Compression	H.264 , MJPEG	
9	Compression profile	Should support H.264 baseline , Main profile and high profile	
10	Frame Rate and Resolution	H.264 3M (2048 X 1536) @25/30 fps , 2 MP (1920 X 1080 ) @ 30 FPS	
11	Simultaneous Stream	Minumum 2 streams should be configurable at 1920 X 1080 @ 25/30 fps simultaneously	
12	White Balance	Auto / Manual / ATW / One Push	
13	GOV Length	It should be possible to vary the GOV length in the camera setting.	
14	Field Of View	36° to 106°	
15	Noise Reduction	Digital Noise Reduction 2D / 3D DNR	
16	Zoom	4x optical Zoom, 10x Digital Zoom	
17	Digital PTZ	Camera should support digital PTZ	
18	Video Streams	Quad Stream supportable, All stream should be H.264	
19		Video compression type (H.264/MJPEG) and bit rate of each stream should be viewable on home screen	
20	Image Setting	Saturation, Brightness, Contrast, Sharpness,Hue adjustable	
21	Two way audio	Line in / Line Out	
22	Audio Compression	G.711 / G.726 / AAC / LPCM	
23	Iris	P/DC/Auto iris	
24	Wide Dynamic Range	76dB or better	
25	IR	40 mtr IR distance or better	
26	Alarm	1 x Input / 1 x output	

27		Camera should have in-built Edge Bases Analytics, Abandoned Object, Intrusion	
28	Storage backup network failure	<i>on</i> Camera should support network failure detection , Camera should have the capability to start the recording automatically on SD card in case of connectivity between camera and NVR/Storage device goes down	
29	Edge Storage	Built in SD card slot with support upto 128 GB SD card	
30	Network Interface	RJ-45, 10/100Mbps Ethernet	
31	Protocols	IPv4/v6, TCP/IP, UDP, RTP, RTSP, HTTP, HTTPS, ICMP, FTP, SMTP, DHCP, PPPoE, UPnP, IGMP, SNMP, QoS, ONVIF	
32	Text Overlay	Date & time, and a customer-specific text etc	
33	Security	HTTPS / IP Filter / IEEE 802.1X	
34	Firmware Upgrade	The firware upgrade shall be done though web interface, The firmware shall be available free of cost	
35	Video Output	1 X BNC	
36	Image Rotation	Normal , Mirror , 90 deg clockwise , 90 deg anti clockwise , 180 deg rotate	
37	Privazy Masks	Upto 5 privacy masks	
38	Audio <i>Transmission</i> mode	Full Duplex , Half Duplex , Simplex	
39	Enclosure	IP67 weather proof , IK 10	
40	Power	POE/ 12 V DC /24 V AC	
41	Operating Temperature	30 °C to 60 °C	
42	Operating Humidity	Humidity 10%–90% No Condensation	
43	Certification	UL, CE, FCC, RoHS	

44	ONVIF	ONVIF Profile S and G	
45	User accounts	20	
46	Supported Web Temperatur	Internet Explorer (7.0+) / Firefox / Safari	
<b>PTZ CAMERA</b>			
<b>S. No</b>	<b>Features</b>	<b>Specifications</b>	<b>Compliance</b>
1	Certifications	UL ,CE,FCC	
2	Compatibility	ONVIF profile s	
3	Sensor	1/3 " Progressive CMOS or larger	
4	Resolution	3MP (2048 X 1536 )	
5	Multiple Stream	Minimum Triple Stream	
6	Frame Rate	upto 25 fps @ 3MP , Upto 50fps @ 2MP ( Main Stream)	
7	Focal Length	4.3-129 mm	
8	Field Of view	60° - 2.4 °	
9	Optical Zoom	30X	
10	Digital Zoom	10X	
11	Focus	Auto / Manual	
12	WDR	120dB	
13	Noise Reduction	2D/ 3D	
14	Shutter Speed	1/3 ~ 1/10000 sec.	
15	IR	Inbuilt IR ,IR distance upto 100 mtr	
16	Day & Night	IR Cut filter	
17	Min Illumination	0.05 @ F1.6 (Color), B/W :0.005 Lux @ F1.6	
18	Iris	Auto iris	
19	SD Card support	Yes	
20	Video Compression	H.264 , MJPEG	
21	Privacy Mask	upto 20 privacy zones	
22	Audio	1/1 channel In/Out	
23	PAN	360 ° endless , Manual speed 0.1° ~ 90°/s , preset speed upto 280°/s	
24	Tilt	,-15 ° ~ 90° , Manual speed 0.1° ~ 60°/s , Preset speed upto 300°/s , Auto flip	
25	Presets	256	
26	Protocols	IPv4/v6, TCP/IP, UDP, RTP, RTSP, HTTP, HTTPS, ICMP, FTP, SMTP, DHCP, PPPoE, UPnP, IGMP, SNMP, QoS, ONVIF	
27	Alarm	2 Input / 1 Output	
28	BNC	1 X BNC	

29	Ethernet Interface	1 X RJ 45	
30	Weather Proof	IP 66	
31	Operating Temperature	, -30°C ~ 50°C	
32	Power Supply	24 V AC / POE	

<b>SERVER STORAGE</b>			
<b>S. No</b>	<b>Features</b>	<b>Specifications</b>	<b>Compliance</b>
1	Min Number of IP Cameras Supported	32 Channels	
2	Max Viewing & Recording Resolution	3MP at 25 FPS or better;	
3	Processor	Processor: Intel Xeon E5-2600 Series v4 2.1GHz or better	
4	RAM (Memory)	16GB or better	
5	Cooling Fans	Cooling fans to be available	
6	Storage HDD	6 x SATA HDD Slots with total max storage capacity of 64TB;	
7	HDD type for storage	24TB (4 x 6TB 7.2K RPM SATA Enterprise Grade 6Gbps 3.5in Hot-plug Hard Drive)	
8	NVR installation	Rack-Mount	
9	Operating System	Embedded Linux / <i>Windows 2012 R2</i> Server/Linux	
10	Temperature range	5°C to +40°C	
11	Network	Quad Gigabit Ethernet Interfaces	
12	Raid Support	Hardware Raid Controller to support Raid 0,1,5,6 or more	
13	VMS	Preinstalled VMS. Licenses required to activate Camera Channels	
14	Power Supply	Dual Redundant PSU	
15	DVD+/-RW Drive	Required	
<b>VMS</b>			
<b>S. No</b>	<b>Features</b>	<b>Specifications</b>	<b>Compliance</b>
1	Supported <i>Operating</i> Systems	Linux, Microsoft Windows: 7/8, Microsoft Server 2008 R2/2012, Microsoft Windows Embedded 8 Standard. Support for both 32-bit (x86), 64-bit (x64) versions	
2	ONVIF Support	ONVIF, ONVIF Profile S Supported Cameras	
3	Video Stream Formats	MJPEG, MPEG-4, H.264	
4	Audio Support	2-way support	
5	Resolution	Limited only by the camera	
6	Frame Rate	Limited only by the camera	
7	Number of servers in the system	Unlimited	

