Government of West Bengal
Urban Development Department
Office of the Executive Engineer
Central Mechanical Division
Nirman Bhawan, Salt Lake, Kolkata-700091

Notice Inviting Quotation

NIQ NO.:UD/NIQ/CMD/08/2014-15 OF EXECUTIVE ENGINEER , Central Mechanical Division

Memo No:1017 **Dated: 28.08.2014**

Notice Inviting Quotation are invited by the Executive Engineer, Central Mechanical Division on behalf of the Governor of West Bengal for the works mentioned below, through electronic tendering (e-Tendering) from eligible and resourceful contractors having sufficient credential and financial capability for execution of works of similar nature.

Intending bidders desirous of participating in the tender are to log on to the website www.wbtenders.gov.in .

Bidders willing to take part in the process of e-Tendering are required to obtain Digital Signature Certificate (DSC) from any authorized Certifying Authority (CA) under CCA, Government of India (viz. NIC, nCode Solution, Safescrypt, e-Mudhra, TCS, MTNL, IDRBT). DSC is given as a USB e-Token. After obtaining the Class 2 or Class 3 Digital Signature Certificate (DSC) from the approved CA they are required to register the fact of possessing the Digital Signature Certificates through the registration system available in the website.

NIQ are to be submitted online and intending bidders are to download the documents from the website stated above, directly with the help of the e-Token provided. This is the only mode of collection of documents. Details of submission procedure are given below under "General terms and conditions and information".

Name of Work:- Design, supply, installation, testing and commissioning of cumulative 80 kWp grid connected Solar PV Power Plants of capacity 50 kWp at Nirman Bhavan & 30 KWp at Nagaryan under Urban Development Department on turnkey Basis.

Last date & time of submission of bids online is 15.09.14, 14.00 Hrs

The intending bidder must read the terms and conditions of the NIQ carefully. They/He should particularly go through the eligibility criteria required and satisfy himself of the requirements for eligibility. He should only submit his bid if he considers himself eligible and he is in possession of all the documents required.

All information posted on the website consisting of NIQ and related documents, Form 2911(ii),Technical specification, BOQ, Corrigendum etc. and Drawings, if any, shall form part of the tender document.

General Terms & Conditions and Information

1. **Eligibility for participation**

(a) Firms or Contractors, bonafide, Registered Engineers Co-operative Societies, Consortiums and Partnership Firms registered with the State Government and contractors of equivalent Grade / Class registered with Central Government / MES / Railways satisfactory execution of contract(s) to design supply, installation and commissioning of Solar PV Power Plant(s) of aggregated **capacity 40 kWp** anywhere in India during the last five years. Joint venture firms are not eligible to participate.

Note: *In case of consortiums, maximum number of constituents shall be restricted to 5 (five) and each constituent must have at least some credential and also at least 10% turnover in contracting business. Individual constituent of a consortium cannot be another consortium.*

2. **Scope of Work**

(a) The Work will be executed on Turkey Basis as per attached technical specification.
(b) Timely procurement and transportation to site in properly packed condition of all equipment, materials and miscellaneous item required to complete the project
(c) Design, supply, installation, testing and commissioning with **five years** comprehensive operation and maintenance of Grid -Tie Solar PV Power Plants of capacity 50 kWp & 30KWp at Nirman Bhavan & Nagaryan on turnkey basis.
(d) Providing of routine, preventive, break down maintenance of PV Power Plants during Warranty Period and Comprehensive Maintenance Period for five years after commissioning.

The equipment and materials for on grid –tie type Solar PV Power Plants of above stated capacity of 50 kWp & 30 KWp will include but not limited to the following:

a) PV Modules (Poly crystalline)
b) PV Array Structure
c) PV Array Junction Box
d) Grid –Tied Inverters
e) Web based on line data logger with Insolation meter and Remote Monitoring Unit
f) Inverter Panel
g) Grid interfacing LT Panel
h) Isolator
i) Kiosks for Inverter, Inverter Panel and Grid Interfacing LT Panel as may be required
j) Export Import Energy Meter
k) Cable & Wires
l) Protecting earthing system arrangement.
m) Fire Buckets and fire Bucket Holder
n) Recommended spares
o) Signage (Project Name Plate and caution as per IS)
p) Project Documents

q) Periodic operation Maintenance Log Book
r) All relevant drawings, data sheets, technical catalogues on each piece of equipment/devices and type test certificates along with **comprehensive user's manual and Operation and maintenance format.**
s) Mandatory spares and maintenance tools and tackles kits as identified by the contractor and other associated materials and accessories, which is necessary or usual for satisfactory and trouble-free operation and maintenance of the above equipment.

2.1 Scope of Service

The item of work to be performed on all equipment and accessories will include but not limited to the following:

i) Receiving, unloading and transportation at site.
ii) Replacement of all damaged equipment and accessories with new one or short supply items.
iii) Final check-up of equipment and commissioning and putting the system into successful functional operation.
iv) All civil works associated with the installation & commissioning of the proposed PV Power Plant will have to be done by the Contractor. The contractor will specify and submit detail GA drawing indicating minimum space to be required for installation of indoor equipments and as well as PV Array. Such works, not listed in the schedule of works but required for completion of the project will be deemed to have been included in the scope of this Bid.
v) The contractor will carry out the routine, preventive, break down maintenance of PV Power Plants during Warranty and Comprehensive Maintenance Period for five (05) years from the date of successful commissioning.

INTENDING PARITCIPANTS ARE REQUESTED VISIT THE SITE ON ANY WORKING DAYS PRIOR TO SUBMITTING BID BY CONTACTING EXECUTIVE ENGINEER, CENTRAL MECHANICAL DIVISION, NIRMAN BHAVAN (1ST. FLOOR), SALT LAKE, KOLKATA- 700 091 (PHONE NO. 033-2337-0318).

2.2 Qualifications of the bidder

a. The bidder should be a company/Agency registered in India
b. The bidder must have Tread License &an office in Kolkata to administrative, supervise and maintenance of the system going to be installed or valid certificate of rating **SP-1A or SP-1B or SP-2A or SP-2B** issued by MNRE Government of India.
c. The bidder Should have experience in successful satisfactory execution of contract(s) to design supply, installation and commissioning of Solar PV Power Plant(s) of aggregated **capacity 40 kWp** anywhere in India during the last five years.

3. Submission of NIQ

3.1 General process of submission

Participants are to be submitted online through the website stated above. All the documents uploaded by the NIQ Inviting Authority form an integral part of the contract. Participants are required to upload all the documents along with the other documents, as asked for in the NIQ, through the above website within the stipulated date and time as given in the NIQ. Participants are to be submitted in two folders

for the work, First one Technical Proposal and second proposal i.e. Financial Proposal. The Participant shall carefully go through the documents and prepare the required documents, and upload the scanned documents in Portable Document Format (PDF) to the portal in the designated locations of Technical Bid. He needs to fill up the rates of items individually in the BOQ, downloaded for the work, in the designated Cell and upload the same in designated location of Financial Bid. The documents uploaded are virus scanned and digitally signed using the Digital Signature Certificate (DSC). Participants should specially take note of all the addendum / corrigendum related to the NIQ and upload the latest documents as part of the NIQ.

3.2 Technical Proposal

The Technical Proposal should contain scanned copies and/or declarations in the following standardised formats in two covers (folders).