8	Number of <i>remote</i> workstations	Unlimited	
9	Interface Language	English and multi-language support	
10	Archive Materials Storage Format	In the format received from the IP camera	
11	Archive Size	Should be able to create different archive sizes per any camera or any group of cameras.	
12	File Playback Speed	From single-frame playback up to 32x speed up or better	
13	Auto Zoom	Displaying the separate enlarged area with moving objects	
14	PTZ cameras	Control of PTZ cameras using the client interface: camera rotation, zoom in/out (optical zoom), focus	
15	Panoramic <i>camera</i> support	Support of various modes used in panoramic cameras with just a single VMS license.	
16	Cameras auto search	The ability to automatically search for cameras that support ONVIF or UPnP detection protocol in a local network	
17	Server backup	Hot backup: in case of server failure, recording is redirected to a backup server	
18	Integration with 3rd Party Video Analytics Server	Should support and accept notifications from 3rd Party analytics server.	

19	<i>User Interface</i>	Timeline based UI which allows one-click based access to past recordings.	
		Timeline should always accessible. No separate interface for viewing recordings.	
		Dragging the timeline should synchronize all camera images to the selected point in time.	
		The timeline can be hidden so that the camera windows can be shown on the whole screen.	
		Camera window cloning enables the simultaneous viewing of real-time and recorded image.	
		VMS should support Calendar search and specific time search	
		The size and layout of camera windows should be able to be freely adjusted	
		Window layouts should be able to be saved in shortcut buttons with specific labels	
		Automatic arrangement of camera windows should be possible	
		Video Wall support and <i>camera window</i> arrangement functionality	
		Pre-programmable notifications	
		Creation and naming of bookmarks of video.	
20	<i>Camera Tools</i>	Full screen Mode: Should be able to the selected camera in full screen mode	
		Create video clip: Should be able to create a video clip recording of the visible image. Can be selected in another camera window, which will cause the video clip to continue from that window. (editable video clip)	
		Quick search from this camera: Should only show the recordings for this camera on the timeline. The playback should jump over motion detections in other areas.	
		Area search: User should be able to draw areas comprising one or more camera image, and the motion detections of this area will be shown on the timeline. The playback will jump over motion detections in other areas.it shold be possible to modify the area search during playback	
		Clone window: Should copy the camera window. Should allow simultaneous viewing of the present time and recordings from the same camera with the use of the “Detach from the main timeline” function.	
		Detach from the main timeline: Should open a separate timeline as a window. The other camera windows should follow the main timeline.	
		Start recording: Should starts a continuous recording of 1 minute (time adjustable) of this camera image on 1-click.	

		Customized buttons: Can be used to control gates or other external devices with rule-customized buttons.	
		Screenshot: Saves the visible image as an image file (JPG, PNG or PDF). Resolution can be selected.	
21	Remote Use	Compatible with Windows, Linux and OS X client machines	
		Should use TCP/IP connection that can be encrypted.	
		Can be connected to multiple network video servers simultaneously.	
		Recordings from <i>multiple servers can be</i> synchronized.	
		Real-time image and recording transfer online, either full quality or compressed quality can be selected.	
		Notification events and alarms are forwarded directly from the server to the user.	
		Customized buttons enable the management of different functions, such as recording and saving from connected external devices.	
22	Notifications	Real-time notification window	
		Notifications include a screenshot <i>and a</i> description of the event contents	
		Notification colors should be adjustable	
		Clicking the notification should open an image recording of the event from the connected camera.	
		Bookmarks should be able to be saved directly from notifications	
		Should have the capability to have the notification list length of upto 100	
		Rules should be able to be used to set specific conditions for notifications.	
23	Multiple Network Video Recorders Synchronization	Should support viewing synchronized real-time and recorded image feed from multiple servers	
		Should support saving views comprised of camera feed from multiple recorders	
		Area search for a combination of cameras from different recorders	
		Notifications and alarms from multiple recorders simultaneously	
		Saving merged backup copies and video clips	
24	Bookmarks	Support saving bookmarks in the timeline	
		Support naming, editing and removing bookmarks	
		Bookmarks should be saved in the bookmark list and should also be visible on the timeline.	
		Bookmarks are saved locally.	

		Bookmarks can be browsed with the arrow keys, previous/next	
25	Editable Views	Camera windows can be arranged as wanted	
		Camera window layouts can be saved and named	
		Frequently used views can be saved as shortcut buttons	
		Camera views can contain cameras from multiple recorders	
26	Video Clips	Time frame and selected cameras: Saves a grid comprising of selected cameras into a single file.	
		Quick search and area search can be used with the video clip tools.	
		Save as an AVI/MP4 .	
27	Backup Copies	Saving of full-quality backup copies	
		The start and end points of the backup file can be freely determined.	
		Quick search and area search can be used to filter unwanted movement.	
		Backup copies can be viewed using the remote software.	
		Quick and area searches can be made in the backup file	
28	Rules	Rules can be used to control recorder functionality and external devices as well as to send information on different events	
		One or more conditions are set for the rules.	
		Conditions can include for example: Schedule, I/O-feed, motion detection, alarm lines, connection loss etc.	
		Rules are set actions to be performed when rule conditions are met. Actions can include: Digital output control, notification event/alarm, selecting a PTZ preset, saving a bookmark, sending an email message etc.	
29	User Management	Username and password protection, Selecting functions and software areas, Camera access based on user permissions, Remote access selection for users, Camera control selection for users	
30	Archival Modes	<i>Storage</i> Storage space is shown as a percentage of total available space.	
		Recording time can be specified to a date.	
		User Interface should be able to show the date of the oldest recording	
31	Access Groups and Users	The VMS should have the capability to create atleast 4 access groups.	
		Administrator should have the right to assign the camera to atleast one group.	