A. ***Technical File (Statutory Cover) containing,***

i. ***Application for*** **NIQ** (*Vide Form-1*) *(to be submitted in "**Forms**" folder)*
ii. ***Tender Form No.2911(ii)*** *(to be submitted in "**2911**" folder)*
iii. Notice Inviting Quotation (NIQ) *(to be submitted in "**NIT**" folder)*
iv. ***Addenda / Corrigenda*** : If published.
Note: *Contractors are to keep track of all the Addendum / Corrigendum issued with a particular tender and upload all the above digitally signed along with the* NIQ. *Bidders submitted without the Addendum / Corrigendum will be treated as informal and liable to be rejected*

v. ***Declaration of not having common interest with other participants*** (*Vide Form-4*) *(to be submitted in "**Forms**" folder)*

vi. ***Earnest Money Deposit*** (***EMD***)

Scanned copy of Demand Draft (DD) / Banker's Cheque (BC) / Deposit at Call Receipts (DCR) of **Rupees two lakhs** only towards EMD, in favour of the Executive Engineer Central Mechanical Division payable at Kolkata. *(to be submitted in "**Drafts**" folder)*

Note: NIQ will be summarily rejected if any item in the Statutory Cover is missing.

B. ***My Document (Non-Statutory Cover) containing,***

i. ***Certificates***

1. Professional Tax (PT) submission Challan and PAN Card details. Application for such addressed to the competent authority may also be considered.

2. VAT Registration Certificate (Non production of the document will result in VAT deduction as per prevailing rules).

ii. ***Company Details***

1. Registered Deed for Partnership Firm / Consortiums from Registrar of Assurances having office at Todi Mansion, Kolkata. Mere application for registration will not be considered. However, in cases where the applicant is yet to receive registration certificate from Todi Mansion, the applicant is to submit an affidavit in Non-Judicial Stamp Paper along with the application pledging that *"the registration certificate of the Consortium / Partnership Firm would be submitted to the Tender Inviting Authority before making agreement with the Tender Accepting Authority in case he is found lowest."* In case of inordinate delay in submitting the document, his bid is liable to be rejected and his EMD deposited will stand forfeited to Government. Any change in the constituents of the *Consortium / Partnership Firm* should also be registered from the Office at Todi Mansion, Kolkata, prior to the date of application of tender otherwise his

application will be rejected.

Note: *An affidavit regarding authorized user of DSC for Consortiums and a declaration regarding such authorization for Limited Companies is to be submitted.*

2. Trade Licence.
3. Memorandum of Articles for Limited Companies.
4. Society Registration and Bye-Laws for Cooperative Societies.

iii. ***Credential***
Satisfactory execution of contract(s) to design supply, installation and commissioning of Solar PV Power Plant(s) of aggregated **capacity 40 kWp** anywhere in India during the last five years

iv. ***Others*** :Relevant licence if any.

Note: ***Failure of submission of any one of the above mentioned documents will render the tender liable to summary rejection.***

3.3 Financial Proposal

The financial proposal should contain the following document in one cover (Folder).**Please note that financial proposal will be opened for those who are qualified in Technical proposal.**

i. ***Bill of Quantities*** **(BoQ)**:

The contractor is to quote the rate item wise online through computer in the space marked for quoting rate in the BOQ. *(Only downloaded copies of the above documents are to be uploaded, virus scanned and digitally signed by the contractor).*

4. Submission of original copies of documents of Earnest Money Deposit

i. ***Mode of Payment***
Cost towards EMD must be submitted in the form of Bank Draft (BD), Bankers Cheque (BC) and Deposit Call receipts (DCR) of any scheduled Bank of India. Payment in any other form, e.g. NSC, KVP, etc. will not be accepted.

ii. ***Place of submission***
The original copies of the DD / BC / DCR, towards cost of Earnest Money Deposit should be submitted in a ***sealed envelope*** in the Office of the Executive Engineer, Central Mechanical Division at Nirman Bhawan, 1st Floor, Salt Lake, Kolkata-700091

iii. ***Time of submission***
The original copies of DD / BC / DCR towards cost of EMD should be submitted in a ***sealed envelope*** in the office as stated above within the date and time as specified in the schedule of dates provided in the NIQ. If the bidder fails to submit the original copies within the due date and time his tender will not be opened and his bid will stand rejected.

5.1 Completion Certificate

i. Completion Certificates for fully (100%) completed works during the current year and last five financial years will only be accepted. Certificates issued for partly completed works will not be considered.

ii. Completion Certificate(s) or Commissioning Certificate jointly signed by the Bidding Farm and Purchaser / Ordering Authority to substantiate satisfactory

completion of the Solar PV Power Plant(s) of aggregated **capacity 40 kWp** anywhere in India during the last five years

5.2 Conditional and incomplete tender

Conditional and incomplete tenders are liable to summary rejection

6. Opening and evaluation of tender

6.1 Uploading of summary list of technically qualified tenderers

i. Pursuant to scrutiny and decision of the Tender inviting authority the summary list of eligible tenderers for the work whose Technical & Financial Proposals will be considered will be uploaded in the web portals.

ii. While evaluation, the under signed may summon of the tenderers and seek clarification / information or additional documents or original hard copy of any of the documents already submitted and if these cannot be produced within the stipulated timeframe, their proposals will be liable for rejection.

6.3 Opening of Technical Proposal

i. Technical proposals will be opened by the Tender Inviting Authority or his authorised representative electronically from the website stated above, using their Digital Signature Certificate.

ii. Technical proposals for those tenders whose original copies of DD / DCR / BC towards tender cost and EMD have been received will only be opened. Proposals corresponding to which original copy of DD / DCR / BC towards tender cost and EMD has not been received will not be opened and will stand rejected.

iii. Intending tenderers may remain present if they so desire.

iv. Cover (Folder) for Statutory Documents (vide Clause 3.2.A) will be opened first and if found in order, Cover (Folder) for Non-statutory Documents (vide Clause 3.2.B) will be opened. If there is any deficiency in the Statutory Documents, the tender will summarily be rejected.

v. Decrypted (transformed into readable formats) documents of the Non-statutory Cover will be downloaded, and Processed Committee.

6.4 Opening and evaluation of Financial Proposal

i. Financial proposals of the tenderers declared technically eligible by the Tender inviting authority will be opened electronically from the web portal stated above on the prescribed date.

ii. The encrypted copies will be decrypted and the rates will be read out to the contractors remaining present at that time.

iii. After opening of the financial proposal the preliminary summary result containing inter- alia, name of contractors and the rates quoted by them will be uploaded.

iv. If the Tender Accepting Authority is satisfied that the rate obtained is fair and reasonable and there is no scope of further lowering down of rate, he may after having the comparative statement test checked by the Divisional Accountant / Divisional Accounts Officer attached to the office of the concerned Executive Engineer, instruct to upload the final summary result containing the name of contractors and the rates quoted by them against each item after acceptance of the rate.

v. However, if there is any scope for lowering down of rates in the opinion of the Tender Accepting Authority, all the tenderers will be notified through the website to attend sealed bids to be followed by open bids to be held at the office of the Tender Accepting Authority in his presence at prescribed date and time, which will be done offline, i.e. as manually, as per present

procedure.

vi. After holding such bids, final result after acceptance of the rate by the Tender Accepting Authority would have to be uploaded in the web portal.
vii. The Tender Accepting Authority may ask any of the tenderers to submit analysis to justify the rate quoted by that tenderer.

7. Bid Validity

The Bid will be valid for 90days from the date of opening of the financial bid

8. Acceptance of Tender

Lowest valid rate should normally be accepted. However, the Tender Accepting Authority does not bind himself to do so and reserves the right to reject any or all the tenders, for valid reasons and also reserves the right to distribute the work amongst more than one tenderer.