		Different level of access to the camera shall be configurable in the VMS		
32	Tab switch	Should be possible to create unlimited number of tabs and give them distinctive names.		
		Tabs can be renamed and rearranged		
		Tab switching time should be configurable from 1 sec to 60 sec for allowing all the cameras to appear on screen tab wise , tab switch time should be common to all the tabs		
33	Software Detection	<i>Motion</i>	Smart Motion detection should function with all types of ONVIF conformant cameras regardless of manufacturer.	
			Sensitivity <i>and noise reduction should be</i> adjustable.	
			VMS Should index the location of motion in the image for the purposes of area searches.	
			Separate motion detection areas with different sensitivity can be set for an image.	
			Areas of the image that should not be recorded can be covered via motion detection.	
34	Map View	Cameras can be placed in map views and opened directly from the map		
		There can be multiple maps e.g. for different floors.		
		Maps can include links to other maps.		
		Maps are placed in separate movable windows, and several windows can be viewed simultaneously		
		Maps can be zoomed and moved by using your mouse inside the window.		
		Camera locations can be edited		
		The motion detection activation of a camera feed can be indicated in a map view		
		Map modification can be turned off		
35	Virtual Matrix	Command and Control room interface for real time surveillance		
		Virtual matrix can include one or more screens and should support Video Walls.		
		Includes monitor windows and regular camera windows that can be used to record several views		
		Image source selection for monitor windows can be automated e.g. based on alarms.		
		Cameras selected for monitor windows can be controlled with one or more joysticks.		
		Controlled camera can be selected with joystick buttons or mouse.		
		Notification events are shown instantaneously from e.g. alarm information or motion detection.		

36	Shortcut keys	VMS should have the option of customizing the shortcut keys.	
37	Diagnostics	Notification events can be set in the system in different ways, such as rules, motion detection from image, external I/O data, or internal software command.	
		Notifications can contain a free text field, event colours are customisable, and a preview image is attached to the notification.	
		Status information and preset alarms are saved in the alarm log in chronological order	
		The alarm log contains an acknowledgement functionality.	
		User can access a recording attached to a notification by one click	
38	Autohorization	Should support dual authorization	
39	Snapshot	snapshot from multiple cameras can be saved in single png ,jpeg or pdf file	
38	System	VMS and CCTV cameras should be from same OEM	

Executive Engineer (E) Jodhpur  
CPWD Jodhpur

**APPROVED MAKES OF MATERIALS FOR E & M**

Sl.	Details of Materials/ Equipment	Manufacturer's Name
	<b>I.E.I, MCBDB &amp; MCB, Cables and Wires</b>	
1	MCB, Isolator, Industrial plug Socket, RCCB, RCBO's	Schneider Electric ACTI-9(N)/ Legrand (DX3)/ Hager/ L&T(Exora)/ ABB (SB200M)/Seimens (Betaguard)/Havells/Indo Asian (Optipro)/ Anchor by Panasonic/C&S
2	MCBDB & Loose Wire Box	Schneider Electric/ Legrand/ Hager /L&T/ ABB (Elegance)/ Siemens/ Havells/Indo Asian (Optipro)/ Anchor by Panasonic/C&S
3	Change Over Switch	L&T/ Havells/ HPL/ Hager/Indo Asian
4	Automatic Transfer Switch (ATS)	Asco/Russel/Socomac/Hager/ABB/ L&T/ Havells
5	FRLS PVC insulated copper conductor single core cable for wiring. (ISI marked)	Finolex/ RR Kabel/ KEI/ Havells/ Polycab/Paragon (Electron)/ Lapp/Grandlay/Plaza /Anchor/Bonton/Paramount cable
6	Armoured/Unarmoured Telephone cable, Coaxial Cable	Delton/ Finolex/ RR Kabel/ Havells/ Anchor/Bonton/ Paramount cable
7	MS Conduit (ISI marked) with heavy duty MS conduit pipe accessories	BEC/NIC/AKG/RMCON <b>(Note: The make of accessories shall be same that of conduit pipe and will comply to IS/14768 part 2 2003)</b>
8	PVC conduit (ISI marked) with heavy duty PVC conduit pipe accessories	AKG/ Norpack/BEC/Polypack/Precision/Anchor
9	Modular switches, socket/ telephone socket/ cable TV socket/ data outlet socket/ fan regulator/ GI boxes etc (Wiring accessories)/ regulators etc.	Legrand (Arteor)/ Schneider electric (Livia)/ Wipro (North West-PLATIA)/ Hager (Insyta)/ M.K. (blenze) /Havells (Murano)/Anchor by panasonic (wood)/ /Indo Asian (Elvira)
10	Selector Switch & Toggle Switch	Salzer (L&T)/ Siemens/ Kaycee/Reshabh/ABB
11	PVC Trunking	MK/ Schneider Electric/ Legrand
12	GI Pipe	Tata/ Jindal (Hissar)/ Prakash Surya
13	Paints	ICI/ Asian/ Berger
14	Terminal Blocks & Connectors	Elmax/Wago/Hensel/Connectwell
15	Phenolic Laminated Sheet/ Bakelite sheet	Hylam/ Formica (P-I Grade)/ Mylam/Greenlam
16	Cat-6 Cable, Wires & Fiber optic cable	Amp, Avaya/ Beldon/ Legrand/ Molex/ Schneider/ Comscope/Bonton
	<b>Fans &amp; Fittings</b>	
1	Fluorescent Fittings	Wipro/ Phillips/ Crompton Greaves/ Havells/Osram/Jaquar/Surya
2	LED Fittings	Wipro/ Phillips/ Crompton Greaves/ Havells/Osram/ Trilux/Lighting Technology/Panasonic/ Halonix/ Surya
3	Exhaust fan	Havells/Crompton greaves/USHA/ Almonard/Orient
4	Ceiling Fan (BLDC Only)	Havells/ Crompton Greaves/ USHA/ Orient/ Anchor by Panasonic/Halonix/
5	Wall Bracket Fitting	Havells/ Crompton Greaves / Decon / Phillips/Lighting Technology/ Luster/ Jaquar
6	Lamps / Fluorescent tubes/ T-5 Fluorescent Tubes/ LED lamp	Wipro/Phillips/ Crompton Greaves/ Havells/Osram/Jaquar/ Surya/ Panasonic/ Halonix/ Surya
7	Geysers	Racold/CG/Havells/Usha/Venus/AO Smith/Jaquar/ Anchor by panasonic
	<b>Street Lighting</b>	
1	LED post Top fitting	Wipro/ Phillips/ Crompton Greaves / Havells/ Osram/ Keselec Schreder/ Lighting Technology /Luster/Halonix/ Surya
2	LED Street light fitting	Wipro/ Phillips/ Crompton Greaves / Havells/ Osram/ Keselec Schreder/ Lighting Technology/ Halonix / Surya
3	LED street lights with inbuilt Solar panel and controller	Wipro/ Phillips/ Crompton greaves/ Havells/ Osram/ Lighting Technology/ Halonix/ Surya
4	Ornamental MS & C.I pole (factory finish)	Keselec Schreder- Ecopole3m ATG in GI with base plate/ Valmont / Wipro/ Phillips/ Crompton greaves/ Bajaj/Paruthi Engineers Pvt. Ltd./ Luster/Twinkle
5	Hot Dipped Galvanized Octogonal Pole (Factory finish)	Valmont/ Wipro/ Phillips/Crompton Greaves/Bajaj/ Paruthi Engineers Pvt. Ltd.
6	Polycarbonate Junction Box/ Enclosure	Hensel/ Spelsberg/ Naptune-Bals
7	XLPE Insulated PVC Sheathed Alum./ Copper Conductor Armored Cable of 1.1KV Grade	Finloex/ RR Kabel/KEI/Havells/Polycab/ Paragon (Electron)/ Universal/ Nicco/ RPG cables/Grandlay/Plaza/Bonton/ Paramount cable
	<b>Sub Station Equipments</b>	