8.1 Tender Accepting Authority

Special Engineer , Salt Lake Reclamation and Development Circle .U.D. Department, Govt. of W.B. or the undersigned as per existing rule.

8.2 Execution of Formal tender after acceptance of tender

The tenderers, whose tender is approved for acceptance, shall within 15 days of the receipt of Letter of Acceptance (LOA) to him, will have to execute 'Formal Agreement' with the Tender Accepting Authority in quadruplicate copies of W.B.F. No 2911(ii) which may be purchased on cash payment / in payment modes prescribed in Clause 4(i) from the office of the Executive Engineer concerned with the work.

9. Return of Earnest Money of the unsuccessful tenderer(s)

For return of the Earnest Money of the unsuccessful tenderer(s), he/she/they is/are to apply for the same to The Executive Engineer concerned with the work, giving the reference to the work , NIQ No., date of tender, amount and mode of Earnest Money deposited – all in a complete form. The Earnest Money of all tenderers other than the lowest tenderer in each case may be refunded, after acceptance of the rate in comparative statement or immediately after expiry of seven days from the date of final bid, whichever is earlier.

10. Payment

a. 50% payment after successful supply of all the items in the system
b. 40% payment after successful installation, commissioning, and Performance testing , users' training and observing the performance of the system for 30 days from the date commissioning and handing over of Power Plant
c. 10% plus SD money will be released as per terms of Security Deposit and shall be released as per 'Security Deposit' clause

11. Withdrawal of Tender

If any tenderer found lowest after opening of the financial bids withdraws his tender before acceptance or refusal within a reasonable time without giving any satisfactory explanation for such withdrawal, he shall be disqualified for making any tender to the department for a minimum period of one year. All cases in which the Tender Accepting Authority has reason to doubt the bonafide of such withdrawal should be reported to the Chief Engineer concerned in all details for issuance of such disqualification orders by the said Chief Engineer, under intimation to the other Chief Engineers, e-Tendering Cell and also this Department. Copy of such Order should invariably be communicated to the Nodal Officer, e-Governance of this Department with a request to upload the same in the Departmental website.

12 Approval

Design and Drawing: The contractor will obtain approval for all the designs associated with civil, mechanical and electrical work which includes design of foundation, structure cable sizing, fabrication work , layout design , wiring diagram etc. prior to the execution of work and for this purpose the contractor will submit all design and drawing for obtaining approval from UDD.

If the contractor has in-house facility for structural design and civil design, the array structure and foundation design should be signed by competent engineers having minimum LBS/ESE/EBA license, otherwise design should be prepared or **vetted by reputed civil engineering design firm having structural engineer with minimum LBS/ESE/EBA License.**

Materials: Contractor will obtain approval for the materials deliverable under the project.

13 Field Proven Inverter

The propose inverter must be field proven in Indian atmosphere. The inverter of the proposed manufacturer must be used in any project. Also there must be a good maintenance setup of the proposed inverter manufacturer with having sufficient numbers of qualified service engineers (Degree/ Diploma engineers) and well equipped set up with instruments, tools and tackles at anywhere in **Eastern Region** of India. The maintenance setup of the proposed inverter manufacturer may be inspected by UDD, if required.

14 Materials and Workmanship

Qualified, experienced people should be deployed to install the **PV Power Plant.** All materials will be of the best quality and workmanship capable of satisfactory operation under the operating and prevailing climatic conditions of respective. Unless otherwise specified, they will conform in all respect to the latest edition of the relevant code and standards.. The project must be supervised by a qualified Structural Engineer/ Engineering firm and Electrical /Electronics Engineer so that the work will be as per drawing and related IS/IEC Code. The work will be performed confirming safety precaution of all level of worker execute the project. The name and the qualification of the project engineers must be submitted to UDD after placement of order. The qualification of the supervising engineers must have degree or diploma in respective stream.

15 Insurance:

The Bidder shall be responsible and take an Insurance Policy for transit-cum-storage-cum-erection for all the materials to cover all risks and liabilities for supply of materials on site basis, storage of materials at site, erection, testing and commissioning.

The Bidder shall also take insurance in his interest for Third Party Liability covering loss of human life, engineers and workmen and also covering the risks of damage to the third party/material/equipment/properties during execution of the Contract. Before commencement of the work, the Bidder will ensure that all its employees and representatives are covered by suitable insurance against any

damage, loss, injury or death arising out of the execution of the work or in carrying out the Contract. Liquidation, Death, Bankruptcy etc., shall be the responsibility of contractor.

16 Warranty

Within the scope of warranty, the Contractor will repair or replace of any defective part of the Plant & Equipment supplied, Works done and services rendered under the Contract and render periodic maintenance as a preventive measure to up keep performance of the power plant and also to attend breakdown maintenance as and whenever needed.

The contractor must ensure that the goods supplied under the contract are new, unused and of most recent or current models and incorporate all recent improvements in design and materials unless provided otherwise in the contract.

The warrantee period of the complete PV Systems will be **60 calendar months** from the date of commissioning. However, the modules will have warranty of 25 years with degradation of power generated not exceeding 20% of the minimum rated power over the 25 years period and not more than 10% after 10 years period as per guideline of MNRE Government of India.

The equipments or components, or any part thereof of the Power Plant, if so found defective during warrantee period, the contractor will remain liable to repair or replace immediately without any extra cost to the satisfaction of the UDD so that the PV generation is not affected

In case of PV Module, the contractor has to transfer all the Guarantees to the owner of the project for the balance period after completion of the Comprehensive Maintenance Period of the Project.

In order to ensure satisfactory performance of the Power plant, the contractor must take up periodic maintenance as may be required and also attend breakdown maintenance as and whenever required as per **requirement** within the warrantee period and scope under warranty obligation.

17 Comprehensive Maintenance contract (CMC)

All the equipments (Except SPV Modules for which the guarantee period is 25 years) will be provided with Comprehensive Maintenance for 5(five) years from the date of completion of work. The equipments or components, or any part thereof, so found defective during Comprehensive Maintenance period will be forthwith repaired or replaced without any extra cost within the scope of Comprehensive Maintenance to the satisfaction of the Purchaser.

18 Maintenance service

The operation & maintenance of Solar Photovoltaic Power Plant include wear, tear, overhauling, machine breakdown, insurance, and replacement of defective modules, invertors / Power Conditioning Unit (PCU), spares, consumables & other parts for a period of 5 years.

The maintenance includes routine, preventive, breakdown and capital as follows:

a) Routine and preventive maintenance:

Routine and preventive maintenance will include but not limited to the followings:

i) Cleaning of module at least once in a month.

ii) **Checking** and maintenance activities such as tightening of all electrical connections monthly, quarterly, half yearly, and yearly basis which are required to be carried out on all the components of the power plant to minimize breakdowns and to ensure smooth and trouble free running of the power plant.

iii) The contractor will be responsible to carry out routine and preventive maintenance and replacement of each and every component / equipment of the power plant and he will provide all labour, material, consumables etc. for routine and preventive maintenance at his own cost.

b) Breakdown maintenance:

Breakdown maintenance will include but not limited to the followings:

i) Breakdown maintenance will mean the maintenance activity including repairs and replacement of any component or equipment of the power plant which is not covered by routine and preventive maintenance and which is required to be carried out as a result of sudden failure/breakdown of that particular component or equipment while the plant is running.

ii) The contractor will be responsible to carry out breakdown maintenance of each and every component of the power plant and he will provide the required manpower, materials, consumables, components or equipment etc. for breakdown maintenance at his own cost irrespective of the reasons of the breakdown/failure

iii) The contractor will undertake necessary maintenance/troubleshooting work of the Solar PV Power Systems. Response time will not be more than 72 working hours from time of occurrence. Adequate measures should be taken for prevention of wear and tear of the machines. Solar PV Power System is to be designed to operate with a minimum of maintenance.

iv) The scope of Support Service provides preventive maintenance as & when necessary within the contract period and break down maintenance in the event of malfunctions, which prevent the operation of the power system or part of it within the stipulated time period & free replacement of spares required for maintenance.

v) If any defect is found within the warrantee period, contractor will be liable to repair or replace the same at his own cost and risk, within three (72 hours) days from the date of complaint lodged by UDD or by the user himself.

c) **Capital maintenance:**

Capital maintenance will include but not limited to the followings:

i) **Capital Maintenance** will mean the major overhaul of any component or equipment of the power plant which is not covered by routine, preventive and breakdown maintenance which may become necessary on account of excessive wear & tear, aging, which needs repair/replacement.

ii) The capital maintenance of power plant and all civil structures will normally be planned to be carried out on an annual basis. For this purpose a joint inspection by the supplier and purchaser will be carried out of all the major components of the power plant, about two months in advance of the annual maintenance period, in order to ascertain as to which components of the power plant require capital maintenance. In this regard the decision of the purchaser will be final and binding.

iii) However, if the condition of any plant and component warrants its capital maintenance at any other time, a joint inspection of the purchaser and supplier will be carried out immediately on occurrence of such situation and capital maintenance will be carried out by arranging the shutdown of the plant/part of the plant, if required, in consultation with concerned authorities.

iv) The decision of the purchaser will be final and binding. Capital maintenance also includes replacement of defective lights fans under the project supplied by the contractor. The capital maintenance includes painting, of mechanical structure, civil structure.

d) **Maintenance Report**

Monthly, half yearly, yearly maintenance report and Generation report of each power plant as per format duly approved by UDD must be submitted by the contractor to UDD on regular basis.

19 Earnest Money

The earnest money will have to be submitted in the form of Demand Draft, Banker's Cheque or Pay Order to be drawn in favour of **"Executive Engineer Central Mechanical Division "** payable at Kolkata. The EMD amount will be released to the successful Bidder after commissioning of the power plant. But the EMD will be returned to the unsuccessful Bidder immediately after completion of bidding process. Any action on the part of the Bidder to revise the price and / or change the structure of price at his own after the opening of the Bid or do not execute the work after placement of Order result in rejection of the Bid and forfeit of the earnest money.

20 Security Deposit:

Security money will be 10% of the executed work value, which will be retained as performance and operational guarantee for a period of **60 calendar months** from the date of commissioning. No interest will be given against this retention.

The security money will be realized proportionately during release of progressive payment and will be finally adjusted with the payment to be released after observing the performance of the system for 30 days from the date commissioning. The security money will be released subject to satisfactory fulfillment of obligations w.r.t. warranty, comprehensive maintenance and performance of the power plant. However, the contractor will be liable to fulfill warrantee obligation for the PV Modules for the rest period. UDD may, however, consider release of security money **after one year** from the date of handing over of the Power Plant against BG as Performance Bank Guarantee of equivalent amount to be issued by any Schedule /Nationalized Bank as per format to be confirmed by UDD.

The validity of the Bank Guarantee will have to for **five years.** The performance guarantee is linked with the maintenance service to be rendered during warranty and CMC period.

21 Price:

Price should be fixed and firm inclusive of all taxes and duties, insurance and other incidental charges, if any. The prices quoted by the firm shall be complete in all respect and no price variation /adjustment shall be payable No price escalation will be considered due to any reason what-so-ever.

Prices will be quoted and payable in Indian Rupees only.

22. Schedule of Dates for e-Tendering

Sl. No.	Activity	Date & Time
1.	Publishing Date	29.08.2014 : 1000 hrs
2.	Document Download start date	29.08.2014 : 1000 hrs
3.	Bid submission start date	29.08.2014 : 1000 hrs
4.	Document Download end date	15.09.2014: 1400 hrs
5.	Bid submission end date	15.09.2014: 1400 hrs
6.	Last date physical submission of cost of documents including EMD	16.09.2014: 1400 hrs
7.	Technical Bid opening date	17.09.2014: 1500 hrs
8.	Financial Bid opening date	To be notified later

Additional Terms & Conditions

1. The Executive Engineer of the Division concerned will be the Engineer-in-Charge in respect of the contract and all correspondences concerning rates, claims, change in specification and/or design and similar important matters will be valid only if made by the Engineer-in-Charge. If any correspondence of above tender is made with Officers other than the Engineer-in-charge for speedy execution of works, the same will not be valid unless copies are sent to the Engineer-in-Charge and approved by him. The instruction given by the Sub-Divisional Officer and the Sub-Assistant Engineer on behalf of the Engineer-in-Charge shall also be valid (who have been authorized to carry out the work on behalf of the Engineer-in-Charge) regarding specification, supervision, approval of materials and workmanship. In case of dispute, the decision of Engineer-in-Charge shall be final and binding.

2. The acceptance of the tender including the right to distribute the work between two or amongst more than two bidders will rest with the Tender Accepting Authority without assigning reason thereof. The accepting authority reserves right to reject any or all tenders without assigning any reason thereof.

3. The Bidder shall have to comply with the provisions of (a) Contract labour (Regulation & Abolition) Rules, 1970, and (b) Minimum Wages Act, 1948 or the modification thereof or any other laws relating thereto as will be in force from time to time.

4. Department shall not entertain any claim whatsoever from the contractor for payment of compensation on account of idle labour on any ground including non-possession of land.

5. The Government shall not be held liable for any compensation due to machines becoming idle for any circumstances including untimely rains, other natural calamities, strike, etc.

6. Imposition of any duty / tax / royalty etc. whatsoever of its nature (after work order / Commencement and completion of the work) is to be borne by the bidder. Original Challans of those materials, which are procured by the bidder, may be asked to be submitted for verification.

7. Cess @ 1% of the cost of construction works shall be deducted from the Gross Value of the Bill in terms of Finance Department Order No.853-F dated 01.02.2006. Also it is instructed to register his Establishment under the Act, under the competent registering authority, i.e. Assistant Labour Commissioner / Deputy Labour Commissioner of the region concerned.

8. No mobilization / secured advance will be allowed unless specified otherwise.

9. VAT/Sales Tax, Cess, Royalty of sand, stone chips, stone metal gravel, boulders, forest product etc, Toll Tax, Income Tax, Ferry Charges and other Local Taxes, if any, are to be paid by the contractor. No extra payment will be made for these. The rates of supply and finished work items are inclusive of these.

10. All working tools and plants, scaffolding, construction of vats and platforms will have to be arranged by the contractor at his own cost.

11. The contractor shall supply mazdoors, bamboos, ropes, pegs, flags etc. for laying out the work and for taking and checking measurements for which no extra payment will be made.

12. The contractor should see the site of works and tender documents, drawings, etc. before submitting tender and satisfy himself regarding the condition and nature of works and ascertain difficulties that might be encountered in executing the work, carrying materials to the site of work, availability of drinking water and other human requirements and security etc.