1	LT panel/ Meter Panel Board/ Outdoor Feeder Pillar/APFC panels /	Tricolite Electrical Industries/ Control & Switchgears Pvt. Ltd./ Sterling & Wilson/ MILESTONE/ Adlec Control System Pvt. Ltd./ Advance Panels & Switchgears Pvt. Ltd./ Indo Asian /Associated Switchgears & Projects Ltd/ Engineer & Engineer/Havells /Pristine/Indo Asian/Allied Engineers/Expert/Elecrotech Pvt.Ltd
2	Air insulated Rising Main/ Bus ducts	C&S/ L&T/Schneider/Legrand/Godrej/Expert/ Elecrotech Pvt.Ltd/ Elecrotech Pvt.Ltd
3	Sandwich type bus Trunking	C&S/ L&T/Schneider/Legrand/Godrej/ Elecrotech Pvt.Ltd
4	Moulded Case Circuit Breaker (MCCB) Thermal Release/ Microprocessor Based (Ics=Icu=100%)	Schneider electric NSX series/ Legrand (DPX3)/ L&T(D-Sine)/ABB(TMax)/Seimens(VLseries)/C&S(Winbreak-1/2)/ Havells /Indo Asian (Optium)/Havells
5	Power/ Aux. Contactor 3/4 Pole	Schneider Electric/ Legrand/Hager/L&T/ ABB/Seimes/C&S/BCH/ Havells /Indo Asian (Opticon)
6	Potential transformers/ Current Transformers	Automatic Electric/ Gilbert & Maxwell/ Matrix/ Precise/ L&T/ Kappa
7	LED Type Indicating Lamps/ Push button	Schneider electric /L&T / Siemens/C&S/Vaishno
8	Over load relays	Schneider Electric/ L&T/ Siemens/C&S/ABB/Havells
9	Conventional/Electronic Digital Meters (A/V/PF/Hz/KW/KWH)	Conzerv/ L&T/ Secure/ AE/ C&S/ Havells
10	Timer	Schneider Electric/ Legrand / Hager / L&T/ABB/Seimens/C&S
11	Fasteners/ GI Clamps	Hilti/ Fisher/ Chilli / GMGR
12	D.W. Corrugated HDPE Pipe (ISI Marked)	REX/ Duraplast/Triputi/ Duraline/CPE
13	Transformer (Oil/ Dry pipe )	Crompton/ ABB/ Schneider/VOLTAMP
14	HT Panel/ Ring main Unit	Compton/ Siemens/ ABB/ L&T/ Scheinder/Plaza
15	H.T. Cable (ISI marked)	CCI/ KEI/ Havells/Polycab/Universal/Nicco/Plaza
16	HT End Termination/Cable Joining Kit	Reychem/ Denson/ Cab Seal/safekei/3M
17	<b>ACBs with Display</b>	Schneider Electric(Masterpact)/Legrand(DMX3)/L&T(U-Power-OMEGA)/ABB(Emax)PR122/Seimens/C&S(Win Master)/ Havells
18	Rubber mat	Jyoti/ Deep Jyoti/ Premier (Duly ISI Marked)
19	Ammeter	Rishab/ L&T/AE/C&S/HPL
20	Voltmeter	Rishab/ L&T/AE/C&S/HPL
21	Fire Extinguishers(ISI Marked)	Minimax/ Safex/ Lifeguard/Kanex/ Omex/Ceasefire/Andex
22	Capacitor and Reactors /APFC Relay	EPCOS/ L&T/ DUCATI/ ABB/ Siemens/ Schiender/ Havells
23	XLPE Insulated PVC Sheated Alum./ Copper Conductor Armored/Unarmored Cable of 1.1KV Grade	Finloex/RR kabel/KEI/ Havells/Polycab/Paragon(Electron)/Universal/Nicco/RPG cables/Grandlay/Plaza/Bonton/ Paramount cable/V-mark
24	Cable Glands Double Compression With Earthing Links	Baliga Lighting/ Comet/ Cosmos/ Dowells/Gripwell
25	Bimetallic Cable Lug	Comet/ Dowells (Biller India)/ Hax Brass (Copper Alloy India) / Jainson/ Action
26	MS/ GI Cable Tray	Pilco/slotco/pasco/MEM/ BEC/ steelways/ Legrand
27	Programmable Logic Controller (PLC)	Siemens/ Allen Bardley/ L&T/ ABB
	<b>Water Supply Pump Sets</b>	
1	Mono Submersible Pump Set	KSB/CG/Kirloskar/Grundfoss
2	Submersible Pump Set	KSB/CG/Kirloskar/Grundfoss
3	GI pipe	Tata/Jindal Hisar/Prakash surya
4	Sluice Valve / Check Valve/ Butterfly valve/ Non Return Valve	Kirloskar/Sant/ Leader/ Joloto/Audco/Advance
5	Submersible Cable	Fionlex/RR Kable/ KEI/ Havells/Polycab/Paragon (Electron) /Grandlay
	<b>CCTV System</b>	
1	IP Based Camera (Dome/PTZ/Bullet/C-Mount type)	Bosch/ Pelco/Axis/Avizolon/Mobotix
2	Conventional Camera (Dome/PTZ/Bullet/C-Mount type)	Bosch/ Pelco/Axis/Avizolon/Mobotix
3	DVR /NVR / Server	Bosch/Honeywell/Pelco/Axis/Sony
4	Switch	Cissco/Zyxel/Zuniper/Brocade
5	Data Network Cable	Amp/Avaya/Beldon/Legrand/Molex/ Schneider/Bonton
6	Mounting/Floor Rack	Netrack/ Comrack/Valrack