13. A machine page numbered Site Order Book (with triplicate copy) will have to be maintained at site by the contractor and the same has got to be issued from the Engineer-in-charge before commencement of the work. Instructions given by inspecting officers will be recorded in this book and the contractor must note down the action taken by him in this connection as quickly as possible.

14. The work will have to be completed within the time mentioned in the tender notice. A suitable work programme is to be submitted by the contractor within 7 (Seven) days from the date of receipt of Work Order which should satisfy the time limit of completion. The contractor should inform in writing the name of his authorized representative at site within 7 (Seven) days from the date of receipt of Work Order who will receive instruction of the work, sign measurement book, bills and other Government papers, etc.

15. No compensation for idle labour, establishment charge or on other reasons such as variation of price index etc. will be entertained.

16. All possible precautions should be taken for the safety of the people and workforce deployed at worksite as per safety rule in force. Contractor will remain responsible for his labour in respect of his liabilities under the Workmen's Compensation Act etc. He must deal with such cases as promptly as possible. Proper road signs as per P.W.D. practice will have to be made by the contractor at his own costs while operating a public thoroughfare.

17. The contractor will have to maintain qualified technical employees and/or Apprentices at site as per prevailing Apprentice Act or other Departmental Rules & Orders circulated from time to time.

18. The contractor will have to accept the work programme and priority of work fixed by the Engineer-in-charge so that most vulnerable reach and/or vulnerable items be completed before the date needed by the Department due to impending monsoon or rise of water level or for other reasons.

19. The quantities of different items of work mentioned in the tender schedule or in Work Order are only tentative. In actual work, these may vary considerably. Payment will be made on the basis of works actually done in different items and no claim will be entertained for reduction of quantities in some items or for omission of some items. For execution of quantitative excess in any item beyond 10% or supplementary works, approval of the Superintending Engineer / Chief Engineer would be required depending on whoever be the Tender Accepting Authority, before making payment.

20. Any materials brought to site by contractor must be subject to approval of the Engineer-in-charge. The rejected materials must be removed by the contractor from the site at his own cost within 24 hours of issue of the order to that effect. The rates in the schedule are inclusive of cost and carriage of all materials to worksite. The materials will have to be supplied in phase with due intimation to the Sub-Divisional Officer concerned in conformity with the progress of the work. For special type of materials, i.e. Geo Synthetic Bags, HDPE Bags, Geo Textile Filter, Geo Jute Filter, etc. if any, relevant Data Sheet containing the name of the Manufacturers, Test Report, etc. will also be submitted in each occasion. Engineer-in-charge may conduct independent test on the samples drawn randomly before according approval for using the materials at site. In this regard decision of Engineer-in-charge is final and binding.

Technical Specification of roof top solar PV system at Nagaryan & Nirman Bhavan

1.0 Outline of the scheme of the project :

1.1 The array capacity of the PV Power plant shall be minimum **50 kWp at Nirman Bhavan & 30 KWp at Nagaryan.**

1.2 The PV array shall be installed at the available space earmarked at project site.

1.3 The power from PV array shall be feed into grid through grid tie string inverters of aggregated minimum nominal capacity 50 kVA, 3Ø 415 V 50Hz AC of any combination at Nirman Bhavan & 30 kVA, 3Ø 415 V 50Hz AC of any combination at Nagaryan. But the nominal capacity of each inverter will be ranging from 10kVA to 25 kVA

1.4 The Grid –tie Inverters, Inverter Panels, Grid Interfacing LT Panel shall be installed in suitable kiosk/proper shuttering with proper security and protection with arrangement of proper shed for protection from rain and direct sunlight as necessary.

1.5 Outputs of the grid-tie string inverters shall be terminated to an **Inverter Panel** to be located close to the inverters.

1.6 The output of the **Inverter Panels** shall be terminated and connected with supply mains through Grid interfacing Panels.

1.7 An Export Import Energy Meter to be installed nearer to the Grid interfacing Panel before connected to the mains to measure the energy produce from the PV Power Plant in each building.

1.8 The SPV power plant to be installed should be Robust, Economic, Efficient and Time tested and having a good aesthetic view matched with the Building.

2.0 Solar PV Modules

The Cell of the Modules shall be poly crystalline. The capacity shall be consider as per declared capacity in the published technical brochures of the proposed PV Module Manufacturer.

The PV modules must qualify the relevant **IEC 61215 or IS 14286 and IEC 61730.** The proposed PV Module must have the Test Certificate issued from accredited test laboratories of MNRE Government of India under JNNSM Program. The test certificates issued from IEC accredited laboratories shall also be acceptable.

Proposed PV Module must be manufactured in India.

Each PV module used in this solar power project must use an RF identification tag. The information must be mentioned in the RFID used on each module as per applicable guideline of MNRE Government of India.

Performance Warranty:

The manufacturer should warrant the output of Solar Module(s) for at least 90% of its rated power after initial 10 years & 80% of its rated power after 25 years from the completion of trial run at site.

If, Module(s) fail(s) to exhibit such power output in prescribed time span, the Contractor will either deliver additional PV Module(s) to replace the missing power output with no change in area of land used or replace the PV Module(s) with no change in area of land used at Owner s sole option.

Manufacturer of proposed PV modules must have the ISO 9001:2008 or ISO 14001 Certification for their manufacturing unit for their said manufacturing item.

Desired specification of the PV Module shall include but not limited to the following:

Sl No	Item	Description
1.0	Certification	i) IEC 61215 or IS 14286 ii) IEC 61730
1.1	Test certificate issuing authority.	NABL/ IEC Accredited Testing Laboratories or MNRE accredited test centers.
2.0	PV Cell	
2.1	Type	poly crystalline
2.2	Size	156mmX156mm
3.0	PV Module	
3.1	Rating at STC	i)240 Wp/ 250Wp, 60 cells (without any negative tolerance) ii)290 Wp / 300Wp, 72 cells (without any negative tolerance)
3.2	Efficiency	minimum14%
3.3	Fill factor	Minimum 70%
3.4	Withstanding voltage	1000V DC
3.5	Glass	
3.5.1	Thickness	3.2 mm (minimum)
3.5.2	Type	High transmission, low iron, tampered & textured glass with anti reflective coating.
3.6	PV Module Junction Box	

Sl No	Item	Description
3.6.1	Protection level	IP 54 or above
3.7	Bypass Diode	
3.7.1	System Voltage (Vsys)	600-1000 V dc
3.7.2	Number	3 numbers (minimum)
3.8	Module Frame	
3.8.1	Type	Anodized aluminum frame

3.0 PV Array

Desired specification of the PV Array shall include but not limited to the following:

Sl No	Item	Description
1.0	Nominal Capacity	Minimum 50 kWp at Nirman Bhavan & Min 30 KWp at Nagaryan
2.0	PV Module interconnection connector	MC-4 / Tyco connector
3.0	PV Module interconnection cable and array cable	PV 1-F standard /NEC standard "USE-2 or RHW-2" type
4.0	PV array String Voltage	Compatible with the MPPT Channel of the inverters

4.0 PV Array Structure

During Structural design following points must be include but not limited to the following:

1. The Module Mounting structure must be made of MS as per IS 808 (latest edition)
2. **Weight of the Metallic part of PV Array structure excluding nuts and bolt must be minimum.**
3. The structure should be capable of withstanding **a wind load of 150 km/hr after installation.**
4. All structures including any metallic part thereof must be protected against any corrosion.
5. The array structure shall be made of hot dip galvanized MS structure of minimum galvanizing thickness **80 micron**
6. Structures shall be supplied complete with all members to be compatible for allowing easy installation.
7. The module mounting structure shall have to be designed and fabricated with optimum tilting angle considering the site conditions.
8. The structure will be designed for easy and simple mechanical and electrical installation. It will support SPV modules at the mentioned orientation and absorb, transfer the mechanical loads to the ground or any suitable/ existing strength structure as deemed fit.
9. All fasteners, fixtures for supporting conduits , nut & bolts shall be made with best quality stainless steel . Supporting structures including module Mounting structure shall have to be adequately protected against all climatic condition. The array structure shall support SPV modules at a given orientation and absorb and transfer the mechanical loads to the columns or any suitable structure as deemed fit.
10. The structures shall be designed for simple mechanical and electrical installation.
11. Detailed engineering, drawings, specification and instructions for civil and other related structural works will be prepared by the Contractor/ architectural firm for erection and

installation of the PV Array structure. Before execution of the same, prior approval is to be taken from UDD.

12. The supplier shall specify installation details of the PV modules and the support structures with appropriate diagrams and drawings.

5.0 PV Array Junction Box (AJB)

Array Junction Box (AJB) shall have to be used for termination of string prior connecting array with each inverter. There shall be two Arrays Junction Box incase, the inverter is located elsewhere away from PV Array. The minimum number of PV Array Junction Box will be **same as the number of inverter to be provider in the project.** The desired specification of the PV Array Junction Box and accessories shall include but not limited to the following:

Sl No	Item Description	Desired Data
1.0	Enclosure	
1.1	Degree of Protection	IP65 with UV Protected
1.2	Material	Polycarbonate.
1.3	Withstanding voltage	1000V DC
1.4	Withstanding Temperature	100 ^{0}C
1.5	Accessories mounting arrangement	DIN Rail or as suitable
1.6	Front cover	Transparent
1.7	Number of Strings entry	As may be required
1.8	Approved Make	Hensel/ Spelsberg /ABB /*Ensto or* or equivalent make ***(as per acceptability of UDD)***
2.0	Cable Entry and Exit	
2.1	Position	Bottom at cable entry and exit
2.2	Cable Entry and Exit connector type	MC 4 / Tyco Connector (PV Array String cable)
2.3	Cable gland	Earthing cable entry
3.0	Surge Protecting Device (SPD)	
3.1	Type	DC
3.2	Approved Make	OBO Betterman / Dehn / Citel /ABB or equivalent make ***(as per acceptability of UDD)***
3.3	Protection class	Type 2
3.4	Rating (8/20)	900 V 20 kA
3.5	Number of set	As may be required as per string Design (minimum 1 set against each MPPT Chanel)
4.0	Fuse with fuse holder	
4.1	Position	Positive and negative terminal for each series string
4.2	Type	Glass fuse, for PV Use only
4.3	Rating	Current: Minimum **1.25** times the rated short circuit current of the string Voltage: Minimum **1000V DC**
4.4	Approved make	Cooper Bussman/ Ferazz Shamut or equivalent make ***(as per acceptability of*** authority ***)***
5.0	Earthing Provision	Terminal blocks will have to be provided for Earthing
6.0	Terminals, lugs and bus bar	Tinned copper

Note; Some recent inverter having facility of inbuilt PV AJB, In that case AJB should not be financially quoted.

6.0 Grid Connected Inverter

The inverters shall be of string inverter. The power from PV array shall be feed into grid through grid tie string inverters of aggregated minimum nominal capacity 50 kVA, 3Ø 415 V 50Hz AC of any combination for Nirman Bhavan & minimum nominal capacity 30 kVA, 3Ø 415 V 50Hz AC of any combination for Nagaryan. But the nominal capacity of each inverter will be ranging from 10kVA to 25kVA as per suitability of site

Desired specification of each inverter shall include but not limited to the following:

Sl. No.	Operating Parameter	Desired specification
1.0	Type	Grid connected String Inverter
2.0	Usage	Specially used for PV system
3.0	Standards	
3.1	Efficiency Measurement	IEC 61683/ Equivalent BIS Std.
3.2	Environmental testing	IEC 60068-2 (1,2,14,30) / Equivalent BIS Std.
3.3	Interfacing with utility grid	IEC 61727
3.4	Islanding Prevention Measurement	IEC 62116
3.5	Type Test certificate issuing authority **(for item no 3.1 , 3.2,3.3 and 3.4)**	NABL/ IEC Accredited Testing Laboratories or MNRE approved test centers.
4.0	**Input (DC)**	
4.1	Aggregated PV array connectivity capacity	50kWp (minimum) &30kWp (minimum) at Nirman & Nagaryan respectively.
4.2	MPPT Voltage range	Compatible with the array voltage
4.3	Total number of MPPT for 50 kWp Power Plant	5 nos (Minimum) &3 nos (Minimum) at Nirman & Nagaryan respectively.
5.0	**Output (AC)**	
5.1	Aggregated Nominal AC Power output	50 kVA (minimum) Capacity of each inverter is ranging from 10 kVA to 25 kVA &30 kVA (minimum) Capacity of each inverter is ranging from 10 kVA to 25 kVA for Nirman & Nagaryan respectively
5.2	Number of Grid Ph	3Ø
5.3	Adjustable AC voltage range	As per Grid code. **Note: In case the voltage across the feeding point is found to be deviated beyond the tolerable range as per grid code, the Inverter must have voltage adjusting feature to compensate the variation.**
5.4	Frequency range	As per grid code
5.5	AC wave form	Sine wave
5.6	THD	Less than 3%
5.7	Switching	High frequency transformer / transformer less
6.0	General Electrical data	
6.1	Efficiency (Maximum)	95 %
6.2	Sleep mode consumption	Less than 5 W
7.0	**Protection**	
7.1	DC Side	1. Reverse-polarity protection 2. Reverse current to PV array protection, over voltage, Under voltage protection 3. Over current

7.2	AC side	1. DC inject protection to grid less than 1% 2. Over voltage and Under voltage 3. Over current 4. Over and under grid frequency protection, 5. Anti Islanding protection
7.3	Isolation Switch	1. PV array Isolation switch (DC)
7.4	Ground fault detection device (RCD) which can detect changes in ground current. Rating shall be as suitable for inverter	To be provided for transformerless inverter.
8.0	Display	
8.1	Display type	LCD Display
8.2	Display parameter	
8.2.1	DC	Voltage Current Power
8.2.2	On grid connected mode	Line status Grid voltage Grid frequency Export Power Cumulative Export Energy
9.0	Interface (Communication protocol)	Suitable port must be provided in the inverter for i) On site upgrade of Software, ii) On site dumping data from the memory, iii) Web based remote monitoring system
10.0	Web monitoring	Matched with the monitoring and data logging system
11.0	Mechanical Data	
11.1	Protection Class	IP 54 or higher
11.2	Operating ambient temperature	0^{0}C to 60^{0}C
11.3	Cooling	Natural / forced cooling

7.0 Web enable on line data logger and Remote Monitoring Unit :

(i) Web enable data logging system may be an integrated part of the inverter or a separate unit. The data logging system includes **MPPT wise PV array monitoring** system also.

(ii) The data logger should have required transducer to monitor and record the required **system data separately for both the buildings.**

(iii) The data logger shall have reliable battery backup and data storage capacity (minimum two days data) to record all sorts of data simultaneously round the clock.

(iv) Web based Remote Monitoring system must be compatible with data logger. The system shall be provided **with GSM Modem with required SIM card.** The modem must be compatible to GSM and /or GPRS system.