7	Media Converter	Cissco/Zyxel/Zuniper/Brocade
8	Fire Wall	Zyxel/Cisco/Fortdinet
9	Connector	Molex/Amp/ belden /D-Link
	<b>Uninterrupted Power supply (UPS)</b>	
1	Online/Offline UPS	Numeric/Eaton/APC/Vertiv/Mitsubshi/Toshiba
	<b>Solar power Generation System</b>	
1	Solar power Generation System	REIL//BEL/CEL/REC/SOLON/VIKRAM/ABB/MOSER BEAR/WIPRO
2	Junction box	VNT/SUN GARNER/OEM of SPV Modules
3	SPV Inverter	Sungrow/Delta/SMA/ABB
4	Module Mounting Structure	As per MNRE/ Manufacture'S standard
5	XLPE Aluminium/Copper Cable	Finolex/ RR Kabel KEI/ Havells/Polycab/Paragon (Electron)/Universal/Nicco/RPG cables/Grandlay/Bonton
6	Solar Cable XLPO Insulated (DC)	RR Kabel /Polycab/Havells/Finolex/Lapp/Paragon (Electron)

**Note: The firm has to ensure that equipment manufacturer comes under definition of local manufacturers as per Govt.of India,Policy of Public Procurement (Preference to make in India) order,2017(PPM-MII order 2017)issued by Department of Industrial Policy and Promotion. Only products conforming to above policy shall be allowed to be used in the work.**

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**Schedule of Work**

**Name of Work :-Roof Top Solar Generation Plant and Upgradation of NSSO Bhawan Jodhpur Office Building Jodhpur**

SNo.	Description of Item	Qty.		Rate DSR 2018	Add Cost Index @ 10%	Net Rate	Amount	Remark
	<b>Package-1 (E.I. &amp; Fans)</b>							
1	Wiring for light point/ fan point/ exhaust fan point/ call bell point with 1.5 sq.mm FR PVC insulated copper conductor single core cable in surface / recessed steel conduit, with modular switch, modular plate, suitable GI box and earthing the point with 1.5 sq.mm. FR PVC insulated copper conductor single core cable etc as required.							<b>1.3</b>
a	Group C	5	Point	1213.00	121.30	1334.30	6,672.00	1.3.3
2	Wiring for light/ power plug with 2X4 sq. mm FRLS PVC insulated copper conductor single core cable in surface/ recessed steel conduit (25mm )alongwith 1 No 4 sq. mm FRLS PVC insulated copper conductor single core cable for loop earthing as required.	50	Meter	265.00	26.50	291.50	14,575.00	1.5
3	Supplying and fixing of A.C. point combination of 25 Amp socket outlet and suitable 25 Amp SPMCB fixed on 3 module G.I. box i/c providing and fixing 3 module cover plate, testing, commissioning etc as required. ( Havells / NorthWest / MK make )	6	Nos	639.00	63.90	702.90	4,217.00	1.57
4	Supplying, installation, testing & commissioning of LED retrofit fitting in powder coated MS housing in 4 feet length along with single LED tube. LED shall be having LM80 complied as per L70 standard LED with (6000 - 6500 K) CCT. Maximum power consumption shall be 20 W with minimum 2000 system lumens 3 stage CCCV driver with voltage range of 150-270 V AC and DC output operating voltage of driver shall not exceed 72 V DC complete i/c wiring with 1.5 sqmm FRLS PVC insulated copper conductor wire etc as required.	10	Nos.	938.00	0.00	938.00	9,380.00	MR

5	Supply, installation, testing and commissioning of heavy duty, 230Volts, single phase AC supply 300mm dia exhaust fan WITH 900 RPM double ball bearing, with energy efficient motor, louver/shutter, bird screen including all accessories and with 3 core flexible wire complete as required, in the existing opening, including making the hole to suit the size of the above fan, making good the i/c fixing of louver/shutter etc.as required.	1	Nos.	2934.00	0.00	2934.00	2,934.00	MR
6	Supplying and fixing of 250 mm sweep decorative Fresh air fan with all accessories suitable for operation single phase 230 volt 50 cycle per second per sec. AC supply etc. as required. in the existing opening, including making the hole to suit the size of the above fan, making good the damage, connection, testing, commissioning earthing etc. as required.	2	Nos.	1597.00	0.00	1597.00	3,194.00	MR
7	Supply, Installation, Testing and Commissioning of 1200 mm sweep, BEE 5 star rated, ceiling fan with Brush Less Direct Current (BLDC) Motor, class of insulation: B, 3 nos. blades, 30 cm long down rod, 2 nos. canopies, shackle kit, safety rope, copper winding, Power Factor not less than 0.9, Service Value (CMM/W) minimum 6.85, Air delivery minimum 215 CMM, 350 RPM (tolerance as per IS : 374-2019), THD less than 10%, remote or electronic regulator unit for speed control and all remaining accessories including safety pin, nut bolts, washers, temperature rise=75 degree C (max.), insulation resistance more than 2 mega ohm, suitable for 230 V, 50 Hz, single phase AC Supply, earthing etc. complete as required.	38	Each	2688.00	268.80	2956.80	112,358.00	DSR

8	Supply, Installation, Testing and Commissioning of Surface/recess mounted LED downlighter fitting Round shape Nominal size dia having lumens output not less than 1200, system efficacy $\geq 100$ lumens / watt and not higher than 12 Watt, THD should be less than 10%, luminaire power factor should not be less than 0.90 with minimum 50000 burning hours, CRI $\geq 80$ and CCT=4000-6500 K(as reqd.), with inbuilt electronic driver with efficiency should not be less than 85% with surge protection 2.0 KV, IP-20 rated made out of CRCA powder coated enclosure with suitable diffuser and making connection with 1.5 sqmm. FRLS Copper conductor single core cable i/c earthing etc. as required.	20	Nos.	1153.00	0.00	1153.00	23,060.00	MR
9	Supplying, installation, testing and commissioning of Ultra slim decorative 18 Watt LED luminaires having not less than CCT 6000K with aluminium casted, surface mounted round fixture in white finish with opal diffuser and separate electronic driver, suitable for low depth ceiling including all accessories to working on single phase 230/240 volts 50Hz AC supply directly including connections etc. complete as required	6	Nos.	1427.00	0.00	1427.00	8,562.00	MR
10	Supplying installation testing and commissioning of Bulkhead fitting having power consumption not more than 10 Watt system lumens output not less than 800, Power Factor $\geq 0.95$ , CRI $> 80$ , THD 10%, CCT 5500-6600K with Acrylic diffuser and frame, IP 65 protection, pressure die cast housing, diffusers direct on ceiling / wall i/c connections with 1.5 sqmm., PVC insulated, FRLS copper conductor, single core cable etc. as required	10	Nos.	1115.00	0.00	1115.00	11,150.00	MR
11	Supplying installation testing and commissioning of Surface / Wall mounted LED Batten (10w LED mirror light) fitting system lumens output not less than 100, Power Factor $\geq 0.90$ , CRI $> 80$ , THD 10%, CCT 5500-6600K (as required) extruded Aluminium housing provided for efficient heat dissipation with polycarbonate diffuser & integrated electronic driver with all accessories with 1.5 sqmm., PVC insulated, FRLS copper conductor, single core cable etc. as required & as per make & models in enclosed list of approved makes as required.	5	Nos.	440.00	0.00	440.00	2,200.00	MR

12	Supplying, Installation, testing and commissioning of power consumption not more than 36 Watt Recess Mounted (2'x2') (Nominal size) LED Fitting having system lumens output not less than 3600, CRI >80 and CCT (5500-6000 K) as required with inbuilt electronic driver, IP-20 rated CRCA powder coated enclosure with suitable diffuser i/c making connection with 1.5 sqmm FRLS copper conductors single core cable i/c earthing etc. as required.	34	Nos.	3684.00	0.00	3684.00	125,256.00	MR
13	Pdg. & Fixing of BEE star level 4 star rated 15 Liter vertical storage water Geyser with outer casing made of M.S.sheet finished with anti-corrosive powder coating,inner tank made of pure electrolytic copper/stainless steel / SPHP, Tubular copper sheathed and Nickel plated heating element/ twin ceramic cartridge heating element, stem type thermostat and thermal cut out,Dual indicating lamps for power supply and thermostat,PUF insulation, Pressure release valve,fusible plug etc. as required held in position with 4 no. rack bolts,duly wired with 3 core 2.5/4.0 Sqmm PVC insulated & sheathed copper conductor and 16 A/25A three pin plug top,including making inlet,outlet heavy gauge C.P./ Flexible alloy connection,testing etc. as required. (Model No. New Shakti of Bajaj Make )	2	Nos	8511.00	0.00	8511.00	17,022.00	MR
14	Supplying and fixing Cable End Box (Loose Wire Box )(IP43) suitable for following triple pole and neutral , sheet steel , MCB Distribution Board , 415 Volt, on Surface/ recess, complete with testing and commissioning etc as required .							24
a	For 8way , Double Door TPN MCBDB	2	Nos	1239.00	123.90	1362.90	2,726.00	2.24.3
15	Supplying and fixing of following ways surface/ recess mounting, vertical type, 415 volts, TPN MCB distribution board of sheet steel, dust protected, duly powder painted, inclusive of 200 amps tinned copper bus bar, common neutral link, earth bar, din bar for mounting MCB's (but without MCB's and incomer ) as required . (Note : Vertical type MCB TPDB is normally used where 3 phase outlets are required.)							2.5
a	8 way (4 + 24), Double door, Vertical Type	2	Nos	7744.00	774.40	8518.40	17,037.00	2.5.2

16	Supplying and fixing following rating, 100 Amp four Pole, 16 KA MCCB, 415 volts, FPNMCCB in the existing MCB DB complete with connections, testing and commissioning etc. as required.(As Incomer For Vertical MCB DB)							
a	100 Amp Four Pole 16KA MCCB	2	Nos	5978.00	0.00	5978.00	11,956.00	MR
17	Supplying and fixing 5 amps to 32 amps rating, 240/415 volts, "C" curve, miniature circuit breaker suitable for inductive load of following poles in the existing MCB DB complete with connections, testing and commissioning etc. as required.							2.10
a	Single pole	48	Nos	199.00	19.90	218.90	10,507.00	2.10.1
18	Supplying installation testing and commissioning of 40 watt LED Post Top Gate/Pole light fitting (MAPLE) made out of dicast housing for Better Durability, Thermal Management & Protection From corrosivity with pre-wired gear tray with LEDs and driver . suitably gasketed for IP 65 protection with 4.5 KV surge arrestor including connections etc. as required	8	Nos.	7368.00	0.00	7368.00	58,944.00	MR
19	Supplying and drawing following sizes of FRLS PVC insulated copper conductor, single core cable in the existing surface/ recessed steel/ PVC conduit as required.							
a.	3 x 1.5 sq. mm	50	Metre	54.00	5.40	59.40	2,970.00	1.17.3
20	Supplying of one number XLPE insulated PVC sheathed Al. Conductor armoured cable of 1.1 KV grade of following sizes Conforming to IS. 7098/1988 with upto date ammendment / cable tray tying with cable tie / In open etc. as reqd.							
(a)	2 X 16 sq. mm	100	Metre	123.00	0.00	123.00	12,300.00	M/R
(b)	3.5 X 50 sq. mm	50	Metre	214.00	0.00	214.00	10,700.00	M/R
21	Laying of one number PVC insulated and PVC sheathed / XLPE power cable of 1.1 KV grade of following size in the existing RCC/ HUME / METAL/ DWC pipe/surface/ Open duct as required.							
(a)	2 X 16 sq. mm	50	Metre	31.00	3.10	34.10	1,705.00	7.5.1
(b)	3.5 X 50 sq. mm	50	Metre	47.00	4.70	51.70	2585.00	7.5.2