(v) The other required accessories, hardware and compatible software shall have to be provided as an integrated part of the system to monitor the real time data (maximum 20 minutes delay) through web server. The Data logger shall continuously send data to the server.

(vi) The system can be monitored from anywhere through internet without installing any special software. The server shall not be provided by UDD.

(vii) **The price of the remote monitoring system includes all the rental and other costs of the SIM cards, IP address for a period of five years.**

(viii) In case the data cable to be laid in the array field, SPD (surge suppressing device) suitable for communication network, as much number at suitable location are required must be provided with the system.

(ix) **The data logger and modem must be put into a Polycarbonate enclosure having transparent front panel of** Hensel/ Spelsberg /ABB /*Ensto or* or equivalent make ***(as per acceptability of UDD)***

8.0 Inverter Panel

Each of the output of the Inverters shall be terminated in a Panel styled as **Inverter Panel** through 415V 4 pole MCB at the output of the inverter. The set of AC surge suppressor (SPD) of type shall be connected at the outgoing side.

Desired specification of **Inverter Panel** shall include but not limited to the following:

Sl No	Parameter	Desired Specification
1.0	In coming MCB/MCCB (Inverters side depending on design)	
1.1	Approved make	ABB / L&T / Siemens/ Schneider /Hager/ Legrande or equivalent ***(as per acceptability of UDD)***
1.2	Number	01(one) number in each building.
1.3	Type	4 pole
1.4	Rating	415V, 10 kA Current rating 1.5 times of rated current of the inverter
3.0	Surge protection device	
3.1	Position	Outgoing side (Grid side)
3.2	Approved Make	OBO Betterman / Dehn / Citel /ABB or equivalent make (as per acceptability of WBREDA)
3.3	Usage as declare by Manufacturer	For AC use only
3.4	Protection class	Type 2
3.5	Number of set	01 Set in each building.
3.6	Rating	600 V 100 kA (minimum)
5.0	Indicator	Incoming side and outgoing side (R,Y,B)
8.0	Earthing Provision	Terminal Blocks will have to be provided for Earthing
9.0	Enclosure	
9.1	Degree of Protection	IP54
9.2	Material	Polycarbonate.
9.3	Withstanding voltage	1000V DC
9.4	Withstanding Temperature	100 ^{0}C
9.5	Accessories mounting arrangement	DIN Rail or as suitable
9.6	Front cover	Transparent
9.7	Number of Strings entry	As may be required
9.8	Approved Make	Hensel/ Spelsberg /ABB /*Ensto or* or equivalent make ***(as per acceptability of UDD)***

9.0 Inverter combiner panel :

As the PV Power Plant will be installed at the roof top of the both Buildings. All the Inverters and Inverter panels will be installed nearer to the PV Array. The output of the Inverter panels will be combined in a Inverter combiner panel.

Desired specification of **Inverter Combiner Panel** shall include but not limited to the following:

Sl No	Parameter	Desired Specification
1.0	MCCB (Grid Side)	
1.1	Number	01(one) number in each building.
1.2	Approved Make	ABB / L&T / Siemens/ Schneider /Hager/ Legrande or equivalent ***(as per acceptability of UDD)***
1.3	Type	4 pole
1.4	Rating	415V ,150 A , 50 kA
3.0	Metering Arrangement	
3.1	Instantaneous Measuring parameter	i. Voltage, ii. current iii. frequency iv. Power
3.2	CT/ PT Make	KAPPA/ SERVO/AE/ KALPA or equivalent make ***(as per acceptability of UDD).***
3.3	Type of meter	Electronics
3.4	Display type of meter	LED/LCD
3.5	Display of the meter	From outside without opening of front cover
3.6	Meter Make	L&T / Siemens/ Schneider/ Secure or equivalent ***(as per acceptability of UDD)***
4.0	Indicator	Outgoing and incoming side (R,Y,B)
4.0	Earthing Provision	Terminal Blocks will have to be provided for Earthing
9.0	Mechanical	
9.1	Type	Metallic ,dust and vermin proof
9.2	Protection level	IP 21
9.3	Housing	Floor Mounted/ Wall Mounted
9.4	Cable Entry	Bottom
9.5	Glands Position	At cable entry and exit
9.6	Cooling	Natural/ forced
9.7	Access of the switches and visibility of the displays and indicators	The MCCB switch flap shall be accessed from outside of the Panel. The display of the meters and indicators shall be shown from outside of the Panel without opening of the panel.

Note; Some recent Grid interfacing panel having facility of inbuilt inverter combiner pannel, In that case inverter combiner panel should not be financially quoted.

10.0 Grid interfacing LT Panel

Output of each of the two Inverter combiner panel shall be terminated to a **Grid Interfacing LT Panel** in each building.. The Inverter Combiner Panel shall be outdoor type Poly Carbonate of protection level **IP 21.** All the equipments and meter display can only be accessed after opening of front doors. The front door must have locking arrangement.

Desired specification of each **Grid interfacing LT Panel**_shall include but not limited to the following:

Sl No	Parameter	Desired Specification
1.0	MCCB (Grid Side)	

Sl No	Parameter	Desired Specification
1.1	Number	01(one) number in each building.
1.2	Approved Make	ABB / L&T / Siemens/ Schneider /Hager/ Legrande or equivalent ***(as per acceptability of UDD)***
1.3	Type	4 pole
1.4	Rating	415V ,150 A , 50 kA
3.0	Metering Arrangement	
3.1	Instantaneous Measuring parameter	v. Voltage, vi. current vii. frequency viii. Power
3.2	CT/ PT Make	KAPPA/ SERVO/AE/ KALPA or equivalent make ***(as per acceptability of UDD).***
3.3	Type of meter	Electronics
3.4	Display type of meter	LED/LCD
3.5	Display of the meter	From outside without opening of front cover
3.6	Meter Make	L&T / Siemens/ Schneider/ Secure or equivalent ***(as per acceptability of*** UDD)
4.0	Indicator	Outgoing and incoming side (R,Y,B)
4.0	Earthing Provision	Terminal Blocks will have to be provided for Earthing
9.0	Mechanical	
9.1	Type	Metallic ,dust and vermin proof
9.2	Protection level	IP 21
9.3	Housing	Floor Mounted/ Wall Mounted
9.4	Cable Entry	Bottom
9.5	Glands Position	At cable entry and exit
9.6	Cooling	Natural/ forced
9.7	Access of the switches and visibility of the displays and indicators	The MCCB switch flap shall be accessed from outside of the Panel. The display of the meters and indicators shall be shown from outside of the Panel without opening of the panel.

Switch Fuse Unit

A Switch Fuse Unit will be installed after Grid Interfacing Panel before the Point of Common Coupling of grid and PV Power Plant in each building.. Switch fuse unit may be installed in the grid interfacing panel if the grid interfacing panel is nearer to the Point of Common Coupling (the Point at which the power plant connected to the grid. The specification of Switch fuse unit is as follows:

Sl No.	Particulars	Desired Specification
01	Rating	150A
02	Number of Pole	3 Pole with Neutral
03	Handle	To be provided
04	Approved make	ABB / L&T / Siemens/ Schneider /Hager/ Legrande or equivalent ***(as per acceptability of UDD)***

11.0 Busbar Chamber :

200 A 415V 3Ph neutral Busbar chamber with metallic enclosure IP 21 will be provided before termination to the Grid in each building..

12.0 Kiosk (for installation of Array Junction Box, Inverter, Inverter Combiner panel and Grid Interfacing LT Panel) :

(i) All, Inverters **Inverter Panel** shall be installed in suitable locations nearer to the PV Array in Kiosks. **Grid Inter facing panel** also to be put in a Kiosk

(ii) The panels must be installed in suitable kiosks protected from theft and mishandling with sheds so that rain water and direct sun exposure can be avoided.

(iii) The kiosks of must be of a suitable design, covered with a door and locking arrangement with good air circulation. The Kiosks must have security arrangement against theft, manhandling etc.

(iv) The kiosks must have suitable sheds

(v) The minimum clearance of the lower edge of the equipments from the ground level so that the equipments can be operated and maintained easily by standing on the floor.

(vi) The Kiosk structure must have sufficient strength to bare the load of the equipment.

(vii) Necessary civil work as required to construct / fixing the Kiosks(s) to be done by the contractor

13.0 Export Import Energy Meter :

One number 3 Ø 4 wire 415V AC 3X (20A-100A) whole current **Export Import Energy Meter of L&T / Genus or equivalent as per acceptability of UDD** in each building.to be installed. The Meter to be supplied must be tested. The export Import Energy meter shall be installed at the separate housing within an enclosure. The Export Import Energy meter shall be installed at a suitable location before Point of Common Coupling (PCC) with grid side. The meter must be put into a Polycarbonate enclose of IP 65 with transparent fort cover of Hensel/ Spelsberg /ABB /*Ensto or* equivalent make ***(as per acceptability of UDD)***

15.00 Cables & Wirings :

The Specification of wiring material of PV Power plant shall include but not limited to the following:

Sl No	Item	Description
A	DC Cable	
1.1	Conductor	Tinned annealed stranded flexible copper according to IEC 60228 class 5
1.2	Standard	PV-1F / 2 PfG 1169/08.2007 / VDE Standard E PV 01:2008-02 /Equivalent
1.3	Make	LAPP/Top Solar/Nexans/ Schneider or equivalent ***(as per acceptability of UDD)***
B	AC Cable	
2.1	Rated Voltage	1.1kV
2.2	Construction	
2.2.1	Type	Armoured or unarmored as per requirement

Sl No	Item	Description
2.2.2	Conductor	Stranded flexible copper
2.2.3	Insulation	PVC
2.2.5	Standard	IS : 1554 -1
2.3	Make	RR Cable/ Polycab/LAPP/ Havell's or equivalent ***(as per acceptability of UDD)***
C	PVC Conduit tees, bends etc (Hard & flexible)	
3.0	Standard	ASTM D 1785 u PVC
3.1	Ambient Temperature	0 ^{0}C to 50 ^{0}C
3.2	Type	UV stabilized , temperatures, Shock proof chemical resistant
3.3	Make	Oriplast /Supreme
D	GI Pipe	
4.0	Make	TATA/ Jindal/Bansal

i) Buried AC underground cables must be armoured.

ii) The Buried DC Cable must be run through GI conduit / brick protection.

iii) Conductor size of cables and wires shall be selected based on efficient design criteria. The wiring size of shall be designed such that maximum voltage drop at full power

From the PV Array to Inverter(s) should be less than 2%.

From Inverter to AC Grid interfacing panel should be less than 3%.

iv) Cable terminations shall be made with suitable cable lugs & sockets etc, crimped properly and cables shall be provided with dry type compression glands wherever they enter junction boxes/ panels/ enclosures at the entry & exit point of the cubicles. The panels bottoms should be properly sealed to prevent entry of snakes/lizard etc. inside the panel. All cables shall be adequately supported. Outside of the terminals / panels / enclosures, shall be protected by conduits. Cables and wire connections shall be soldered, crimp-on type or thimble or bottle type.

v) Only terminal cable joints shall be accepted. Cable joint to join two cable ends shall not be accepted.

vi) The cable must be laid through PVC conduit or GI pipe on roof and indoor. In case of using metallic pipe as conduit proper grounding of the conduit must be done.

vii) All cable/wires/control cable shall be marked with good quality letter and number ferrules of proper sizes so that the cables can be identified easily.

viii) All cable shall be suitable marked or coded for easy identification. Cables and wires shall confirm to the relevant standards suppliers to specify the specification.

ix) Cable tray (metallic preferably aluminum) of suitable size must be used for laying of cable on the floor or Roof.

x) All fasteners shall be made of Stainless steel or Aluminum.

xi) Minimum two number loop must be provided at the start and end each span of underground cable laying.

16.0 System, equipment and array structure earthing:

i. Equipment grounding (Earthing) shall connect all non-current carrying metal receptacles, electrical boxes, appliance frames, chassis and PV panel mounting structures in one long run. The grounding wire should not be switched, fused or interrupted.
ii. Array Structure must be earthed with GI Strip
iii. The complete earthing system shall be electrically connected to provide return to earth from all equipment independent of mechanical connection.
iv. The equipment grounding wire shall be connected to one grounding electrode per PV power plant.
v. Test point shall be provided for each earth pit.
vi. An earth bus and a test point shall be provided inside control room.
vii. Earthing system design should be as per the standard practices.
viii. The Earthing pit must be of Chemical gel type with Chem-Rod as grounding rod.
ix. The Code of Practice Earthing shall be IS 3043 (latest edition)
x. Necessary provision shall be made for bolted isolating joints of each earthing pit for periodic checking of earth resistance.
xi. Minimum four (04) numbers of earth pit. Earthing Pit Cover Needs to be provided
xii. Each earth systems must be must inter connected through GI Strip to arrive equi-potential bonding. The size of the GI earth strip must be minimum **25 mm x3 mm.**

17.0 Provision for Module Cleaning

Module Cleaning: Necessary equipment is to be provided at site to facilitate easy cleaning of the PV Modules

Water line with necessary numbers of outlet is to be laid down in the array field for cleaning of the PV Module. The water line is to be connected to the suitable nearest point of water source. The whole work shall be executed within the contract value.

18.0 Fire Buckets and Fire Bucket Holding stand

Fire Bucket of minimum quantity eight (08) numbers and Fire Bucket Stand of minimum quantity two (02) shall be provided at Array field in each building.. Each fire Bucket holding stand (Triangular type) shall have the arrangement to hold four (04) numbers of fire buckets. The Fire Bucket stand must be as per IS 2546. The stand shall be installed at the rare side of the PV Array. The minimum technical specification is a follows:

BIS Specification	IS 2546 (latest amendment)
Fire Bucket Capacity	10 liters
Fire Bucket Body Material	Galvanized Mild Steel Sheet
Body Thickness	1 mm

19.00 Spares ,Tools and Measuring Instruments:

The minimum number and different type of spares, tools and measuring instruments must be supplied under this project within the contract value. Also any special tools, spares, measuring instruments if required as may be shall be provided by the contractor.

20.0 Signage:

Project information Signage : The Signage shall be made up of MS Sheet of minimum 2 mm thick of minimum size 4'x 3'. The Signage provide with detail of the project as approved by UDD in each building.. The font size on the signage has to be big enough so that everyone can read it easily. This signage will be outdoor type. The Signage shall be installed on MS structure made up of MS channel, angles. The structure and the Project Name Plate shall be painted with primer and anti-corrosive paint. The Signage shall be installed two (02) prominent place of the project area.

Safety Signage: Safety Signage must be provided mentioning the level and type of voltage and symbols as per IE Rule at different position as may be required.

28/8/14

Executive Engineer
Central Mechanical Division

28/8/14