22	Supplying and laying of following size DWC HDPE pipe ISI marked along with all accessories like socket, bend, couplers etc. conforming to IS 14930, Part II (Ammended on date as IS: 16205 Part-24:2018) complete with fitting and cutting, jointing etc..direct in ground (75 cm below ground level) including excavation and refilling the trench but excluding sand cushioning and protective covering etc., complete as required.							14.16
	63 mm dia (OD-63 mm & ID-51 mm nominal)( for Street light )	50	Metre	209.00	20.90	229.90	11,495.00	14.16.1
23	SITC of Single phase 230 volts 2.00 HP Monoblock "Pump Set heaving section and delivery size 50mmx50mm C.I. impeller discharged at the head rang of 10 Mtr to 24 Mtr is 410 LPM to 200 LPM i/c i/c angle Iron frame work of 35mmx35mmx6mm with Nut Bolts i/c testing connection etc Complete as required (Model No OWN 22(1PH) of CG make) .	2	Nos.	18483.00	0.00	18483.00	36,966.00	M/R
24	Providing & fixing following size of G.M. Gate valve double flanged ISI marked to IS:778-1984 Class-I flanged screwed in bonnet nonrising stem complete with nut, bolt washers, gasket etc. as required. (Make : Sant/Leader)							
	40mm dia	2	Nos.	6831.00	0.00	6831.00	13,662.00	M/R
25	Providing & fixing following size of Non return valve Gun Metal double flanged ISI marked IS:778-1984 Class-I screwed in bonnet flanged ends complete with GI nut bolts, washers, gasket etc. as required. (Make : Sant/Leader)							
	40mm dia	1	Nos.	6386.00	0.00	6386.00	6,386.00	M/R
26	Supplying & fixing 40 mm dida 'B' Class G.I. pipe alongwith accessories including bend, tee, socket etc. i/c cutting the road & making good the same etc. as reqd. (For Protection of Pump Cable) (Make Tata/Jindal Hissar)	40	Mtrs.	510.00	0.00	510.00	20,400.00	M/R
27	Supplying & fixing of 3 x 4 sqmm flat submersible copper cable along with delievery pipe in sump tank and up to the control panel including clamping with pipe connection to startor etc. as reqd. ( Make Finolex/Havells/Poly Cab)	40	Mtrs.	176.00	0.00	176.00	7,040.00	M/R

28	Providing & fixing of 40mm dia GI pipe 'B' Class (ISI marked) complete with GI fitting such as bend, socket, tee making etc. as reqd. including cutting threads etc. making good the damages etc. as reqd. (Make Tata/Jindal/Hissar)	40	Mtrs.	908.00	0.00	908.00	36,320.00	M/R
29	Supplying,Installation,testing & commissioning of dust & vermin proof compartmentlised double door cubical panel board of size not less than 0.9 Sqmtr made out of 2mm thick MS sheet with 300 Amp. 4 strip bus bars with front openable door & locking arrangement i/c supplying & fixing following mountings PVC insutaled, connection, interconnection with PVC insulated (FRLS) copper wire of suitable size etc.earthing, numbering etc. as reqd.							
	a) 100 Amp. FP MCCB 16 KA = 1 No.							
	b) 63 Amp. TP MCB 10 KA C series= 3 Nos.							
	c) 32 Amp. DP MCB C series = 4 Nos.							
	d) DOL starter with S.P.P. feature= 4 No.							
	e) 0-500 Volt 96 mm2 Voltmeter with selector switch = 1 No.							
	f) 0-30 Amp. 96 mm2 Ammeter = 1 Nos.							
	g) Phase indication LED for RYB with protection Fuses= 1 No.	1	Nos.	38018.00	0.00	38018.00	38,018.00	M/R
30	Supplying, Installation ,testing & commissioning of Storage Type RO Water Purifier having purification capacity 25LPH suitable ,single phase suitable having voltage range 100-300 V,50-60Hz having foolowing parameter also (Make:Kent PEARL Mineral RO )							
a	Purifiacion capacity = 25 LPH							
b	Purification =RO+UF+UV+TDS Controller							
c	Best Suitable for Placement on Counter or Kitchan Wall							
d	Filter Cartridges=Sediment,Carbon Block Filter,UF	1	Nos.	35258.00	0.00	35258.00	35,258.00	MR
31	Supplying, Insttlation,Testing and Commissioning of Self Contained Storage type Drinking Water Cooler Comforming to IS:1475 Part I 2001,suitable for operation on 230 Volt +10% 50 Hz single Phase AC supply capacity of 150 Liters cooling capacity 60 liter/hr.(Make: Voltas Water Cooler Model No. PSS 60/150 )	1	Nos.	47633.00	0.00	47633.00	47,633.00	MR

32	S.I.T.C of 32 inch (80 CM) HD 1366 x 768 Display Type Smart LED Picture .HDR , Active HDR, Speaker System 2.1Ch Speaker, , Wi-Fi (Built-in) & Bluetooth, HDMI Input-3 Nos, USB Ports-1 No, LAN-1 No, etc complete as reqd.	1	Nos.	34233.00	0.00	34233.00	34,233.00	MR
33	Supplying installation testing Commissioning of 1.5 Ton Inverter type 5 Star rating ACs with Nitrogen, Vacuumizing and commissioning with vacuum pump of Split Type Inverter AC unit with R-32 (Refrigerent) / Green Gas with rotary compressor & with digital display with remote control suitable for operation on 230 V/ 50 Hz. single phase AC Supply etc. as required.	4	Nos.	50272	0.00	50272.00	201,088.00	MR
	<b>Total Package-1</b>						<b>960,509.00</b>	
	<b>Package-2 (CCTV Surveillance System )</b>							
1	Supply, installation, testing and commissioning of UL Listed IP CCTV True Day/Night Camera, 2 megapixel (1920 x 1080) high resolution, not less than 30 fps, 1/2.9-3" Progressive scan CMOS, 0.01@F1.2, AGC ON. 0.5 Lux or better with IR on, H.265/H.264 / MPEG4 , Quad stream, Bit rate not less than 3.2 Mbps, Standard IP66, PoE (802.3af), Varifocal lens ( 2.8mm - 10mm or better) or equivalent high definition, inbuilt or addon IR range 40-60 mtr, motion detection, Analytics require (Line crossing, Tracking, Motion Detection etc.), with ONVIF Profile S supported, in built micro SD card slot not less than 128 GB, connectors complete as required IR Bullet fixed type for mounting on wall or surface mounted with back box and adapter plate complete as per tender specifications required. (For Outdoor area)	2	Nos.	43775	0.00	43775.00	87,550.00	MR
2	Supply, installation, testing and commissioning of 30x2MP IP IR ONVIF S/G integrated PTZ Camera 30 x IP IR integrated PTZ Camera with latest H-265 Video Compression with intelligent stream management capability for Bit rate optimization and storage management with 1/2.8" Progressive Scan CMOS sensor having lens of 4.5mm to 135mm (F1.6 -F4.4) with optical zoom field of view from 2.4"-60.9" Camera should have essential Video Analytics like as Any Object. Object in field, crossing line loitering following route idle object counter occupancy condition change, following	1	Nos.	180838	0.00	180838.00	180,838.00	MR

	route etc. with minimal illumination color @ 0.05lx, Mono @ 0.01lx & IR ON @ 0 Lux with true HDR of 120db, Camera should have to use OEM integrated & Factory fitted back plate back box & clamps for weather proofing with 4 number of LED's having wave length of 850mm having IR distance of 180mtrs 1920x1080 sensor pixels or more camera should have on board storage facility up to 2TB camera should have IDNR facility for reducing bandwidth and increasing storage. Camera should support 4 type of streams for viewing and recording camera should have on board data security by using TPM (Trusted platform Module) and PKI support of guaranteed and superior protection from hacking and malicious attacks camera housing should be complete outdoor type with IP 66 rating in all respect/Approved Makes : Axis, Bosch, Avigilon)							
3	Supply, Installation, Testing & Commissioning of 16 IP Channels license pre-installed all-in-one recorder box with fully featured video management solution for upto 16 channel IP input /H-264/H-265 NVR . out of the box IP video recording solution without HDD with option for 2 bays SATA HDDs storage capacity pre-installed robust; Main processor: Embedded Linux; Resolution: 1920x1080; Display output: 1 HDMI, 1 VGA;	1	No.	64222.00	0.00	64222.00	64,222.00	MR
4	Supply, Installation, Testing & Commissioning of 4TB Hard disk compatible with above mentioned NVR. (Makes: WD/Seagate)	1	No.	9252.00	0.00	9252.00	9,252.00	MR
5	Supply Installation & Commissioning of Cisco 370W layer2 Ethernet POE Switches providing 24 x 10/100/1000 Fast Ethernet POE Ports	2	No.	80057	0.00	80057.00	160,114.00	MR
6	Supply, Installation, Testing & Commissioning of 9U Rack with suitable nos of point PDU/fan/shelf/cable manager/hardware /Glass door to accommodate the above mentioned equipment.	1	No.	6669	0.00	6669.00	6,669.00	MR
7	S.I.T.C of 32 inch (80 CM) HD 1366 x 768 Display Type Smart LED Picture .HDR , Active HDR, Speaker System 2.1Ch Speaker, , Wi-Fi (Built-in) & Bluetooth, HDMI Input-3 Nos, USB Ports-1 No, LAN-1 No, etc complete as reqd.	1	No.	34233.00	0.00	34233.00	34,233.00	MR

8	Supplying and fixing of following sizes of medium class PVC conduit along with accessories in surface/recess including cutting the wall and making good the same in case of recessed conduit as required.							
	25 MM	100	Metre	90	0.00	90.00	9,000.00	<b>1.21.2</b>
9	Supplying and drawing of UTP 4 pair CAT 6 LAN Cable in the existing surface/ recessed Steel/ PVC conduit as required							
	1 run of cable	300	Metre	49	0.00	49.00	14,700.00	<b>1.53.1</b>
10	Supplying & Laying of 5mtrs HDMI-HDMI Cable to connect NVR to television.	1	No.	1466	0.00	1466.00	1,466.00	<b>A/R</b>
	<b>Total Package-2</b>						<b>568,044.00</b>	
	<b>Package-3 (15 KVA UPS)</b>							
1	Supply, installation, testing and commissioning of 15 KVA (N + 1 configuration), Output PF at 0.8 to unity (at 40 Deg Temp.), on-line UPS system with 3 phase Input and 3 phase Output with +/- 1% regulation, true sine wave, total harmonic distortion less than 5% max. DC to AC efficiency continuous duty, IGBT based PWM with instantaneous sine wave control inverter with inbuilt isolation transformer at input side and manual by pass mode (Static Change Over Switch) and overall efficiency better than 90% with excellent voltage and battery regulation all complete as required specification including supply, Installation, Testing and Commissioning of 2 sets of Sealed maintenance free batteries with each set having 30 minutes back up time. The rate shall also include supply and installation of suitable rating Battery Bank Isolators installed in Sheet Steel rack and suitable copper conductor cable for connectivity between UPS and battery set.	1.00	No.	621784.00	0.00	621784.00	621784.00	<b>A/R</b>
	<b>Total Package-3</b>						<b>621784.00</b>	
	<b>Package-4 (Solar Photovoltaic Power Plant)</b>							

1	<p>Supply,Installation,Testingand Commissioning of on grid Solar Photo voltaic Power Plant conforming to MNRE specifications as amended,consisting of Mono/Poly Crystalline silicon solar cells,net metering facility, necessary protections, earthing,mounted on Aluminium/GI structure of suitable strength with following components complete as required:-a)Solar Photovoltaic Module of capacity 330W porabove,manufactured in India, conforming to IS14286/IEC61215,IS/IEC61730-Part-1,IS/IEC61730-Part-2.Solar Photovoltaic Module conversion efficiency shall not be less than16.5%.PV modules use din solar power plants/ systems must be warranted for their out put peak watt capacity, which should not be less than 90% at the end of 10 years and 80% at the end of 25 years .b) Power Conditioning Unit (PCU) of 350-800 V DC In put voltage range and 400 V AC, three phase, 4 wire, 50Hz+/-2.5 Hz, out put voltage suitable to generate AC Power with efficiency not less than 97 %, total harmonic distortion less than 3% and suitable for ambient temperature from 0 to 50 degree C. The PCU shall adjust the voltage and frequency level to suit the Grid Voltage Frequency. c) Data Monitoring System complete with accessories. d) Fixing of Array junction box &amp; Main junction box with IP 65 protection and termination arrangement for in coming and out going cable along with glands, lugs and other accessories etc. as required.</p>	10	KWP	61060	6106.00	67166.00	671,660.00	<b>DSR</b>
	<b>Total Package-4</b>					<b>Total</b>	<b>671,660.00</b>	

Executive Engineer (E) Jodhpur  
CPWD Jodhpur

**Name of Work :- Roof Top Solar Generation Plant and Upgradation of NSSO  
Bhawan Jodhpur Office Building Jodhpur**

**ABSTRACT OF COST (ELECTRICAL WORK)**

<b>S.No.</b>	<b>Packages of work</b>		<b>Amount</b>
1	Package-1 EI & Fans, fittings	=	960509.00
2	Package-2 (CCTV Surveillance System )	=	568044.00
3	Package-3 (15 KVA UPS)	=	621784.00
4	Package-4 (Solar Photovoltaic Power Plant)	=	671660.00
	<b>Total :</b>	=	<b>2821997.00</b>

Executive Engineer (E) Jodhpur  
CPWD Jodhpur